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ABSTRACTS

GS 16

SURGICAL TELE-MENTORING USING A ROBOTIC PLATFORM – INITIAL EXPERIENCE IN A MILITARY INSTITUTION

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Purpose: The Military Health System (MHS) has long recognized the value and strategic importance of telehealth services in supporting the medically ready force and a ready medical force. Surgical telementoring will leverage technology to project surgical expertise with the primary goals of improving readiness and patient outcomes. We postulate that use of this technology will have a positive effect on surgeon satisfaction, procedural competence, the timeliness of operative intervention, surgical procedure efficiency, and key intra-operative decision-making. We performed a pilot study utilizing a tele-mentoring and telepresence interface during robotic-assisted surgery.

Materials and Methods: An IRB-approved prospective feasibility study to determine the safety and efficacy of providing remote surgical consultation to local surgeons utilizing robotic surgery technology. The fields of general surgery, urology, gynecology and thoracic surgery were included. Study participants of the surgical team were provided with a face-to-face orientation by the mentoring surgeon. The mentoring surgeon was located at the same institution in a separate tele-mentoring room equipped with audio and 2D video communication established with the operative team. A six-question evaluations was completed before and after the operation by the staff surgeon, residents, operative team members and the mentor. Evaluations assessed the perceived effect of surgical telementoring on the range of surgical services offered, satisfaction of operative team members, improvement in patient outcomes, reliability and connectivity of audio/video connection and whether the leadership/administrative support needed for surgical tele-mentoring will provide an obstacle or positive influence. Answers were scaled on a Likert Scale that ranged from 1-5. Statistical analysis was performed using the Wilcoxon matched-pairs signed rank test and sign test of matched pairs.

Results: Fifteen operative cases participated in the study with 7 general surgery, 3 urology, 2 gynecology and 3 thoracic surgery. There were a total of 86 paired evaluation responses: 43 pre-operation and 43 post-operation. With a strong degree of confidence ($p < .05$), participation in the operation had a positive effect on the participants responses with regards to all questions surveyed. Participant perception of leadership/administrative support was varied.

Conclusion: Surgical Tele-mentoring is safe and efficacious in providing remote surgical consultation to local surgeons utilizing robotic surgery technology in a military institution. Operative teams perceived this capability as beneficial and reliable audiovisual connectivity was demonstrated between the main operative room and the Virtual Medical Center. Further study is needed to develop surgical tele-mentoring capability to improve patient care without geographic limitations during times of peace, war and pandemic outbreaks.

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CLINICAL OUTCOMES OF ROBOTIC RESECTION FOR PERIHILAR CHOLANGIOCARCINOMA. AN INSTITUTIONAL SERIES OF COMPLEX HEPATOBILIARY CANCER OPERATION. IS IT SAFE AND EFFECTIVE?

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Purpose: Perihilar cholangiocarcinoma is one of the most difficult hepatobiliary malignancy to treat with high rate of local recurrence and poor overall prognosis. Potential cure can only be achieved by a complete oncological resection. Due to its unfavorable location within the porta hepatis, standard surgical approach has always been the traditional open operation. Outcomes after laparoscopic resection had been sporadically described by high-volume Asian centers with very discouraging results. With our expanding experience after completing more than 400 robotic liver resections, we aimed to describe our clinical outcomes of robotic resection for perihilar cholangiocarcinoma. To our knowledge, this is the largest series from the Western hemisphere.

Materials and Methods: With IRB approval, we prospectively followed all patients who underwent resection for hilar cholangiocarcinoma between 2018-2022. Diagnosis was determined based on clinical findings, radiologic imaging, endoscopy, and biopsy. All the perioperative clinical and oncological outcome variables were recorded and analyzed. Data are presented as median (mean±standard deviation).

Results: 27 patients underwent robotic resection for perihilar cholangiocarcinoma with 22 of those underwent concomitant hepatectomy. The median age was 72 years. Patients undergoing resection had a median Childs-Pugh score of 5 and MELD score of 9. All patients initially presented with jaundice and underwent preoperative drainage. Median operative time was 458 minutes with an estimated blood loss of 150 mL. There were no intraoperative conversions to open or other intraoperative complications. Postoperative length of stay was five days and there was no in-hospital or 30-day mortality. Three postoperative complications occurred, one was Clavien-Dindo Classification II and two were Clavien-Dindo Classification III. One patient was readmitted within 30 days and one 90-day mortality occurred. 41% of patients had cholangiocarcinoma at the biliary bifurcation extending unilaterally up into the secondary biliary ducts (Type 3A/3B), while 7% had bilateral involvement of but not beyond the secondary biliary ducts (Type 4). The median tumor size was 2 cm and R0 resection was obtained in 93% (25) of patients, with R1 in 7% (2). Tumor pathology was determined to be primary biliary adenocarcinoma in 88% of patients. At the time of analysis, 19 patients were alive without evidence of disease and eight were deceased.

Conclusion: The use of the robotic platform for perihilar cholangiocarcinoma resection is safe and effective, yielding excellent short-term clinical outcomes. As more hepatobiliary centers adopt the robotic technology, we believe that this method can be an alternative to the traditional open approach and potentially can lead to superior clinical outcomes.

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ROBOTIC SURGERY IN UKRAINE: FIRST EXPERIENCE AND DEVELOPMENT PROSPECTS

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Purpose: The purpose of our work - to analyse our own experience of performing robotic operations

Materials and Methods: On the basis of the First Territorial Medical Union of Lviv and the Department of Surgery, Plastic Surgery and Endoscopy of the Lviv Danylo Halytsky National Medical University, 43 robotic procedures were performed using the da Vinci S system from December 2020 to February 2023. There were adult patients 29, children - 14. The average age of adults ranged from 20 to 72 years (average - 42 ± 2.5), children from 4 to 17 years (average - 12 ± 3.2).

1. Robotic Nissen fundoplication
2. Heller's robotic procedure
3. Robotic hernioplasty
4. Robotic high anterior resection
5. Robotic hysterectomy
6. Robotic splenic cystectomy
7. Robotic Anderson-Hynes pyeloplasty
8. Robotic nephroureterectomy
9. Robotic ureteroneocystostomy
10. Robotic prostatectomy
11. Robotic cholecystectomy
12. Robotic adhesiolysis
13. Robotic appendectomy
14. Robotic sleeve gastrectomy
15. Robotic ovarian cystectomy
16. Robotic myomectomy
17. Robotic adnexectomy
18. Lich-Gregoir robotic procedure
19. Robotic splenectomy

Results: Members of the robotic team have experience in performing laparoscopic interventions, and also completed training in robotic surgery at the European Institute of Telesurgery IRCAD/EITS in Strasbourg (France), at Harvard University and the Department of Minimally Invasive Surgery at the Liver and Pancreas Institute in Boston (USA), Medical City Denton, Dallas, Texas (USA). The "learning curve" mainly related to such a section of the robotic operation as "docking", which was reduced from 3 hours at the beginning of the implementation of the technique to 20 minutes. There were no intraoperative complications or conversions.

The average duration of the operation was 210 ± 15 minutes, hospital stay - 2 ± 1.2 days. The advantages of performing robotic operations, in our opinion, were: stabilized three-dimensional stereoscopic control of the operating field, increased image clarity and depth perception beyond a standard laparoscopic monitor, digital 20-fold high-definition magnification provided greater confidence in the accuracy of surgical manipulations, increased maneuverability of instruments created an additional degrees of freedom from five movements to seven, improving the dexterity of surgeons and providing greater precision in the surgical field, which more accurately imitated open surgery, patients with severe surgical pathology, absence of physiological tremor, avoidance of intraoperative complications (bleeding, damage to other organs).

Conclusion: 1) Teamwork of like-minded people is an important aspect of performing robotic operations.

2) The future of robotic surgery must involve lowering costs, developing new platforms and technologies, creating and validating training programs and virtual simulations, and conducting randomized clinical trials to determine the best applications of robotics.

3) Creation of a State National Program to support robotic surgery, which will allow implementing the technology for its widespread use, reduce the number of complications and improve the quality of life of patients

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INCIDENCE OF MESH INFECTION AFTER ROBOTIC CHOLECYSTECTOMY WITH CONCOMITANT HERNIA (INGUINAL/VENTRAL) REPAIR WITH MESH, A SINGLE SURGEON'S EXPERIENCE.

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Purpose: There are studies showing safety of using mesh in the abdominal cavity with concomitant laparoscopic cholecystectomy despite a 20-75% incidence of bile harboring bacteria. There is paucity of data showing safety of doing robotic cholecystectomy and concomitant transabdominal preperitoneal (TAPP) inguinal hernia repair with mesh, and or intraperitoneal onlay mesh repair (IPOM) for umbilical/ventral/incisional (abdominal wall) hernias. We did a retrospective study of robotic cholecystectomies with simultaneous placement of mesh either for a inguinal or abdominal wall hernia to determine the rate of mesh infection.

Materials and Methods: This is a retrospective review of one surgeons case log from 2016-2022 where robotic cholecystectomy and hernia repair (inguinal, and or abdominal wall) with intra-abdominal mesh placement was done simultaneously. Demographic and clinical data and the incidence of mesh infection and other complications were assessed.

Results: There were 25 patients with the following demographics: 13 females, 12 males, age 60 ± 16 years, 3/25 were current smokers, BMI of 30 ± 8 . All patients had cholecystectomy, 1 with cholangiogram, and 5 with gallbladder spillage. There were 11 cases of inguinal hernia repairs (4 were bilateral) totaling 15 inguinal hernia repairs, 10 umbilical, 2 ventral, and 4 incisional hernia repairs (of which 3 cases had both inguinal and abdominal wall hernia's). Two patients had TAH and BSO in addition to the cholecystectomy and hernia repairs. Inguinal hernia repairs were done first before the cholecystectomies, and abdominal wall hernia's were repaired after the cholecystectomies. Follow up time by the primary surgeon and through EMR was 26 ± 24 months. For the total of 15 inguinal hernia repairs done, 8 had ProGrip™ (Covidien), 4 had 3D Max™ Large heavy, and 7 had Large Mid mesh (Bard). There were no infections of the inguinal hernia meshes. Of the 16 abdominal wall hernia's, 4 had Phasix™ ST mesh (Bard) and 12 had Ventralight™ ST mesh (Bard). There was 1 patient with umbilical hernia repair with mesh, who had redness of the umbilical area postoperatively and was treated with 2 weeks of oral antibiotics and the erythema resolved. She had had an ERCP 1 month prior. There were no other mesh infections. There was 1 recurrence of an inguinal hernia (ProGrip used). There were 4 recurrences of the abdominal wall hernia, 2 were in patients who had TAH and BSO at the same time, with BMI of 54 and 34 respectively. One patient had recurrence in the substernal epigastric area, and the other in the left upper quadrant area. Of the total 25 patients and 31 hernia repairs with mesh placements at time of cholecystectomy, we report 1/31 possible mesh infection, and 0/31 mesh removal due to an infection.

Conclusion: The primary concern in applying mesh in a clean contaminated case is infection of the mesh. Both gallbladder disease and hernia's are common problems. Cholecystectomy and inguinal/abdominal wall hernia's with mesh placement simultaneously can be done safely using the robot despite the surgery occurring in one abdominal cavity. This could potentially save the patient another surgery in the future.

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EXPLORING FIRST TIME EXPERIENCE WITH TRAINING ON A NOVEL ROBOTIC SURGICAL PLATFORM

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Purpose: The introduction of novel robotic surgical platforms has changed the landscape of robotic surgical training. There is limited data available regarding training needs of learners navigating this new training environment. Training on novel platforms will need to incorporate approaches to training multi-level, multi-specialty learners while ensuring training remains efficient and effective. Understanding the impact of learner demographics on their initial experience with a novel platform will assist in guiding tailored educational approaches that accommodate the specific needs of these learners and optimise training to ensure patient safety when utilising new platforms in the clinical environment.

Materials and Methods: N=17 participants had recorded data for simulation activities completed using HUGO RAS (Medtronic, Minneapolis, MN). The data was collected from robot novice participants who were interacting with the HUGO system for the first time. The simulation activities were targeted at orientating the participant to the key robotic skills of camera use, depth perception, bimanual dexterity, endowrist manipulation and needle driving. First attempt metric scores were collected for Pick and place, Pegboard 1, Matchboard and Thread the Rings 2 (Mimic Simulation, Surgical Science, Sweden). Demographic data was collected for participant age, gender, surgical specialty, experience and current role, previous experience with robotic surgery and if they either played a musical instrument or video games. Results were analysed using SPSS (IBM corp. Armonk, NY)

Results: Demographic influence on overall module score and time to complete module were analysed using non-parametric tests. There were significant differences between roles and previous exposure to robotics for time to completion of activity. This was not reflected as a significant difference in overall scores. Analysis of mean scores and mean time to complete activity for role showed higher scores and faster completion times for fellows when compared to trainees or consultants. Metrics where participants scored outside of the pass range differed across the activities. In the first module participants were more likely to fail on quality and efficiency-based metrics (absolute number of errors 12 vs. 3) where in Pegboard and Thread the rings exercises failure due to risk and safety-based metrics were more common (3 vs. 4 and 5 vs. 8). Only three participants failed their initial attempt at matchboard, and this was due to instrument collisions and drops.

Conclusion: Metric data can facilitate understanding of the learning experience of individuals with the first experience using a novel surgical platform. The most adaptable learner group in this study were surgical fellows. Using this data to anticipate challenges a learner may encounter can improve efficiency of training by targeting instruction to address these aspects. This data is a snapshot and does not capture the learning curve or degree of impact of interactions with other robotic surgical platforms either before or during training on a novel platform. Further research into multiplatform training should be a priority to ensure both efficient and effective training delivery and patient safety in this new robotic surgical environment.

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ROLE OF INTRA-OPERATIVE ULTRASOUND IN ROBOTIC HEPATOPANCREATO-BILIARY SURGERY

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Purpose: Robotic hepatopancreatic-biliary (HPB) surgery continues to evolved significantly. Although there are some disadvantages, primarily the lack of sensory feedback, robotic HPB surgery has proven its safety and feasibility with better magnification, precision and accuracy of dissection, and its truly minimally invasive nature. Intraoperative ultrasound is a well-established technology utilised widely in surgical procedures. The most recent compact drop-in probe allows surgeons to identify anatomical structures otherwise invisible during robotic surgery. The importance of intraoperative ultrasound is still underestimated and not often utilized. We describe the benefits and practical utility of intraoperative ultrasound with operative videos in robotic HPB surgery.

Materials and Methods: Three robotic operative cases are presented to demonstrate how ultrasound is utilized, its clinical value and its influence on intraoperative decisions. The intraoperative videos include;

1: A case of intrahepatic cholangiocarcinoma in segment four. The preoperative cross-sectional image could not clearly identify the margin of the intrahepatic duct. Utilising intraoperative ultrasound, the margin is confirmed and successfully resected with a clear margin;

2: Identification of major vessels in HPB surgery; There are many critical structures to identify during hilar dissection. In this case with extrahepatic biliary stricture, ultrasound was used to identify anatomical landmarks, including the common hepatic artery, hepatic artery proper, gastroduodenal artery and the portal vein;

3: Identification of anatomical landmarks in parenchymal transection in hemihepatectomy. Anatomical landmarks such as the middle hepatic vein needs to be constantly checked during parenchymal transection in hemihepatectomy, however this can be challenging in minimally invasive surgery. We demonstrate how we identify and approach the middle hepatic vein during parenchymal transection.

Results: Most updated ultrasound technology safely allows surgeons to control a probe with versatile robotic instruments even within a small space. Furthermore, it can provide greater intraoperative information such as anatomical structures and margin status. It requires surgeons to be adequately experienced in minimally invasive surgery and possess comprehensive anatomical knowledge.

Conclusion: Intraoperative ultrasound is a dynamic tool and a valuable adjunct available to surgeons to improve visualisation of anatomy in robotic HPB surgery. Intraoperative ultrasound use in robotic HPB surgery may lead to more precise and accurate surgical resections, improving the safety of minimally invasive surgery.

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ROBOTIC VERSUS LAPAROSCOPIC LIVER RESECTION OF THE POSTEROSUPERIOR SEGMENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS.

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Purpose: Robotic liver resections have gained increasing attention in recent years due to their potential benefits over traditional open or laparoscopic surgery, including shorter hospital stay, and faster recovery. In particular, theoretical benefits of robotic approach for posterosuperior segment (segment 7 and 8) lesions are readily understood. However, the safety and feasibility of these technically demanding procedures remain unclear. In this systematic review and meta-analysis, we aim to evaluate the safety and feasibility of robotic surgery of the posterosuperior segments compared to laparoscopic liver resections.

Materials and Methods: A comprehensive literature search was conducted in major databases, including PubMed, MedLine, and the Cochrane Library, to identify studies reporting outcomes of robotic and laparoscopic resections of liver segments 7 and 8. The articles were screened for eligibility and quality of the included studies. Data on various perioperative outcomes, including mortality, morbidity, and length of hospital stay, were extracted and analyzed.

Results: A total of 34 studies comprising 3351 patients were included in the meta-analysis, of which 3089 were laparoscopic resections (LR) and 262 robotic resections (RR). The pooled estimates for mortality and morbidity rates were 0.76% (95% CI: 0.1%-2.4%) and 0.35% (95% CI: 0.18%-2.8%), respectively ($p = 0.22$). The RR group had older patients, with mean age of 60.5 ± 9.1 vs 54 ± 21.0 in the laparoscopic arm ($p=0.25$). Mean operative time was similar in both groups (LR 255.8 ± 89.8 min vs. RR 239.1 ± 66.7 min; $p=0.31$). Complications (Clavien-Dindo III and above) after surgery did not show any significant differences (all $p > 0.05$). Transfusion rates were less in RR (8.2%) compared to LRS (10.2%) group, however not reaching statistical significance ($p=0.18$). Length of stay was significantly reduced in the RR group, with a mean time of 6.4 ± 2.0 days compared to 7.3 ± 2.9 for the LR group ($p = 0.04$).

Conclusion: Robotic posterosuperior resections of the liver appear to be safe and feasible procedures, with comparable mortality and morbidity rates and reduced hospital stay when compared to laparoscopic liver surgery. Careful patient selection and meticulous surgical technique are crucial for achieving good outcomes in these technically challenging procedures. This systematic review demonstrates that robotic technology may offer potential benefits over laparoscopic approaches. Further studies are needed to assess the long-term oncologic and functional outcomes of patients undergoing robotic resections of liver segments 7 and 8.

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A NOVEL METHOD OF NATURAL ORIFICE VERSUS CONVENTIONAL MINI-LAPAROTOMY FOR SPECIMEN EXTRACTION AFTER ROBOTIC SURGERY FOR LOW RECTAL CANCER: PROPENSITY SCORE-MATCHED COMPARATIVE STUDY.

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Purpose: We propose an intussusception-pull out (IPO) method of natural orifice specimen extraction surgery (IPO-NOSES) during robotic surgery for low rectal cancer and evaluated its feasibility and short-term safety by comparing surgical and postoperative outcomes with those of conventional robotic resection of lower rectal cancer (RLRC).

Materials and Methods: Clinicopathological data, including surgical and postoperative outcomes, and follow-up findings of patients who underwent robotic IPO-NOSES surgery and conventional RLRC surgery from September 2019 to June 2022 were retrospectively reviewed to compare the postoperative outcomes of the two groups.

Results: Thirty-two patients were included in the robotic IPO-NOSES group, and seventy-six patients were included in the RLRC group. The IPO-NOSES group had a lower visual analog score (VAS) for pain on postoperative day 1 (1.7 ± 0.7 vs. 2.2 ± 0.6 , $p = 0.003$) and shorter postoperative anal venting time (2.7 ± 0.6 vs. 3.5 ± 0.7 , $p < 0.001$). There were no significant differences between the two groups regarding gender, age, BMI, tumor size, TNM stage, operative time, intraoperative bleeding, postoperative complications, and inflammatory response (all $ps > 0.05$). In terms of postoperative anal function and urinary function, the two groups had similar Wexner scores ($p = 0.817$), LARS scores ($p = 0.177$), and IPSS scores ($p = 0.255$). After long-term follow-up, there was no significant difference in the rates of local recurrence and distant metastasis between the two groups ($p = 0.291$).

Conclusion: IPO-NOSES is a safe and effective minimally invasive surgical approach for treating lower rectal cancer. Compared with RLRC, IPO-NOSES has the advantage of abating postoperative pain for patients, promoting recovery of gastrointestinal function, reducing abdominal wall dysfunction, and avoiding abdominal wall incision complications.

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ROBOTIC-ASSISTED PROCTOSIGMOIDECTOMY WITH SPHINCTER- AND NERVE-SPARING SURGERY FOR HIRSCHSPRUNG'S DISEASE: A PROSPECTIVE STUDY

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Purpose: Robotic surgery is one of the most cutting-edge minimally invasive techniques that overcomes many shortcomings of laparoscopic surgery, yet few studies have evaluated robotic operation in Hirschsprung's disease (HSCR). We aimed to evaluate the technical feasibility and medium-term outcomes of robotic-assisted proctosigmoidectomy (RAPS) with sphincter- and nerve-sparing surgery (SNS) for rectosigmoid HSCR.

Materials and Methods:

From July 2015 to January 2022, a review of our prospectively designed database showed a series of 156 consecutive rectosigmoid RAPS patients who underwent SNS-RAPS.

SNS robotic endorectal dissection was performed circumferentially down to the pelvis, which is the most unique and crucial part of the operation. Dissection was begun circumferentially at 1.0 cm above the peritoneal reflection. The rectum was mobilized outside the longitudinal muscle layer, with the anatomical plane further away from the Denonvilliers' fascia and nerve plexus anterior or lateral to the rectum. When pulling the rectum cranially, intestinal wall muscle layers provided greater tensile strength than the mucosa, allowing the pelvis to be shallower and avoiding intraoperative intestinal mucosal tearing with peritoneal contamination. Since the robotic platform allowed for dissection in a narrow field, we were able to dissect the rectum to a lower level, nearly up to the dentate line. The mobilization of the rectum could reach 4-7 cm into the pelvis. After unlocking the da Vinci robot, a circular incision was performed with a 5-10 mm distance from the dentate line, dividing the mucosa upwards by 2-4 mm, breaking through the muscular cuff and revealing the robotic dissection plane in the pelvis. To avoid residual dysfunctional bowel, we uniformly excised the dilated and thickened bowel, followed by the Soave's anastomosis with interrupted 5-0 or 4-0 absorbable sutures above the biopsy site. Surgical outcomes and continence function were analyzed. The complications within 30 days postoperatively and post-30-day postoperatively were calculated respectively. The bowel function score (BFS) was applied to evaluate overall bowel function while the postoperative fecal continence (POFC) score focused on SNS-related incontinence.

Results: No conversion to open/laparoscopic surgery or intraoperative complications occurred in this series. The median age at surgery was 9.5 months and the length of removed bowel was 15.5 cm. The total operation time, console time and anal traction time were 155.22, 60 and 43 minutes, respectively. There were 25 complications within 30 days postoperatively and 48 complications post-30-day postoperatively. For children aged ≥ 4 years, the mean total bowel function score (BFS) was 17.32 and showed moderate-to-good bowel function in 90.91% of patients. The POFC score for the analysis of incontinent function was satisfactory, and the results showed a promising trend annually at 4-6 years old postoperatively, which were 10.95, 11.48, and 11.94, respectively. Age at surgery ≤ 3 months vs >3 months: no significant difference in postoperative complications, BFS score (17.27 vs 17.44) and POFC score (11.19 vs 11.61).

Conclusion: RAPS is a safe and effective alternative for HSCR in neonates and infants, with the advantage of further minimizing injury to sphincters and perirectal nerves and so providing better continence function.

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ROBOTIC-ASSISTED KASAI PORTOENTEROSTOMY FOR BILIARY ATRESIA IN A TERTIARY HOSPITAL

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Purpose: Robotic-assisted Kasai portoenterostomy (RAKPE) has been utilized to treat biliary atresia (BA). Theoretically, robotic-assisted Kasai portoenterostomy (RAKPE) may overcome the difficulties of LKPE in fiber block dissection and anastomosis. However, RAKPE is not widely performed and its efficacy remains unknown. We summarized the experience of RAKPE for BA and determined its efficacy.

Materials and Methods: We retrospectively analyzed 28 consecutive infants with non-syndromic type III BA who received RAKPE in our center from January 2020 to October 2021. We found the Treitz ligament and exteriorized the proximal jejunum through the umbilical trocar using laparoscopy. The Roux-en-Y jejunojejunostomy reconstruction was fashioned extracorporeally using the Echelon Flex™ powered plus stapler (Ethicon Endo-Surgery, Cincinnati, OH, USA) at the jejunum 18 cm away from the Treitz ligament. RAKPE is a three-arm setup and four-trocar operation. Bipolar coagulation was used to dissect the small blood vessels at the hepatic portal. The fibrous cone was shallowly transected with bending electric scissors, followed by gelatin sponge compression to staunch the hemorrhage. Finally, a wide anastomosis was accurately constructed. Demographics and outcomes were recorded.

Results: The mean age at operation was 57.32 ± 6.11 days, and the mean weight was 4.90 ± 0.48 kg. The mean operative time was 210.65 ± 18.80 min. No conversion to laparotomy or intraoperative complications occurred. The mean estimated blood loss was 7.75 ± 2.29 mL. Enteral feeding was resumed after 3.51 ± 1.21 days. All patients achieved bile excretion postoperatively, and dark green bile-stained stools were passed 1.50 days (range 1.00–3.00 days) after surgery. The average postoperative length of hospital stay was 10.56 ± 2.64 days. The jaundice clearance (JC) rate was 76.00% within 6 months after surgery and the incidence of cholangitis was 48.00% within 1 year following surgery, including 7 patients with single cholangitis and 5 patients with recurrent cholangitis (≥ 2 times). The survival with native liver (SNL) rate was 80.00% at 1 year and 66.67% at 2 years.

Conclusion: RAKPE can be regarded as a treatment option for patients with BA due to the good outcomes reported. RAKPE has great advantages in complete resection of fibrous cones and the establishment of an accurately shallow anastomosis with adequate width.

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PATIENT-REPORTED OUTCOMES OF LOCALLY ADVANCED GASTRIC CANCER UNDERGOING ROBOTIC VERSUS LAPAROSCOPIC GASTRECTOMY: A RANDOMIZED CONTROLLED STUDY

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Purpose: During the last few years, extraordinary progress has been made in neoadjuvant, adjuvant chemotherapy and minimally invasive surgery for locally advanced gastric cancer (AGC), and there are endless studies on minimally invasive gastrectomy for AGC. However, most of these studies are limited to the analysis of objective clinical indicators, and it is also necessary to integrate the Patient-reported outcomes (PROs) into clinical treatment under the modern new medical models. There is a lack of research in this area.

Materials and Methods: This single-center, prospective, randomized, controlled study was performed at the Affiliated Hospital of Qingdao University from October 2020 to August 2022. A total of 244 patients scheduled for radical gastrectomy were randomly divided into 122 patients who underwent laparoscopic gastrectomy and 122 patients who underwent robotic gastrectomy. Postoperative PROs and short-term clinical outcomes (including postoperative complication rate, surgical quality, and short-term postoperative recovery) were compared between the two groups.

Results: A total of 237 patients were enrolled for modified intention-to-treat analysis (RG = 120; LG = 117). Both groups showed similar postoperative morbidity (16.67% vs. 15.38%, $P=0.788$). Compared with the LG group, the RG group had better postoperative scores in the emotional domain [POM 1: 83.3 (16.7) vs. 75.0 (16.6), $Z=-2.578$, $P=0.010$; POM 3: 91.7 (25.0) vs. 83.3 (25.0), $Z=-2.975$, $P=0.003$], the social domain [POM 1: 66.7 (33.3) vs. 66.7 (41.7), $Z=-2.444$, $P=0.015$; POM 3: 91.7 (6.7) vs. 83.3 (21.7), $Z=-2.156$, $P=0.031$], and general health status [POM 1: 66.7 (33.3) vs. 50.0 (33.4), $Z=-2.512$, $P=0.012$]. The financial burden of the RG group was higher [POM 1: 66.7 (66.7) vs. 33.3 (66.7), $Z=-3.885$, $P<0.001$; POM 3: 33.3 (66.7) vs. 0 (33.3), $Z=-2.102$, $P=0.036$]. The RG group had significant advantages in intraoperative performance, and subgroup analysis showed that these advantages were more obvious in patients with total gastrectomy and high BMI. In addition, the RG group had better performance in the postoperative recovery course.

Conclusion: RG could improve social function recovery and the postoperative negative psychological state of patients while maintaining better clinical outcomes compared with LG.

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THE EFFECTS OF ROBOTIC AND LAPAROSCOPIC RADICAL TOTAL GASTRECTOMY ON SHORT-TERM CLINICAL OUTCOME: A PROSPECTIVE RANDOMIZED CONTROLLED STUDY

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Purpose: It is uncertain whether robot-assisted total gastrectomy can improve the clinical outcome of patients with gastric cancer. We conduct a high-quality RCT study to observe the short-term clinical outcomes of patients undergoing robotic and laparoscopic total gastrectomy.

Materials and Methods: This study is a single-center, prospective, randomized, controlled trial. The patients with gastric cancer were randomly divided into two groups: robotic and laparoscopic radical total gastrectomy group. The two groups of patients were managed according to the ERAS perioperative management plan. Finally, 40 patients in the robot group and 42 patients in the laparoscopic group were included in this study.

Results: The statistical analysis showed that the baseline data between the two groups had no statistical difference, while the estimated intraoperative blood loss in the robot group was lower (80.51 ± 68.77 vs 89.89 ± 66.12 , $P=0.008$), and the total number of lymph node dissection was higher (34.74 ± 12.44 vs 29.83 ± 12.22 , $P<0.001$) compared with the LTG group. The number of lymph node dissection at the upper edge of pancreas in RTG group was more than that in LTG group (12.59 ± 4.18 vs 10.33 ± 4.58 , $P=0.001$). In addition, the postoperative recovery indexes and some laboratory data of the RTG group were better than those of the LTG group, while the postoperative complications of the two groups were not significantly different (19.0% vs 18.9%, $P=0.962$), and the number of surgical errors in the RTG group was significantly lower than that in the LTG group.

Conclusion: The RTG group showed better intraoperative performance, which can improve the short-term clinical results of patients, and is more conducive to the rehabilitation of patients. The number of operational errors in the RTG group was lower than that in the LTG group, and the safety of robot surgery was guaranteed. In addition, the robot surgery system can reduce the surgical stress reaction of patients and enable them to receive postoperative chemotherapy more quickly. However, the cost of surgery for robot group is higher, which is the main factor restricting its wide application.

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ROBOT-ASSISTED VS LAPAROSCOPIC ASSISTED RESECTION OF CHOLEDOCHAL CYST

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Purpose: The choledochal cyst (CC) is a rare congenital dilation of the bile duct. Compared with the conventional laparoscopic surgery, robotic surgery enhances several key aspects of minimally invasive surgery, the instrument has several advantages such as three-dimensional magnification imaging, jitter filtering function, multi degree of freedom rotation of the robotic arm, and high comfort of the surgeon operation. The purpose of this study was to present a study of robot-assisted resection of the choledochal cyst to laparoscopic assisted surgery and to discuss the technical points.

Materials and Methods: A retrospective study was conducted on 190 patients with choledochal cyst who underwent robot-assisted surgical resection from April 2020 to April 2023, and 569 patients underwent laparoscopic assisted surgery from January 2012 to April 2023 at the Children's Hospital, Zhejiang University School of Medicine. The Da Vinci Xi Surgical System was used to perform the surgery. The data were collected including the clinical information of the patients, operative details, and postoperative outcomes.

Results: 190 patients received robot-assisted surgery and 569 patients received conventional laparoscopic assisted surgery. 2 cases in the Da Vinci surgery group were found to have accessory hepatic ducts during surgery, while 9 cases of biliary tract variation were found in the laparoscopic surgery group. There were 8 cases in the Da Vinci surgery group and 13 cases in the laparoscopic surgery group with a diameter of hepaticojejunostomy less than 5mm, respectively. There was no significant difference in patients' age, weight, operation time and the postoperative feeding time between two groups ($P < 0.05$). The robot-assisted group had a significantly higher hospitalization cost ($P < 0.05$) and shorter postoperative hospitalization time. There were 93 cases of cystic type choledochal cyst in robot-assisted group and in 76 cases the distal end could be clearly exposed and dissected for ligation. In 276 cases of cystic type choledochal cyst in the laparoscopic assisted group, 81 cases could have the distal end exposed and dissected, the rate of distal bile duct ligation was higher in the robot-assisted group ($P < 0.05$). For other cases, the cyst was directly peeled off without detecting the distal end. 1 case in the robot-assisted group and 7 cases in laparoscopic assisted group were converted to laparotomy and there was no significant difference in the conversion rate of laparotomy ($P > 0.05$). In the robot-assisted surgery group, there were 4 cases of biliary fistula, 1 case of anastomotic stenosis, 1 case of pancreatitis, and 1 case of postoperative bleeding. While in the laparoscopic group, there were 14 cases of biliary fistula, 9 cases of anastomotic stenosis, 10 cases of pancreatitis, 3 cases of postoperative bleeding, 4 cases of internal hernia and 3 cases of biliary torsion. There was no significant difference in surgical complications between the robot-assisted surgery group and the laparoscopic group ($P > 0.05$).

Conclusion: Robot-assisted resection of choledochal cyst is feasible and safe, it is more suitable for cases that require precise procedures, However, at present, some problems such as the high hospitalization cost, and the lack of established indications for young children are still obstacles that need to be overcome.

GS 109

CAN ARTIFICIAL INTELLIGENCE REPLACE HISTOPATHOLOGISTS IN THE DIAGNOSIS OF BREAST CANCER?

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Purpose: At present, pathologists examine histological slides to determine the diagnosis of diseases. However, this has been found to be subjective and leads to increased variability. Advancements in artificial intelligence (AI) such as machine-learning and deep-learning (DL) have opened the possibility for AI to remove the role of pathologists in the diagnosis of breast cancer. We conducted a database search and selected 6 studies that have been published and satisfied our inclusion criteria.

Overall, AI was found to be significantly more accurate at detecting lymph node metastasis, and more sensitive to biomarker detection whilst also maintaining a higher concordance rate compared to conventional histopathology in breast cancer diagnosis. However, AI requires large datasets for reference and training, therefore a biased dataset can introduce bias into the programme. Additionally, difficulties in obtaining diverse datasets limit the abilities of AI in diagnosing cases in different populations or contexts. Our findings indicate that although possible, AI cannot replace pathologists but should be used in collaboration to assist in the diagnosis of breast cancer.

Materials and Methods:

Identification

Screening

Included

Records identified from database searching: Pub Med

(n = 29)

Records removed before

Duplicate records removed

(n = 0)

Records screened

(n = 29)

Records excluded

Based on Title and

Abstract

Language other than

English

Papers >5 years old

Technique different to Machine learning and

Deep learning

—

Full text reports assessed for eligibility

(n = 19)

Full text reports excluded

- Research not including information on breast cancer diagnosis

Studies included in review

(n = 7)

Results: From the results, AI histopathology is more accurate in detecting lymph node metastasis than conventional histopathology. In some cases, it has better performance in classifying breast cancer subtypes using biomarker detection as seen in Table 5. This may be due to AI's ability to process multiple slides simultaneously, therefore being able to identify trends and similarities to other cases. Additionally, it can minimise variability in diagnosis by acting as a subjective method, however, this is limited by the data set used to train the AI program. In view of this, there is a considerable chance that using AI to work on these skills may bring a positive change to the diagnosis of metastasis and tailored cancer treatments.

On the downside, AI fell short in breast cancer diagnosis. With only 75.86% of cases with an accurate diagnosis. Its failure to meet expectations by 24.14% may be attributed to its limited generalisability to the wider population and limitations in diagnosing complex cases. As a result, cases could be missed when using AI, potentially resulting in a poorer prognosis in the long run.

Conclusion: Overall, AI has the potential to fundamentally change the way work is done in the future. However, it is unable to replace human capabilities, but rather complement and enhance them. Therefore, a collaborative human- machine task force would provide improved performance over each option individually.

GS 110

PERCEIVED COMFORT AND TOOL USABILITY DURING ROBOT-ASSISTED AND TRADITIONAL LAPAROSCOPIC SURGERY: A SURVEY STUDY

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Purpose: It is known that over half of previously surveyed surgeons performing Robot-Assisted Laparoscopic Surgery (RALS) and three quarters of those performing Traditional Laparoscopic Surgery (TLS) experience intraoperative pain. This survey study aimed to expand upon the ongoing impact of that pain as well as perceived tool usability associated with TLS and RALS, for which considerably less documentation exists.

Materials and Methods: A survey regarding the presence and impact, either immediate or ongoing, of intraoperative pain and Likert scale questions regarding tool usability was administered to TLS and RALS surgeons on the European Association for Endoscopic Surgery (EAES) mailing list. There were 323 valid responses from TLS surgeons collected over the eight-week period; 102 respondents also had RALS experience. Prevalence statistics as well as trends based on biological sex and glove size were obtained from the 323 responses.

Results: Most respondents were right-handed European males (83–88%) with a medium glove size (55.8%). One third of TLS surgeons experienced moderate or severe shoulder symptoms. Female participants were, on average, 7.5 years younger and 12.1 cm shorter than their male colleagues, with significantly smaller glove size. Female participants had significantly fewer years' experience in TLS ($p < 0.0005$), although not RALS ($p > 0.05$). Weekly operating times were similar between sexes.

Small-handed surgeons experienced wrist symptoms significantly more frequently than large-handed, regardless of modality. RALS was associated with a significantly more optimal back and wrist posture compared to TLS. TLS surgeons reported increased ease with applying and moderating force while operating.

The shoulder and neck were the sites of the most complaints reported by TLS (70%) and RALS surgeons (39%–52%). These were also the locations of the largest proportions of moderate and severe pain. TLS surgeons experienced a significantly increased severity and impact of pain compared to RALS surgeons for the neck, shoulders, upper and lower back, thenar area, proximal phalanx of the thumb, knees, and ankles and feet.

Operating laparoscopically required moderate mental effort for 56–57% of surgeons regardless of modality. However, a significantly larger proportion of surgeons reported that the robotic console caused moderate to high stress and confusion compared to TLS (49.0% vs 34.9%, $p < 0.03$).

Two hundred surgeons reported requiring interventions to investigate or alleviate pain. Of these 71% used pain medication, 39.5% engaged physiotherapy, 10–12.5% were taking leave, visiting a doctor, or receiving medical scans, and 4% required surgery. Intraoperative pain made 8.9% of surgeons consider ending their surgical career. Female surgeons reported utilizing these interventions and considering retirement at slightly higher frequencies than their male colleagues.

Conclusion: These results suggest that intraoperative pain may be severe enough in many cases to interfere with surgeon concentration, negatively impacting patient care. Methods to support or change wrist and back posture during TLS would greatly benefit surgeons. Opportunities also exist to improve upon the viewing angle and hand controls of RALS consoles to further benefit surgeon comfort. Continuing to understand the relationship between tool usability and comfort is crucial in guaranteeing the health and wellbeing of both surgeons and patients.

GS 111

SURGEON TRAINING IN THE ERA OF COMPUTER ENHANCED SIMULATION ROBOTICS AND EMERGING TECHNOLOGIES. A REVIEW OF THE CURRENT LITERATURE AND APPLICATIONS.

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Purpose: Rapid advances in computing and imaging technology have enabled the rise of minimally invasive surgery (MIS) as an alternative to traditional open procedures. MIS approaches have subsequently become the gold standard across many surgical disciplines owing to the perioperative benefits, improved cosmesis and functional recovery. Robotic surgery presents an alternative MIS approach that promises to eclipse laparoscopy and become the new standard of care in the near future.

In line with the changes in surgical and medical technology, teaching methodology has recently undergone significant evolution from traditional apprenticeship models as we adapt to ever increasing rates of technological advancement. Big data, artificial intelligence and machine learning are on the precipice of revolutionizing all aspects of surgical practice with far reaching implications. Robotic platforms will increase in autonomy as machine learning rapidly becomes more sophisticated and therefore training requirements will no longer slow innovation. Surgeons should aim to be at the forefront of this revolution for the ultimate benefit of patients. Surgical exposure will no longer be due to incidental experiences. Rather, surgeons and trainees will have access to a complete database of simulated minimally invasive procedures and procedural simulation certification will likely become a requisite from graduation to live operating in order to maintain rigorous patient safety standards.

Materials and Methods: A comprehensive search of existing English-language literature over the last decade was conducted using pre-defined criteria using the databases MEDLINE (EBSCO), PubMed, EMBASE, Scopus, CRANE Central registry of controlled trials, CINAHL (EBSCO) and Web of Science database searches. Combinations of medical subject headings and the following keywords were used: robotic surgery, minimally invasive surgery, surgical training, surgical learning curve, virtual reality, 3-D printing, dual-console training, augmented reality, telemonitoring, artificial intelligence, machine learning, big data and surgical performance metrics.

Results: Novel training modalities including virtual reality, 3-D printing, dual-console training, augmented reality and telemonitoring are prominent and crucial tools identified in the literature that are now readily available with accumulating evidence that they are improving the quality and rapidity of surgical training. Additionally, automated performance metrics and novel methods of technical assessments allow for increasing training productivity and improving the learning curve of surgeons and surgical trainees.

Conclusion: This review provides a comprehensive outline of the current and future status of surgical training in the robotic and digital era.

GS 135

TRENDS OF USE OF KNOTLESS TISSUE CONTROL DEVICES AND SMOOTH SUTURES IN ROBOTIC VENTRAL HERNIA REPAIR: A RETROSPECTIVE DATABASE ANALYSIS

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Purpose: Barbed sutures have changed the wound closure landscape by removing the need to tie knots, which leads to greater strength and security, greater consistency, and higher operating room efficiency as compared with conventional sutures. While several published studies have compared barbed vs. smooth sutures for wound closure using a laparoscopic surgical approach, this study addresses the evidence gap regarding the use of knotless tissue control devices (KTCD) (Ethicon, Inc.) vs. smooth sutures for wound closure in robotic surgery.

Materials and Methods: Retrospective analysis of hospital data from the US Premier Healthcare Database (PHD). Study subjects were age ≥ 18 years and had a robotic surgical admission for ventral hernia repair (VHR) between October 1, 2015 and June 30, 2022 (first of such admissions=index). Outcomes measured during the surgical admission included quarterly KTCD utilization trends as a proportion of all robotic procedures, in-hospital through 90-day post-discharge wound-related complications (composite measure of surgical site infection and wound dehiscence), total hospital costs, and operating room (OR) time; 30, 60, and 90-day all-cause inpatient readmissions were also examined. We used 1:1 propensity score matching to balance the KTCD and smooth suture groups on numerous patient and hospital/provider characteristics, allowing a maximum standardized mean difference (SMD) ≤ 0.05 for all matching covariates. Generalized estimating equations (GEE), accounting for hospital-level clustering, with link functions and error distributions tailored to the empirical distribution of post-match outcomes were used to test for statistically significant differences between the KTCD and smooth suture groups.

Results: From Q4 2015 to Q2 2022, KTCD utilization more than doubled in robotic VHR (from 12.2% to 25.3%). Of the 32,469 identified cases, there were 6,687 patients in each group (13,374 total) after matching. The median patient age was 57 years and 53.1% were female. The observed incidence proportion of wound-related complications during the index admission through 90 days post-discharge was similar between the groups (0.91% for KTCD vs. 0.91% for smooth suture, difference 0.0% [95% CI -0.34% – 0.34%], $P=1.000$). The observed OR time during the surgical admission was lower in the KTCD group as compared with the smooth suture group (154.3 minutes for KTCD vs. 172.7 minutes for smooth suture, difference 18.4 minutes [95% CI -32.7 – -4.0], $P=0.012$). Total hospital costs were similar between the groups (\$10,719 for KTCD vs. \$10,720 for smooth suture, difference \$1 [95% CI -\$1,114–\$1,112], $P=0.999$). The incidence proportions of all-cause inpatient hospital readmissions within 30 (2.6% for KTCD vs. 3.2% for smooth suture, $P=0.095$), 60 (3.3% for KTCD vs. 3.6% for smooth suture, $P=0.332$), and 90 (3.8% for KTCD vs. 4.4% for smooth suture, $P=0.137$), days after discharge were similar between the two groups.

Conclusion: In this retrospective study of 32,469 patients undergoing robotic VHR, adoption of KTCD has grown substantially over the past 6 years. While the use of KTCD vs. smooth sutures significantly reduced operating room time, all other clinical and economic outcomes were similar between the two groups.

GS 166

EVOLVING FROM MAXIMALLY INVASIVE SURGERY TO ROBOTIC SURGERY FOR PANCOAST TUMOR RESECTIONS

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Purpose: The Intergroup Trial 0160 established induction chemoradiation and surgical resection as the gold standards for treating Pancoast tumors in select patients. The cornerstone of Pancoast tumor resection includes a radical en bloc resection of the chest wall near the thoracic inlet, upper lobectomy, and hilar/mediastinal lymph node dissection via thoracotomy. Although several surgical approaches to Pancoast tumors have been reported, the outcomes following the minimally invasive approach are limited to a few case reports. The feasibility and safety of robotic surgery has been well described for anatomic lung resections, mediastinal node dissection and extensive thoracic inlet dissection. To date, there have been no reported publications on the utility of robotic-assisted surgery in Pancoast tumor resections. We present our outcomes following robotic-assisted surgery for resectable Pancoast tumors.

Materials and Methods: From 2020-2022, three patients underwent pre-operative biopsy confirmation of NSCLC, the appropriate staging workup, induction therapy, followed by surgery as part of the multimodality therapy for Pancoast tumor resection. Patients that underwent a hybrid-robotic approach, video-assisted, or thoracotomy approach, were not included in this study.

Results: Three upper lobectomies (right, n=2 and left, n=1) were performed, with en bloc chest wall resection and radical lymphadenectomy. All three patients had a positive smoking history, and the median BMI and Charlson Comorbidity Score were 26.6 and 4, respectively. The median FEV 1 and DLCO were 2 Liters and 78%. Induction chemotherapy was administered to the entire cohort, concomitant radiation (n=2) and immunotherapy (n=1) were also provided as part of the induction therapy. R0 resection was achieved (n=3). Median operative blood loss and length of stay were 200 mL and 5 days, respectively. 30-day and 90-day survival were 100%, and two patients showed no sign of recurrence.

Conclusion: To date, this the first case series to describe the results of robotic-assisted surgery for resectable Pancoast tumors, and our study highlights the safety and feasibility of this approach. The robotic platform reduces the invasiveness of the operation, while maintaining oncological effectiveness and patient safety.

GS 172

SHOULD PUBLIC HEALTHCARE FUND ROBOTIC COLORECTAL SURGERY IN AUSTRALIA? A SYSTEMATIC REVIEW

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Purpose: Robotic-assisted colorectal surgery in Australia has seen tremendous uptake over the last decade for both malignant and benign pathology. The highest volume of surgery however remains segregated within the private hospital sector, partly due to difficulty in justifying the perceived costs to the public health system. Whilst this was certainly true during the advent of the robot era, much has changed within the industry and there is a shift to introduce this technology to government funded hospitals. The aim of this study is to evaluate whether more recent literature suggests robotic colorectal surgery is cost-effective and should become readily available in a public funded healthcare model.

Materials and Methods: A systematic review of PubMed, Scopus, and Cochrane databases was performed to identify studies reporting on the cost of robotic colorectal surgery in Australia the last 5 years. Both benign and malignant pathology was included.

Results: One hundred and eighteen manuscripts were screened, and 3 studies were suitable for inclusion. This comprised a total of 537 Australian patients who underwent either robotic or laparoscopic colorectal surgery in Australia. The most recently reported mean cost of surgery per patient in the robotic group was \$34,350, versus \$26,083 in the laparoscopic group. A second study reported median cost was \$19,269 versus \$8,828 respectively. A third study reported a more modest difference of only \$2,728 between groups. Heterogeneity of data did not allow for meta-analysis.

Conclusion: Significant costs of robotic colorectal surgery – potentially more than double the cost of laparoscopy – remain a barrier to uptake within Australia's public healthcare model. The low number of manuscripts identified highlights the need for more prospective Australian studies which may demonstrate improved cost-effectiveness in the coming years due to increased competition in the robotic market.

GS 175

PRECLINICAL EXPERIENCE AND TECHNIQUE STANDARDIZATION WITH THE HUGO RAS SURGICAL ROBOTIC SYSTEM IN GENERAL SURGERY.

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Purpose: Medtronic has introduced a new robotic surgical device in 2020. The system is based on a modular architecture with four independent robotic arms, one for each instrument or the camera. The console is “open” allowing the surgeon to be in visual contact also with the operating room and the surgical field. This paper aims at describing the new system and the standardized set up.

Materials and Methods: Since November 2020, 22 cadaveric labs were performed at the University of Illinois at Chicago, Surgical Innovation and Training Laboratory (SITL) center. During those sessions, the cart position and settings as well as the port placement, for the upper abdominal quadrants, the right and left abdominal quadrants and the pelvic region were standardized. The final settings were tested in a 5th and 95th percentile body shape.

Results: All procedures in the different abdominal quadrants were performed without technical complications. No major collisions or system malfunctions were recorded. A standardized approach to the upper quadrants, for the left colectomy, for the right colectomy and for the low anterior resection were finalized.

Conclusion: The Medtronic HugoTM system is a valid surgical platform with a great potential in general surgery. The standardization of the set-up is fundamental to the success of the utilization of the system. The presented setup guides have already been successfully utilized in live cases outside the US.

GS 176

GIANT HIATAL HERNIA REPAIR: ROBOTIC VERSUS LAPAROSCOPIC APPROACH

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Purpose: To compare the short and long-term outcomes of robot-assisted fundoplication (RAF) and laparoscopic fundoplication (LF) in patients with large HH (type III, IV).

Materials and Methods: Data for 73 patients who underwent robot-assisted or laparoscopic surgery for type III or IV of HH between March 2015 and March 2022 were retrospectively analyzed. The selection included 35 patients who underwent RAF and 38 patients - treated laparoscopically. There were no differences between two groups in terms of age (p-value = 0,194), sex (p-value = 0,132), BMI (p-value = 0,839), comorbidities (p-value = 0,134). All patients of both groups underwent complete (360 degrees) symmetrical fundoplication with suture cruroplasty without mesh. Short-term outcomes such as mean operation time, blood loss, duration of hospital stay, and postoperative complications were evaluated. During the follow-up period of 6-60 months, patients were examined to study the recurrence rate and a comprehensive assessment of the quality of life was carried out using the questionnaires (SF-36, GERD-HRQL).

Results: Operation time was shorter in the RAF group (125min(IQR: 75-240)versus150min(IQR: 70 - 280);p-value= 0,045). The rate of blood loss was similar in the two groups (RAF – 20 ml (5-50); LF – 25 ml (5-100); p=0,264).There were no conversions in the two groups.The rate of postoperative complications(Clavien – Dindo I-V)in the RAF group and LF group were8,5%and13,1%respectively (p-value= 0,531). Our results showed therobot-assistedfundoplication was associated with a shorter hospital stay (7days(IQR: 4-13) versus 8days (IQR: 4-16); p-value= 0,009). Long-term outcomes were evaluated in 32/35 (91,4 %) patients of the RAF group and 32/38 (84,2 %) of the LF group. Recurrence of disease was diagnosed in 1 (3,1 %) patient in the LF group, but redo-surgery was not required. The quality of life indicators for each of the components of the SF-36 questionnaire did not differ in both groups. GERD-HRQL questionnaire were better in the RAF group, but the differences had no statistical significance (RAF — 2,53 ± 5,1 points versus LF — 4,01 ± 9,4 points, p-value = 0,321).

Conclusion: Safety and efficacy seem to be comparable between RAF and LF in patients with giant hiatal hernias (type III, IV). RAF was associated with a reduction in the time of surgery and hospital stay. There is a tendency to reduce the complications rate and improve the quality of life through the use of robotic surgery, which requires more observations to confirm.

GS 182

ROBOTIC MESH EXPLANTATION FOR INGUINODYNIA - A SINGLE CENTRE RETROSPECTIVE COHORT STUDY

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Purpose: Chronic pain after minimally invasive inguinal hernia repair with mesh can have debilitating effects on quality of life (QOL), limiting daily activities and ability to work. Many medical and surgical options for treatment have been proposed, however there is no consensus on the role of mesh explantation in the management of these patients. There are currently few studies that demonstrate the safety and efficacy of robotic mesh explantation, which in our experience provides superior dexterity, tissue handling and visualisation of important structures in these complex re-do surgeries, where scarring, fibrosis and obliterated tissue planes increase the complexity of these operations, with nearby nerves, blood vessels and testicular structures being at risk. In addition, very few studies have reported effects on quality of life after robotic mesh removal. Our study aims to review our experience of robotic groin mesh removal and the effect on patient's quality of life and pain scores.

Materials and Methods: A retrospective cohort review of all patients who underwent groin mesh removal by robotic approach from 2012 to 2023 at our institution was conducted. Patients were interviewed post-operatively to determine their overall pain scores and QOL was measured using the Carolinas Comfort Scale (CCS) Questionnaire. Patient characteristics, operative times, pre-operative imaging techniques and analgesia use was also recorded.

Results: Twelve patients underwent robotic groin mesh removal for chronic pain. The mean BMI was 25 with an ASA score of 1.6. The mean pre-operative pain score was 7.3/10 compared to 4.3/10 post-operatively. The mean post-operative CCS score was 24, indicating moderate discomfort. 3 patients demonstrated CCS scores <11 indicating no discomfort and no patients demonstrated CCS scores >90, indicating severe debilitating discomfort.

There were no significant perioperative complications in this patient group and mean operative time was 144 minutes. Only 5 patients required ongoing regular analgesia post-operatively, compared to 9 patients prior to mesh removal.

Conclusion: Robotic mesh explantation for treatment of chronic pain post-inguinal hernia repair is safe and effective in achieving good QOL and reducing the need for long-term analgesia.

GS 199

SENHANCE ROBOTIC ASSISTED SURGERY INITIAL EXPERIENCE IN GENERAL SURGERY AT A TERTIARY CENTER

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Purpose: The Senhance Robotic system is a platform based on three robotic arms able to host 5 mm or 3mm multiuse instruments that dramatically reduce operational costs. The surgeon cockpit is an open concept console with a 4K 3D screen and controllers designed to resemble laparoscopic instruments. The vision tower hosts an Intelligent Surgical Unit (ISU) that controls the visualization and the instruments. The ISU also provide intelligent features as the possibility to measure inside the abdominal cavity and the possibility to tag anatomical structures.

The aim of this study is to describe the initial experience with the Senhance robotic system in a general surgery residency program to assess advantages and limits of the platform.

Materials and Methods:

The system was used to perform elective cases only. One attending surgeon and multiple residents worked at bedside and on the console. All procedures were recorded. Setup and docking time, console time, and overall surgical time was collected.

Results: From June 2021 to June 2023, 144 procedures were performed using the robotic platform—90 Cholecystectomies, 49 inguinal hernia repairs, 4 sleeve gastrectomies, and 1 Nissen fundoplication. No intraoperative complications were reported. One conversion from robotic to laparoscopic cholecystectomy occurred, due to inexperienced bedside assistance. Blood losses were minimal for all cases.

Conclusion: The Senhance Robotic system enables computer assisted laparoscopy in a general surgery residency program. The system works well in a training setting and is able to significantly lower the costs of the procedure compared to other robotic systems. The enhanced measurement and identifications features allow for innovative training concepts. The lack of endowrist on the instruments makes the system more similar to laparoscopy with enhanced digital features. Future Senhance systems will overcome the endowrist problems.

GS 203

DAVINCI SINGLE PORT (SP) IN GENERAL SURGERY, LESSON LEARNED FROM THE FIRST 354 CASES.

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Purpose: A new robotic platform DaVinci Single Port (SP) has been introduced in 2018 mainly for urologic procedures. The platform currently has no FDA approval in general surgery. We started using the SP in general surgery in 2019 under an IRB protocol. With this study we present the initial experience of 327 cases with the DaVinci Single Port (SP) platform in general surgery.

Materials and Methods: A prospective series of robotic SP procedures including transabdominal preperitoneal inguinal hernia repairs (SP-TAPP) and cholecystectomies (SP-C) (off-label) were analyzed. Primary endpoints were safety and feasibility defined by the need for conversion and incidence of perioperative complications.

Results: A total of 354 SP procedures were performed; 119 SP-TAPP and 228 SP-C, plus a miscellaneous of other procedures including hiatal hernias, ventral hernias, gastric resections, and sleeve gastrectomy. There were no conversions or additional ports placed. Mean console time was 18.4, 34.67, and 50 min for SP-C, unilateral, and bilateral SP-TAPP, respectively. There was no mortality, intraoperative or major postoperative complications. Mean length of stay (LOS) was 112 min for elective SP-TAPP and 129min for SP-C.

Conclusion: Robotic SP surgery is safe and feasible for two of the most performed general surgery operations. Further experience might allow expanding the applications of robotic single-incision surgery for other procedures.

GS 207

EVALUATION OF GASTROINTESTINAL COMPLICATIONS IN VENTRAL HERNIA REPAIR USING THE ACHQC NATIONAL DATABASE

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Purpose: Most patients undergoing ventral hernia repair are elderly and have complex comorbidities requiring intricate hernia repairs. Robotic ventral hernia repair has gained popularity due to potentially better outcomes compared to open repairs, such as reduced postoperative complications and shorter hospital stays. However, large-scale studies comparing GI complications, recurrence, readmission, and re-intervention rates within the first 30 days after surgery are lacking. Further research is needed to assess long-term outcomes and benefits of these procedures.

Materials and Methods: Retrospective analysis was performed using data from a national hernia specific registry (ACHQC), which included patients aged 18 to 90 who underwent open or robotic ventral hernia repair with at least 30 days of follow-up (N = 33,488). Propensity score matching was used to create comparable open and robotic repair groups (N = 8,148). Logistic regression analysis was employed to compare the 30-day rates of GI complications, readmission, re-intervention, and hernia recurrence.

Results: Among the included patients, 24.7% underwent robotic repair, while 75.3% underwent open repair. After propensity score matching, patients who underwent robotic repair had significantly lower rates of 30-day GI complications compared to those who underwent open repair (1.29% vs. 0.91%, $p=0.02$). Although both groups experienced ileus as the most common complication, the incidence was significantly higher in the open repair group (25% vs. 15%, $p<0.004$). The readmission rate within 30 days was similar between the groups (3% overall), but the chance of requiring re-intervention was significantly higher after open repair (1.44% vs. 0.99%, $p=0.01$). Hernia recurrence rates at 30 days were low and comparable (0.24% overall), with the only complication more prevalent after robotic repair being seroma formation (5.6% vs. 3.7%, $p<0.001$).

Conclusion: Robotic ventral hernia repair may offer advantages over the traditional open approach. In this study comparing open and robotic ventral hernia repair, the rates of postoperative complications, recurrence, readmission, and re-intervention were examined using a national hernia database. Although seroma formation is slightly more common with robotic repair, the majority of cases do not require intervention, and open repair carries a higher risk of seroma infection. Therefore, robotic ventral hernia repair is a safe and often favorable option in carefully selection patients undergoing ventral hernia repair.

G1

ROBOTIC SURGERY IN OBSTETRICS AND GYNECOLOGY: A BIBLIOMETRIC STUDY

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Purpose: To identify the research trends and patterns of robotic surgery research in obstetrics & gynecology since its implementation.

Materials and Methods: A cross sectional study of all articles published on robotic surgery in obstetrics & gynecology.

We used data from Clarivate's Web of Science platform to identify all relevant publications. We collected bibliometric data from the iCite National Institute of Health platform.

Results: A total of 838 publications were included in the analysis. Of these, 485 (57.9%) were from North America and 281 (26.0%) from Europe. 788 (94.0%) articles originated in high-income countries and there were no publications from low-income countries. The number of publications per year has increased, reaching a peak of 69 articles in 2014.

The subject of 344 (41.1%) articles was gynecologic oncology, followed by benign gynecology (n=176, 21.0%) and urogynecology (n=156, 18.6%). Articles discussing gynecologic oncology had lower representation in low- and middle-income countries (32.0% vs. 41.6%, $p > 0.001$). Case reports and case series had higher representation in low- and middle-income countries than high-income countries (22.0% vs. 8.6% and 16.0% vs. 4.6%, respectively). After 2015 there has been a higher representation of publications from Asia [96 (19.7%) vs. 27 (7.7%)] and from low- and middle-income countries [41 (8.4%) vs. 9 (2.6%)] compared to the preceding years.

In a multivariable regression analysis including publication year, impact factor, subject of article, continent and study design, the following factors were associated with a higher citations per year score: journal's impact factor [adjusted odds ratio (aOR) 95% confidence interval (CI) 1.30 (1.16-1.41)], subject of study being oncology [aOR 95% CI 1.73 (1.06-2.81)] and randomized controlled trials [aOR 95% CI 3.67 (1.47-9.16)]. Publication year was negatively independently associated with a higher citations per year score [aOR 95% CI 0.93 (0.88-0.98)].

Conclusion: Robotic surgery research in obstetrics & gynecology is dominated by research in gynecologic oncology and reached a peak nearly a decade ago. The disparity in the quantity and quality of robotic research between high income countries and low- and middle-income countries raises concerns regarding the access of the latter to high quality healthcare resources such as robotic surgery.

G2

SURGICAL TRAINING IN ROBOTICS- FULL DEPTH STEREO VISION, INTERCATIVITY AND MULTIUSER MODE USING A VIRTUAL REALITY HEADSET

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Purpose: The purpose of this presentation is to discuss the use of HintVR™, a virtual reality training and education platform that enables expert robotic surgeons to upload their surgeries and the corresponding anonymized patient specific scans. We propose a novel solution to a trainee surgeon by enabling him to see the unparalleled 3D stereoscopic vision of the robotic console, with an added layer of interactivity and multiplayer capabilities on a virtual reality headsets that are becoming more pervasive.

Materials and Methods: Today, Minimal Access Surgery is gold standard in most surgical management and includes endoscopic, laparoscopic and robotic procedures. These procedures use advanced haptics, miniature surgical tools and 3D depth stereo vision enabling surgeons to perform the procedures with great precision leading to minimal blood loss, scar and tissue loss leading to faster recovery of the patients and better outcomes. The current standard of training in Robotic surgery involves shadowing an expert surgeon during a live case. The two key aspects that the trainee needs to learn is detailed anatomy and expertise in manoeuvring the robotic platform. Mastering the stereoscopic vision with the 3D depth remains the key in ultimate skill development. Secondary consoles that mirror the surgeon's stereoscopic view are expensive and available at only few centres.

Results: We discuss cases of robotic Gynaecological surgery (Myomectomy, endometriosis resection and hysterectomy) and its usefulness of the VR platform that provides an excellent opportunity to engage robotic fellows and residents in live sessions from across the world in real time with no latency in communication. This VR-based surgical training can be easily accessed and integrated into existing surgical education programs. Trainees can use VR simulators at any time and from any location, which can help to reduce the costs and logistical challenges associated with traditional surgical training. The tools available to the surgeons include advanced imaging tools to manipulate the CT/MRI scans, markers to annotate on the anatomy during surgery. The platform enables immersive case based discussions that allows for 3D pre-op planning and virtual surgery on the CT / MRI scan and then actual surgery on robotic platform and post op imaging visualization all from a single application.

Conclusion: Overall, VR has great potential as a surgical teaching aid, offering a safe, efficient, and effective way to prepare future surgeons for the complex and demanding work of surgical practice. The use of immersive platforms delivers excellent visual haptics and presents an opportunity to create a library of fully interactive case-based discussions available for the next generation of robotic surgeons anytime anywhere.

G4

“ROBOT-ASSISTED HYSTERECTOMY IN A SURGICAL ONCOLOGY SERVICE. RETROSPECTIVE ANALYSIS OF THE EXPERIENCE AT CENTRO MÉDICO NACIONAL “20 DE NOVIEMBRE” ISSSTE IN MEXICO CITY.”

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Purpose: INTRODUCTION: Robot-assisted surgery is a relatively new minimally invasive technology that has shown some theoretical advantages compared with other surgical techniques. These advantages include improved visualization through 3D imaging, higher precision, and more exact control of instrumentation. Since approval by the Food and Drug Administration in 2005 for the use of robotic-assisted gynecologic surgery, this technology has been widely adapted around the world to perform hysterectomies for both benign and malignant indications.

The objective is to report the characteristics and results of patients with robot-assisted hysterectomy for malignant and premalignant conditions in the Surgical Oncology Service of the Centro Médico Nacional “20 de Noviembre” - ISSSTE in Mexico City.

Materials and Methods: Retrospective cohort from a single center of robot-assisted hysterectomies referred to our Oncologic Robotic Surgery Department from January 2016 to May 2023. This paper reviews the description of the clinical characteristics of the population, the histologies and the surgical outcomes.

Results: We reviewed 105 clinical cases of robot-assisted hysterectomies with a mean age of 51.65 years. The median blood loss was 195.64 ml. The median surgical time was 206.18 min. Malignant disease was present in 85.32%, benign disease in 14.68%. Tumor size was not regularly reported by pathologists, and pelvic lymphadenectomy was performed for >50% myometrial invasion or high-grade tumors. Preoperative diagnostic biopsy was performed in 94.81%. Four patients (3.8%) required intraoperative conversion to open and laparoscopic procedures, the rest completed the robot-assisted procedure. Postoperative mortality at 30 days was 0.9%, due to pulmonary thromboembolism. The median overall survival among patients with endometrial cancer is 55.06 months.

DISCUSSION: Robot-assisted surgery allows high-resolution, three-dimensional, and zoomed-in views to be controlled and fixed by the surgeon. The scaling function and antishake and articulated instruments, aiding suturing and dissection, improve the accuracy of each operation. For oncology purposes, robotic-assisted surgery reduces hospital stay, incidence of complications, blood loss, and blood transfusion rates compared with open surgery and conventional laparoscopic surgery, allowing for adjuvant treatments such as radiotherapy, brachytherapy and chemotherapy if necessary. The console is located away from the sterile field, allowing the surgeon to perform the surgery without maximal barrier precautions. Image data such as CT and MRI can also be displayed in the field of view.

Conclusion: In this initial experience, the robot-assisted hysterectomy has proved to be a safe and feasible procedure for gynecologic cancer, without compromising oncologic outcomes.

G5

EMERGENCY UTERINE RUPTURE REPAIR: A NOVEL APPROACH USING ROBOTICS

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Purpose: Introduction: Uterine rupture is defined as the anatomical separation of uterine muscles and is a serious complication of vaginal births after cesarean delivery (VBAC), imposing risk on both the mother and the fetus. The incidence of uterine rupture with prior lower segment cesarean section (LSCS) is 0.3%. In this study, we report a case of Uterine Rupture following VBAC, repaired robotically.

Case presentation: 35-year-old G2P2 presented with severe abdominal pain radiating to both shoulders following vacuum-assisted vaginal delivery. She had a previous C-section two years ago due to arrest of labor. Ultrasound findings revealed free fluid within the abdominal cavity indicative of uterine rupture. Subsequently, an emergency robotic assisted repair of the ruptured lower uterine segment was performed in 30 minutes.

Materials and Methods: Case Report

Results: Uterine Rupture, a rare but severe obstetrical emergency complication, increases maternal morbidity and mortality. Prompt diagnosis, and prevention is of utmost importance for favorable outcomes. Our paper proves that robotic technology is as efficient as other surgical modalities and can be easily utilized in emergency situations. To our knowledge, this case would be the first in the world where uterine rupture repair was done robotically.

Conclusion: Uterine Rupture, a rare but severe obstetrical emergency complication, increases maternal morbidity and mortality. Prompt diagnosis, and prevention is of utmost importance for favorable outcomes. Our paper proves that robotic technology is as efficient as other surgical modalities and can be easily utilized in emergency situations. To our knowledge, this case would be the first in the world where uterine rupture repair was done robotically.

G8

ROBOTIC ASSISTED SURGERY IN GYNAECOLOGY : AN INITIAL EXPERIENCE WITH THE HUGO™ ROBOTIC - ASSISTED SURGERY SYSTEM AT A TERTIARY CENTRE

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Purpose: Minimally invasive surgery is now widely adopted and is the preferred choice for surgical intervention. Robotic-assisted surgery, with its less-invasive method, is a technical innovation, and its use in the field of gynecology is rapidly growing. The HugoRobotic-Assisted Surgery (RAS) system has received CE mark approval for its use in gynecological, urological, and general surgery procedures. It offers enhanced ergonomics, tremor filtration, three-dimensional visualization, range of motion, and dexterity over laparoscopic surgical techniques. The purpose of this study was to report a single-center experience of 20 cases operated with the HugoRAS system among patients with gynaecological conditions.

Materials and Methods: The study comprised 20 cases with a mean age of 45.25 ± 6.54 years who were treated at a tertiary care center between 2022 and 2023. Patients were treated for accessory and cavitated uterine mass (ACUM) (5%), abdominal uterine bleeding (AUB) (85%), and postmenopausal bleeding (5%) and underwent hysterectomy, ACUM excision, or myomectomy with the use of the HugoRAS system. The surgical procedures were performed with appropriate positioning of the patient, ports, assistant, arm carts, and docking angles by adhering to the patient placement guidelines and port placement measurements as per the setup guide and keeping the docking and tilt angles within 5° of the allowable deviation. The outcome parameters evaluated were docking time, duration of surgery, blood loss during surgery, duration of in-hospital stay, postoperative complications, and pain perception after surgery at 1 hour, 6 hours, 12 hours, and 1 week.

Results: Hysterectomies were performed in 18 patients (90%), ACUM excision in 1 patient (5%), and myomectomy in 1 patient (5%). The mean \pm standard deviation (SD) docking time was 26.95 ± 11.11 (range: 12–54) minutes, and the mean \pm SD duration of the surgery was 01:26:51 \pm 00:21:54 (range: 0:55:03–02:10:13) hours:minutes:seconds. The blood loss in all the cases was minimal, with a mean \pm SD of 103.5 ± 62.43 (range: 50–250) mL, necessitating no blood transfusions. The average in-hospital stay lasted for a mean \pm SD of 2.5 ± 0.71 (range: 2–4) days. None of the patients experienced immediate complications after surgery. However, in two patients, late complications were observed with minimal spotting in the third week due to granuloma tissue at the vault, managed by a conservative approach. Pain perception revealed a decline, with a visual analog scale (VAS) score of 3.2 ± 0.41 at 1 hour to 2.2 ± 0.41 at 6 hours and 1.0 ± 0.0 at 12 hours post-surgery. By the end of the first week, pain had completely subsided (VAS score 0) in all patients.

Conclusion: The HugoRAS system proves to be feasible in treating gynecological conditions and provides comparable patient outcomes in terms of docking time, duration of surgery, blood loss, duration of in-hospital stay, postoperative complications, and pain perception vis a vis the existing robotic systems available in the market [LR1] [SSK2]. With an open console, improved vision, multidimensional access, and independent modular arms, the HugoRAS system brings a new level of precision, flexibility, and dexterity to the operating surgeon.

G10

TAILORED ROBOTIC RADICAL HYSTERECTOMY FOR STAGE 4 ENDOMETRIOSIS- 10 KEY STEPS

Rooma Sinha Apollo Hospitals, Hyderabad, India

Purpose: The primary objective of this presentation is to demonstrate 10 key steps in of robotic hysterectomy in the setting of stage 4 endometriosis.

Materials and Methods: Detailed counselling and consent is taken. The day before patients take low residue diet and mechanical bowel preparation. Under general anaesthesia, uterine manipulator with appropriate Rumi tip and KOH cup (Cooper surgical) is placed for vaginal manipulation. Bladder is drained with foley's catheter and kept in situ during the procedure. Dorsal lithotomy with 22-25 degree Trendelenburg position is achieved. The sequential steps are as follows-

1. Port placement-Exploration of pelvis & abdomen done to assess the extent of endometriosis and daVinci Xi robot is docked.
2. Sigmoid mobilization and excision of any extra pelvic disease
3. Bilateral Ureterolysis- Follow the ureters into the pelvis
4. Opening of broad ligament lateral to Infundibulo-pelvic ligament after transection of the round ligament and development of retro peritoneal space
5. Adhesiolysis & dissection of adnexa from lateral to medial on both sides and isolation, coagulation & transection of Infundibulo-pelvic ligament
6. Pararectal dissection and opening of Okabayashi space on both sides
7. Dissection of retro-cervical space and excision of endometriosis of Recto-Vaginal septum or bowel if present
8. Anterior colpotomy on KOH cup after bladder reflection
9. Identification & Skeletonization of Uterine artery & Vein on both sides- Coagulation & Transection
10. Completion of colpotomy & Closure of vault

Results: Successful completion of surgery without any intra-operative complications. Console time 102 minutes & total operative time 120 minutes. Estimated blood loss 60ml. Length of stay in hospital was 24 hours.

Conclusion: Approach of hysterectomy for stage 4 endometriosis as a radical hysterectomy dissecting adnexa from lateral to medial achieves complete excision of disease and prevents injury to neighbouring organs.

G11

THE FIRST HUGO-RAS ROBOTIC CASE IN AUSTRALIA AND NEW ZEALAND – PREPARATION AND TRAINING

Mikhail Sarofim, Jessica Robertson, Assem Kalantan, Sarah Choi, Greg Cario, David Rosen, Danny Chou
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Purpose: In this presentation we will discuss the training and preparation involved in performing the first case on a new surgical system in Australia and New Zealand. The goal of this presentation will be to give units an idea of what is involved in setting up a new surgical system. Given this was the first case in Australia, intensive training was required by the surgeon, surgical assistants, and operating theatre staff. We will discuss the importance of infrastructure surrounding the preparation, the importance of a team leader, well trained staff, and a supportive administration. We will also discuss the importance of the start-up specialists in administering training and supporting the team.

Materials and Methods: The first case on the HUGO-RAS system was performed in Sydney, Australia on the 13th of February 2023.

Results: The surgeon, surgical assistants, and theatre team were involved in three full-day training sessions. Moreover, the team completed dry run simulations on two separate occasions prior to the first list. The surgeon had to complete a compulsory simulation and dry lab training curriculum.

The first HUGO-RAS operating list was performed in Australia after three months of preparation. The first case was unsuccessful; there was a system issue which meant that after the ports were placed and the robot was docked the surgical console did not recognise the instruments and the procedure was abandoned and performed laparoscopically. Thankfully, there was two planned procedures that day and the second case on the list was performed without any issues on the HUGO-RAS system. We will discuss these setbacks and how they were overcome.

Conclusion: The Medtronic HUGO-RAS system is an exciting development in robotic assisted surgery in Australia. While introducing new surgical features and advantages it also allows added competition to the largely single robot dominated field of gynaecology in Australia. This is beneficial not only for surgeons looking to access surgical time, but also for patients in accessing advanced technology. This presentation highlights what it takes for a surgical unit to adopt a new surgical system and the challenges they may face.

G12

THE HUGO ROBOTIC CASE SERIES IN AUSTRALIA

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Sydney Womens Endosurgery Centre, Sydney, Australia

Purpose: The first HUGO-RAS robotic system installed in Australia and New Zealand was first utilised on a patient in our unit on the 13th of February. Since then, we have performed 28 robotic gynaecological cases. We will present our case series and what we learnt about the system and its utilisation for robotic assisted gynaecological surgery.

Materials and Methods: Of the 28 cases 11 have been total laparoscopic hysterectomies, 10 excision of severe endometriosis, 2 myomectomy, 2 oophorectomies, 1 cervical cerclage revision, and 1 rectal shaving (Sydney Shaving).

These cases have been performed by a single surgeon, single anaesthetist, two gynaecology fellows assisting, and the same scrub nurses and scouts. Surgical operating times have been recorded including anaesthetic times, port placement, docking time, on-console time, and undocking time. We have also recorded intra-operative complications as well as patient outcomes

Results: Of the 28 cases two cases were abandoned due to errors in the HUGO-RAS system and surgeon console recognising the robotic instruments. The issue was robot based and unrelated to the patient, surgical team, or intra-operative issues. The remainder of the cases were performed to completion. There have been no major complications in the patients intra-operatively or post-operatively. Overall, all parameters measured have been marginally longer as compared to the Da Vinci system, however given the limited numbers this may be attributed to the learning curve associated with a new system. Of note, a significantly longer docking time is the biggest difference between the two systems.

In terms of procedure, the HUGO-RAS system performs well with low-port surgery which we utilised for the majority our endometriosis excisions. Given the limited number of instruments available, the system was not useful for myomectomies as there is no single toothed tenaculum.

The surgical assistants have reported multiple instances of collision with the arm carts; notably one assistant has been struck twice in the head (video footage is available). Given the modular design and large instrument drives, small intra-abdominal movements are translated to large rapid movements externally, making the movement of the arms unpredictable.

Conclusion: The HUGO-RAS system is an exciting new robot for multiple specialties across Australia and New Zealand. Since the first system was installed in February 2023, it has already created a big impact on the market. This translates to better access for patients, more options for surgeons and advancement and competition in the field of robotic surgery in general. Our case series highlights that we are still on the learning curve associated with a new system and are excited for what the future brings.

G13

ASSOCIATION OF GLOBAL EVALUATIVE ASSESSMENT OF ROBOTIC SKILLS (GEARS) SCORES WITH OPERATIVE TIME FOR ROBOTIC HYSTERECTOMY: A RETROSPECTIVE STUDY

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Purpose: Global Evaluative Assessment of Robotic Skills (GEARS) scores are a validated, crowd-sourced, video-based assessment tool for grading overall technical proficiency for robotic surgery. Little is known whether GEARS scores are associated with operative time, a common measure of surgical efficiency, for robotic hysterectomy.

Materials and Methods: This was a retrospective study of electronic health record data (EHR) from a large robotic surgical program of a Federally-listed Patient Safety Organization in the United States. Surgeons within the hospital system uploaded videos of robotic hysterectomies for GEARS scoring on a voluntary basis. EHR data for surgeons with ≥ 4 GEARS-scored robotic hysterectomy uploads between January 1, 2019, and December 30, 2020, were included for analysis; each surgeon was assigned a average GEARS score based on their uploads during this period (baseline average GEARS). Operative times (first incision to close) were collected for all robotic hysterectomies in 2021. A multivariable generalized linear model (log link, gamma error) was used to examine, for each robotic hysterectomy in 2021, the association of the baseline average GEARS for the operating surgeon with operative time, adjusting for patient age, race, insurance type, body mass index (BMI), American Society of Anesthesiologists (ASA) class, surgical indication, elective vs. non-elective admission, inpatient vs. outpatient surgery, number of concomitant secondary procedures, and the Elixhauser comorbidity index.

Results: A total of 446 GEARS-scored robotic hysterectomies from 22 surgeons were included for analysis. The mean GEARS score was 20.5 (18.2- 22.9). A total of 938 robotic hysterectomies performed in 2021 were included for the analysis of operative time (OT). The mean operative time for robotic hysterectomy was 113.9 (34.0- 440.0). In the multivariable analysis, a 1-point increase in baseline average GEARS was associated with 12% (95% confidence interval [CI] 7% - 16%) lower operative time for robotic hysterectomies performed in 2021. Age, surgical indication and number of concomitant secondary procedures were associated with longer operative time, while patients undergoing outpatient surgery had shorter OT.

Conclusion: In this study of robotic hysterectomies, higher average GEARS scores measured over a 2-year baseline period were significantly associated with lower operative times in the following year, suggesting that GEARS scores can meaningfully differentiate surgeons based on this measure of surgical efficiency. Replication of these results in additional surgical procedures is underway.

G14

FEASIBILITY OF ROBOTIC ASSISTED PRIMARY CYTOREDUCTIVE SURGERY FOR ADVANCED STAGE OVARIAN CANCER: A PILOT STUDY

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Purpose: To evaluate the feasibility and report on the surgical of robot-assisted primary cytoreductive surgery in Advanced Stage Ovarian Cancer.

Materials and Methods: After obtaining IRB approval of the study and obtaining appropriate consent, patients with Stage II, III, and IV ovarian cancer patients who underwent robotic cytoreductive surgery were enrolled prospectively between October 2020 to October 2022. All data were extracted from patient medical records via hospital-specific EMRs. The variables included within the analysis were: age, BMI, presence of ascites, largest tumor size, pelvic mass size, presence of omental caking, type and number of surgical procedures performed, cytoreductive effort, length of stay, preoperative albumin, preoperative hemoglobin, postoperative hemoglobin, blood loss, conversion to open rate, operative time, histology, omental size, tumor size in the omentum, stage, grade, and complications. Surgical outcomes such as rate of optimal cytoreductive surgery, intraoperative, postoperative complications and rate of conversion were determined.

Results: 31 patients underwent robot-assisted primary cytoreductive surgery from December 2020 to October 2022. The average age was 67 [42-84] and the average BMI was 25 [16-36]. A preoperative evaluation of CA 125 had abnormal levels at an average of 1164 [15-9806] U/mL. Preoperative CT scan imaging showed the average size of pelvic mass was 8.8 cm [1-20]. Twenty-one of the patients had ascites and seventeen had omental caking present on the CT scan imaging. The histology of the tumors was 25/31 serous, 2/31 clear cell, 1/31 high-grade serous, 1/31 low-grade serous, and 2/31 endometrial.

All 31 patients were able to undergo the intended procedure and on average each patients underwent 3.6 [0-7] procedures. The incidence and type of procedures that were performed were as follow: 9/31 (29%) patients underwent a modified posterior exenteration, 8/31 (26%) underwent a bowel resection, 3/31 (10%) ureterolysis, 30/31 (97%) omentectomy, 5/31 (16%) diaphragm peritoneal stripping, and 6/31 (19%) had an appendectomy. Of the 31 patients, seven patients (22.6%) underwent a complicated procedure—which included diaphragm peritoneal stripping, diaphragm muscle resection, peritonectomy, splenectomy, and distal pancreatectomy.

The operative outcomes were based on average blood loss, which was 286cc [50-1000] and the average OR time, which was 202min [91-470]. The pathological outcome of the average tumor size on the omentum removed was 3.87m [0-10.7]. There were no intraoperative complications or ICU admissions. One patient required a transfusion and cystotomy, one patient had a wound infection, one patient was readmitted for diarrhea, and one patient had a rectovaginal fistula. The average preoperative hemoglobin was 13.0 [10.9-15.9] while the average postoperative hemoglobin was 11.6 [7.7-15.7]. Optimal cytoreductive surgery was achieved in 14/31 (47%) of patients. The conversion to open was 9/31 (29%). Postoperative outcomes included the average length of stay at 8.1 days [1-60]. When compared, the average length of stay in patients who had a bowel resection was 13.5 days [1-60] while the average length of stay in patients who did not have a bowel resection was 1.8 days [1, 8].

Conclusion: Robotic Primary Cytoreductive Surgery for ASOC is achievable, feasible, and associated with decreased blood loss, complications, and hospitalizations.

G 19

PRECLINICAL EVALUATION OF THE CARINA™ RAS PLATFORM:

A NEW ROBOTIC-ASSISTED SURGICAL TECHNOLOGY FOR USE IN GYNECOLOGY

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Purpose: The benefits of minimally invasive surgery are well known in gynecology. The utilization of surgical robotics has become more pervasive, covering most benign and malignant gynecological surgeries. Carina™ RAS Platform (Ronovo Surgical, Shanghai, China) is the first modular robotic-assisted surgical system developed in China. We hereby introduce and demonstrate the feasibility of this new advanced robotic system.

Material and Methods: We used Carina™ to complete two cadaveric trials of total hysterectomy with double adnexectomy plus dissections of both pelvic lymph node and paraaortic lymph node. The evaluation criteria were system preparation time, console time, surgical access assessment, robotic arm collision, and subjective surgeon feedback.

Results: Carina™ was positioned in “X” configuration (Image 1) for both procedures, which were completed smoothly. This configuration created a large space for robotic arm movement, enabling reach to as low as lower pelvic cavity and as high as the duodenum without redocking (Image 2). The average system docking time was 28 minutes, and the average console time was 85 minutes. The procedures were completed with a single docking. There were no robotic arm collisions outside of the patients nor instrument collisions inside the abdomen of the patients during any of the procedures. The average score on the NASA-TLX scale of the psychological and physical workload of the surgeons was 0.5.

Conclusion: Experience from these trials demonstrated feasibility of using Carina™ in gynecological surgery on cadaver models. The modular architecture of the system seems to enable greater operating space, fewer collisions, and reduced redocking. Carina™ may enable gynecologists to perform more procedures more efficiently.

HN 33

COMPARISON OF TWO ROBOT ASSISTED THYROIDECTOMY TECHNIQUES

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Purpose: Robotic thyroidectomy is challenging procedure. Since introduction of robotic thyroidectomy, various different robot assisted approaches have been described. Due to the complexity of the technique and requirement of proper surgical training and the specialised instruments for this procedures, every robotic surgeon cannot venture this procedure. It has many advantages over the conventional thyroidectomy technique and is a boon for the young patients with thyroid nodules requiring thyroidectomy. This paper compared robot assisted retro-auricular approach with robot assisted CO2 insufflation bilateral axilla-breast approach in terms of perioperative outcomes and learning curve.

Materials and Methods: During period of Dec 2020 till Dec 2022, 24 patients underwent robot assisted hemithyroidectomy. 12 patients underwent robot assisted retro auricular approach thyroidectomy (RAT) and 12 underwent robot assisted CO2 insufflation BABA approach thyroidectomy (RABIT). These 2 groups were compared in terms of patient characteristics, perioperative clinical results, cosmetic results, complications and pathological details. Learning curves were compared between these two approaches.

Results: Patient characteristics were similar for both groups. The mean total operation time for hemi thyroidectomy was 66.9 min in the RAT group and 140 min in the RABIT group. Average flap elevation time in RAT group was 32.33 min and in RABIT group was 21.42 minutes. Both patient groups were similar in terms of cosmetic results, pathological features, intraoperative blood loss, length of hospital stay, and complication rate. However, there were unique complications seen such as greater auricular nerve paresis in RATS group similarly surgical emphysema was seen in RABIT group in one patient.

Conclusion: RABIT approach has longer operating time as compared to RATS approach with longer learning curve. Complication rates and postoperative hospital stay were similar for the 2 procedures. In terms of cosmesis there was no significant difference between 2 groups but a trend towards RABIT approach was seen younger females. However, further studies with larger number, longer follow-up and objective patient satisfaction analysis would be required to conclusively make any comments.

HN 167

CLINICOPATHOLOGICAL FEATURES ASSOCIATED WITH OVERALL SURVIVAL AND RECURRENCE IN OROPHARYNGEAL SQUAMOUS CELL CARCINOMA - RESULTS FROM AN AUSTRALIAN HEAD AND NECK CANCER SERVICE

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Purpose: We present a large cohort review of TORS resection for oropharyngeal squamous cell carcinoma (OPSCC) and its associated oncological outcomes.

Materials and Methods: A retrospective case series review was performed on all OPSCC patients who underwent primary transoral robotic surgery and neck dissection at St. Vincent's Hospital Sydney, Head and Neck Cancer service from 2011-2021. The primary outcome was to analyse the long-term survival and oncological outcomes, and to investigate clinical and pathological features associated with overall survival and recurrence. Secondary outcomes included rates of HPV-positive disease, rates of adjuvant therapy, and sites/subsites of recurrence

Results: 190 patients underwent TORS-based therapy with guideline directed adjuvant therapy for OPSCC. 97% (n=184) of patients had HPV positive disease. The positive margin rate on final histopathology was 10.5%. Adjuvant therapy was indicated in 86 (46%) patients. The local recurrence rate was 11% (n=22) with the majority (77%) of patients recurring in the first 3 years since treatment. The 3-year and 5-year OS for the cohort was 95% and 91% respectively. This was significantly higher when stratified against the HPV negative cohort (96.7% vs 50%, p=0.002). Presence of extra-nodal extension and positive margins were associated with increased risk of recurrence, whereas adjuvant therapy was found to be a protective factor.

Conclusion: This study has demonstrated the clinicopathological prognostic markers for OPSCC patients who underwent TORS-based therapy. Our study has demonstrated high disease-free and OS benefits associated with TORS, with or without guideline-indicated adjuvant therapy.

HN 168

INCIDENCE AND DISTRIBUTION OF CONTRALATERAL LYMPH NODE METASTASIS ASSOCIATED WITH HPV-RELATED OROPHARYNGEAL SQUAMOUS CELL CARCINOMA

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Purpose: There is limited information surrounding the utility of performing contralateral neck dissection specifically for HPV-positive oropharyngeal squamous cell carcinoma (HPVOPSCC).

Materials and Methods: A retrospective case series review was performed on consecutive HPVOPSCC patients who underwent transoral robotic surgery (TORS) and bilateral neck dissections at St. Vincent's Hospital, Sydney, Head and Neck Cancer Service from 2012-2022. The primary outcome was to investigate the incidence and location of contralateral neck metastases in this cohort by histopathological analysis. Secondary outcomes include location of ipsilateral lymph node metastasis based on primary cancer subsite, clinicopathological features associated with contralateral neck lymph node metastasis, rates of recurrence, and overall survival analysis.

Results: hundred and ten patients underwent TORS and bilateral neck dissections for HPVOPSCC at our institution between 2012 and 2022. Majority of patients (n=93) were cN1+ at time of diagnosis. Twelve patients (10.9%) had clinical evidence of bilateral neck disease, of which, all had bilateral neck disease confirmed on final histopathology. Of the 97 patients who did not, only 2 (2%) patients had bilateral neck involvement demonstrated on pathology. The most commonly involved contralateral nodal station was level II (11/110, 10%), followed level III (4/110, 3.6%), retropharyngeal node (3/110, 3.6%), level IV (2/110, 1.8%), level VA (2/110, 1.8%), and level Vb (1/14, 0.9%). For all oropharyngeal subsites, level II (particularly level IIa) was the most frequently involved (>70%) level in the ipsilateral neck. Level V (including Va and Vb) was rarely involved, occurring in <10% of palatine tonsil, <5% in lingual tonsil, and never in glossotonsillar sulcus tumours. Presence of extra-nodal extension and multiple ipsilateral positive nodes were associated with increased risk of contralateral nodal disease. The local recurrence rate was 11.8% (n=13), with the majority recurring in the first 2 years post-treatment. The 3-year and 5-year overall survival (OS) for the cohort was 96% and 92% respectively. When OS and recurrence-free survival were stratified against presence of contralateral neck disease, this was not statistically significant (p>0.05).

Conclusion: This study has provided the incidence of contralateral nodal metastatic disease for HPVOPSCC and has added to the growing body of evidence demonstrating that patients with a clinically negative contralateral neck and early-stage disease, have very low pathological rates of contralateral nodal disease and may be appropriate for ipsilateral neck treatment. It has also demonstrated follow-up data and survival analysis.

HN 192

PARAPHARYNGEAL SPACE TUMORS : CHANGES IN PARADIGM OF SURGERY OVER TIME

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Purpose: In this study our purpose is to evaluate the feasibility , safety and outcome of trans-oral robotic surgery for parapharyngeal space tumors.

Materials and Methods: In this series we report five cases of PPS tumors, who underwent resection via TORS.

Case 1: 31 year old female presented with swelling in left tonsillar fossa accompanied by gradual change in voice for 7 months. On examination there was bulge in left tonsillar fossa. CECT showed 47 X 27 X 40 mm heterogeneously enhancing mass in left PPS. Fine Needle Aspirate showed Pleomorphic Adenoma .

Case 2: 47 years old male presented with history of snoring. He had history of transoral excision of left parapharyngeal space tumor in which histopathology came out to be pleomorphic adenoma. He was asymptomatic for 13 years post surgery. On examination there was scar mark on soft palate on left side. There was bulge on soft palate reaching till midline and pushing uvula to right side. CEMRI showed well defined mass measuring 44 x 19 x 50 mm. FNAC was Pleomorphic Adenoma

Case 3: 64 year old male presented with a progressive change in voice for one year. On examination there was a right oropharyngeal bulge involving the tonsillar fossa, both tonsillar pillars and the adjoining soft palate, causing a shift of the uvula to the right. CEMRI showed a well-defined ,75 X 53 X 35 mm lesion in right PPS. FNAC from mass, showed Pleomorphic Adenoma.

Case 4: 34 year female presented with Left Intraoral swelling for 12 years. On examination there was globular soft to firm swelling in left side soft palate and oropharynx. .CEMRI showed lobulated mass in left parapharyngeal space measuring 48 x 40 x 34 mm causing mass effect in oral cavity . it was displacing carotid artery posterolaterally. Post Op histopathology showed pleomorphic adenoma.

Case 5: 34 year male presented with snoring for 2 years. Firm. globular swelling in right soft palate seen. CEMRI showed 28 x 34 x 53mm altered signal intensity mass in parapharyngeal space.Histopathology showed pleomorphic adenoma

There was no involvement of the Internal carotid, External carotid or the Internal jugular vessels in all five cases.

All Patients were operated under general anesthesia via nasotracheal intubation. The Da Vinci SI system with three arms was used (one endoscopic arm with integrated cameras for the 3-dimensional view and two instrument arms, a 5mm Maryland forceps and a 5mm monopolar spatula cautery). A bedside assistant was tasked with suctioning of fumes and blood, retraction and helping in controlling intraoperative bleeding. Transoral exposure was obtained with a FK retractor.

Results: We were able to remove the tumor in toto in the 1st and 4th patient, while in 2nd and 3rd case, tumor was removed in piece meal. No major complication was encountered and the wound healed spontaneously. On 6 month follow up all patients were asymptomatic without recurrence.

Conclusion: In conclusion , TORS approach for PPS tumors can provide the much required bridge for direct, less invasive and safe approach in properly selected patients.

ORTHO 95

ACCURACY OF CUP POSITION USING AN INERTIAL NAVIGATION SYSTEM COMPARED TO STANDARD LANDMARKS IN DAA THA

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Purpose: Dislocations in total hip arthroplasty (THA) are still responsible for almost a quarter of the complications leading to early revision surgery, despite improvements in surgical techniques, implants and technology. Correct acetabular component placement plays a critical role to wipe out these early revisions. Although the transverse acetabular ligament (TAL) can control anteversion, inclination can only be guided by navigation. In order to overcome initial disadvantages with navigation, an imageless, easy to use inertial navigation system has been recently introduced. This study aims to analyze the accuracy of inclination with this inertial imageless navigation system compared to the standard anatomical landmarks (SAL).

Materials and Methods: 180 patients were retrospectively included after a THA was performed by the same surgeon via the direct anterior approach (DAA) at a single center. The first cohort (83 patients) used SAL in contrast to the second cohort (95 patients) where navigation was applied. Inclination was aimed at 38 degrees and anteversion was assessed by the transverse acetabular ligament (TAL) in both cohorts. Demographic data and contralateral hip information were collected. Postoperative radiographs, AP pelvis and cross table lateral, were fulfilled at 6 weeks. Inclination was determined on the AP pelvis and anteversion was measured on the cross table lateral radiograph.

Results: A mean inclination of 41.8 (\pm 6.8) degrees and 38.9 (\pm 4.4) degrees was found in the SAL and navigation cohort, respectively. There was a mean overall anteversion of 25.8 (\pm 3.1) degrees. There was no statistical difference in gender, age and BMI between the two cohorts. If the inclination was set within 10 degrees of the target (i.e. 38 degrees), 88% of the SAL cohort and 97% of the NAV cohort would be achieved. These decrease to 53% and 83% respectively if the variation to target is narrowed down to 5 degrees.

Conclusion: Acetabular component inclination could be significantly more accurate if an inertial navigation device was used without having the limitations and disadvantages of current standard navigational techniques. This could avoid up to a quarter of complications leading to early revision in THA.

ORTHO 116

COMPARISON OF POST-OPERATIVE PAIN AND COMPLICATIONS AFTER ROBOTIC-ASSISTED VERSUS MANUAL TOTAL KNEE ARTHROPLASTY IN THE SAME PATIENT UNDERGOING SIMULTANEOUS BILATERAL TKA A PROSPECTIVE DOUBLE-BLINDED RANDOMIZED CONTROL TRIAL

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Purpose: Robotic technology was introduced to minimize technical errors such as mal-alignment and instability, which can result in poor outcomes and increased revision rates after TKA. Studies have shown that robotic-arm assisted TKA reduces soft tissue trauma and inflammatory markers in the post-operative period, which translates to less pain and faster recovery, and shorter length of stay; however, these studies were non-randomised, retrospective studies in different patient cohorts. This is one of the first prospective, double-blind randomized controlled trial to compare early post-operative pain and recovery after robotic-arm assisted TKA versus manual jig-based TKA, using a single implant design, in the same patient undergoing bilateral simultaneous TKA.

Materials and Methods: 102 eligible patients underwent bilateral simultaneous TKA and were recruited to have one knee replaced by RTKA and the other knee replaced by MTKA. Eligible patients had a similar deformity (based on radiological HKA angle measurements), grade of arthritis based on the Kellgren-Lawrence system and similar pre-operative VAS pain scores between both knees. Computer-generated randomization was applied to decide which knee would receive robotic-assisted TKA and MTKA. Post-operative VAS pain was the primary outcome. Secondary outcomes included active ROM, Tourniquet time, intra-operative complications, and insert thickness used in RTKA versus MTKA.

Results: 91 patients were included in the final analysis. There was no difference in the pre-operative functional status based on the Oxford Knee Score (OKS). The mean pre-operative OKS in the Robotic cohort [15.03 (SD=5.23)] and Manual cohort [(15.52, SD=5.74] ($p=0.675$) was comparable. Pre-operative pain levels were comparable between knees operated by either procedure (Mean Robotic OKS-Pain Subscore 34.9, SD=11.7 versus Mean Manual OKS-Pain Subscore of 34, SD=10.5, $p=0.805$). VAS pain scores on the day of surgery were significantly lower in the RTKA group (Mean VAS 5.36, SD=1.865) compared to the MTKA group (Mean VAS 6.23, SD= 1.499, $p=0.001$), with a similar trend on the first and second postoperative days. Active knee flexion was comparable. Tourniquet times were significantly shorter in the RTKA (Mean tourniquet time 58.47 minutes, SD= 12.56) than in the MTKA group (63.60 minutes, SD=20.33, $P=0.045$). There were 2 cases of Medial Collateral Ligament avulsion fractures and 1 case of intra-operative tibial condyle fracture in the MTKA group.

Conclusion: This double-blind RCT demonstrated significantly lower pain scores in robotic- TKA compared to manual TKA in the immediate post-operative period, performed in the same patient undergoing bilateral simultaneous-TKA. RTKA was associated with shorter operating times. Large-volume randomized studies are required to assess outcomes at longer follow-up periods to establish clinical benefits.

ORTHO 117

ACCURACY OF SURGEON-DERIVED VERSUS CT-BASED BONY LANDMARK REGISTRATION DURING ROBOTIC-ASSISTED TKA: A COMPARATIVE CLINICAL STUDY

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Purpose: Robot-assisted total knee arthroplasty (RA-TKA) aims to improve implant positioning accuracy and reduce outliers in achieving limb alignment. Image-based systems rely on pre-operative imaging, such as CT scan, to create a 3D virtual model of the knee, while image-less systems require surgeons to register landmarks and bone intraoperatively. Concerns about potential errors during landmark registration in imageless system registration have mostly been studied on cadavers or saw-bone models. This is one of the first studies to compare the accuracy and reproducibility of bony landmark registration using CT-based and surgeon-derived landmarks during robotic-assisted TKA.

Materials and Methods: This study was a prospective observational analysis on 90 consecutive patients to assess surgeon-derived accuracy in intra-operative bony landmark registration compared to 3D CT-based landmark registration using the Image-based MAKO-robotic TKA software. After completing bone registration with an error less than 0.2mm, the surgeon was required to register pre-defined anatomical landmarks using the bone registration probe, relying entirely on the tactile and visual feedback from the operating field. The logs for each case were extracted using a custom Python script and planar and 3D distances between the surgeon-derived intra-operative landmark registration points and their corresponding 3D CT-derived landmarks were compared and mapped in x, y, and z coordinates. Based on the variations in landmark registration, the software code was designed to calculate differences in bone resection (over-resection and under-resection) and axial component positioning of the femur (internal versus external rotation).

Results: 84 patients with a mean age of 62.6 years (SD= 8.9) were eligible for final analysis. Trans epicondylar axis (TEA) error with surgeon-derived points ranged from 7.9 degrees of internal rotation to 9.7 degrees of external rotation compared to CT-based clinical TEA. Mean 3-D distance error of the surgeon derived medial and lateral epicondyle was 6.1mm (SD-3.1) and 5.4mm (SD-2.3) respectively. Along the coronal plane, the majority of the surgeon-derived points were found to be over-cutting both the medial (N-72, 85.7%) and lateral femoral condyle (N-61, 72.6%); and also the medial (N-60, 71.4%) and lateral posterior femoral condyle (N-53, 63%). Tibial resection error ranged from 2.4mm proximally to 3.6mm distally in the medial plateau and 3.8mm proximally to 6.4mm distally along the lateral tibial plateau. Most surgeon-derived points on the medial tibial plateau were under-cutting (N-49, 58.3%) whereas on the lateral tibial plateau, the surgeon tended to over-cut (N-52, 61.9%).

Conclusion: This study demonstrated high variability in Image-free bone registration of anatomical landmarks by surgeons compared to CT-image based landmark registration in patients undergoing robotic-arm assisted TKA. Errors in bone registration can lead to variations in component positioning as well as in the depth of bone resection. Our findings show a wide variability in bone resection depths and femoral component rotation with image-free techniques.

ORTHO 118

FUNCTIONAL ALIGNMENT IS ASSOCIATED WITH INCREASED INCIDENCE OF PRE-BALANCE, REDUCED SOFT TISSUE RELEASE AND POSTOPERATIVE PAIN COMPARED TO MECHANICAL ALIGNMENT IN PATIENTS UNDERGOING SIMULTANEOUS BILATERAL ROBOTIC ASSISTED TKA- A PROSPECTIVE, SELF-CONTROL

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Purpose: Mechanical alignment (MA) has been considered the gold-standard for total knee arthroplasty (TKA), but personalized alignment strategies such as Functional alignment (FA) which is a balance-driven strategy aim to restore native knee alignment, with minimal compromise of the soft tissue envelope. This is one of the first studies to evaluate the influence of two different alignment strategies (MA versus FA) on soft-tissue balance of the knee, in the same patient undergoing simultaneous bilateral robotic-assisted TKA (SB-RATKA) with one strategy employed in each knee. This study aimed to quantitatively assess and compare knee balance, incidence of soft-tissue releases and post-operative pain using MA versus FA in the same patient SB-RATKA.

Materials and Methods: This was a prospective, self-controlled, randomized controlled trial involving 72 patients with bilateral knee osteoarthritis who underwent SB-RATKA using the MAKO® robotic system. Inclusion criteria consisted of patients with bilateral OA knee with a comparable grade of arthritis, similar deformity, and comparable pain. 65 patients were included in the final analysis with one alignment strategy done per knee, with the patients blinded to the alignment strategy used. The study recorded the incidence of pre-balance (with pre-balance defined as quantitative mediolateral balance in flexion and extension, with the difference equal to or less than 2mm based on MAKO dynamic gap assessment) in both groups, post-operative VAS pain scores and additional soft tissue releases required.

Results: The mean age of the study population was 57.95 years, with a female preponderance (N=53, 81.6%). The pre-operative coronal (MA-9.5 ±4.3; FA-9.6 ±4.3) and sagittal (MA-3.6 ±4.2; FA- 3.3 ±4.4) plane deformities were comparable in both groups. At the end of dynamic balancing, the MA group had significantly more medial compartment tightness in both flexion (MA-15.6 ±1.8; FA-17 ±1.3) and extension (MA-14.9 ±1.9; FA-17 ±1.1) ($p < 0.0001$) compared to the FA group. 66% of knees in the FA group (N=43) achieved pre-balance compared to 32.3% in the MA group (N=21) ($p < 0.0001$). The requirement for posteromedial release (PM), posterior capsular (PC) release, tibial reduction osteotomy (TRO), and superficial MCL pie crusting (sMCL) were significantly lower in the FA group (PM-22, PC-13, TRO-8, sMCL-2) compared to the MA group (PM-44, PC-29, TRO-18, sMCL-8). FA group had a substantially lower mean post-operative VAS pain score (12 hours-5.4; 24 hours-4.6) compared to the MA group (12 hours-6.1; 24 hours-5.7). This trend was also observed 48 hours and 72 hours post-surgery and was shown to be highly significant. ($p < 0.0001$)

Conclusion: Functional alignment strategy resulted in a higher incidence of knee balance and a reduced need for additional soft tissue release during SB-RATKA compared to the mechanical alignment strategy. These findings support the use of FA as an alternative to MA in TKA. Future research will examine the impact of these alignment strategies on patient-reported outcomes at medium-term follow-up.

ORTHO 119

INFLUENCE OF PCL RETENTION AND SACRIFICE ON KNEE BALANCE AND BONY RESECTION WITH FUNCTIONAL ALIGNMENT DURING ROBOT-ASSISTED TOTAL KNEE ARTHROPLASTY.

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Purpose: The decision to retain or sacrifice the posterior cruciate ligament (PCL) during total knee arthroplasty (TKA) is a subject of debate among arthroplasty surgeons. Prior studies have reported varying effects of PCL resection on gaps, with flexion gap being more affected. Most of these studies were in-vitro using mechanical tensioners on cadavers that do not replicate normal physiological elasticity. Additionally, previous in-vivo studies have solely investigated the impact of PCL removal on gaps, without considering its effects on bone cuts and overall ability to achieve preemptive balance. The primary aim of this study was to determine the number of knees that could achieve pre-balance with and without the PCL and to analyze the effects of PCL removal on gaps and bone cuts. Furthermore, we also attempt to utilize the initial gap assessment data to predict which knees can be balanced through PCL retention or sacrifice.

Materials and Methods: This was a prospective study of 100 consecutive patients undergoing primary Mako robot assisted TKA (RATKA). Patients with primary unilateral varus osteoarthritis of the knee were included. Initial gap assessment and pre balancing without soft tissue release was performed with the PCL retained, and knees were classified as balanced or unbalanced. Subsequently, the PCL was removed in all cases, and re-balancing was performed to evaluate changes in the proportion of knees balanced and the impact on gaps and bone resection thickness. Furthermore, the medio-lateral differences in initial gaps were recorded in all cases to predict which knees may require PCL sacrifice to achieve further balance.

Results: The study included 100 patients with a mean age of 59.2 (SD=8.56) with female preponderance (N=73, 73%). Mean pre-operative varus deformity was 10.5 degrees (SD=2.14). 69 knees (69%) were balanced using functional alignment with the PCL retained. PCL sacrifice in the balanced group resulted in a preferential increase in flexion gap. Rebalancing these knees lead to a decrease in posterior femur cut(2.5 mm postmedial, 2.1 mm posterolateral) Removal of the PCL in remaining 31 knees helped achieve further pre-balance in 15 knees which had isolated flexion medial tightness. 16 knees which had medial tightness both in flexion and extension remained unbalanced even with PCL resection, requiring additional soft tissue releases to achieve balance.

Conclusion: With functional alignment and dynamic balancing during RATKA, majority of the knees balanced with PCL intact. PCL resection increased the chances of attaining pre-balance and lead to a preferential increase in flexion gaps. Rebalancing the knees in the balanced group after PCL resection was associated with a decrease in the thickness of posterior femoral bone resection making it more bone-conserving. We could predict knees with isolated flexion medial tightness and a mediolateral (ML) extension gap difference of 5mm or < can be balanced with removal of the PCL. Knees with medial tightness both in flexion and extension and an ML extension difference of >7 mm could not be balanced even after removal of the PCL requiring further soft tissue releases.

ORTHO 151

SHORT-TERM FOLLOW-UP OF THE EFFICACY OF ROBOT-ASSISTED MINIMALLY INVASIVE RESECTION OF LIMB OSTEIOD OSTEOMA

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Purpose: To observe the difference in surgical efficacy between robot-assisted minimally invasive resection and conventional surgical approach for the removal of osteoid osteoma of the limb

Materials and Methods: From November 2017 to June 2019, 13 patients with limb osteoid osteoma were enrolled and divided into two groups according to the patient's voluntary principle. In the treatment group, 5 cases, aged 11-23 years (mean 16.2 years), 2 cases each of femoral and tibial trunk and 1 case of femoral trochanter, underwent tumour resection using the robot, and in the control group, 8 cases, aged 4-35 years (mean 17.9 years), 4 cases of femoral trunk, 3 cases of tibial trunk and 1 case of proximal humerus, were resected using conventional C-arm fluoroscopic localisation. Due to the small number of cases, only the differences between the two groups in terms of operation time, bleeding volume, tumour resection accuracy (ratio of tumour nest length to bone resection area length), postoperative pain medication dosage and pain score at 3 days postoperatively were observed to evaluate the effectiveness of the robot in the surgical resection of limb osteoid osteoma.

Results: Postoperative pathological findings confirmed the diagnosis of osteoid osteoma in all cases, with no complications such as wound infection or fracture, and no bone grafting or use of internal fixation. In the treatment group of 5 cases, the mean operative time was 81 minutes (21 minutes for robotic positioning and 60 minutes for lesion excision), the mean bleeding was 34 ml, the mean number of postoperative NSAIDs used was 1.2, and the mean visualisation pain score (VAS) was 1.2 at 3 days postoperatively and 0 at 1 month postoperatively. The mean accuracy of tumour resection was 0.86. In the control group of 8 cases, the mean operation time was 63 minutes, the mean bleeding was 41 ml, the mean number of postoperative NSAIDs used was 3.2, the mean visualisation of pain score (VAS) was 3.1 at 3 days postoperatively, the mean VAS score was 1.1 at 1 month postoperatively, and the mean accuracy of tumour resection was 0.52.

Conclusion: Although robot-assisted resection of osteoid osteoma took longer than traditional surgery, more time was spent on robotic positioning and comparable time was spent on tumour resection as in traditional surgery. In terms of accuracy of tumour resection and postoperative pain relief, the robotic surgical resection was more accurate, less traumatic and the patient recovered faster.

ORTHO 169

CAN WE IMPROVE ON 80% HAPPY PATIENTS WITH A ROBOT-ASSISTED MECHANICALLY ALIGNED TOTAL KNEE REPLACEMENT (TKA)

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Purpose: Publications and presentations are continuing to report that 20% of patients are unhappy with the outcome of their total knee arthroplasty and therefore we need to explore our targets for alignment. New philosophies for implant alignment are being advocated to improve patient satisfaction with this procedure. Having commenced robot assist TKA whilst maintaining the aim of implanting the prosthesis to a neutral mechanical axis we reviewed our patients to specifically ask them if they are happy with the outcome of their knee replacements after 1 year.

Materials and Methods: This is a retrospective cohort study on the first 175 patients who underwent robot-assisted Total Knee Arthroplasty (TKA) from Dec 2019 to August 2021 and were followed for a minimum of 1-year postoperatively. All TKAs used ROSA robot assist technique with Persona cementless prosthesis aiming to restore neutral mechanical alignment with a flexion gap balancing. We evaluated response to two primary questions which are, whether or not the patients were happy they had their left/right knee replacement surgery?" and "whether they were happy with the outcome of their left/right knee replacement?".

We used descriptive statistics to summarise outcomes and Chi-squared test was used for categorical variables to test association between patients' assessment of TKA outcome and extent of soft tissue release. For all analyses, P-values ≤ 0.05 was considered statistically significant.

Results: Of the group of 175 patients, 165 were contactable and responded with 95% patients confirming they were happy they had the surgery done and 93% of patients confirming they were happy with the outcome of the surgery. A sub analysis identified that patients who had simultaneous bilateral Total Knee Arthroplasty (TKA) were less likely to be happy and we found this to be significant ($p \leq 0.05$). However, there was no statistically significant difference in functional outcome with an average oxford knee score of 40.

Conclusion: Using robot assist technique for mechanical alignment TKA with flexion gapbalancing 93% of our patients were happy with the outcome of their surgery. The often-quoted figure of 20% patients being unhappy with TKA is either incorrect or the addition of robot assist has improved this outcome even with MA philosophy. Staged surgery should be considered for patients requiring bilateral Robot-assisted Total Knee Replacement (TKA) as our results indicate less satisfaction with the bilateral simultaneous procedure.

ORTHO 178

DOES ROBOTIC ASSISTED POSTERIOR STABILIZED TOTAL KNEE REPLACEMENT RESECT LESSER BONE THAN ROBOTIC ASSISTED CRUCIATE RETAINING TOTAL KNEE REPLACEMENTS

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Purpose: This study aimed to compare the amount of bone conservation between posterior stabilized robotic assisted total knee replacement (PS-RATKR) and cruciate retaining robotic assisted total knee replacement (CR-RATKR). Seventeen patients underwent PS-RATKR and seventeen underwent CR-RATKR.

Materials and Methods: This retrospective study included 34 patients who underwent RATKR with either PS or CR design. Seventeen patients received PS-RATKR and seventeen received CR-RATKR. All RA-TKR's were performed by the same surgeon using the same robotic arm system. The bone cuts on the tibia and posterior femur was measured using the values of bone resection from the Robotic system. The data were analyzed using chi square tests.

Results: The average bone resected from the tibia for PS-RATKR was 5.74 mm, while it was 6.64 mm for CR-RATKR.

The average bone resected from the posterior femur for PS-RATKR was 8.94 mm, while it was 10.6 mm for CR-RATKR.

The highest amount of bone resected from the tibia and femur was taken for the calculation of the mean.

The average tibial slope for PS-RATKR was 3.4 degrees, while it was 5.77 degrees for CR-RATKR.

These results were statistically significant ($p < 0.05$). The results showed that PS-RATKR conserved more bone on the tibia and posterior femur than CR-RATKR.

Conclusion: In conclusion, PS-RATKR conserved more bone on the tibia and posterior femur than CR-RATKR. In robotic assisted TKR's bone resection is done only after ligament balancing which helps in conserving bone. Removing the Posterior Cruciate Ligament prior to balancing helps in increasing flexion gap which in turn leads to decreased amount of bone resection from the posterior femur and tibia. The tibial slope required to achieve adequate flexion gaps in PS-RATKR is significantly lesser than the tibial slope required in CR-RATKR.

ORTHO 180

DOES ROBOTIC ASSISTANCE HELP WITH BONE PRESERVATION IN TOTAL KNEE REPLACEMENT

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Purpose: 1. To determine the size of the tibial polyethylene inserts used in total knee replacements and use it as a surrogate marker in analyzing the bone resected in robotic and conventional TKRs.

2. To determine the amount of bone resected in Robotic TKR's and analyze whether the amount of bone resected is less than standard conventional TKR's.

Materials and Methods: Study design - Retrospective study

Inclusion criteria – All primary robotic and conventional total knee replacements done by a single surgeon

Duration of the study – 1 year (January 2022 – December 2022)

Study population = 157 knees

All primary total knee replacements (Robotic and Conventional) performed by a single surgeon was analyzed retrospectively and the tibial polyethylene inserts used were tabulated.

All knee replacements were performed with a medial parapatellar approach. In robotic knee replacements the size of the bone cuts was noted from the data available in the robotic system. The highest value of the bone resected from the femur and tibia was tabulated. In conventional knee replacements 9mm of the distal femur and 9mm of the normal side of tibia was cut. All robotic knee replacements were balanced before bone cuts were made and then bone resection was done with the robotic arm.

Results: It was seen that out of 90 knees which underwent Robotic TKR the base size tibial polyethylene of 9mm was used in 84 knees whereas Base+2mm (11mm) polyethylene was used in 6 knees. Hence we were able to use the base size tibial insert in 93.3% of the knees which underwent robotic TKR.

Out of the 67 knees which underwent conventional TKR's it was found that the base tibial polyethylene of 9mm was used in 45 knees whereas the base + 2mm (11mm) polyethylene was used in 19 knees and the base + 4mm(13mm) polyethylene was used in 3 knees.

The amount of bone resected from the distal femur and the tibia was also calculated and it was found that robotic TKR had an average distal femoral cut of about 7.4mm with the minimum being 3mm. The average amount of tibia resected was found to be around 6.4mm of the normal side of the tibia with the minimum being 3mm.

The values were tabulated in a 2x2 contingency table. The significance of the comparisons was evaluated using the chi-square test and Fischer's exact test. It found that there was significant difference in the size of the tibial polyethylene used in robotic TKR's compared to conventional TKR's.

Abstract content appears as submitted.

Conclusion: It was found that robotic total knee replacements resulted in smaller tibial polyethylene inserts compared to conventional total knee replacements indicating that the amount of bone resected is considerably lower in robotic total knee replacements. Also there was not even a single case which required a base+4mm poly in robotic TKRs whereas base +4mm poly was used in 3 out of the 67 conventional TKRs.

With this study we conclude that using robotic navigation in total knee replacement can result in smaller amount of bone resection and hence preserve more bone.

ORTHO 181

VARIATIONS IN PELVIC TILT BETWEEN RELAXED-SEATED AND FLEXED-SEATED POSITIONS AFFECT STABILITY ASSESSMENT IN 3D MODELLING IN TOTAL HIP REPLACEMENT (THR).

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Purpose: Hip instability is the second most common cause of revision hip arthroplasty in the first 11 years. The spinopelvic axis is becoming recognised as an essential contributor to impingement and instability leading to dislocation. Computer-assisted hip surgery uses the relaxed-seated radiograph as a surrogate marker of pelvic tilt in all seated positions. However, the flexed-seated position is a high-risk position for dislocation, and the relaxed-seated radiograph may not reflect this risk. This study aims to determine whether adding a flexed-seated radiograph affects stability assessment in 3D modelling of THR.

Materials and Methods: Ninety patients underwent computer-assisted THR and received standing, relaxed-seated, and flexed-seated radiographs. Sacral slope (SS) was measured and analysed using Pearson correlation.

Results: Of examined patients, 96.7% anteriorly tilted their pelvis moving from relaxed-seated to flexed-seated, and 50% of patients anteriorly tilted by ≥ 10 degrees SS. There was a negligible correlation between change in SS [standing to relaxed-seated] and change in SS [relaxed-seated to flexed-seated]. There was a moderate correlation between standing SS and flexed-seated SS. There was a strong correlation between relaxed-seated SS and flexed-seated SS; however, there was a wide variance of flexed-seated SS for any given relaxed-seated or standing SS.

Conclusion: The flexed-seated position is a quantitatively higher risk position for anterior impingement and posterior dislocation in 96.7% of patients. The magnitude of anterior pelvic tilt when flexing forward varies by patient, with 50% of patients flexing by ≥ 10 degrees, and some tilting by ≥ 30 degrees. The flexed-seated position cannot be predicted by existing radiographs, with other measures of spinopelvic mobility having no reliable correlation. As the flexed-seated position reflects a high risk of impingement and dislocation, this measurement is an important marker in surgical planning to prevent instability.

ORTHO 189

SHORT-TERM OUTCOMES OF RESTRICTED KINEMATIC ALIGNMENT VS MECHANICAL ALIGNMENT DURING ROBOT-ASSISTED TOTAL KNEE ARTHROPLASTY

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Purpose: Restricted kinematic alignment (rKA) in total knee arthroplasty (TKA) aims to restore pre-arthritic knee anatomy and physiology, while setting appropriate boundaries for patients with atypical or inferior anatomy. It reduces soft-tissue release (STR) required to balance the knee, and aims to improve on the results of mechanical alignment (MA) TKA. Robot-assisted (RA)msurgery permits bone-mapping and accurate execution of bone-cuts during TKA within +/- 0.5mm, thus enabling the surgeon to reproduce near-precise rKA as planned. The purpose of this study was to compare STRs required for rKA versus MA in RA-TKA, and to compare clinical outcomes between the two groups.

Materials and Methods: 100 patients each, undergoing TKA for osteoarthritis with varus deformity, using MA and rKA respectively were studied. Pre-operative long-leg radiographs were obtained to assess mechanical-axis deviation, LDFA and MPTA. With the aim of restoring the limb within 3° of the mechanical-axis, the following narrow-boundaries for rKA were considered acceptable while planning bone-cuts during RAS TKA: (i) angulation of 0°-4° for LDFA and MPTA in the coronal plane in extension, (ii) femoral component external rotation between 0° and the combined Whiteside-Posterior condylar axis angle, in the transverse plane in flexion, (iii) femoral component flexion of 0°-6° in the sagittal plane and (iv) tibial slope of 0°-6° in the sagittal plane. Gap tightness was assessed throughout the range of movement. Residual medial compartment tightness and the need for STRs, posterior cruciate ligament recession/release (PCLR), tibial reduction osteotomy (TRO) or femoral sliding condylar osteotomy (SCO) were documented. Necessity for these procedures was compared between the MA and rKA groups, and within sub-groups of residual medial compartment tightness of 0-3mm, 4-7mm and greater than 7mm. KSS, functional score and WOMAC was assessed at 1 year.

Results: 85, 13 and 2 patients in the rKA group versus 54, 32 and 14 in the MA group were restored to the 0-3mm, 4-7mm and greater than 7mm sub-groups respectively. The overall requirement for STRs, PCLR, TRO and SCO was significantly lesser in the rKA group. Residual medial compartment tightness of 0-3 mm was treated in all patients without additional STR besides deep fibers of the medial collateral ligament. Medial tightness of 4-7 mm required additional STRs, PCLR or TRO. Tightness greater than 7mm had a significantly high requirement of SCO for attaining a balanced knee. The KSS (93.2 +/- 2.9 for rKA and 92.8 +/- 2.04 for MA) (p=0.242), functional score (93.08 +/- 5.88 for rKA and 92.36 +/- 5.31 for MA) (p=0.108) and WOMAC (89.72 +/- 2.49 for rKA and 89.16 +/- 2.84 for MA) (p=0.140) were comparable between the groups at one year following surgery.

Conclusion: RAS-TKA with narrow-boundary based rKA is associated with similar clinical outcomes compared to MA-TKA, but is associated with significantly lesser requirement of soft tissue releases, PCLR, TRO and femoral SCO. Residual projected medial compartment tightness on RAS is a good predictor of STRs that shall be required to balance the knee.

ORTHO 195

ILIO- FEMORAL IMPINGEMENT ANGLE: A NEW RADIOGRAPHIC MEASURE

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Purpose: Hip dislocations after total hip arthroplasty (THA) are a debilitating complication and a common position for dislocation is with the hip in deep flexion. New advances in three dimensional (3D) modelling allow us to simulate the flexion angle for when there is bone on bone impingement of the femur on the anterior inferior iliac spine (AIIS). We aimed to identify a simple radiographic measurement that can replicate this impingement.

Materials and Methods: A radiographic study was performed on 80 consecutive patients who underwent preoperative planning for THA with 3D remodelling from 2021-2022 at a single institution. The flexion angle at which the femur impingement on the pelvis was identified from the 3D model was recorded. This was compared to an angle from the AIIS to the centre of the femoral head and a vertical line measured on lateral seated flexed radiographs. This angle was named the Ilio-Femoral Impingement Angle (IFIA).

Results: The IFIA significantly correlated with the deep flexion impingement angle of the femur and AIIS found on 3D modelling ($r = 0.65$; 95%CI 0.50-0.76; $p < 0.001$).

Conclusion: This study demonstrates that the novel radiographic measurement of the IFIA represented the deep flexion impingement angle of the femur on the AIIS. The IFIA may be used as a simple and cost-effective alternative measurement to model impingement during flexion.

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OUR EARLY ASSESSMENT OF TKA MANAGED WITH IMAGELESS ROBOTIC VELYS SYSTEM AND ATTUNE PS KNEE

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Purpose: Dynamic intraoperative assessment of joint gaps and ligaments in robotic assisted TKA(RA-TKA) platforms enables precise bone resection, component alignment and soft tissue balance leading to an improvement in postoperative pain and recovery. The purpose of the study is to determine early clinical outcomes of imageless RA-TKA using

Velys Surgical robot and Attune PS system.

Materials and Methods: 38 patients who were planned for unilateral RA-TKA between December 2022 and February 2023 and were willing for follow up were enrolled in this prospective cohort study . Exclusion Criteria:- a) B/LTKA , b) BMI > 40 and c) Complex cases that require stems and augments. All the cases were operated by a senior arthroplasty surgeon using Velys Robotic system using mechanical alignment. Imageless RA-TKA system uses intraoperative landmark registration which is highly accurate in planning cuts , component size and orientation. All tibia were cut in 0 degree varus and 3 degree posterior slope and after assessment of ligament balance femur component size, flexion and rotation was adjusted to ligament tension and stability assessment . Post op analgesia was standardized with twice daily dose of nsaid and no use of opioids. Active knee bending exercise started immediately from POD 0 and full weight bearing walk from POD1. Knee functional outcome was evaluated by ROM , WOMAC and VAS score at immediate postop , 2 weeks and 3 months.

Results: 38 patients who underwent RA-TKA were included in this study. 9/38 patients were male . Mean age was 63.05 ± 6.10 years. Only 1 patient had inflammatory arthritis and rest 37 had Osteoarthritis knee. 24/38 were right sided knee . Mean BMI was 33.83 ± 4.11 . Mean HKA was 168.2 ± 6.34 degree, 15/38 had fixed flexion deformity and 4 patients had hyperextension deformity with a mean flexion of 95.65 ± 6.79 degree. 1 patient had long intramedullary nail in situ. Mean preop VAS score was 79.9 ± 5.91, mean preop WOMAC score was 35.92 ± 6.94 and mean preop KSS score was 33.23 ± 8.93. IMMEDIATE POST OP: mean flexion achieved was 110.52 ± 9.21 degree and mean VAS score was 41.42 ± 6.22 . At 2 weeks follow up mean ROM was 118.81 ± 5.12 degree , mean VAS score was 24.39 ± 3.85 , mean WOMAC score was 52.12 ± 5.97 and mean KSS score was 62.76 ± 3.47 . At 3 months follow up mean ROM was 125.26 ± 4.64 degree, mean VAS score was 14.55 ± 3.23 , mean WOMAC score was 71.34 ± 5.48 and mean KSS score was 77.92 ± 3.45.

Conclusion: Imageless Robotic TKA is associated with excellent patient satisfaction in terms of very good pain relief in immediate postop period, early mobilization and rehabilitation with improved knee function scores without any complication in short term follow up.

T 85

ROBOT-ASSISTED VESUS THORACOLAPAROSCOPIC ESOPHAGECTOMY FOR LOCALLY ADVANCED ESOPHAGEAL SQUAMOUS CELL CARCINOMA AFTER NEOADJUVANT CHEMORADIOTHERAPY

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Purpose: Robot-assisted esophagectomy (RAE) and thoracoscopic esophagectomy (TLE) are surgical techniques for the treatment of esophageal cancer. This study aimed to compare the perioperative and mid-term outcomes of RAE versus TLE for patients with locally advanced esophageal squamous cell carcinoma (ESCC) undergoing neoadjuvant chemoradiotherapy (nCRT).

Materials and Methods: Consecutive patients receiving nCRT plus RAE or TLE were retrospectively included in this single-institution study from January 2016 to January 2021. Minimally invasive McKeown esophagectomy with two-field or three-field lymph node dissection was performed. In the RAE group, da Vinci system with three-arm technique were used in both thoracic and abdominal phases. The operative time was defined as the time from the start of the chest incision to the completion of closure of the cervical and abdominal wounds. Perioperative outcomes were compared and survival analysis was performed.

Results: This study enrolled 251 patients, 80 (31.9%) in RAE and 171 (68.1%) in TLE. The conversion rate was equivalent in RAE versus TLE (3.8% vs 2.9%, $P = 1$). Median operative time in RAE was significantly shorter than that in TLE (254 vs 289 minutes, $P < .001$). Compared to TLE, RAE harvested more lymph nodes along the recurrent laryngeal nerve [4 (3-6) vs 3 (1-5), $P < .001$]. Overall complications were similar in RAE compared to TLE (38.8% vs 38.0%, $P = .911$). No statistically significant difference in disease-free survival (log-rank $P = 0.721$) or overall survival (log-rank $P = 0.325$) was found between groups.

Conclusion: Compared to TLE, RAE could achieve shorter operative duration and better lymph nodes dissection along the bilateral RLN for locally advanced ESCC after nCRT, with comparable short-term outcomes. A long-term survival remains to be verified.

T 107

FIRST AUSTRALIAN EXPERIENCE OF ION BRONCHOSCOPY-MEETING THE CHALLENGE OF SMALL PULMONARY NODULES

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Purpose: This paper presents the findings of the first Australian experience of ION bronchoscopy, which aimed to evaluate outcomes of procedures for the diagnosis of pulmonary nodules. Pulmonary nodules are small abnormal growths in the lungs that may require further investigation for potential malignancy. The implementation of routine lung cancer screening guidelines has led to the increased detection of lung nodules with tissue biopsy increasingly required. Following our first in human study using a prototype, the commercial system ION is now available. The primary objective was to assess the diagnostic yield and procedural outcomes associated with robotic bronchoscopy in a real-world clinical setting.

Materials and Methods: A prospective RBWH HREC approved study with CTN approval via TGA. The audit analysed patient data for 35 patients who underwent robotic bronchoscopy at RBWH between May 2022 and April 2023.

Results: A total of 33 robotic procedures were completed. 28.6% of the patients had a previous bronchoscopy including "standard of care" nodule biopsy using EBUS. The demographic characteristics of the sample showed a male count of 54.3% and a female count of 45.7%, with an average age of 66.86 years and an average BMI of 27.26. 8.6% were found in the left lower lobe (LLL), 45.7% in the left upper lobe (LUL), 11.4% in the right lower lobe (RLL), 5.7% in the right middle lobe (RML), and 28.6% in the right upper lobe (RUL). Lesion sizes ranged between 8mm-28mm with average lesion size of 15.9mm. 57.6% of patients had positive Bronchus sign on CT while 42.4% did not have Bronchus sign.

The final overall diagnoses were malignant 84.8% and benign rate 15.2% of cases. The diagnostic yield of robotic bronchoscopy for pulmonary nodules was 87.9% overall, with a higher diagnostic yield observed for malignant nodules (96.4%) compared to benign nodules (40.0%). The overall diagnostic yield with the presence of the Bronchus sign was found to be 89.5%, indicating a slightly higher rate of accurate diagnosis when this sign was present. When the Bronchus sign was absent, the diagnostic yield was slightly lower at 85.7%.

Transbronchial needle aspiration (TBNA) was the primary technique used in 97.0% of cases, while washing only was utilized in 3.0% of cases. Additional techniques such as transbronchial lung biopsy (TBLB) and brush biopsy were employed in 9.1% and 6.1% of cases, respectively, with 3.0% of cases utilizing both TBLB and brush biopsy. The average procedure time was 68.1 minutes, with a total fluoroscopy time of 4.4 minutes and a radiation dosage of 19.5 mGy.

The audit also reported a low complication rate, emphasizing the safety of the procedure. There was no pneumothorax in this cohort and one mild haemoptysis occurred which managed conservatively.

Conclusion: These findings highlight the efficacy of robotic bronchoscopy in diagnosing pulmonary nodules, with a high diagnostic yield and a preference for less invasive techniques such as TBNA. The nodules are small and difficult to biopsy by conventional means being bronchus sign negative.

T 160

EFFECTS OF PREOPERATIVE DIABETES MELLITUS ON PERIOPERATIVE OUTCOMES AFTER ROBOTIC-ASSISTED PULMONARY LOBECTOMY

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Purpose: Identifying risk factors for perioperative complications is important for predicting patients' long-term health outcomes. We investigated preoperative diabetes mellitus (DM) as a risk factor for perioperative outcomes after robotic-assisted pulmonary lobectomy (RAPL).

Materials and Methods: We retrospectively analyzed consecutive patients who underwent RAPL over a 93-month period by one surgeon. Occurrences of perioperative complications were analyzed in 500 study patients, with 86 patients diagnosed with preoperative DM and 414 patients without preoperative DM. Statistically significant ($p \leq 0.05$) differences between groups were determined by Chi-square/Fisher's exact analysis or Wilcoxon Rank-Sum (Mann Whitney U test) for medians.

Results: Among 500 patients undergoing RAPL, 17.2% had preoperative DM. Postoperatively, patients with preoperative DM were more likely to have atrial fibrillation ($p=0.011$). Patients with preoperative DM were more likely to have squamous cell carcinoma or neuroendocrine carcinoma, while patients without DM were more likely to have adenocarcinoma ($p=0.021$). Patients with preoperative DM were less likely to have cancer spread to one or more lymph nodes ($p=0.001$). Finally, patients with preoperative DM had significantly longer hospital length of stay ($p=0.042$), and significantly decreased median overall survival time ($p=0.048$).

Conclusion: Patients with preoperative DM were found to have more incidences of postoperative atrial fibrillation, longer hospital lengths of stay, and decreased median overall survival time. Patients with preoperative DM have significantly different cancer histologies than patients without preoperative DM, and patients with DM were less likely to have lymph node metastases. Therefore, preoperative DM is a risk factor for postoperative atrial fibrillation, increased hospital length of stay, and decreased median survival after RAPL.

T 162

RUIJIN ROBOTIC PULMONARY SURGERY, FROM TECHNIQUE TO CLINICAL STUDY

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Purpose: In 2009, the first da Vinci robot-assisted lobectomy was performed in China. Since then, robot-assisted thoracic surgery has become more and more widely performed in various centers in China. Ruijin Hospital affiliated to Shanghai Jiao Tong University School of Medicine, as one of the earlier centers to perform robot-assisted thoracic surgery in China, has carried out more than 1,700 robotic surgeries since May 2015, including more than 1,300 lung cancer surgeries. The surgeries consisted of various procedures from simple to difficult, such as wedge resection, lobectomy, segmentectomy and sleeve resection, along with several studies with low to high evidence levels, such as retrospective studies, meta-analysis and prospective studies, were conducted. This study investigates the safety and value of robot-assisted surgery for lung cancer by summarizing the Ruijin series of robotic lung cancer surgery studies.

Materials and Methods: To summarize the results of a series of studies on robot-assisted surgery for lung cancer conducted from May 2015 to the present at Ruijin Hospital.

Results: Since the first publication on short-term clinical outcomes of robotic radical lung cancer surgery in 2017, Ruijin Hospital has published a total of 7 studies in the Ruijin series of robotic lung cancer surgery in *Ann Surg*, *JTCVS*, *EJCTS*, *ATS* and other leading journals specializing in surgery and thoracic surgery. Among them, 5 were retrospective studies, 1 was a Meta-analysis, and 1 was a prospective randomized controlled study. The total impact factor was 42.751, with a single maximum score of 13.787. The 7 studies in the series were a comparative study of short-term clinical outcomes of robotic versus single-port thoracoscopic radical lung cancer resection (2017, *EJCTS*), a learning curve for robotic anatomic segmentectomy (2019, *ATS*), perioperative outcomes of robotic combined lung subsegmentectomy (2019, *ATS*), and experience of robotic lung sleeve resection (2019, *WJSO*), multicenter robotic versus thoracoscopic anatomic lung segmentectomy short-term clinical outcomes (2020, *JTCVS*), meta-analysis on long-term outcomes of robotic versus thoracoscopic radical lung cancer (2020, *EJCTS*) and prospective randomized controlled trial on clinical outcomes of robotic versus thoracoscopic assisted lobectomy (2021, *Ann Surg*). The results of the series show that robotic lung cancer surgery is safe, feasible, and has similar short-term and long-term clinical outcomes to thoracoscopic surgery, with advantages in terms of N1 lymph node dissection and long-term disease-free survival.

Conclusion: A series of studies on robotic lung cancer surgery at Ruijin Hospital showed that robotic lung cancer surgery, including lobectomy, segmentectomy and sleeve resection, is safe and feasible from simple to complex procedures, and holds advantages over thoracoscopic surgery in terms of N1 lymph node dissection and long-term survival.

T 208

USING PATIENT-REPORTED EASTERN COOPERATIVE ONCOLOGY GROUP PERFORMANCE SCORE TO PREDICT PERIOPERATIVE OUTCOMES AFTER ROBOTIC-ASSISTED PULMONARY LOBECTOMY

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Purpose: The Eastern Cooperative Oncology Group (ECOG) Performance Scale (PS) is a measurement of patients' functional level. The score is assigned based on their ability for self-care, daily activity, and physical ability. Poor functional performance preoperatively has been demonstrated to predict surgical outcomes and complications across different subspecialties. ECOG PS is typically reported by physicians, but this study investigated the predictive value of patients' own determination of their ECOG PS on perioperative outcomes following robotic-assisted pulmonary lobectomy (RAPL) for lung cancer.

Materials and Methods: We retrospectively analyzed 367 patients who underwent RAPL by one surgeon between January 2014 and March 2022 and who had patient-reported ECOG PS preoperatively. Patients were divided into 2 groups: ECOG = 0 (N = 268, 73.0%) or ECOG \geq 1 (N = 99, 27.0%). Patient demographics, comorbidities, and perioperative outcomes were analyzed using Chi-Square or Fisher's exact tests, Student's t-tests, and Kruskal-Wallis tests, with statistical significance of $p \leq 0.05$.

Results: Patients with ECOG \geq 1 had greater estimated blood loss during surgery (100 mL [50, 172]; $p = 0.011$), longer skin-to-skin operative time (185 min [146, 222]; $p = 0.042$), longer chest tube duration postoperatively (4 days [3, 8]; $p = 0.047$), and longer hospital length of stay (5 days [3, 8]; $p = 0.009$) compared to patients with ECOG = 0 (Table 1). No significant differences were found in intraoperative or postoperative complications or in 30-day mortality.

Conclusion: Patients' determination of their own ECOG PS has significant predictive value for perioperative outcomes following RAPL. ECOG PS should be included on preoperative patient questionnaires to identify patients' risk for perioperative complications and assist with postoperative patient care and discharge planning. Investigation into additional patient or caregiver assessments of functional status may yield further evidence supporting the use of patients' determination of their own functional status to assess risk for perioperative complications and outcomes. Further studies may also compare physician and patient-reported measurements of functional level in their ability to predict perioperative outcomes and mortality.

T 210

MAYO CLINIC'S EARLY SCREENING FOR DISCHARGE PLANNING AS A PREDICTOR OF PERIOPERATIVE OUTCOMES AFTER ROBOTIC-ASSISTED PULMONARY LOBECTOMY

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Purpose: Mayo Clinic's Early Screen for Discharge Planning (ESDP) is an evidence-based tool designed to streamline and improve discharge planning through earlier identification of patient needs. This study investigated the predictive value of Mayo Clinic's Early Screen for Discharge Planning on perioperative outcomes following robotic-assisted pulmonary lobectomy.

Materials and Methods: We retrospectively analyzed 226 patients who underwent RAPL by one surgeon between April 2018 and January 2022 and who had ESDP scores documented. ESDP assessments were performed by assigning scores based on Mayo's established scoring criteria for the following four categories: self-rated walking limitation, age, prior living status, and disability. We used a cut-off value of ESDP=6 to group patients into Low ESDP (ESDP≤6, N=160, 70.8%) or High ESDP (ESDP>6, N=66, 29.2%). We analyzed patient demographics, comorbidities, and perioperative outcomes using Chi-Square or Fisher's exact tests, Student's t-tests, and Kruskal-Wallis tests, with significance set to $p \leq 0.05$.

Results: High ESDP patients were older ($p=0.011$) and had higher BMI ($p=0.040$), more females (45/66, 68.2%; $p=0.006$), higher risk of air leak >5 days (24/66, 36.4%; $p=0.002$), longer chest tube duration (5 days [3, 10]; $p=0.001$), and longer hospital length of stay (LOS) (5 days [3, 7]; $p=0.001$) compared to Low ESDP patients (Table 1). Multivariable analyses demonstrated that High ESDP independently predicts air leak >5 days (OR=2.008; 95%CI=1.127–3.578; $p < 0.001$), chest tube duration (OR=1.682; 95%CI=1.492–1.896; $p < 0.001$), and hospital LOS (OR=1.252; 95%CI=1.074–1.284; $p < 0.001$). There were no significant differences in estimated blood loss, skin-to-skin duration, intraoperative and postoperative complications, or mortality.

Conclusion: ESDP is an effective predictor of perioperative outcomes following RAPL and can be used to evaluate a patient's risk for air leak >5 days, chest tube duration, and hospital length of stay. The results obtained in this study are a positive indicator of the tool's utility in improving planning and anticipating patient perioperative needs. Mayo Clinic's ESDP can be utilized to further integrate and allocate resources and improve continuity of care. Further studies may be performed, analyzing the specific cut-off value to best determine patient outcomes. Additional analysis may also be used to evaluate the ESDP's predictive value for readmission.

T 212

ASSESSMENT OF PROGNOSTIC NUTRITIONAL INDEX TO EVALUATE THE RISKS ASSOCIATED WITH ROBOTIC-ASSISTED VIDEOTHORACOSCOPIC PULMONARY LOBECTOMY

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Purpose: The Prognostic nutritional index (PNI) is calculated from serum albumin concentration and total lymphocyte count. Existing studies imply that lower PNI values may be associated with worse perioperative outcomes. This study investigated the relationship between PNI and perioperative outcomes after robotic-assisted video-thoracoscopic (RAVT) pulmonary lobectomy.

Materials and Methods: We retrospectively analyzed 493 patients who underwent RAVT lobectomy by one surgeon over 11.8 years. Patients were grouped as having a Low PNI (≤ 43) or High PNI (> 43). Demographics, preoperative comorbidities, intraoperative and postoperative complications, perioperative outcomes, and median overall survival time (MST) were compared across patients with Low vs High PNI values using Chi-Square, Fisher's Exact test, Student's t-test, Wilcoxon rank-sum test, or Kaplan-Meier analysis respectively, with significance at $p \leq 0.05$. Multivariable analysis was used to determine independent predictors of perioperative outcomes after RAVT lobectomy.

Results: There were 224 patients with a Low PNI and 269 patients with a High PNI. Low PNI patients were more likely to have preoperative weight loss ($p = 0.0001$), hyperlipidemia ($p = 0.0041$), chronic obstructive pulmonary disease ($p = 0.0023$), and chronic kidney disease ($p = 0.0365$) and greater preoperative tumor size ($p = 0.0001$). The two PNI groups did not differ in intraoperative or postoperative complication rates, except for greater incidences of pneumonia ($p = 0.0074$) and conversion to thoracotomy ($p = 0.0243$) in Low PNI patients. Low PNI patients had greater estimated blood loss ($p < 0.001$), skin-to-skin operative time ($p = 0.009$), and length of hospital stay ($p = 0.018$).

Conclusion: The assessment of PNI may play a vital role in evaluating the risks associated with RAVT lobectomy and guiding preoperative optimization to potentially improve the perioperative outcomes.

T 213

ASSESSMENT OF GERIATRIC NUTRITIONAL RISK INDEX TO EVALUATE RISKS LINKED TO ROBOTIC-ASSISTED VIDEO-THORACOSCOPIC PULMONARY LOBECTOMY

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Purpose: In previous literature, the Geriatric nutritional risk index (GNRI), calculated from serum albumin concentration and body weight values, has been associated with perioperative outcomes. This study investigated the relationship between GNRI values and perioperative outcomes after robotic-assisted video-thoracoscopic (RAVT) pulmonary lobectomy.

Materials and Methods: We retrospectively analyzed 365 elderly patients (≥ 65 years of age) who underwent RAVT lobectomy by one surgeon over 11.8 years. Patients were grouped as having an At-Risk GNRI (≤ 98) or No-Risk GNRI (> 98). Demographics, preoperative comorbidities, intraoperative and postoperative complications, perioperative outcomes, and median overall survival time (MST) were compared between patients with At-Risk vs No-Risk GNRI values using Chi-Square, Fisher's Exact test, Welch's t-test, Wilcoxon rank-sum test, or Kaplan-Meier survival analysis, respectively, with significance at $p \leq 0.05$. Multivariable analysis was performed for to evaluate for independent predictors of significant perioperative outcomes.

Results: There were 15 patients with an At-Risk GNRI and 350 patients with a No-Risk GNRI. At-Risk GNRI patients had higher intraoperative complication rates ($p = 0.0478$). The two GNRI groups did not differ in postoperative complication rates, except for greater incidences of prolonged air leak > 5 days ($p = 0.0322$), hypoxia ($p = 0.0041$), pneumonia ($p = 0.005$), and hypotension ($p = 0.027$) in At-Risk GNRI patients. At-Risk GNRI patients had greater skin-to-skin operative time ($p = 0.009$), chest tube duration ($p = 0.001$), and hospital length of stay ($p < 0.001$). Median overall survival in patients with No-Risk GNRI was 79.7 months (95% CI: 60.7-98.6) versus 14.3 months (95% CI: 12.1-16.4) in At-Risk GNRI patients ($p < 0.001$).

Conclusion: Assessing GNRI could be instrumental in evaluating the risks linked to RAVT pulmonary lobectomy and guiding preoperative measures to potentially improve perioperative outcomes and survival.

U 9

A NOVEL TECHNIQUE FOR THE DISTAL URETER AND BLADDER CUFF DURING ROBOTIC NEPHRO-URETERECTOMY: THULIUM LASER RESECTION

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Purpose: Controversy remains regarding management of the distal ureter and bladder cuff during nephro-ureterectomy for upper tract urothelial carcinoma. Herein we present a novel technique for management of the bladder cuff using Two-micron Thulium laser.

Materials and Methods: We performed a retrospective single surgeon review of all patients who underwent nephroureterectomy at National Capital Private Hospital, Canberra from March 2010 until August 2019. All patients had their bladder cuff excised with Thulium laser and either underwent a laparoscopic or robotic nephroureterectomy. The demographics as well perioperative measures and oncological outcomes were assessed.

Results: A total of 24 patients underwent nephroureterectomy with bladder cuff excision utilising the Thulium laser. A total of nineteen (80%) laparoscopic and five (20%) robotic nephroureterectomies were performed. All cases had the distal ureter and bladder cuff managed by transurethral Thulium laser. Twenty-one (88%) patients were aged over 65 years and 9 (38%) patients had a history of smoking or were current smokers. Fifteen patients were male, nine patients were female. Fifteen patients (63%) were either overweight or obese according to their body mass index. Eleven were left sided tumours and thirteen were right sided tumours. Regarding perioperative outcomes, the average blood loss for the laparoscopic approach was 229ml compared with 240ml for the robotic approach, both managed with Thulium laser for the bladder cuff. The average length of stay was 8 days for laparoscopic and 6 days for robotic approach. The average operative time was 183 minutes for laparoscopic and 262 minutes for robotic approach respectively. All patients had clear margins, fourteen patients (58%) had high-grade tumours and twelve patients (50%) had T2 disease or above. Eighteen patients had renal pelvis, calyceal or upper ureteric involvement, three had mid ureteric tumours while two had distal tumours and one had multiple tumours. One patient had recurrence of their urothelial carcinoma within the bladder four months post nephro-ureterectomy and evidence of metastatic disease ten months post-operatively and another patient had para-aortic lymph node metastases at seven months postoperatively.

Conclusion: Thulium laser resection is a viable alternative to open and electro-surgical approaches of the distal ureter and bladder cuff for patients undergoing nephroureterectomy for upper tract urothelial carcinoma. Further studies are required to compare the technique with the commonly performed approaches, however our study demonstrates that it is safe, provides the surgeon with optimal vision, minimises blood loss and has sound oncological outcomes.

U 10

OUTCOMES OF ROBOTIC MILLIN'S PROSTATECTOMY IN AN AUSTRALIAN PATIENT COHORT

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Purpose: To demonstrate the feasibility, safety, and efficacy of RSP using the Millins' approach in an Australian patient cohort. Although Robotic Simple Prostatectomy (RSP) is performed in several Australian centres, there is a paucity of published Australian data.

Materials and Methods: We reviewed prospectively collected perioperative and outcomes data for patients who underwent a Robotic Millins' Procedure (RMP) from June 2019 to March 2022. Statistics were reported as mean and range with a p value of <0.05 considered statistically significant.

Results: 27 patients underwent RMP over the study period with a mean age of 67 years and prostate volume of 156.4 cc (100-275). The mean console time was 168 mins (122-211), blood loss of 233mls (50-600) and average length of stay of 3.8 days (3-8). The pre-operative versus post-operative outcome means were; serum PSA was 9.69 Vs 1.2 mmol/L, IPPS score was 17.1 Vs 1.25, Quality of life score (QOL) 3.4 Vs 0.4, post-void residual volume (PVR): 223.6 ml Vs 55.9 ml, Q-max 7.86 Vs 29.6 ml/sec. These were all statistically significant ($p < 0.001$). The mean weight of resected tissue was 74 grams (43-206) with 25 patients having benign histopathology and two being diagnosed with prostate cancer (Gleason 2+2=4 and 3+4=7). No patients returned to theatre or required a blood transfusion.

Conclusion: Data from our patient cohort demonstrates the feasibility, safety, and efficacy of RMP for BPH in an Australian patient cohort. Our outcomes compare favourably with published studies on robotic simple prostatectomy.

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ROBOTIC PROSTATECTOMY FOR TUMOR STUM CASE REPORT

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Purpose: A male patient, 60 years old, former abstinent smoker for 10 years, without urinary complaints and with a history of Transurethral Resection of the Prostate in 2014 searched for medical assistance. The patient started with dysuria, pollakiuria and fever and was hospitalized and underwent CT-Scan at the time, which showed a rounded formation in the prostate topography, showing heterogeneous density and enhancement by contrast with hypodense/cystic images in between and some peripheral calcifications, measuring 8.7x9.5x8.5 cm (volume: 365.3 cm), compressing the bladder neck and moving it to the left. An MRI of the prostate was performed and demonstrated a expansive solid-cystic lesion diffusely affecting the right lobe of the prostate, not included in the PI-RADS classification. This finding is undetermined, but presents characteristics that allow the inclusion in the differential diagnosis of a stromal neoplastic nature (multicystic STUMP). There are no definitive signs of malignancy to the method. He underwent a ultrasound scan that revealed a prostate of 280 grams with post- micturition residue of 280ml, he presented PSA test of 2.0 ng/mL.

Materials and Methods: A Robotic-assisted radical prostatectomy was then indicated. The procedure was preceded by cystoscopy and bilateral double-J implant for better identification of the ureters. Transperitoneal access was done with a vein needle. Direct access to the pouch of Douglas was initiated, with release of the tumor portion in contact with the rectum and posterior region of the bladder. After that, we carried out the lowering of the anterior peritoneum, until the identification of the endopelvic fascia, following by the removal of preprostatic fat and the opening of the anterior bladder neck and of the posterior bladder neck that was widely distorted and retracted by the lateral mass. We also carried out the retraction of the lateral bladder walls. The dissection of the prostatic apex was difficult to perform due to the presence of a large tumor mass that limited the amplitude of the movements of the forceps, but was successfully performed. The preservation of the neurovascular bundle was successfully performed on the extra fascia, and the membranous urethra stump was well vascularized and of appropriate extension, after removal of the mass, an anterior Rocco stitch was performed, followed by anastomosis in classical Van Velthoven mode and no lymphadenectomy was performed.

Results: The total console time was 210 min. The surgery time was 240 min with estimated bleeding of 300 mL. Patient was discharged from hospital within 48 hours without presenting further complications.

The pathology of the surgical specimen showed incidental finding suspicion of it being Stromal Tumor of Uncertain Malignant Potential (STUMP) with round cell pattern.

Conclusion:

In accordance with the existing limited literature, the finding of this type of tumor occurred accidentally, associated with an adenocarcinoma. Based on the opinion of the medical team together with the patient's desire, the therapeutic approach via robotics was chosen as the ideal management for the observed clinical presentation, consisting of a challenge in the therapeutic approach.

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INVESTIGATION OF THE EFFECT OF COMMUNICATION DELAY AND VIDEO COMPRESSION IN REMOTE SURGERY USING A ROBOTIC-ASSISTED SURGERY SYSTEM

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Purpose: To investigate the effect of image degradation due to communication delay and video compression in remote surgery using a robotic-assisted surgery system.

Materials and Methods: In an experiment using the hinotoriTM Surgical Robot System developed by Mediaroid Corporation, a delay generator (Spirent Communications Attero-X) was placed between the Operation Unit and Surgeon Cockpit to intentionally generate a communication delay to investigate its effect in remote operation. The images were then compressed by an image encoder/decoder (IBEX HLD-5000E/D) to evaluate the effect in remote operation. The operation was performed by three experienced urological surgeons for urethral anastomosis and partial nephrectomy using a laboratory animal. The effect was evaluated on a scale of 1 to 5 (2 and under was evaluated as disqualified).

Results: The experiment using a delay generator showed that surgery was performable if the delay time was up to 160ms. In terms of image compression, surgery was possible with 10MB of compressed images (5MB each for the right and left eye image).

Conclusion: This investigation provided benchmark data. Furthermore, the effect of network jitter was found to be significant in the study under the commercial 5G Network (NTT Docomo) and further investigation is underway.

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PREDICTING SEMINAL VESICLE INVASION IN PROSTATE CANCER PATIENTS UNDERGOING ROBOTIC-ASSISTED LAPAROSCOPIC PROSTATECTOMY: THE ROLE OF MULTIPARAMETRIC MRI AND PSMA-PET

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Purpose: Robotic-assisted laparoscopic prostatectomy (RALP) plays a pivotal role in the management of prostate cancer (PCa). Accurate prediction of seminal vesicle invasion (SVI) is crucial for surgical planning as it is associated with higher risks of biochemical recurrence and metastases. This study investigates the potential of pre-operative 3T multiparametric magnetic resonance imaging (mpMRI) and prostate-specific membrane antigen positron emission tomography (PSMA-PET) in predicting SVI on final histopathology in RALP patients.

Materials and Methods: In this retrospective cohort study, we reviewed the records of patients who underwent RALP for prostatic adenocarcinoma between January 2021 and July 2022 at major tertiary hospitals in Sydney, Australia. Explanatory variables including age, healthcare financial status, serum prostate-specific antigen (PSA) level, capsular involvement on mpMRI, lesion location on PSMA-PET and mpMRI, and SVI on PSMA-PET or mpMRI were analysed. Univariate and multivariate linear regression analyses were performed to identify significant predictors of SVI.

Results: Among the 327 patients analyzed, SVI was observed in 16.5% on final histopathology. Univariate analysis revealed several preoperative variables associated with SVI, including older age, higher PSA concentration, presence of prostate base and mid lesions on PSMA-PET, prostatic capsular involvement on mpMRI, presence of PIRADS ≥ 3 prostate base lesions on mpMRI, and SVI presence on both PSMA-PET and mpMRI. Multivariate analysis identified older age, SVI presence on PSMA-PET, PIRADS ≥ 3 prostate base lesions on mpMRI, and prostatic capsular involvement on mpMRI as significant predictors of SVI. Histopathology features associated with SVI included increased tumour volume, higher Gleason score, positive surgical margin, extraprostatic extension, and local lymph node involvement.

Conclusion: Our findings underscore the potential of combining PSMA-PET with high-risk mpMRI findings in predicting SVI in patients undergoing RALP. The presence of SVI on PSMA-PET, as well as the identification of prostate base lesions and capsular involvement on mpMRI, demonstrated significant correlations with SVI on final histopathology. This study highlights these imaging modalities' relevance in robotic urological surgery, offering valuable insights for pre-operative planning. Incorporating mpMRI and PSMA-PET into the preoperative assessment of PCa patients undergoing RALP may optimize surgical decision-making, improving outcomes and patient management. Further validation studies are warranted to confirm these findings and establish the role of these imaging techniques in routine clinical practice for robotic-assisted prostatectomy.

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A COMPARISON OF SHORT – TERM OUTCOMES BETWEEN ROBOTIC AND OPEN NEPHRECTOMY FOR AUTOSOMAL DOMINANT POLYCYSTIC KIDNEY DISEASE AT THREE SYDNEY INSTITUTIONS.

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Purpose: Nephrectomy for autosomal dominant polycystic kidney disease (ADPKD) may be performed via minimally-invasive or open methods to create space for future transplantation or manage symptoms such as pain, haematuria, recurrent infection and hypertension. We present our technique of robotic nephrectomy for ADPKD, and compare the short-term outcomes with the open method.

Materials and Methods: Ethics approval was obtained from the Sydney Local Health District Ethics Committee. We retrospectively reviewed all nephrectomies for ADPKD performed at the Royal Prince Alfred Hospital, Chris O'Brien Lifehouse and Mater Hospital between January 2016 and December 2022. Data collected include patient demographics, indications for surgery, operating time (OT), estimated blood loss (EBL), short-term complications, patient-controlled analgesia (PCA) use and post-operative length of stay (PLOS). A midline laparotomy incision was utilised for the open cases. Standard port placement for nephrectomy was used for all robotic cases using the da Vinci Xi robot. For bilateral nephrectomies, a more midline port placement allowed for the use of the same ports for both sides after repositioning the patient. Large cysts were punctured to facilitate specimen retrieval through a Pfannenstiel incision.

Results: A total of 26 nephrectomies (12 robotic, 12 open, 2 laparoscopic) were performed over the seven – year period. Bilateral nephrectomy accounted for 71% of both robotic and open groups. Median resected kidney weight was 1873g. Three patients had undergone prior renal transplantation. Outcomes were compared using the Mann-Whitney U test ($p < 0.05$). Estimated blood loss, complication rate and PLOS were higher in the open group, with a significant difference in PCA requirement ($p = 0.03$).

Conclusion: Robot-assisted nephrectomy is safe and effective for ADPKD. While limited by small sample sizes, in our experience, it is associated with fewer complications, shorter post-operative length of stay and less opioid analgesia use than the open method.

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ROBOT-ASSISTED RADICAL NEPHRECTOMY USING NOVEL SURGICAL ROBOT SYSTEM, HINOTORI: REPORT OF FIRST SERIES OF 9 CASES

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Purpose: The objectives of this study were to present the perioperative findings of the first series who underwent robot-assisted radical nephrectomy (RARN) using a newly launched platform, hinotori surgical robot system, and compare the outcomes with a similar set receiving RARN with the existing system, da Vinci.

Materials and Methods: This study included a total of 30 patients, consisting of 9 and 21 undergoing RARN using the hinotori and da Vincisurgical robot systems, respectively. As a rule, RARN was performed via the intraperitoneal approach employing 3 robotic arms, irrespective of the robotic systems.

Results: Median age, body mass index and tumor diameter in the hinotori group were 64 years, 23.2 kg/m² and 55 mm, respectively. All procedures with hinotori could be completed without conversion to open surgery. Median operative time, time using robotic system, estimated blood loss and length of hospital stay in this group were 157 minutes, 83 minutes, 8 mL and 7 days, respectively, and no patient experienced major perioperative complications. In this group, 2, 1 and 6 patients were pathologically diagnosed with pT1a, pT1b and pT3a tumors, respectively. No significant differences in clinical characteristics were noted between the hinotori and da Vinci groups, and there were no significant differences in the perioperative outcomes between these 2 groups.

Conclusion: Despite being a small case series, this is the first study evaluating RARN using the hinotori surgical robot system, which could be safely conducted, resulting in the achievement of perioperative outcomes comparable to those of the da Vinci system.

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MODIFIED APICAL DISSECTION IMPROVES EARLY CONTINENCE IN ROBOTIC-ASSISTED LAPAROSCOPIC RADICAL PROSTATECTOMY: COMPARATIVE STUDY BETWEEN MODIFIED APICAL DISSECTION AND ANTERIOR SUSPENSION STITCH

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Purpose: Recently, modified apical dissection (MAD) technique in robotic-assisted laparoscopic radical prostatectomy (RARP) has shown excellent functional outcomes but has never been rigorously validated at various institutions. This study aimed to evaluate the effect of MAD on early continence and potency by comparison with anterior suspension stitch (SS).

Materials and Methods: 100 patients who underwent RARP with SS, and 100 with MAD by a single surgeon were propensity score matched and were retrospectively compared for continence and potency recovery at 1wk, and at 1, 3, 6, 9, 12mo. Continence was defined as use of ≤ 1 safety pad per day; potency was defined as ability to achieve erections firm enough for sexual intercourse at a satisfactory level with or without help of phosphodiesterase type 5 inhibitors

Results: Continence was reached in 20.6%, 33.3%, 67.2%, 74.1%, 81.1%, and 83.0% of patients in the SS group, compared with 49.2%, 73.3%, 86.8%, 96.6%, 100%, and 100% in the MAD group at postoperative 1wk, 1, 3, 6, 9, and 12mo, respectively. In the SS group, potency rates were 0%, 20%, 50%, 66.7%, 75%, 83.3%; in the MAD group, the rates were 50%, 90%, 88.9%, 100%, 100%, and 100%. Recovery of continence was higher in the MAD group within the first 6 months ($p = 0.005$, $\<0.01$, 0.041, 0.016 at 1wk, and 1, 3, 6mo). There were no significant differences in potency recovery rates between the two groups (all $p \geq 0.05$).

Conclusion: The MAD technique results in earlier recovery of continence when compared with the SS technique.

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PREDICTIVE FACTORS OF RENAL FUNCTION AFTER ROBOT-ASSISTED PARTIAL NEPHRECTOMY IN CLINICAL T1B TUMORS

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Purpose: Robot-assisted partial nephrectomy (RAPN) allows for a safe dissection and precise tumor resection. Although RAPN also applies for even clinical T1b renal cell carcinoma (RCC), little is known about renal function after RAPN for cT1b renal tumor.

Materials and Methods: Fifty patients who underwent RAPN for cT1b renal tumor from November 2017 to September 2022 in Akita University Hospital were entered in this retrospective study. The estimated glomerular filtration rate (eGFR) was assessed at baseline and postoperative day (POD) 180. A significant decline of renal function was defined as $\geq 15\%$ reduction from baseline eGFR. Uni- and multivariable logistic regression analyses (including age, sex, R.E.N.A.L nephrometry score, and perioperative factors such as operative time and estimated blood loss) were performed to elucidate the risk factors of renal function.

Results: The median age was 62 years (IQR: 55-70). The median tumor diameter and R.E.N.A.L nephrectomy score were 44 mm (IQR: 43-50) and 8 (IQR: 7-9), respectively. 82% of patients achieved Trifecta. The median eGFR at baseline and PODs180 were 70 mL/min/1.73m² (IQR: 60-78) and 61 mL/min/1.73m² (IQR: 53-71), respectively. A significant renal functional decline in at POD 180 was observed in 19 (38%) of 50 patients. By multivariable analysis, R.E.N.A.L nephrectomy score (HR 11.07; 95% CI [1.67-72.99]; $p = 0.012$) and estimated blood loss ≥ 200 ml (HR 6.279; 95% CI [1.35-29.02]; $p = 0.019$) were significant risk factors of renal functional decline. A subgroup-analysis of the component of R.E.N.A.L nephrectomy score showed that the L component (location relative to the polar lines) significantly impacted renal functional decline (HR 3.03; 95% CI [1.33-6.92]; $P = 0.008$).

Conclusion: RAPN was a safe and feasible approach for cT1b RCC. R.E.N.A.L nephrometry score, especially the L component, is a significant predictive factor of renal function decline after RAPN for cT1b renal tumors.

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USE OF ARTIFICIAL INTELLIGENCE TO AID IN TIMELY AND HIGH QUALITY PROSTATE CANCER DIAGNOSTICS AND CARE

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Purpose:

This study compares artificial intelligence (AI)-derived and human-derived whole gland segmentation of the prostate, seminal vesicle, and urethra through magnetic resonance imaging (MRI) and evaluates the practical use of this technology to streamline workflow and care through procedures such as MRI-ultrasound fusion prostate biopsies.

Materials and Methods: The AI-generated “auto contours” for prostate MRIs of 31 patients were generated through the MIMsoftware “ProtégéAI” program to produce contours of the prostate, seminal vesicle, and urethra. These MRIs were also contoured manually by both a board-certified urologist and a radiologist, and the volumetric conformity of the 3 groups of contours was evaluated through the calculation of the Dice and Jaccard coefficients, as well as other metrics such as the Hausdorff distance (HD), and Mean Distance to Agreement (MDA). The elapsed time to produce contours was also recorded.

Results: The average volumetric dice and jaccard coefficients, HD, and MDA for the AI and urologist contoured images (AI-U) were 0.875, 0.779, 9.186 mm, and 1.410 mm for the whole gland segmentation of the prostate, 0.377, 0.260, 14.708 mm, and 4.260 mm for the seminal vesicle, and 0.283, 0.178, 18.117 mm, and 4.907 mm for the urethra; for the AI and radiologist contours (AI-R), the values were 0.757, 0.614, 17.562 mm, and 3.050 mm for the prostate, 0.451, 0.315 16.069 mm, and 4.075 mm for the seminal vesicle, and 0.162, 0.092, 19.956 mm, and 4.798 mm for the urethra. In comparing the contours of the urologist to the radiologist (U-R), the values of the prostate were 0.769, 0.630, 15.109 mm, and 2.733 mm, for the seminal vesicle, 0.471, 0.333, 12.981 mm, 3.264 mm, and for the urethra, 0.144, 0.080, 13.560 mm, and 3.406 mm. For the prostate and urethra, the difference in dice similarity was not significant between AI-R and U-R, but both comparisons were different from the AI-U comparison ($p < 0.05$). For the seminal vesicle, no statistical difference in the 3 dice coefficients was observed ($p > 0.05$). The average times to produce contours for AI, a urologist, and a radiologist were 96.5 seconds, 285.8 seconds, and 217.9 seconds, respectively ($p < 0.05$ for each time).

Conclusion: The results suggest that auto contours of the prostate show reasonable volumetric conformity with manual contours, while less conformity was observed for the urethra and seminal vesicle. No statistical difference between the dice similarities of AI-U, AI-R, and U-R for the seminal vesicle was observed. Though the contours of the prostate and urethra did show a higher conformity for AI-U than AI-R and U-R, because AI-R and U-R presented similar conformities, it is unlikely this variability is linked to the AI’s accuracy. Hence, AI varies in conformity as much as other physicians and generates contours in less time. Upon proofreading and correction by a physician before use, current AI software holds potential as an effort-reducing tool for streamlining prostate cancer diagnostics in the clinical setting.

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SELF REMOVAL OF CATHETER AFTER ROBOT ASSISTED RADICAL PROSTATECTOMY – SAVING THE PLANET ONE CATHETER AT A TIME

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Purpose: Self-removal of catheter after Robot assisted radical prostatectomy (RARP) is a novel concept which has never been reported in the literature.

Materials and Methods: We included 129 consecutive RARPs performed in our centre for the self-TWOC (trial without catheter) program. The exclusion criteria were: patient preference, surgeon preference due to difficult anastomosis or patients suffering from poor manual dexterity. The men who opted in were explained about self-TWOC preoperatively and contacted after TWOC to fill a questionnaire. Among the 129 who opted in, 112 filled the follow-up questionnaire and therefore were included in the final analysis

Results: Self TWOC was successful in all the 112 men included in the study. Patient satisfaction was high as shown in table 1. Distance of travel avoided per patient: 79.6+/-36.72 km (Mean+/-SD). Average travel time per patient: 77 minutes. Waiting time in hospital avoided: four hours per TWOC appointment. This also saved 85£/patient for the hospital. Our study showed fuel cost savings of 9.87 to 15.99£ per patient depending on car engine size/type. The carbon footprint calculated was 0.02 tonnes of CO₂ assuming average engine sized (<2.0 litre capacity) diesel/petrol cars and 0.01 tonnes of CO₂ for average UK petrol hybrid car. The calculated carbon offset per patient for diesel/petrol cars: 0.32£, petrol hybrid: 0.16£.

Conclusion: Self TWOC after RARP is feasible, safe and cost-effective for the hospital and patients. With 7913 robotic prostatectomies in UK per year, our program if expanded to other units can save 158 tonnes of CO₂ emissions per year.

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FUNCTIONAL AND ONCOLOGICAL OUTCOMES OF ROBOT-ASSISTED RADICAL PROSTATECTOMY IN OBESE MEN - A MATCHED PAIR ANALYSIS

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Purpose: Robot-assisted radical prostatectomy (RARP) in men with body mass index (BMI) ≥ 35 kg/m² is considered technically challenging. We conducted a retrospective matched pair analysis to compare the oncological and functional outcomes of RARP in men with BMI ≥ 35 kg/m².

Materials and Methods: We interrogated our prospectively maintained RARP database and identified 1273 men who underwent RARP from January 2018 till June 2021. Among them, 43 had BMI ≥ 35 kg/m², and 1230 had BMI < 35 kg/m². A 1:1 genetic matching was performed between these two groups for PSA, Gleason grades, clinical stage, D'Amico risk stratification, and nerve spare extent. Continence rates and biochemical rates on one-year follow-up was analysed. Potency rates were not assessed. Statistical analysis was performed using SPSS. Paired tests were done using Wilcoxon sign rank-sum test. $P < 0.05$ was considered statistically significant.

Results: The two groups were comparable in almost all parameters except for age. Console time ($p = 0.20$) and estimated blood loss ($p > 0.90$) were not significantly different. There was no blood transfusion, open conversion or (Clavien-Dindo grade ≥ 3) intra/post-operative complication in either of the two groups. The two groups did not have any difference in biochemical recurrence rates (BCR) on one-year follow-up ($p > 0.90$). Men with BMI ≥ 35 achieved continence rates equivalent to men with BMI < 35 within one year. On logistic regression analysis, age ($p < 0.001$) and extent of nerve sparing ($p = 0.026$) emerged as significant factors influencing continence recovery.

Conclusion: RARP is safe in men with BMI ≥ 35 kg/m². The one-year continence and oncological outcomes are similar to matched men with BMI < 35 kg/m² undergoing RARP.

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ASSESSMENT OF ROUTINE SAME DAY DISCHARGE SURGERY FOR ROBOT-ASSISTED RADICAL PROSTATECTOMY

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Purpose: It is important for robotic surgery to show it can be cost effective, especially by reducing length of stay (LOS). Therefore, our institution developed a protocol for daycase robotic-assisted radical prostatectomy (RARP). The aim of this study was to validate this as a safe practice and assess the potential benefits to the hospital and the patient.

Materials and Methods:

All patients booked for RARP were screened for suitability for day case. Exclusion criteria were history of complex abdominal surgeries, BMI > 35 and patient living alone. All daycase RARPs were performed as a morning case with a protocol for review throughout the day with evening discharge if mobilising and eating/drinking well.

The primary outcome of the study was success rate of discharge home on day of surgery (DOS) with secondary outcomes of readmissions and complications. A patient questionnaire was completed at home including both Visual Analogue Scale (VAS) for pain and satisfaction rating.

Results: 45 patients underwent daycase RARP over a 6-month period with minimum of 30 days follow-up. 41/45 (91%) had successful DOS discharge home. The four admissions overnight were because of dizziness, low oxygen saturation, intra-operative complication and diagnosis of COVID-19. There were no readmissions and no 30-day complications. The most common issues at home were catheter discomfort and constipation with low mean VAS pain score and low nausea reported. The overall patient satisfaction rating was high and 97% said they would recommend to a family member. The cost saving for the hospital was 460 Euro per patient.

Conclusion: Daycase procedure is a viable, safe and efficient pathway for appropriately selected and counselled patients undergoing RARP. The patients tolerated symptoms well post-operatively and were highly satisfied.

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COMPARISON BETWEEN INTRA AND POSTOPERATIVE OUTCOMES OF THE DA VINCI SP AND DA VINCI XI ROBOTIC PLATFORMS IN PATIENTS UNDERGOING RADICAL PROSTATECTOMY

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Purpose: To compare the postoperative pain scale and outcomes in patients with similar demographic characteristics undergoing robotic-assisted radical prostatectomy (RARP) with SP and Xi robots.

Materials and Methods: One hundred consecutive patients who underwent RARP with the SP were matched, using a propensity score (PS), with 100 patients who underwent RARP with the Xi, from a cohort of 1757, between June 2019 to January 2021. We described and compared the perioperative pain scores and outcomes of both groups.

Results: The SP group had less blood loss (50cc vs. 62.5cc, $P < 0.001$) and longer operative time (114 min vs. 94 min, $P < 0.001$). The only period we could show a difference in postoperative pain scores was 6 hours after surgery, with a small advantage for the SP (2 vs. 2.5, $P < 0.001$). Both groups had satisfactory postoperative continence recovery (91% vs. 90% for the SP and Xi, respectively). The groups had a mean follow-up of 24.5 and 22 months for SP and Xi, respectively. The tumor stage and percentage of positive surgical margins were similar between groups (15% vs. 15%, $P = 1$).

Conclusion: Patients undergoing RARP with the SP had longer operative times with less blood loss than the Xi. However, despite the lower number of abdominal incisions on the SP, the groups had similar intraoperative performance, and we were unable to demonstrate clinically significant differences in postoperative pain scores between the groups 6, 12, and 18 hours after surgery.

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IMPACTS ON FUNCTIONAL AND ONCOLOGICAL OUTCOMES OF ROBOTIC-ASSISTED RADICAL PROSTATECTOMY 10 YEARS AFTER THE TASKFORCE RECOMMENDATIONS AGAINST PSA SCREENING

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Purpose:

For experienced surgeons, prostate cancer outcomes are ultimately affected by the pathology of the disease they treat. Over the last decade and a half, we have experienced a dramatic alteration in the pathology that we are addressing. During this time, the most significant shift in prostate cancer management was observed following the May 2012 decision by the United States Preventive Service Task Force (USPSTF) that recommended against PSA screening for all men. This has affected the types of prostate cancers we are treating and can potentially influence treatment outcomes. We aimed to analyze the functional and oncologic trends in prostate cancer outcomes in the largest single surgeon, single practice series.

Materials and Methods: We retrospectively reviewed our prospective IRB-approved prostate cancer registry for 11396 patients that underwent robotic-assisted laparoscopic prostatectomy (RALP) between 2008 and 2021. Each patient had at least a 12-month follow-up. The cohort was divided into two groups based on the date of RALP: Group 1, before USPSTF recommendations took effect (01/2008-12/2012); and Group 2 no fewer than six months following the implementation of USPSTF recommendations (01/2013-12/2021). Group 1 had 4760 patients, and Group 2 had 6636 patients, with a median follow-up of 109 and 38 months, respectively. We assessed the functional and oncologic outcomes of the two groups.

Results: We detected time-trend changes after 2012. There was a migration to younger ages, less than 60, and an increase in the median preoperative PSA (5 to 6 ng/ml). There was an 18% increase in the higher grade and stage of the disease, Gleason $\geq 3+4$ (19% increase), and $\geq pT3$ (18% increase). This translated to a 6% increase in positive surgical margins with an initial rapid increase that was tempered with a surgical adjustment in the amount of nerve sparing (NS). There was a 24% reduction in full nerve sparing in response to the worsening pathology. Outcomes were also affected by the modification in NS. Comparing groups 1 and 2, there was a significant decline in post-operative outcomes in Group 2, including: a 12-month continence reduction of 9%, reduction in potency by 27%, and reduction trifecta by 22%. The breakpoint in functional outcomes appears to be mid-2012.

Conclusion: In our practice, we have witnessed a significant change in the types of patients we are seeing and the outcomes we are able to deliver. We are seeing younger patients with higher-grade diseases, and the increasing number of high-risk patients has led to worse functional and oncologic outcomes. The initial rapid rise in PSM was leveled by the move towards more partial nerve sparing. The USPSTF recommendation has affected the oncology and outcomes of prostate cancer in an increasingly younger patient population.

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SIMULTANEOUS HERNIA REPAIR IN ROBOTIC-ASSISTED RADICAL PROSTATECTOMY IS SAFE WITH LOW RATES OF MESH COMPLICATIONS

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Purpose: Robotic-assisted radical prostatectomy (RARP) is known as the gold-standard treatment for localized prostate cancer in the USA. However, performing RARP along with a concomitant hernia repair with mesh is debatable because the current literature has no sufficient or well-designed studies. Some argue that this procedure may result in mesh infections due to possible contact with urine. This study reports our experience with simultaneous hernia repair with mesh placement in patients who underwent radical prostatectomy.

Materials and Methods: From August 2008 to August 2021, we prospectively collected the data of 244 patients who underwent RARP with concomitant hernia repair (inguinal, umbilical, and ventral) with mesh placement. After a propensity score match (PS), these patients were retrospectively compared with 244 patients from 6275 RARPs operated on in the same period without hernia repair. We report the preoperative demography and perioperative outcomes up to 90 days after the surgery.

Results: Median follow-up was 36.6 months for the control and hernia groups respectively ($p=0.81$). Eighty-three patients had unilateral inguinal hernia repair, 22 had a bilateral inguinal hernia repair, 95 had a ventral hernia repair, and 44 had an umbilical hernia repair. The median operative time was 112 min for the control group and 160 min for hernia groups ($p<0.001$). Estimated median blood loss was 100mL and 50mL for the control and hernia groups, respectively ($p=0.41$). We did not find statistically significant differences in minor complications (Clavien ≤ 2). Although the postoperative readmissions in 90-days were higher in the hernia group (18 vs.7, $p=0.038$), none was associated with mesh complications.

Conclusion: Robotic-assisted radical prostatectomy with concomitant hernia repair and mesh placement is safe and does not increase complications related to the mesh. In our experience, hernia repair increases the operative time, usually due to initial peritoneal flap dissection and final suturing. Therefore, we believe that hernia repair with mesh during RARP is safe and spares patients the additional impacts related to an additional surgical procedure.

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TECHNICAL AND ANATOMICAL CHALLENGES TO APPROACH ROBOTIC-ASSISTED RADICAL PROSTATECTOMY IN PATIENTS WITH UROLIFT[®]

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Purpose: Urolift[®] is a surgical modality to treat lower urinary tract symptoms (LUTS) in patients with enlarged prostates. However, the inflammatory process caused by the device usually displaces the prostate's anatomical landmarks and challenges surgeons performing robotic-assisted radical prostatectomy (RARP). In this video, we will illustrate several technical challenges in patients with Urolift[®] who underwent RARP.

Materials and Methods: We performed a video compilation with several surgical steps illustrating key aspects and critical details of the anterior bladder neck access, lateral bladder dissection from the prostate, and posterior prostate dissection to avoid ureteral and neural bundles injuries.

Results: We perform our RARP technique with our standard approach in all patients. The beginning of the case is performed like every patient with an enlarged prostate. We first identify the anterior bladder neck and then complete its dissection with Maryland and Scissors. However, extra care must be taken in the anterior and posterior bladder neck approach due to the clips found during the dissection. The challenge starts when opening the lateral sides of the bladder until the base of the prostate. It is crucial to perform the bladder neck dissection beginning at the internal plane of the bladder wall. Such dissection is the easiest way to recognize the anatomical landmarks and potential foreign materials, such as clips, placed during previous surgeries. We cautiously work around the clip to avoid using cautery on the top of the metal clips because energy is transmitted from one edge to the other of the Urolift[®]. This can be dangerous if the edge of the clip is close to the ureteral orifices. The clips are usually removed to minimize cautery conduction energy. Finally, after isolating and removing the clips, the prostate dissection and subsequent surgical steps are continued with our conventional technique. Before proceeding, we ensure that all clips are removed from the bladder neck to avoid complications during the anastomosis.

Conclusion: Robotic-assisted radical prostatectomy in patients with Urolift[®] is challenging due to modified anatomical landmarks and intense inflammatory processes in the posterior bladder neck. When dissecting the clips placed next to the base of the prostate, it is crucial to avoid cautery because energy conduction to the other edge of the Urolift[®] can cause thermal damage to the ureters and neural bundles.

U 48

ROBOTIC BLADDER DIVERTICULECTOMY: A CASE SERIES

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Purpose: Bladder diverticula are sac-like protrusions in the bladder wall, often caused by bladder outlet obstruction, neurogenic bladder or chronic infection. While small diverticula may be asymptomatic, larger ones can cause various complications such as urinary tract infections, bladder stones, or urinary retention. Bladder diverticulectomy surgery is the gold standard treatment for symptomatic diverticula and diverticula containing malignancy. Diverticulectomy is quite uncommon, with most urologists only performing it once every few years. This rarity, combined with the relative recency of the increasing uptake of robotic surgery means that individual experience with Robotic Bladder Diverticulectomy (RBD) is varied.

Notably, the literature contains multiple different operative techniques, including the use of catheter balloons placed in the diverticula, concurrent cystoscopy and multiple approaches to the neck of the diverticulum. Bladder diverticula containing malignancy also require alternate approaches to maintain oncological principles of resection and to prevent spillage into the peritoneal cavity.

The aim of this case series is to combine, collate and report on the experience, techniques and outcomes of multiple surgeons undertaking RBD. Dissemination of these results intends to enable further uptake by the broader urological community and improve outcomes for future patients.

Materials and Methods: Retrospective data from five urologists were collated, encompassing nine patients who underwent RBD between 2017-2023. Baseline characteristics, operative metrics and primary outcome data were compiled. This included oncological outcomes for patients with malignant diverticula and functional outcomes. Operative techniques for all patients were reported with additional qualitative feedback from individual surgeons. Objective outcomes such as post-void residuals were compared with paired sample t-tests.

Results: Nine patients underwent RBD, three for diverticula containing malignancy with the remaining for symptomatic diverticula. All five surgeons utilised a four port transperitoneal approach and opted for the extravesical dissection of the diverticular neck. Concurrent flexible or rigid cystoscopy was employed for intravesical illumination and visualisation. Intraoperative techniques for maintaining oncological principles for malignant diverticula varied.

The mean (interquartile range (IQR)) surgery duration was 106 minutes (52.5-160) with associated blood loss of 85ml (35-135) and a typical hospital stay of 2.0 days (2-2). The mean (IQR) diverticula resected was 1.44 (1-2) with a 92.22mm (51-145) diameter. No patients experienced a post-operative leak and the average length of catheterisation was 7 days. Only one patient experienced an early complication with urinary retention and infection requiring presentation to hospital.

All malignant cases had clear margins and all patients with symptomatic diverticula had subjective symptomatic resolution at 30 days post-op. There was a reduction in their post-operative post-void

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All malignant cases had clear margins and all patients with symptomatic diverticula had subjective symptomatic resolution at 30 days post-op. There was a reduction in their post-operative post-void residual ($p=0.08$).

Conclusion: RBD is an increasingly popular technique due to its minimally invasive approach, improved visualisation, and precise instrumentation. Amongst the participating urologists the transperitoneal, extravesical approach was ubiquitous and strongly advocated. The management of malignant diverticula included more variation in techniques to maintain oncological principals. RBD remains safe, with excellent operative metrics and good patient outcomes.

U 49

MODIFIED PUBOVESICAL COMPLEX-SPARING TECHNIQUE UNDER HYPOTHERMIA DURING ROBOTIC-ASSISTED LAPAROSCOPIC RADICAL PROSTATECTOMY

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Purpose: Functional outcome of continence and potency is paramount for pentafecta of robotic-assisted laparoscopic radical prostatectomy (RARP). We modified the technique of “Pubovesical Complex-sparing Technique” and preserved complete periprostatic anatomy for continence and potency component.

To introduce the surgical steps and assisted techniques of modified pubovesical complex (PVC)–sparing RARP with hypothermia and present the preliminary results of this technique.

Materials and Methods: Thirty-four PVC-sparing RARP with hypothermia procedures were performed in clinically localised prostate cancer patients with mean age 63.1 years old from Jan.1 2019 to Sep. 2020 by the same experienced surgeon.

The first step is seminal vesicle and vas deference dissection from pouch of Douglas. Modified Intrafascial dissection of the neurovascular bundles and Pubovesical Complex Sparing Technique from Dr.Gaston et al. Near-infrared fluorescence (NIRF) technology and indocyanine green (ICG) are used to identify and determine the benchmark artery of neurovascular bundle and blood supply of PVC [2; 3] Accessory pudendal arteries (APAs) were also identified and preserved.

The plane between the detrusor apron and the ventral part of the prostate was created. The Santorini’s plexus is left intact adhesion to PVC and the prostate is blandly dissected. Ultradissection the bilateral border from prostate edge to bladder neck and deep into seminal vesicle. Bilateral seminal vesicles were pulled out from Douglas pouch. The bladder neck was separated from the prostate and well preserved.

The whole dissection procedure was under hypothermia circumstance to minimize neural and tissue damage.

Results: Thirty-four cases were enrolled in this study from Jan.1 2019-Sep. 2020. The mean age was 63.1 years, BMI was 23.53. The Mean PSA was 8.1 ng/ml. The mean prostate volume as evaluated by TRUS was 36.5 ml. The mean Gleason score of the biopsy was 7.3. Clinical stage cT1c 1, cT2a 7, cT2b: 1, cT2c: 2. The Mean console time was 133.9 mins (range, 80–185). Two complications including leg edema and skin allergy (GII), gouty arthritis (GII). The mean bladder catheterisation time was 8 days (range 7–9 days). The urinary continence was 100% at mean day 6.6 days (range from day 0 to day 21) after removal of foley catheter.

Conclusion: Our approach is technically feasible and it can expedite restoration of urinary function. Further studies (more cases and case-control study) are needed to confirm our results.

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SURGICAL AND ONCOLOGICAL ACHIEVEMENTS WERE ASSOCIATED WITH SURVIVAL IN PATIENTS TREATED WITH ROBOT-ASSISTED RADICAL CYSTECTOMY

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Purpose: Radical cystectomy (RC) is the gold standard modality for high-risk bladder cancer. We aimed to investigate the perioperative morbidity and oncological adequacy in patients treated with robot-assisted radical cystectomy (RARC).

Materials and Methods: We retrospectively evaluated 40 patients who underwent RARC with urinary diversion (UD) in a single center with a minimum of 1 year follow-up. Patients who simultaneously demonstrated negative soft surgical margins (STSMs), ≥ 16 lymph node (LN) yield, absence of major complications (grade III-IV) at 90 days, absence of UD-related long-term sequelae and absence of clinical recurrence at ≤ 12 months, were considered as having achieved the RC-pentafecta. Tetrafecta criteria was applied with the exclusion of the LN yield from the pentafecta. Statistical analyses were performed to evaluate associations of the RC-pentafecta with the clinicopathological variables and the prognoses.

Results: A mean follow-up was 26.6 months. Seven (18%) fulfilled all pentafecta criteria, while 23 (58%), 7 (18%), and 3 (8%) attained 4/5, 3/5, 0-2/5 pentafecta criteria, respectively. There were no significant differences between pentafecta attainment and non-attainment groups in terms of both cancer-specific survival and overall survival. On the other hand, pentafecta without LN yield showed a RC-tetrafecta rate of 73%. The tetrafecta achievement group had significantly higher cancer-specific survival and overall survival compared with the non-achievement group, respectively.

Conclusion: Surgical and oncological achievements were associated with prognosis. It was retrospective with a small number of patients; hence, future studies are needed with larger numbers of patients for the validation of the RC-pentafecta.

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DOES PREVIOUS TRANSURETHRAL RESECTION OF THE PROSTATE AFFECT THE OUTCOMES IN ROBOTIC ASSISTED RADICAL PROSTATECTOMY?

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Purpose: Transurethral resection of the prostate (TURP) is one of the surgical options for treating enlarged prostates with lower urinary symptoms (LUTS). In this group of patients, due to their older age, concomitant prostate cancer is not uncommon. However, the fibrosis and distortion of the prostate anatomy by prior TURP can potentially hinder surgical efficacy at robotic-assisted radical prostatectomy (RARP). In this scenario, the literature still lacks robust evidence of patients with previous TURP undergoing RARP.

Materials and Methods: From 2008 to 2022, 231 men with previous TURP underwent RARP (TURP group) at our institution by a single surgeon (VP). These men were propensity scored matched using clinicopathological characteristics to men without previous TURP who underwent RARP by VP at our institution (Control group). Perioperative and postoperative variables were analysed for significant differences in outcomes between groups. Variables analysed included estimated blood loss (EBL), operative time, catheter time, hospitalization time, postoperative complications, Positive surgical margins (PSM) rates, cancer status, potency rates, and continence rates.

Results: Propensity score matching (1:3) yielded 231 men in the TURP group and 677 men in the Control group with equivalent clinicopathological characteristics including: age, prostate specific antigen (PSA), body mass index (BMI), preoperative SHIM, preoperative AUASS, biopsy ISUP grade, nerve sparing degree, and median follow up. Patients in the TURP group showed no statistically significant differences in operative safety measures including EBL (100 vs. 100 mL), operative time (80 vs. 80 min), catheter time (5 vs. 5 days), hospitalization time (1 vs. 1 day), or postoperative complications. Functional measures including potency rates (HR=0.8, 95%CI 0.5 - 1.4, p=0.4) and continence rates (HR=.96, 95% CI .81- 1.14, P=0.69) were not significantly different. Measures of oncologic control including PSM rates (14% vs 18%) and Biochemical recurrence (BCR) (HR= 1.11, 95%CI 0.76 1.62s, P=0.57) showed no significant differences.

Conclusion: In RARP after TURP there is often noticeable distortion of the surgical anatomy. Even in this older age group of patients, for an experienced team the procedure is safe and provides similar oncologic control and functional outcomes to RARP in patients without previous TURP.

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A COMPARISON OF POST-SURGICAL QUALITY OF LIFE BETWEEN RETIZUS-SPARING AND CONVENTIONAL ROBOT-ASSISTED RADICAL PROSTATECTOMY: A PROPENSITY SCORE MATCHED ANALYSIS

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Purpose: One of the gold standard treatments for localized prostate cancer is robot-assisted radical prostatectomy (RARP). RARP largely contributes to fine surgical manipulation, while it potentially has disadvantage of deterioration of urinary and sexual function which would have a negative impact on the post-surgical quality of life. Alternative techniques for such conventional RARP (C-RARP) have therefore been reported, and retzius-sparing RARP (RS-RARP) has become prevalent in recent years because of its' advantage of maintaining urinary continence. However, comparative data of RS- with C-RARP on overall quality of life have been scarce. Here, we retrospectively evaluated urinary and sexual QOL scores following the two types of RARP by using Extended Prostate Cancer Index Composite questionnaire (EPIC).

Materials and Methods: A total of 132 patients who underwent RS and C-RARP from January 2020 to July 2021 was included. Perioperative health-related quality of life was assessed based on EPIC which was obtained preoperatively and at 1, 3, 6, and 12 months postoperatively (1M, 3M, 6M, 12M). The QOL score was calculated by using domain summary score and subscale score of EPIC not only in all the patients, but in 70 patients matched by propensity score-analysis at 1:1 ration with controlled age, initial PSA, Gleason score, prostate volume, and c-Tstage.

Results: In the results of 132 patients, in a comparison RS-RARP and C-RARP, the domain summary score showed that urinary function following RS-RARP was significantly lower the score of the decline than C-RARP at 1, 3, 6, and 12M after the surgery ($p < 0.05$). Sexual function was also significantly low the score of the decline after RS-RARP ($p < 0.05$). In terms of the urinary subscale items, function (1M to 6M), bother (1M to 12M), incontinence (1M to 12M) and irritative (1M) were better in RS-RARP than those in C-RARP ($p < 0.05$). In terms of the sexual subscale, sexual function (1M, 3M, 6M, 12M) and sexual bother (6M, 12M) were significantly better in RS-RARP ($p < 0.05$). However, C-RARP was significantly better maintained in bowel bother.

The propensity score matched group results also showed that urinary function was significantly preserved in the urinary summary score (1M to 12M) ($p < 0.05$) (Figure.). In subscale scores, RS-RARP was significantly superior in Urinary and Sexual subscale ($p < 0.05$). In addition, there was no difference between RS-RARP and C-RARP in bowel bother. The positive rate of resection margin was 17 (49%) for RS-RARP and 11 (31%) for C-RARP, with no statistical difference.

Conclusion: RS-RARP may contribute to the preservation of sexual function as and voiding function after surgery.

U 58

ROBOTIC PARTIAL NEPHRECTOMY WITH ADJUNCTIVE ULTRA-THICK AMNIOTIC MEMBRANE

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Purpose: To evaluate the clinical outcomes of robotic partial nephrectomy with adjunctive cryopreserved ultra-thick amniotic membrane (AM).

Materials and Methods: A retrospective review was performed on patients with small renal cell carcinoma that underwent robotic partial nephrectomy followed by application of cryopreserved ultra-thick AM. Baseline characteristics, operative times, creatinine levels, and glomerular filtration rate (GFR) were assessed.

Results: Ten patients (4 female; 6 male; 68 ± 8.6 years) were included in the analysis. All patients presented with multiple co-morbidities including hypertension ($n=6$), diabetes ($n=3$), hyperlipidemia ($n=2$), and/or tobacco use ($n=4$). The mean GFR and creatine levels at baseline were 69.3 ± 19.8 ml/min and 1.05 ± 0.26 mg/dl, respectively. Surgery was uneventful in all cases, with an average warm ischemia time of 12 ± 2.2 min. At 12 months post-operatively, GFR change from baseline was only -2.6 ml/min, while creatinine levels were maintained at 1.05 mg/dl. There was no recurrence of cancer. No complications attributable to the application of AM were observed.

Conclusion: Robotic partial nephrectomy with adjunctive cryopreserved ultra-thick amniotic membrane is safe and may improve clinical outcomes in challenging cases.

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INITIAL EXPERIENCE OF ROBOT ASSISTED RADICAL PROSTATECTOMY WITH MANTRATM MULTIARM ROBOTIC PLATFORM .

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Purpose: SSI MantraTM (SS Innovation group) is a new addition to the arsenal of robotic systems in India. Here, we describe our initial experience of robot assisted radical prostatectomy (RARP) and bilateral extended pelvic lymph node dissection (B/L ePLND) for carcinoma prostate (CAP) with this platform .

Materials and Methods: Consecutive biopsy proven CAP patients undergoing RARP and B/L ePLND by the SSI MantraTM robotic platform from February 2022 – January 2023 were included in this study. All patients underwent RARP by transperitoneal 6 port technique . A combined anterior-posterior approach was used . Perioperative and early functional outcomes were recorded .

Results: Thirty-three CAP patients underwent RARP with B/L ePLND . The median(IQR) age and baseline PSA were 64.5(61-69.5) years and 11 (7.9-26) ng/dL respectively . The procedure was post TURP and post neoadjuvant therapy(NAHT) in 6(18 %) patients each . The mean docking and operative times were 13.8 and 192 minutes respectively . Unilateral/Bilateral nerve sparing was done in 19 (57.5%) patients . One patient had left external iliac vein injury due to tethered nodes post NAHT(successfully managed robotically) .Of the 33 patients ,18 (54.5 %) , 5(15%) and 10(30.5%) had stage pT2, pT3a and pT3b disease, respectively . Positive surgical margins were reported in 6 (18.1%) patients , including 1(5.5%)with pT2 and 5 (33.3%) with &pT3 . The median lymph node yield was 18 . At 12 weeks follow up (for n=20) , 17 (85 %) were continent.

Conclusion: RARP with the SSI Mantra robotic platform is technically safe and feasible . The system seems capable of delivering oncological and functional outcomes comparable to established surgical platforms. Further studies comparing the long term clinical efficacy and cost effectiveness are needed to further establish its role in clinical practice .

U 65

STANDARDIZATION OF 3-PORT ROBOTIC INCISIONAL HERNIA REPAIR AFTER RARP

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Purpose: Incisional hernia is a complication that occurs occasionally, and surgical intervention is required to prevent more severe sequela. Among the several options of management, robotic-assisted herniation repair has been discussed in the recent 2 years. However, previous studies focus more on the feasibilities of this procedure or the comparison of different hernia repair approaches. In this study, we aim to propose a standardized technique through a retrospective review of 20 patients who underwent robotic-assisted incisional hernia repair (RIHR) after robotic-assisted radical prostatectomy (RARP).

Materials and Methods: We recruited patients from a group of 3,000 consecutive patients who underwent RARP from December, 2005 to February, 2023 by a single surgeon. Patient characteristics included age, body mass index (BMI), PSA level, pathology Gleason score, and pathology TNM staging. The variants regarding the patients' incisional hernia included incisional hernia occurrence time after RARP, defect size, operation time, console time, blood loss, and follow-up time after the herniation occurrence. In 2020, we established a cutoff defect size of 3x2 cm as the criteria for using mesh reinforcement or not. Nevertheless, as one of the patients experienced hernia recurrence 6 months after hernioplasty without applying mesh. We encourage defect approximation with mesh reinforcement in every patient. Also, we standardized the suture technique to optimized the outcome.

Results: The mean defect area was 27.95 cm, and the average operative time was 107.4 min, with a mean console time of 80.75 min. Blood loss was 16.75 ml, and the hospital stay of all patients was 3 days without complications. The mean follow-up period was 43.1 months, with one recurrence.

Conclusion: RIHR is a feasible surgical method that is not inferior to the traditional open or laparoscopic repair. Furthermore, standardization of the procedure could improve patient outcome and smoothen the learning curve of this surgical technique.

U 66

RENAL ARTERIAL PSEUDOANEURYSM AFTER ROBOTIC-ASSISTED PARTIAL NEPHRECTOMY: SINGLE-CENTER ANALYSIS OF PREDICTIVE FACTORS

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Purpose: Robotic-assisted partial nephrectomy (RaPN) is widely performed for renal tumor and can preserve renal function. Renal artery pseudoaneurysm (RAP) is a potential life-threatening complication of partial nephrectomy. The goal of this study is to determinate the incidence of RAP after RaPN and identify the predictive factors, specifically focusing on those requiring management with embolization.

Materials and Methods: A retrospective review of the institutional RaPN database was performed from December 2009 to June 2021. RAP was diagnosed by computed tomography angiography (CTA) for patients who were suspected of having RAP clinically. Patients who underwent embolization for RAP after RaPN represented a separated cohort to be compared with other patients (control). Patients' demographic data, tumors' characteristics, and operative outcomes were evaluated. Statistical analyses were used to determine the predictive factors of RAP after RaPN.

Results: A total of 544 patients who underwent RaPN was reviewed, and 14 patients developed RAP after surgery. 12 patients underwent embolization, and 2 patients underwent observation. Most those patients experienced gross hematuria and were diagnosed by CTA. No patients had recurrent RAP during follow-up after treatment. No difference was found in age, body mass index (BMI), tumor size, total preoperative aspects and dimensions used for an anatomical (PADUA) score, warm ischemia time, blood loss, intraoperative blood transfusion rates between patients who underwent embolization for RAP versus controls. However, male predominance (91.7% versus 59.4%, $p = 0.024$), higher total higher R.E.N.A.L Nephrometry Score (median 9.0 versus 8.0, $p = 0.02$), longer operative time (mean 349.6 mins versus 283.7 mins, $p = 0.046$) and longer postoperative hospital stays (median 6.0 days versus 5.0 days, $p = 0.031$) were noted in the patients who underwent embolization for RAP postoperatively. Besides, more proportion of patients who had 3 points N score (nearness to renal sinus or collecting system) in R.E.N.A.L score in embolization group, which reached statistically significance ($p = 0.031$). Univariate analysis revealed that R.E.N.A.L score and total operative time were statistically significant predictors of development of RAP.

Conclusion: The incidence of RAP is rare in our institute (2.6%). The occurrence of RAP is associated with higher R.E.N.A.L Score and longer operative time.

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RISK FACTORS FOR HEMORRHAGIC COMPLICATIONS FOLLOWING ROBOTIC-ASSISTED PARTIAL NEPHRECTOMY

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Purpose: The aim of this study was to analyze the risk factors for hemorrhagic complications in patients who underwent robotic-assisted partial nephrectomy.

Materials and Methods: We retrospectively reviewed the records of 260 patients who underwent robotic-assisted partial nephrectomy. Hemorrhagic complications were defined as bleeding, hematoma, or arteriovenous fistula requiring hemostatic medication, blood transfusion, or therapeutic intervention. Hemorrhagic complications were graded according to the modified Clavien classification system, and the hemorrhagic complication group comprised only those complications with Clavien grade II or higher. Thereafter, we investigated the presence of any relevant association between perioperative factors and hemorrhagic complications.

Results: Of 260 patients included in the study, 32 (12.3%) had hemorrhagic complications. The postoperative hemoglobin level was significantly lower in the hemorrhagic complication group than in the group without complications. The hemorrhagic complication group had significantly more essential blood loss and a significantly longer length of hospital stay. In the univariate analysis, type 2 diabetes mellitus, RENAL score, sum of the renal size plus renal sinus involvement in the PADUA score, prolonged console time (>180 min), prolonged warm ischemic time (>25 min), and method of pedicle control were statistically significant risk factors. In the multivariate logistic regression analysis, warm ischemic time >25 min was the only significant risk factor for hemorrhagic complications (odds ratio, 3.51; 95% confidence interval, 1.28–9.59; $p=0.01$).

Conclusion: Patients who undergo robotic-assisted partial nephrectomy with a warm ischemic time >25 min are significantly more likely to have hemorrhagic complications and should hence receive careful perioperative follow-up.

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VIRTUAL REALITY DEVICE APPLICATIONS IN TELEPRESENCE AND ROBOTIC SURGERY MENTORING: INITIAL EXPERIENCE OF A PROSTATE CANCER REFERRAL CENTER

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Purpose: The aim of this study is to test and validate the use of virtual reality (VR) technology in teaching robotic surgery

Materials and Methods: The study was conducted at a high-volume center for Robotic Assisted Laparoscopic Radical Prostatectomy (RALP) using a platform that allows attendees to view a live 3D stream of an operating room. A streaming cart was installed near the performing surgeon and connected to the robotic console, allowing for the transmission of audio and visual input to the VR headsets used by the attendees. The study included 10 cases and was streamed to 6 different locations with 4 attendees within the operating theater, 3 outside the operating theater but on the hospital premises, and 2 attendees at home.

Results: The results of the study suggest that the use of VR technology as a telepresence solution for teaching surgical procedures allows for immersive and interactive learning while maintaining social distancing as well decreased cost of travel.

Conclusion: The study demonstrates that VR technology can be an effective tool for teaching robotic surgery remotely and can be used as an alternative, cost-effective method to traditional in-person surgical training during the COVID-19 pandemic or other situations where physical presence is not possible.

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MUSCLE FATIGUE AND PHYSICAL DISCOMFORT REPORTED BY SURGEONS PERFORMING ROBOTIC-ASSISTED SURGERY: A MULTINATIONAL SURVEY

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Purpose: Robotic surgery has revolutionized surgical procedures and has provided many advantages over traditional laparoscopic and open surgeries. Despite the benefits, there are concerns about the physical discomfort and injuries that may be experienced by surgeons during robotic surgeries. This study aimed to identify the most common muscle groups implicated in robotic surgeons' physical pain and discomfort.

Materials and Methods: A questionnaire was created and sent to 1000 robotic surgeons worldwide, with a response rate of 30.9%. The questionnaire consisted of thirty-seven multiple-choice questions, three short answer questions, and one multiple-option questions pertaining to the surgeon's workload as well as their level of discomfort while and after performing surgery. The primary endpoint was to identify the most common muscle groups implicated in robotic surgeons' physical pain and discomfort. Secondary endpoints were to highlight any correlation between age group, BMI, hours of operation, workout regimen, and significant pain levels.

Results: The results showed that the most common muscle groups implicated in physical pain and discomfort were the neck, shoulders, and back, with many of the surgeons attributing their muscular fatigue and discomfort to the ergonomic design of the surgeon console.

Conclusion: Despite the level of surgeon comfort the robotic console provides when compared to other conventional forms of surgery, the findings suggest the need for better ergonomic practices during robotic surgeries to minimize physical discomfort and injuries for surgeons.

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DETECTION OF PROSTATE CANCER EXTRACAPSULAR EXTENSION WITH MPMRI USING DEEP LEARNING METHOD

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Purpose: This study aimed to develop a deep learning (DL) algorithm to enable us to train a DL model from scratch in regard of detecting extracapsular extension (ECE) of prostate cancer (PCa) on T2-weighted magnetic resonance imaging (MRI) images. Our fully automatic user-friendly framework aims to enable radiologists and surgeons to conduct the network's training operation on CPUs in clinical practice.

Materials and Methods: A retrospective analysis was conducted using a dataset of 300 patients with pathologically proven T3 PCa (Positive ECE) and 300 patients with pathologically proven T2 PCa (Negative ECE) as the learning group. The DL model was trained, validated and tested on this dataset to evaluate its performance in detecting ECE.

Results: The DL model using a multiple-slice image yielded the highest accuracy of 90%, and 64% on training and validation sets, respectively. Also, the trained model was tested by a blind test set and results showed areas under the receiver operating characteristic curve (AUC) of 0.6 as well as accuracy of 60% for the blind test set. We achieved the above results via training the model for 30 epochs with RMSprop optimiser, learning rate=0.0001, alpha=0.99, eps=1e-08, weight decay=0.00001, and momentum=0 parameters

Conclusion: The primary results of this study indicate that applying DL on T2-weighted MR images can effectively detect ECE in PCa and may have potential clinical applications for the diagnosis and treatment of this disease. Our DL model indicates improved accuracy, offers a promising alternative to human experts for ECE staging using mpMRI. Our model provides a data-driven and reproducible way to detect ECE of PCa using any MRI sequence and a personalized strategy to potentially improve the treatment result.

U 96

USING LASER SPECKLE CONTRAST IMAGING TO DETECT THE NEURO VASCULAR BUNDLE INTRAOPERATIVELY IN ROBOTIC ASSISTED LAPAROSCOPIC RADICAL PROSTATECTOMY: INITIAL CLINICAL EXPERIENCE OF A PROSTATE CANCER REFERRAL CENTER

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Purpose: Laser speckle contrast imaging (LSCI) is a non-invasive imaging technique that has shown promise in the detection of the NVB in robotic prostatectomies. LSCI uses laser light to illuminate tissue and measures the contrast of the speckle pattern caused by the movement of blood cells. The contrast in the speckle pattern is related to the velocity and density of the blood flow, providing information on the location and size of blood vessels. We present the initial experience of a prostate cancer referral center using LSCI to identify the NVB

Materials and Methods: In this study, we performed LSCI on 22 patients undergoing RALP to identify the NVB. The patients had varying Gleason scores, stages, and different degrees of nerve bundle preservation were performed. Prior to surgery, all patients underwent routine preoperative evaluation, including digital rectal examination, prostate-specific antigen (PSA) testing, and biopsy. Intraoperatively, LSCI was performed using a laser speckle contrast imaging system (ActivSight™ (Activ Surgical, Boston, MA). The NVB was identified by visual inspection using white light from the robotic camera and then imaged using LSCI. The imaging was performed by positioning the LSCI probe over the area of interest and obtaining real-time images of the tissue perfusion. The images were analyzed using custom software to extract information on blood flow velocity and vessel diameter. The LSCI imaging was performed at various stages of the surgery, including before and after dissection of the prostate. In this study, we performed LSCI on 22 patients undergoing RALP to identify the NVB. The patients had varying Gleason scores, stages, and different degrees of nerve bundle preservation were performed. Prior to surgery, all patients underwent routine preoperative evaluation, including digital rectal examination, prostate-specific antigen (PSA) testing, and biopsy. Intraoperatively, LSCI was performed using a laser speckle contrast imaging system (ActivSight™ (Activ Surgical, Boston, MA). The NVB was identified by visual inspection using white light from the robotic camera and then imaged using LSCI. The imaging was performed by positioning the LSCI probe over the area of interest and obtaining real-time images of the tissue perfusion. The images were analyzed using custom software to extract information on blood flow velocity and vessel diameter. The LSCI imaging was performed at various stages of the surgery, including before and after dissection of the prostate

Results: The landmark arteries were identified using regular white light in some cases however when LSCI was applied, they were visualized much more distinctly before dissection in all 22 cases bilaterally. In cases where nerve preservation was intended to be >50% on the specific side, the landmark artery was visualized after dissection as well (Figure 1). In cases where minimal NVB preservation was intended, the landmark artery was not well visualized after dissection.

Conclusion: This demonstrative proof of concept highlights the feasibility and potential utility of LSCI in identifying the NVB during RALP. Further studies and follow up of patients' erectile function are needed to validate these findings and to explore the potential applications of LSCI in RALP.

U 112

CAN PREOPERATIVE MENTAL HEALTH PREDICT SURGICAL OUTCOMES FOLLOWING ROBOTIC-ASSISTED RADICAL PROSTATECTOMY?

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Purpose: Preoperative poor mental health (PMH) status has been associated with worse surgical outcomes in patients undergoing orthopaedic and general surgery. However, there is little evidence of this pre-existing condition on surgical outcomes following robot-assisted radical prostatectomy (RARP). The objective of this study was to explore the association between preoperative mental health status with surgical outcomes following RARP.

Materials and Methods: Retrospective analysis of a prospective cohort study including all patients undergoing RARP between October 2016 and May 2022 at a major teaching hospital in Sydney. Mental Component Score (MCS) from the Short Form 36 survey was used to determine participant's self-reported mental health status. Univariate and multivariate logistic regression analyses were used to investigate associations between preoperative PMH and surgical outcomes (length of stay, surgical time, and complication rate), decision regret, pain.

Results: A total of 266 men underwent RARP during the studied period. Of these, 242 patients (91%) completed the preoperative survey (Table 1). Mean age at surgery was 63.8 years. Preoperative PMH associated with younger age, reduced access to economic resources, PMH at 6 weeks and 6 months postoperatively, greater pain and higher decision regret at 6 weeks postoperatively (Table 2). On multivariate analysis, preoperative PMH was associated with younger age, PMH at 6 weeks and 6 months postoperatively (Table 2).

Conclusion: For patients undergoing RARP, poor preoperative mental health is associated with younger age and poorer postoperative mental health. Future studies should investigate if targeted preoperative psychological interventions would improve postoperative mental health outcomes, specifically in younger patients undergoing RARP.

U122

INITIAL EXPERIENCE WITH ARTIFICIAL INTELLIGENCE-ENABLED MULTISPECTRAL IMAGING TO IDENTIFY CANCEROUS MARGINS IN ROBOTIC-ASSISTED RADICAL PROSTATECTOMY

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Purpose:

Radical prostatectomy (RP) is the most common surgical treatment for localized prostate cancer, and positive surgical margins (PSM) play a crucial role in cancer control. MarginAssure Imaging System developed by CytoVeris uses a Multi-Spectral Tissue Auto-Fluorescence Imaging (MS-TAFI) concept and employs AI-based machine learning algorithms in tumor detection. This platform is capable of analyzing the unique "optical fingerprint" of tissue based on its intrinsic biomolecular and morphological characteristics without requiring the use of dyes or imaging agents. The system includes an imaging chamber where a surgically excised specimen is placed and imaged. The AI-generated output produced by the system displays the presence or absence of cancerous tissue. In this scenario, using this technology, we aim to identify in real time extracapsular extension (ECE) and PSM.

Materials and Methods: This is a prospective study performed from Jan 2023 to April 2023 in our center. We evaluated 511 margins from 179 patients and divided the machine learning process into two phases:

Phase 1 (training) consists of using MarginAssure to image excised prostate specimens and correlate the results with clinical data including preoperative MRI images and biopsy results as well as postoperative histopathology diagnosis to develop the "labeled" data.

Phase 2 (testing) will be the validation of the device on immediately excised prostate specimens before fixation in the intraoperative setting. Postoperatively, the histopathology "gold standard" will be the determinate of positive or negative margins. The imaging results will be evaluated against the pathology and the concordance between the device/algorithm assessment and histopathology will be assessed.

Results: The median age 65, Median AUA 14, median SHIM 19, Overall PSM 22% and overall EPE 50%. Our analysis described 76.9% accuracy, 74.4% AUC, 76.5% specificity, and 91.6% sensitivity, 95% confidence intervals (76 +/- 0.1568). These early, initial results validate the feasibility of the approach.

Conclusion: Initial results showed that the MarginAssure Imaging System has the potential to differentiate between cancerous and benign tissue which may enhance the precision of tumor resection during radical prostatectomy. We described acceptable sensitivity and specificity rates of detection. Next steps would include building a more comprehensive database for algorithm training/testing, developing a domain-specific feature extractor based on self-supervised contrastive learning, model hyper-parameter optimization, and more rigorous evaluation and validation testing on unseen samples.

U 126

SINGLE-PORT ROBOT-ASSISTED SIMPLE PROSTATECTOMY A MULTI-INSTITUTIONAL SERIES FROM THE SPARC

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Purpose: Our aim is to report the feasibility of the single-port (SP) transvesical (TV) robot-assisted simple prostatectomy (RASP) by presenting the results of the multi-institutional Single-Port Advanced Research Consortium (SPARC).

Materials and Methods: Data from four institutions were collected prospectively and analyzed. SP TV RASP was performed in patients with severely symptomatic benign prostatic hyperplasia (BPH). A 3 cm suprapubic incision was made to access the bladder directly with the SP access port. The procedure included two steps: 1) Dissection of the prostatic adenoma and 2) a 360° reconstruction with a mucosal flap (Figure 1). Neither continuous bladder irrigation nor drains were required after SP TV RASP in our experience.

Results: A total of 117 cases were analyzed. All cases were completed successfully without the need for conversion. Mean age and body mass index were 67 years and 28 kg/m², respectively. Median Charlson comorbidity index was 3, up to 42% and 28% of the patients had a history of abdominal surgery and prostatic procedures, respectively. The median preoperative volume on imaging was 149.5 cc (IQR: 109-196). The most common indication for surgery was urinary retention (59%). Median operative time and estimated blood loss were 162 minutes and 100 ml, respectively. There were 3 intraoperative complications during the initial experience, all of them were air emboli due to high pneumovesicum pressure (>12 mmHg). Median specimen weight was 81 g (IQR: 59-123) and incidental adenocarcinoma was found in 5 cases (4.3%). Inpatient median MME was 7.5 mg. The median pain score at discharge was 2/10, 92% did not require narcotics at discharge. Planned outpatient cases were discharged within 24 hours 85% of the time. Median catheter duration was 6 days. Preoperative and postoperative biochemical and functional results are shown in Figure 2.

Conclusion: SP TV RASP is a feasible outpatient technique for patients with severe BPH. The 360° mucosal flap reconstruction step provides hemostasis and fast recovery.

U 128

IDEAL STAGE 2B EVALUATION OF UROLOGICAL PROCEDURES WITH THE VERSIUS ROBOT

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Purpose: The IDEAL stage 1/2a study demonstrated feasibility of the use of the Versius robotic platform at a single institution. This multi-centre collaborative stage 2b study adds wider exploration assessing surgical, oncological and functional outcomes in patients undergoing urological procedures with the Versius.

Materials and Methods: Data was collected from a prospective registry. Surgical outcomes were cross checked from electronic patient records held at each hospital included in the study.

Results: Five UK hospitals have undertaken a total of 70 urological procedures using the Versius (Table 1). Device failure occurred in one of the cases requiring conversion to laparoscopy and a further case required conversion to open due to intra-operative complication (2/70, 2.9%). One positive margin was observed in a robotic prostatectomy patient (12.5%). Immediate continence was achieved in 4 of 8 (50%) after prostatectomy. Eight patients (11.4%) had complications within 30 days, three were Clavien-Dindo class 3 and one class 4.

Conclusion: A range of urological procedures were shown to be feasible, safe and efficacious using the Versius device. Oncological outcomes were excellent with only 1 positive margin observed and no patient requiring adjuvant treatment over the study follow up period. Although the procedure times were longer across all procedures compared to the conventional Da Vinci device, this was to be expected given the learning curve and is anticipated to reduce with further experience and development of the device.

U 129

THE LISBON ZERO CLIP ROBOTIC-ASSISTED RADICAL PROSTATECTOMY, EARLY ONCOLOGICAL AND FUNCTIONAL OUTCOMES. IS THIS THE WAY TO GO?

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Purpose: Evaluate the early oncological and functional outcomes of the “Lisbon zero clip RARP technique” developed in Hospital da Luz, Lisbon.

Materials and Methods: We reviewed prospectively collected demographic, clinicopathological and functional data from all surgeries performed by one high volume surgeon (KM). Exclusion criteria were, salvage surgery and the use of clips during surgery. The grade of nerve sparing approach was decided upon our institutional prediction semantic model based on clinical and MRI features.

Recuperation of erectile function (EF) was defined as &20 SHIM questionnaire or ability to have satisfactory sexual intercourse.

Recuperation of continence was defined as use of no pad or 1 safety pad.

Clavien Dindo classification has been used for complication rate measurement.

Surgical Technique:The Lisbon Zero Clip RARP technique focuses on the maximal preservation of the antero - lateral complex without opening the endopelvic fascia and with high release combined with limited use of monopolar cautery, anterograde nerve sparing (NS), no use of clip material, maximal preservation of the intraprostatic urethra length, Total Anatomical Reconstruction (TAR) in 3 layers and use of Monocryl™ 4.0 sutures for hemostasis. No drains are used and catheter is left indwelling for 6 days.

Results: “Lisbon zero clip RARP technique” was proposed to 303 patients with pre-operative normal erectile function. After application of exclusion criteria 213 patients were included. The cohort had a mean age of 62.5 years (SD=7.95) and mean prostate volume of 50,19 g (SD=22.5).

Mean follow-up time was 14.3 months (SD= 8.4).

Bilateral full-NS was performed in 46 patients (23.8%), partial-NS in 143 (74.1%) and non-NS in 4 (2.1%).

Early complication rate (< 30 days) was 8.9% (n=19) with 5.2% of minor complications (Clavien I-II) and 3.7% of major complications (Clavien III-IV). Estimated Blood Loss 271ml SD 146ml

Histopathological patient distribution showed T2a 5.3% (n=11), T2b 15.0% (n= 31), T2c 59.9 % (n=124), T3a 14.5% (n=30) and T3b 5.3 % (n=11) and

ISUP distribution : in 22,7% ISUP 1, 48,5 ISUP, 20,6 % ISUP 3, 6,7 % ISUP 4 and 1,5% ISUP 5,.

Regarding lymphadenectomy results Nx 54.9% (n=117), N0 39.9% (n=85), and N1 6% (n=6).

Abstract content appears as submitted.

Overall significant positive surgical margin rate (margin length ≥ 2 mm) was 6.3% (n=13), with 4.2% (n=7/166) in T2 and 14.6% (n=6/41) in T3 patients.

Biochemical recurrence was identified in 7 high risk patients (3.3%).

Postoperative EF recovery in the group receiving full NS surgery was 69%, 75.6%, 91.7%, 85.3% and 84.6% at 1, 3, 6, 9 and 12 months, respectively.

Overall continence recovery was 97.9%, 98.4%, 98.6%, 98.6%, 98.6% at 1, 3, 6, 9 and 12 months, respectively.

Conclusion: The Lisbon Zero Clip RARP technique, is feasible with high safety, excellent early oncological results and very high immediate continence and functional recovery.

U 130

COMPARISON BETWEEN PRE-OPERATIVE GA68-PSMA PET LYMPH NODES INVOLVEMENT, IN INTERMEDIATE/HIGH RISK PROSTATE CANCER, AND HISTOPATHOLOGICAL LYMPHADENECTOMY RESULTS AFTER ROBOTIC-ASSISTED RADICAL PROSTATECTOMY (RARP)

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Purpose: In intermediate/high-risk prostate cancer, pre-operative staging exams are mandatory. The aim of these imaging studies is to evaluate eventual lymph node involvement and/or metastatic spread of the tumor. Nevertheless, CT, MRI, and Bone Scan modalities have controversial sensitivity. According to current guidelines PSMA PET/CT is more appropriate in N-staging as compared to other imaging exams.

The introduction of PET-PSMA and its use also as a pre-operative exam, seems to improve diagnostic accuracy due to favorable negative predictive value.

The objective of our study is to evaluate the strength of PET-PSMA as a pre-operative staging exam and its usefulness to predict lymph nodes involvement in order to best plan lymph node dissection.

Materials and Methods: Fifty patients who underwent 68Ga-PSMA PET/CT and following radical prostatectomy plus robotic lymphadenectomy were included in this retrospective analysis. Nuclear medicine doctor considered the “Standardized Uptake Value” (SUV) of the metastatic lesions. Diagnostic tests were performed through per-patient analysis in a 2x2 table with ePLND results considered as the gold standard and PET/PSMA as a diagnostic method to be tested. Correlation analysis between continuous variables were performed using the Spearman’s rank test.

Results: The clinical characteristics of the 50 patients included in the analysis showed a mean age of 63.3 years (SD=8.2), a median total PSA of 7.7 ng/dl (IQR=5.4), and 44% were classified in the staging biopsy as ISUP \geq 4 and 28% as pT3. Patients were recruited during 5 years from 2018 to 2022.

Descriptive and comparative analysis of the global population and separated into two groups (pN0 or pN1) was performed. Among them, 43 patients (86%)

submitted to ePLND did not present lymph node metastases (pN0), and 8 patients

(14%) were positive for locoregional lymph node metastases (pN1). A low prevalence of patients with positive nodes (16%) was found, reducing

the value of PPV (28.6%) and increasing of NPV (86.0%). In this sample, PET-PSMA showed low sensitivity in detecting lymph node disease (S=25%) and good ability to exclude disease (E=88.1%).

There was a significant positive correlation between the Total SUVmax of the prostate with initial total PSA ($r=0.38$; $p=0.019$) and the percentage of tumor involvement ($r=0.383$; $p=0.022$).

Conclusion: Despite PET-PSMA is an excellent study to identify extraprostatic disease, has a high accuracy in excluding lymph node involvement and may be a good option as pre-operative staging, it is not yet validated to limit the performance of lymphadenectomy in patients with intermediate/high risk prostate cancer or high predictive nomograms score.

The positive correlation between SUV and prostate involvement indicates that PET-PSMA could reflect, with a good approximation, the pathological features of the prostate.

U 141

USING REPOSITORY DATA TO DETERMINE KIDNEY STONE PREVALENCE OF PATIENTS DIAGNOSED DURING PATIENT ENCOUNTERS

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Purpose: Much of the current studies that investigate the prevalence of kidney stones in the United States are based on survey data from organizations such as The National Health and Nutrition Examination Survey (NHANES). In this study, the prevalence of kidney stones amongst different demographics was assessed using international classification of diseases (ICD) 9 and 10 codes used for institutional billing of patient information in a tertiary care center.

Materials and Methods: A retrospective study was conducted through Information for Integrated Biology and Bedside repository data (i2b2 1.7.12a PROD) of the UF Health System to perform queries to investigate the prevalence of kidney stones diagnosed during patient encounters from July 2011 to March 2023 across different demographics.

Results: Of a population of 1,688,687 adult patients ages 20 and older, the total prevalence of kidney stones was 5.69%. Of the patients that were diagnosed with calculus of the kidney, 58.88% were female, and 41.12% were male ($p < 0.05$). Amongst the age groups of 20-39, 40-49, and ≥ 60 , the percentage of patients with kidney stones was 21.49%, 23.93%, and 54.58%, respectively ($p < 0.05$). Out of the total number of patients with stones, when grouping by females aged 20-39, males aged 20-39, females aged 40-59, males aged 40-59, females aged ≥ 60 , and males aged ≥ 60 , the prevalence of each group was 16.23%, 5.25%, 14.93%, 9.01%, 27.72%, and 26.86% ($p < 0.05$). Stratified by ethnic groups of American Indian or Alaskan Native, Black, Hispanic, Indian, Native Hawaiian or other pacific islander, White, White Hispanic, Multiracial, and other, the distribution of patients with kidney stones was 0.14%, 15.25%, 0.30%, 0.01%, 0.06%, 66.99%, 0.008%, 0.48, and 15.32 ($p < 0.05$). The prevalence of patients with kidney stones as well as comorbidities thought to be risk factors for kidney stone development, these being diabetes, hypertension, tobacco use, hypercholesterolemia, gout, and obesity were also investigated. The prevalence of patients with these comorbidities and kidney stones was 23.20%, 50.03%, 17.21%, 9.46%, 4.61%, and 26.95%.

Conclusion: From the findings of the study, it is suggested that kidney stone prevalence is dependent on gender. Furthermore, the results suggest that kidney stone diagnosis is dependent on age group, where patients of 60 years of age and above are most likely to be diagnosed with kidney stones. Furthermore, kidney stone prevalence is also dependent on gender and age, and females above the age of 60 are most likely to be diagnosed with stones. Lastly, patients with kidney stones are more likely to have obesity and hypertension as comorbidities than any other known risk factor for kidney stones. Further research must be done investigating the clinical outcomes of patients diagnosed with kidney stones as well as an analysis of socioeconomic status and prevalence of kidney stones.

U 145

STANDARD VS AUGMENTED REALITY ROBOTIC RADICAL PROSTATECTOMY: PROOF OF CONCEPT

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Purpose: Use of augmented reality (AR) platforms in surgery has been described in telestration to guide optimal angles and planes for surgery. Live and semi-live telementorship with discussions on approaches based on simultaneous review of scans and models at the time of surgery is plausible. It is hypothesised that this can enhance performance in surgery, such as robotic radical prostatectomy (RRP). Our aim is to compare the intraoperative and early postoperative outcomes of standard vs AR RRP, for a first-year consultant surgeon (JN) as a proof of concept.

Materials and Methods: All patients underwent a transperitoneal retropubic da Vinci X/Xi RRP without lymph node dissection. PSMA PET was used to confirm organ confined disease where indicated. From May 2022 – April 2023, data was prospectively collected. Standard (or non-AR) RRP was used in 37 patients, the following 40 consecutive patients then underwent AR RRP with the platform ProximieTM. Demographics, intraoperative performance, early continence, potency and oncological outcomes were compared between the two groups.

A one-tailed T-Test was used to compare the groups with a significance level set at 0.05.

Post RRP continence was assessed by 24-hour pad use and International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF). Post RRP potency was assessed by erection hardness score 1-4 (EHS). Biochemical recurrence (BCR) is defined as >0.2 ng/mL.

Results: Median follow up for the non-AR group was 6 (interquartile range [IQR] 3-9) months and for the AR group was 3 (IQR 1-6) months. Median age was 63.8 and 64.5 respectively ($p = 0.37$).

Median BMI was similar at 26 ($p = 0.24$). Median PSA was 6.6 for the non-AR group and 7.6 for AR group (p -value = 0.14).

RRP operative time was 177 minutes in non-AR group and 160 minutes for AR group (p -value = 0.06).

0 pad continence rates was 61% in the non-AR and 58% in the AR group. ($p = 0.35$), median ICIQ -UI was 4 vs 6 respectively. ($p = 0.34$).

The non-AR group had 75% EHS of ≥ 2 and the AR group had 25% EHS of ≥ 2 ($p < 0.05$)

Overall positive surgical margin (PSM) rates was 27% (15% T3, 12% T2). PSM median length was 3mm in non-AR and 1 mm in AR group.

BCR was seen in 3% (1 patient with PSM) in non-AR group and 7% (2 of 3 patients had PSM) in the AR group.

No intraoperative complications occurred in either group. One patient in non-AR group developed osteitis pubis 40 days post RRP.

Conclusion: AR RRP is safe and feasible as a telementorship platform in this series of a first year



Abstract content appears as submitted.

consultant. Short-term, non-simultaneous follow-up limits comparative assessment of functional outcomes. The non-AR RRP group benefitted from a longer erectile function rehabilitation. Longer follow up of this cohort and future randomisation of groups should be a next step to assess the impact of AR on RRP outcomes.

U 147

TOGGLING TECHNIQUE ALLOWS RETROGRADE EARLY RELEASE TO FACILITATE NEUROVASCULAR BUNDLE SPARING DURING ROBOT-ASSISTED RADICAL PROSTATECTOMY: A PROPENSITY SCORE-MATCHING STUDY

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Purpose: This study aimed to present the surgical facilitation of neurovascular bundle (NVB) sparing using the toggling technique (30° lens down/up switching) and to evaluate erectile dysfunction (ED) recovery after robot-assisted radical prostatectomy (RARP).

Materials and Methods: We assessed 144 patients (group with toggling, n = 72; group without toggling, n = 72) who underwent RARP with bilateral NVB sparing using propensity score matching. Inclusion criteria were ≥ 1 year follow-up and preoperative potency as per the Sexual Health Inventory for Men (SHIM) questionnaire (≥ 17 points). Recovery of ED after RARP was defined as return to baseline sexual function or self-assessment regarding successful intercourse. The subjective surgeon's nerve sparing (SNS) score and tunneling success rates were used to evaluate surgical facilitation. The recovery rate of ED between the groups was analyzed using Kaplan-Meier analysis.

Results: A better ED recovery trend was confirmed according to the SNS score ($R^2 = 0.142, P = 0.004$). In the analysis of NVB sparing ease, the toggling group showed higher SNS scores (on right/left side: $P = 0.011$ and $P < 0.001$, respectively) and overall tunneling success rates (87% vs. 74%, $P = 0.001$) than the group without toggling. Overall, ED recovery rates were 82% (59/72) and 75% (54/72) in the groups with and without toggling, respectively, at the 1-year follow-up ($P = 0.047$), and the toggling group showed a faster ED recovery rate at 3 months (47% vs. 35%, $P = 0.013$). In a specific analysis of the potent cohort (< 60 years, bilateral full NVB spared, SHIM score ≥ 22), the ED recovery rate reached 87% (14/16) in the toggling group.

Conclusion: The retrograde early release with the toggling technique improves the facilitation of NVB sparing, leading to improved ED recovery.

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ROBOTIC AQUABLATION HIGH INTENSITY THEATRE (HIT) VS STANDARD OPERATING THEATRE IN A TERTIARY CENTRE

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Purpose: Robotic aquablation (AquaBeam System, PROCEPT BioRobotics Inc.) is an ultrasound guided, semi-autonomous, anergic waterjet system used to ablate obstructive prostate tissue. It has proven utility from international multicentre clinical trials, particularly in larger prostate glands. In the UK, waiting lists have increased and our unit pioneered high intensity theatre (HIT) principles in multiple surgical specialties to address this. It optimises theatre efficiency and increases the number of patients operated in a day through meticulous planning and parallel theatres for patients. Our experience of robotic aquablation in a HIT and a non-HIT list setting is assessed for safety and viability to treat more patients.

Materials and Methods: Two parallel surgical teams were supplemented by a 50% increase in staff as compared to conventional theatre models. Two specialist prostate surgeons (RP and JN) used one Aquabeam device between two time staggered operating theatres. The efficient use of one Aquabeam device was assisted with augmented reality displays via a ProximieTM platform. Standardised operating protocol was as follows: 2-3 aquabeam passes, bipolar focal cautery at bladder neck, 3-way catheter insertion followed by in line catheter traction for 15 minutes. Patients were identified as suitable candidates based on ASA score, performance status and agreement to HIT list protocol with pre-operative seminars. Primary outcomes were mean procedure time, median day of discharge and post-operative complications versus standard operating protocol. Secondary outcomes were staff satisfaction.

Results: 10 cases were performed on the HIT list in one day. There were no intra-operative complications and no returns to theatre. Clavien-Dindo grade 2 complications occurred (1 failed twoc and 1 readmission for suspected UTI symptoms with negative culture).

50 cases performed in a standard operating protocol over 5 months. There were no intra-operative complications and no returns to theatre. On average 5 cases were performed per list in standard elective operating protocols. All complications were Clavien-Dindo grade 2 (7 failed twocs, 1 readmission for haematuria, 8 patients treated for suspected UTI symptoms with negative culture).

We performed a t-test analysis on our results with no area reaching statistical significance shown in Table 1. Staff satisfaction results are shown in Table 2.

Conclusion: Our analysis highlights that a dual theatre HIT list with a single Robotic aquablation device, was a safe and efficient method to treat BPH for moderately enlarged prostates (80-150 gms). This suggests a potential for scalability to broaden BPH treatment in resource limited settings and ameliorating long surgical waiting lists.

U 156

ARE CT & BONE SCANS OPTIMAL FOR STAGING PATIENTS WITH GLEASON 4+3 PROSTATE CANCER PRIOR TO RADICAL PROSTATECTOMY? A RETROSPECTIVE STUDY OF 92 PATIENTS

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Purpose: Published guidelines including those from the EAU advise that patients with intermediate-risk prostate cancer and Gleason 4+3 histology undergo cross-sectional abdominopelvic imaging and bone scan for metastatic screening. Negative staging scans could allow for the option of robotic-assisted radical prostatectomy (RARP). However, the pickup rate of extra-prostatic disease is low using conventional CT (computerised tomography) and bone scans. Newer techniques, including Prostate Specific Membrane Antigen Positron Emission Tomography (PSMA PET), have become more favourable but their access is limited.

Herein, we aim to identify the pickup rate of metastatic disease in this patient cohort, using CT and bone scans along with oncological outcomes for those proceeding to surgery.

Materials and Methods: One hundred and three patients with overall Gleason 4+3 histology were identified over 38 months. Patients were excluded if PSA ≥ 20 ng/mL and/or multiparametric MRI prostate $\geq T3b$ stage. Patient demographics, radiological scans, pathology reports and MDT outcomes were analysed. Primary outcomes were: (a) to determine the detection rates of metastatic or nodal disease using conventional CT and bone scans and (b) to identify the number of patients with positive lymph nodes after dissection or detectable PSA immediately post RARP.

Results: A total of 92 patients were identified for analysis. Median age was 72 (range 45-83), PSA 7.8ng/mL (range 1.9-19.3) and prostate volume 39cc (range 10-129); 88/92 (96%) had MRI scans prior to staging. 81/92 (88%) had bone scan staging and 55/92 (60%) had CT scan staging, of which 52/92 (57%) had both. 0/81 (0%) bone scans identified metastatic disease and only 1/55 (2%) CT scans identified nodal disease not picked up by MRI scan.

40/92 (43%) patients proceeded to RARP, of which 16/40 (40%) had lymph node dissections. 1 patient had positive lymph nodes and 1 had detectable PSA immediately post-op.

Conclusion: We found that the detection of metastatic disease by conventional CT and bone scans was low in this cohort of patients. We conclude that PSMA PET scans allow for more accurate detection of metastatic disease. This is of particular use when optimising preprocedural planning in those being considered for radical prostatectomy. Further large scale multicentred studies are warranted.

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'EL-CHAPO STITCH' IN ROBOT ASSISTED RADICAL PROSTATECTOMY AT SUSTAINED LOW- PRESSURE PNEUMOPERITONEUM

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Purpose: Robot Assisted Radical Prostatectomy (RARP) is one of the recognised gold standard modes for the treatment of organ confined prostate cancer in many centres. The procedure carries several challenges. Two areas of challenge include optimal control of the dorsal vein complex (DVC) and reducing the recognised negative impact of high- pressure pneumoperitoneum. Herein, we present our experience of a simple modification of a standard stitch for DVC control and test the impact of low-pressure pneumoperitoneum [LPP] at 6mmHg from time of DVC ligation to completion of the case.

Materials and Methods: A prospective study to include 100 consecutive RARP cases was launched by a single surgeon. At the time of DVC dissection, the pneumoperitoneum was raised to 20 mmHg with drop in pressure following initial control. Data was collected along two parallel arms. Arm 1 included data centred around the time to deploy a DVC Control Stitch [DCS] and blood loss. Blood loss was measured between deployment of first stitch to full completion of stitch with removal of the prostate. This was compared with a control group of 50 cases using conventional approach. Arm 2 included data centred on the impact of LPP at 6mmHg from the time of DCS till full completion of the entire case. Arm 1 involved DCS with use of Vicryl™ sutures cut to 10 CMS each with two separate needles tied in tandem such that the central part permits long “whiskers” for rapid sequence ligation and control prior to removal of the prostate. The suture was nicknamed the “El Chapo” stitch.

Results: In Arm 1, the mean time for deployment of the suture with initial DCS was 7.7 seconds (range 5 – 20). Mean blood loss at first suture deployment to DCS in the study arm was 22mls versus 65mls in the control arm. In all cases the suture allowed the pneumoperitoneum to be dropped to 6mmHg without compromise. In all cases, once DCS was fully completed, the RARP was completed without further alteration to the pressure. There was a decrease in postoperative

ileus in the study group. There was no impact on positive margin or transfusion rate status but there was a threefold reduction in blood loss in the study arm.

Conclusion: Early rapid sequence DVC Control Stitch with the described suture coupled with low-pressure pneumoperitoneum at 6mmHg can be safely applied with reduced blood loss and post-operative ileus in robot assisted radical prostatectomy. Large scale studies to further decipher ways of performing these cases with low-pressure pneumoperitoneum are warranted.

U 174

E3 UBIQUITIN-PROTEIN LIGASE, TETRATRIPEPTIDE REPEAT DOMAIN 3 (TTC3), H4 CLUSTERED HISTONE 5 (H4C5), AND EPITHELIAL CELL ADHESION MOLECULE (EPCAM) ARE NOVEL URINE-ENRICHED LIQUID BIOPSY BIOMARKERS TO DETECT PROSTATE CANCER IN MEN

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Purpose: Prostate Cancer (PCa) is one of the leading causes of cancer deaths among American men; however, the estimated number of diagnoses represents a small fraction of disease-related biopsies performed yearly. Although the Prostate-Specific Antigen (PSA) test is widely used for screening, several advisory groups recommend against using PSA because of its suboptimal performance. Thus, there is an urgent unmet need for novel and more accurate diagnostic biomarkers for PCa detection and to differentiate aggressive cancer from its indolent form.

Materials and Methods: In our study, we used voided urine (50ml) from pre and post-prostatectomy men with PCa and urine from normal healthy men as control. We isolated RNA from exfoliated cells and debris shed into urine and performed RNA-sequencing using the Illumina Next-seq 550 platform. Advanced computational and machine-learning approaches were employed to identify candidate biomarkers in men with PCa. We examined the TCGA database to validate the PCa-specific expression of the identified RNA in tumor tissues. Two RNA markers were further tested by qPCR, and one urinary soluble protein marker was measured by immunoassays. Our study included 137 men with PCa and 97 control men. We identified and validated the presence of ≥ 1 RNA markers (TTC3, H4C5) and a protein marker (EpCAM) in urine as potential candidate biomarkers for PCa detection. We tested and developed these markers using qPCR for TTC3, H4C5, and ELISA assay for EpCAM with higher specificity and sensitivity

Results: Our results outperformed known urinary markers. TTC3, H4C5, and EpCAM markers diminished to low or undetectable levels in post-prostatectomy compared to pre-prostatectomy men with PCa, and we also report that TTC3 can separate benign prostate hyperplasia from prostate cancer. Knockdown of TTC3 and EpCAM in androgen-sensitive and insensitive cells and in vivo xenografts show a dramatic tumor reduction, suggesting their relevance to Prostate Cancer development. We report a highly accurate panel of 3 urine-based biomarkers that detect PCa consisting of EpCAM (protein) and TTC3 and H4C5 (RNA).

Conclusion: The advantage of using individual or combinatorial markers will be the focus of our upcoming independent study of a multi-center trial.

U 184

OUTCOMES OF SALVAGE ROBOTIC-ASSISTED RADICAL PROSTATECTOMY COMPARING PATIENTS WITH PRIMARY FOCAL THERAPY VERSUS WHOLE GLAND ABLATION: A MULTICENTRIC COLLABORATIVE STUDY

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Purpose: With increasing experience, surgeons worldwide have increasingly used Salvage Robotic-assisted Radical Prostatectomy (SRARP) as a tool to treat patients who failed previous non-surgical treatment for prostate cancer. Our study compared the outcomes of salvage radical prostatectomy from two high-volume centers from the US and UK in patients who failed prior treatment with whole gland ablation (wg-SRARP) and focal therapy (f-SRARP).

Materials and Methods: The study assessed 339 patients compared in two groups: 145 patients who had primary focal therapy and 194 patients who had primary whole gland treatment. SRARP was performed in all cases using a standardized technique developed at respective institutes with the da Vinci Xi Surgical System. Our primary endpoint was the comparison of the functional and oncological outcomes between the groups.

Results: The median total operative time for f-SRARP was 18 mins higher than wg-SRARP ($P < 0.001$). Significantly higher rates of nerve-sparing were performed in f-SRARP (focal vs whole gland; bilateral – 15.2% vs 9.3%; unilateral 49% vs 28.4%; $p < 0.001$). Wg-SRARP had higher rates of ISUP 5 (26.3% vs 19.3%; $p < 0.001$) and deferred ISUP score due to altered pathology (14.8% vs 0.7%; $p < 0.001$) while f-SRARP had higher rates of ISUP 4 (11.7% vs 10.7%; $p < 0.001$) and $\geq pT3a$ (64.8% vs 51.6%; $p < 0.001$). Also, f-SRARP had higher rates of positive surgical margins (26.2% vs 10.3%; $p < 0.001$). Functional outcomes were poor in both groups. However, postoperative continence was higher and faster in patients who had f-SRARP compared to wg-SRARP (69% vs. 54.6% ; $p=0.013$). We could not identify statistically significant difference in postoperative potency recovery and biochemical recurrence.

Conclusion: Salvage robotic-assisted radical prostatectomy is challenging wherein patients have adverse pathological features irrespective of primary treatment. Focal therapy group had higher rates of nerve-sparing with increased positive surgical margins. However, both groups had poor functional outcomes regardless of nerve-sparing degree, indicating significant collateral and contralateral damage to tissues surrounding the prostate. We believe that this analysis is crucial for counseling patients regarding expected outcomes before performing a salvage treatment following ablative therapies failure.

U 187

FUNCTIONAL OUTCOMES AFTER SELECTIVE CLAMPING IN ROBOT-ASSISTED PARTIAL NEPHRECTOMY

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Purpose: According to a comprehensive systematic review and meta-analysis on partial nephrectomy (PN), robot-assisted partial nephrectomy (RAPN) delivers mostly superior and at a minimum equivalent outcome compared to open and laparoscopic PN. Selective renal artery clamping is an alternative surgical technique to full clamping, that involves isolating and clamping only those renal arterial branches that directly supply the renal tumor. Selective clamping is performed over full clamping primarily due to better renal functional outcomes. Recently, several studies have evaluated the effectiveness and ability of performing selective clamping in RAPN, however, it remains controversial regarding renal function after RAPN. This study aimed to assess the risks and benefits of selective clamping in RAPN.

Materials and Methods: We retrospectively analyzed 372 patients who had undergone RAPN at our hospital between July 2010 and March 2021. After propensity score matching between the full and selective clamping groups, perioperative outcomes and postoperative preservation ratio of the estimated glomerular filtration rate (eGFR) were compared at 6 and 12 months of follow-up.

Results: Patient characteristics, including age, sex, body mass index, American Society of Anesthesiologists score, preoperative eGFR, tumor side, surgical approach, tumor size, RENAL score, and the presence of hilar or cystic tumors were compared between the full and selective clamping groups, before and after matching. In the pre-matching cohort, only the tumor side showed a significant difference ($p = 0.029$), whereas no significant differences were observed between the full and selective clamping groups in the post-matching cohort. After propensity score matching, we evaluated 47 patients from each group. While no significant differences were observed in surgical time, warm ischemia time (WIT), and incidence rates of all grades of complications between the two cohorts, the estimated blood loss (EBL) was significantly lower in the full clamping group than in the selective clamping group (30 vs. 60, $p=0.046$). However, no significant intergroup differences were observed in the postoperative preservation ratio of eGFR at 6 or 12 months of follow-up (full clamping 94.0% vs. selective clamping 92.7%, $p=0.509$; and full clamping 92.0% vs. selective clamping 91.6%, $p=0.476$, respectively). As the median WIT was 16 min in both groups, the preservation ratio of eGFR under or over 16 min of WIT was examined at the 6- or 12-month follow-up. In the category of WIT \leq 16 min, no significant intergroup differences were observed in the preservation ratio of eGFR at 6 or 12 months (full clamping 86.8% vs. selective clamping 94.1%, $p = 0.381$, and full clamping 94.3% vs. selective clamping 89.5%, $p = 0.365$, respectively). In the category of WIT $>$ 16 min, no significant intergroup differences were observed in the preservation ratio of eGFR at 6 or 12 months (full clamping 95.6% vs. selective clamping 91.8%, $p = 0.092$, and full clamping 91.3% vs. selective clamping 92.9%, $p = 0.938$, respectively).

Conclusion: Selective clamping resulted in higher EBL rates than did full clamping in RAPN. However, selective clamping provided no renal functional advantage over full clamping in our propensity score-matched cohort.

U 188

ROBOT-ASSISTED SURGERY IN TREATMENT OF PATIENTS WITH ZINNER SYNDROME

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Purpose: Zinner syndrome is a rare congenital malformation characterized by unilateral renal agenesis, cystic formation in the ipsilateral seminal vesicle, and obstruction of the ejaculatory duct. Resection of the cyst in the seminal vesicle is typically deemed necessary for patients experiencing symptoms. Surgical intervention remains the primary approach for managing symptomatic cases. For patients who do not respond to conservative treatment or have cysts larger than 5 cm, surgical intervention is recommended. Asymptomatic patients can be managed conservatively with antibiotic treatment. In certain cases, minimally invasive procedures like TRUS-guided cyst aspiration can be performed. The objective of our study was to examine the use of robot-assisted surgery for the minimally invasive treatment of this rare condition.

Materials and Methods: We retrospectively reviewed the clinical data of 15 male patients (age range 18 – 51 years, median – 26 years) with clinically symptomatic and radiologically confirmed Zinner syndrome (9 right and 6 left side) treated in two centers between January 2009 and May 2023. Abdominopelvic contrast-enhanced MRI was performed in all men. Symptoms included perineal/scrotal discomfort and pain (n=12), moderate to severe LUTS (n=7), infertility (n=4), painful orgasm, and hemospermia (n=7). The average diameter of the cyst was 8.3±2.2 cm (range 5.7 – 13.1 cm). Eight out of 15 men underwent transrectal aspiration of the cysts (5 patients &1 puncture) with temporary relief of symptoms for 2 to 12 weeks, but all recurred during the follow-up.

Results: All 15 patients finally underwent Da Vinci robot-assisted resection of the seminal vesicle cyst (in 13 cases associated with vesiculectomy) via a transperitoneal approach. The trocars' and patients' position was similar to radical prostatectomy. Median console time was 52 min (range 20 – 122 min), blood loss 28 ml (range 10 – 150 ml), and length of stay 2.5 days (range 1 – 6 days). There were no serious intraoperative complications. In 2 anatomically complex cases, the bladder was opened during the cyst mobilization and removal, which required additional suturing. During the early post-op follow-up (≤30 days after surgery) 3 patients experienced grade I and 1 patient – grade II complication (UTI) according to Clavien-Dindo classification. After the median follow-up of 60 months (range 6 to 161 months), no cyst formation recurrence was detected, including 2 men with no or partial vesiculectomy.

Conclusion: Following a median follow-up period of 6 years, robot-assisted resection of the seminal vesicle cyst, with or without vesiculectomy, demonstrated a favorable outcome with no instances of recurrence and a low incidence of complications. This surgical approach should be regarded as the "gold standard" for managing symptomatic, sexually active young men with Zinner syndrome.

U207

TOWARD SURGEON SKILL ASSESSMENT AND FEEDBACK ON THE VESICourethRAL ANASTOMOSIS TRAINING TASK WITH VERSIUS

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Purpose: The future of surgical training must be standardised and objective. We also need to develop evaluation processes that are scalable. Personalized performance feedback is also important to aid learning. In this work, we developed a machine learning (ML) workflow to classify surgeon performance using Automated Performance Metrics (APMs) on Vesicourethral Anastomosis (VUA) dry lab training tasks and gathered data insights for obtaining high-level personalized surgeon feedback on their sutures during the VUA tasks.

Materials and Methods: We arranged dry lab training VUA trials (between August 2021 to November 2021) with a novel task design incorporating didactic principles as part of the basic skills training curriculum. In trials, surgeons were asked to perform the VUA task on a phantom ([Vesico-Urethral Anastomosis Kit from 3-Dmed](#) (Franklin, OH, USA)). Participants in the study included trained surgeons (“experts”) (>100 hours of experience using Versius or da Vinci surgical system), surgical residents/fellows and medical students (“novices”). We recorded videos of hand controllers and the VUA task (for gesture annotations) and collected Versius telemetry consisting of Versius needle holders and hand controller’s kinematics data. We manually annotated suture gestures in videos and aligned them with telemetry for each trial to analyze sutures in VUA tasks. From the VUA task (task level) and annotated sutures (gesture level), we extracted APMs representing the performance of the surgeon during the dry lab training. APMs include general metrics like total time to complete a suture/full anastomosis to more sophisticated metrics on needle holder and hand controller articulations. We then used the ML workflow to discriminate these APMs for assessing the performance of expert and novice surgeons and understanding surgeon feedback points using feature engineering techniques.

Results: The VUA training ML model was built using data from 20 surgeons (11 novices, 9 experts). The results show that during the cross-validation our VUA ML workflow identified that 2 of the experts’ performances were not comparable to other experts (**Error! Reference source not found.**). We obtained similar comparative results while assessing surgeons with validated objective metrics by manually reviewing task videos.

Conclusions: In our analysis, we found that novice surgeons need more training/guidance on orientation-related technical skills (both with Versius hand controllers and surgical instrument tip movements), for executing more smooth trajectories and finishing tasks faster (based on the task level analysis). While evaluating suture gestures in VUA, the ML model found (gesture level analysis) that surgeons found it more difficult to execute suture gestures at 8 o'clock urethral stump/bladder neck, 10 o'clock bladder neck, 7 o'clock bladder neck, 12 o'clock bladder neck/urethral stump, 1 o'clock bladder neck and 6 o'clock bladder neck. We think that gesture-level analysis is essential to provide actionable individualized standardised



Abstract content appears as submitted.

feedback to surgeons. Understanding gesture-level data should shorten learning curves, improve safety, whilst automation can aid scalable surgical training.

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U208

PRECLINICAL EVALUATION OF THE CARINA™ RAS PLATFORM FOR USE IN RENAL AND PROSTATE MIS

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Purpose: To evaluate the utility of a new modular robotic-assisted surgical system (Carina™ RAS Platform, Ronovo Surgical, Shanghai, China) for urologic procedures in a preclinical setting.

Materials and Methods: Live porcine models were used to assess Carina™ in performing robotic-assisted partial nephrectomy, and live canine models were used to assess the system in performing robotic-assisted prostatectomy. Cadaveric labs were conducted to evaluate the ability of the system to complete all surgical steps required for a robotic-assisted partial nephrectomy and radical prostatectomy. Procedures were successfully performed by experienced urologic surgeons and supported by a surgical team. The steps of the procedures were systematically recorded to demonstrate that the procedures could be successfully completed. Docking time (from incision to completion of docking to ports), console time, estimated blood loss (EBL, for live models only), and instruments used were recorded at the same time. Three-week morbidity and mortality of the porcine models were recorded. The canine models did not undergo postoperative observation due to difficulty in catheter management.

Results: In total, six partial nephrectomies in porcine models and three prostatectomies in canine models were performed over three days, two partial nephrectomies and two prostatectomies in cadavers were performed over two days, and all procedures were completed successfully by four urologic surgeons. The docking time and console time of porcine partial nephrectomy were 29 ± 3 min and 36 ± 18 min, respectively, warm ischemia time was 16 ± 10 min, and EBL was less than 5 ml. The docking time and console time of canine prostatectomies were 24 ± 3 min and 48 ± 19 min, and EBL was less than 5ml. For the porcine models, there were no intraoperative or postoperative complications up to 3 weeks in follow-up. For cadaveric labs, docking times for the two partial nephrectomies were 33 min and 25 min, console times were 76 min and 62 min; docking times for the two prostatectomies were 26 min and 23 min, console times were 105 min and 92 min; and there were no collisions among robotic arms causing procedural delay.

Conclusion: Use of Carina™ for major robotic-assisted urological procedures demonstrated the safety and effectiveness of the system in cadaver and animal models. Further studies are required to assess clinical utility of Carina™ in human patients.

GS 25

ROBOTIC ANATOMICAL MONOSEGMENT 3 LIVER RESECTION. DESCRIPTION OF SURGICAL TECHNIQUE IN ERA OF PRECISION HEPATECTOMY

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Purpose: Minimally invasive liver resection has gained significant adoption in the past decade due to the perioperative clinical advantages when compared to open method. The majority of the minimally invasive liver resections are however performed non-anatomically without clear exposure of hepatoportal structures and the use of energy device is often excessive. While an anatomical liver resection is known to lead to superior oncological outcomes for certain liver tumor such as hepatocellular carcinoma, it requires solid understanding of the intrahepatic vascular anatomy and techniques to access them. In this video we describe a Glissonean technique for an anatomical monosegment 3 liver resection using a robotic platform and ICG Guidance.

Materials and Methods: 41 year old man presented with constant epigastric pain and early satiety. Past medical history includes hypertension, fatty liver, hyperlipidemia, hypertriglyceridemia, obesity, pre-diabetic. A CT scan showed 7cm hyperenhancing mass partially exophytic in segment 3 of the liver. There was a suspicion for HCC versus hepatic adenoma versus FNH. The operation began with diagnostic laparoscopy and inflow vascular dissection to liver segment 3. The hepatic artery and portal vein supplying liver segment 3 were isolated and clamped to delineate ischemic demarcation line bordering liver segment 2. ICG fluorescence angiography was also used to further delineate segment 3. The liver parenchymal transection is performed mainly using bipolar forceps and a vessel sealer following anatomical planes. The segment 3 bile duct was isolated intrahepatically, ligated and clipped just prior to completion of the operation. A closed suction abdominal drain was not necessary in this operation.

Results: Operation time was 2 hours with 50 cc of blood loss. Postoperative course was uneventful. Pathology report was consistent with 6.8 cm focal nodular hyperplasia (FNH), negative for malignancy. Background liver tissue with minimal macrovesicular steatosis (~ 5%), negative for significant portal or lobular inflammation and fibrosis.

Conclusion: We described a simple and reproducible technical approach for an anatomical segment 3 liver resection using a robotic platform. We believe that this technique is safe and feasible especially for surgeons in their early learning curve in robotic liver surgery.

GS 46

ROBOTIC HELLER MYOTOMY VIDEO DEMONSTRATION WITH ICG

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Purpose: The purpose of this video is to demonstrate one technique to perform a robotic-assisted laparoscopic Heller myotomy with fundoplication using both intra-operative endoscopy and indocyanin-green (ICG) administration to perform intra-operative leak tests. This procedure was performed in 2022 at an urban community hospital in the United States.

Materials and Methods: The patient was a 74F diagnosed with achalasia who described 15 years of symptoms and one episode of food impaction. She had attempted one round of endoscopic Botox treatment for the achalasia and then presented for surgical management.

Surgery was performed using the Xi da Vinci Robot and video was obtained concurrently. After myotomy, leak test was performed traditionally using intra-operative endoscopy as well as with ICG solution mixed with saline imaged by ICG fluorescence. No leaks were noted during the leak tests.

Results: Postoperatively, the patient did well. She remained inpatient overnight and a gastrograffin UGI was performed on post-operative day one which demonstrated no evidence of extra-luminal contrast. She was discharged home on a liquid diet. She was transitioned to soft/pureed foods at one week. At one month, her incisions were well healed and she was transitioned to a general diet without issue.

Conclusion: In conclusion, the technique demonstrated in the video depicts a safe and effective procedure for performing a robotic-assisted laparoscopic Heller myotomy with fundoplication. The use of both intra-operative endoscopy and ICG administration provided reliable evidence of no obvious intra-operative leak which was confirmed post-operatively.

GS 70

ROUX EN Y GASTROJEJUNOSTOMY AND MEDIAN ARCUATE LIGAMENT RELEASE FOR MEDIAN ARCUATE LIGAMENT SYNDROME AND BILE REFLUX

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Purpose: Our patient is 29 year old female with history of chronic nausea after cholecystectomy. She underwent gastric sleeve in 2020. She developed worsening nausea, vomiting and pain. She was found to have bile reflux and SMA Syndrome. She underwent laparoscopic duodenojejunostomy with feeding J-tube placement. She had minimal improvement. She was managed via TPN and jejunostomy tube feeds, with frequent presentations/readmissions for recurrent symptoms. Celiac blocks were performed twice, with initial improvement, but not resolution of symptoms. An inspiratory/expiratory celiac duplex was performed, with elevation of velocities, concerning for Median Arcuate Ligament Syndrome (MALS). A repeat EGD 10/5/22 confirmed bile reflux. We planned for Median Arcuate Ligament Release/Celiac Artery Decompression in conjunction with Partial gastrectomy with roux en y gastrojejunostomy. This was performed with hiatal hernia repair and takedown of jejunostomy site on 12/9/22.

Materials and Methods: We used our standard foregut port placement: one 12mm port for stapling, and four 8mm ports. We began with mobilization of the sleeve and circumferential hiatal dissection. Additional dissection was performed to clear the base of the crura. Posterior dissection through the esophageal hiatus was performed to expose the inferior thoracic aorta. Subsequent dissection exposed the aortic hiatus and isolated the median arcuate ligament. The left gastric, splenic, and common hepatic arteries were all identified in relationship to the celiac trunk. There was thick, fibrotic tissue associated with the celiac axis and median arcuate ligament. This was carefully cleared, and the median arcuate ligament sufficiently divided to free the trunk back to its takeoff from the aorta. IV Indocyanine green showed unobstructed flow through the vessels. A retrogastric tunnel was created, and the stomach stapled to create the gastric pouch. The hiatal hernia was repaired. The jejunostomy tube site was taken down. The ligament of treitz was identified, and the prior duodenojejunostomy was seen. The small bowel was run approximately 30cm beyond the DJ anastomosis, reaching the prior jejunostomy site. A handsewn anastomosis was created. The small bowel was divided, and the jejunostomy site was resected. Intraluminal ICG passed easily through the anastomosis. The roux limb was then run 75cm, and a stapled anastomosis to the BP limb was performed. The common enterotomy was closed with a barbed PDS suture, and the mesenteric defect was closed with silk suture.

Results: The patient was discharged on postoperative day 5. An upper GI study was performed prior to discharge, which showed appropriate passage of contrast. The patient has seen some improvement in nutrition, nausea and vomiting, having gained four pounds between her last two office visits. However, she is still requiring TPN, and experiences some chronic back pain.

Conclusion: Long-term outcomes from celiac artery decompression are variable. Not all patients have lasting relief, and comparison is difficult because of the varying symptoms. Current long term data is mostly from open surgeries, though minimally invasive techniques increasingly look comparable.

Symptom recurrence long term can be anywhere from 5.7% to 47%. Some may also require some form of revascularization.

GS 177

TOTALLY ROBOTIC RESECTION OF A SCHWANNOMA IN THE LEFT PELVIC RETROPERITONEUM BETWEEN L4 AND L5 NERVES

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Purpose: Surgery in the pelvis, particularly in the retroperitoneum, is delicate due to its complex anatomical relationships and requires precise dissection and careful manipulation during surgery to avoid complications and to ensure optimal patient outcomes. Schwannomas, indolent nerve sheath tumors arising from Schwann cells, are rare tumors that are even more rare when located in the pelvic retroperitoneum. Open surgical techniques have traditionally been used for their resection; however, resection of pelvic retroperitoneal tumors through an open approach is especially difficult due to their location. Traditional open techniques to access the pelvic retroperitoneum, including anterior and lateral retroperitoneal approaches, carry an increased risk of damaging the anatomy in this region compared to other areas of the body. A robotic approach to pelvic retroperitoneal nerve sheath tumors is both feasible and less invasive with the potential to improve patient outcomes compared to open surgery. Recent accounts utilizing the newer robotic technology suggest that it provides better visibility and dexterity during surgery and can reduce the risk of neurologic complications for tumors found in this area. However, robotic surgery for this application has been limited and there is minimal literature on accessing the pelvic retroperitoneal space robotically. We present a video of a totally robotic resection of a schwannoma in the pelvic retroperitoneum, detailing our steps to access and resect the tumor from a surgically challenging location. We aim to further explore this newer approach in the developing field of robotic surgery.

Materials and Methods: The patient was a 56-year-old male with a history of several previously resected peripheral schwannomas that presented with an asymptomatic 4.3 cm mass in the left posterior pelvis that was incidentally detected on routine imaging. Imaging evaluation with MRI and PET/CT suggested a neurogenic tumor. The mass could not be percutaneously biopsied due to its location. The size of the tumor and the concern for possible malignancy led to the decision to resect the mass. A totally robotic resection with neurosurgery was planned, as depicted in the video.

Results: The patient successfully underwent the operation: the robotic resection was completed with no short-term postoperative complications. The duration of the surgery was 290 minutes and the estimated blood loss was 10 cc. Following an uneventful postoperative course, the patient was discharged on postoperative day 2. No neurologic deficits were present at the 6-week follow-up. Final pathology revealed a schwannoma.

Conclusion: Traditionally open surgery for pelvic retroperitoneal tumors is challenging and is associated with significant complications. Robotic surgery represents a minimally invasive, feasible approach for such cases with the potential to improve outcomes for patients. Here, we show a totally robotic resection of a pelvic retroperitoneal schwannoma, an approach that may one day become a standard practice.

G3

ROBOTIC ASSISTED LAPAROSCOPIC MYOMECTOMY OF A BROAD LIGAMENT FIBROID UTILIZING A THREE ARM APPROACH

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Purpose: Preoperative imaging was consistent with a 7 cm subserosal fibroid. In order to minimize blood loss a dilute vasopressin solution was utilized to infiltrate the fibroid capsule which also results in hydro-dissection. An intra-operative survey should be performed to ensure adequate uterine mobility and sufficient space for visualization and to allow for optimal surgical access. It is important to make a large enough incision at least the diameter of the fibroid to allow for dissection in the correct plane resulting in less blood loss and more efficient enucleation. Use of the third robotic arm with a tenaculum allows traction and counter-traction to facilitate dissection in the appropriate plane with complete surgeon autonomy.

Materials and Methods: Davinci Xi Robotic Platform

Vasopressin

Results: Successful minimally invasive surgical approach with effective and efficient dissection with minimal blood loss (less than 25 mL). The patient was discharged home on day of surgery and had no post-operative complications and did not require narcotic pain medication.

Conclusion: Use of the third robotic arm with a tenaculum allows traction and counter-traction to facilitate dissection in the appropriate plane during laparoscopic myomectomy with complete surgeon autonomy. This technique resulted in a successful minimally invasive surgical approach with effective and efficient dissection with minimal blood loss

G6

ROBOT-ASSISTED LAPAROSCOPIC TRANSABDOMINAL INGUINAL LYMPHADENECTOMY FOR VULVAR CANCER

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Purpose: Surgical demonstration by case. Show the advantages and characteristics of robot-assisted laparoscopic surgery in inguinal lymphadenectomy, and emphasize the key points that need to be paid attention to in the operation

Materials and Methods: Bilateral inguinal lymphadenectomy and modified radical vulvectomy in a 59-year-old patient with stage 1B squamous cell carcinoma of the vulva under the da Vinci Xi robot

Results: Making it more suitable for performing delicate surgeries in confined subcutaneous spaces. It is more suitable for anatomical identification and lymph node dissection in narrow spaces. Reduces the size of surgical incisions greatly. Reducing the number of puncture wounds. Exploration and resection of pelvic lymph nodes can be conveniently performed if necessary. Fully demonstrated the advantages of the long arm of the robotic surgical system.

Conclusion: Robotic-assisted laparoscopic inguinal lymphadenectomy for vulvar cancer allows to perform more flexible and fine dissection in a small space. The advantage of the length of the surgical arm enables the surgical field to reach the top of the femoral triangle, significantly reducing surgical wounds, and necessary pelvic surgery performed without additional trauma.

G7

ROBOT-ASSISTED LAPAROSCOPIC SURGERY IN ARTERIAL SPARING RADICAL TRACHELECTOMY FOR EARLY CERVICAL CANCER

Xiang Xue The Second Affiliated Hospital of Xian Jiao Tong University, Xian, China

Purpose: Surgical demonstration by case. Show the advantages and characteristics of robot-assisted laparoscopic surgery in arterial sparing radical trachelectomy for early cervical cancer, and emphasize the key points that need to be paid attention to in the operation

Materials and Methods: Robot-assisted arterial sparing radical trachelectomy and pelvic lymphadenectomy in a 30-year-old, desire for fertility with stage IB1 squamous cell carcinoma of the cervix under the da Vinci Xi robot.

Results: The main purpose of radical trachelectomy is to preserve fertility and achieve pregnancy and delivery. Therefore, postoperative preservation of the uterus with adequate blood supply is particularly critical to maintain normal function.

Preserving the uterine artery is a crucial step in performing arterial sparing radical trachelectomy with the aim of preserving the uterus and its blood supply.

The da Vinci surgical system provides a clearer surgical field and enables thorough excision of the paracervix and parametrial tissues.

Improving the stability of the surgical operation and reducing the risk of damaging the preserved uterine arteries

Makes the operation more flexible and suitable for precise dissection, suturing, and other surgeries in narrow spaces, which has great advantages for reconstructive surgery.

Conclusion: Robot-assisted laparoscopic uterine artery-sparing radical trachelectomy for early-stage cervical cancer is a reconstructive procedure. Due to its high-definition naked-eye 3D field of view, flexible turning, fine and accurate separation, it ensures the precise anatomy of uterine artery preservation, significantly improves the chance of preserving uterine blood vessels, and thus ensures the postoperative blood supply and reproductive function of the uterus.

G9

THE VERSIUS VARIATION: AN INNOVATIVE APPROACH TO ROBOTIC SURGICAL TEACHING

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Purpose: The superior ergonomics, vision and benefits of fully wristed instruments that robotic platforms provide has resulted in an increased utilization of robotic surgery amongst Gynaecologists. (1) Unfortunately, fellows training in advanced laparoscopic gynaecology in Australia have minimal access to robotic surgical training. There is a very limited number of robots in public hospitals and minimal access to dual console training systems. Moreover, it is felt that the passive assistant role in a robotic surgical case utilising four robotic arms, reduces learning of surgical techniques compared to the active assisting required in traditional laparoscopic surgery.

The Versius Variation technique developed by SWEC surgeons, aims to increase fellowship training in robotic surgery in a stepwise and safe manner. The modular robotic towers of the CMR Versius TM system allow for the surgeon-in-training to actively participate in the operation and improve their robotic skills whilst the principal surgeon carries out their traditional four-port laparoscopic procedure. We present our novel solution to the problem of training the next generation of robotic surgeons via a hybrid Laparo-robotic technique.

Materials and Methods: A hysterectomy and bilateral salpingectomy for menorrhagia was performed utilising the Versius Variation teaching technique. Primary entry at the umbilicus via a Hasson entry and insertion of a 12mm Hasson balloon port was performed. Two lower 5mm balloon ports and a left lateral 12mm suture port were then inserted under vision. Two Versius CMR (Cambridge UK) robotic towers were docked for camera control via the umbilical port and a 5mm robotic fenestrated grasper inserted via the right lower assistant port. After docking, the assistant surgeon unscrubbed and moved to the robotic console situated on the patient's right side facing the surgeon. Using the robotic arms to control the camera and right assistant grasper, the fellow assisted the consultant to laparoscopically perform a SWEC Hysterectomy with colpotomy onto a 45mm McCartney tube. (2) A Colpo-V incision was made in the middle of the posterior vaginal wall and the uterine specimen delivered vaginally followed by closure of the vaginal vault with interrupted 0-Monocryl sutures. (3) The procedure was performed without incident. Total operating time was 65 minutes, estimated blood loss 10ml. The histopathology showed a 311g uterus with adenomyosis, and leiomyoma.

Results: The unique feature of modular robotic systems, such as the Versius CMR platform, allows for a seamless integration of a robotic camera and assistant arm for the assistant surgeon without any significant impact to the normal process of the surgery. It provides the assistant surgeon with the opportunity to learn to control the robot and develop visual haptics. The surgeon in training develops skills in controlling two robotic arms before progressing to control of four robotic arms as a primary robotic surgeon. Moreover, the risk of inadvertent injury is reduced during this training method, as the assistant has control of only a single fenestrated grasper and the camera.

Conclusion: We present our technique as one possible solution to the issue of training in robotic surgery.

G15

MULTI-QUADRANT ROBOTIC-ASSISTED PRIMARY CYTOREDUCTIVE SURGERY FOR STAGE IIIC OVARIAN CANCER, PELVIC DISSECTION MODIFIED POSTERIOR EXENTERATION WITH PERITONECTOMY AND TOTAL INTRACORPOREAL SIGMOID RECTAL ANASTOMOSIS.

Peter Lim Center of Hope in Reno, Reno, NV, USA

Purpose: To demonstrate the feasibility of primary robotic cytoreductive surgery (PRCS) for the treatment of advanced-stage ovarian cancer (ASOC) via robotic-assisted multi-quadrant approach consisting of modified posterior pelvic exenteration (en bloc of resection of hysterectomy with removal of uterus, tubes, and ovaries, pelvic, bladder and cul-de-sac peritonectomy and sigmoid colon resection) with total intracorporeal colorectal anastomosis

Materials and Methods: The patient is a 56-year-old female who presents with a pelvic mass, minimal ascites with omental caking (see Figure below), and elevated CA 125. She underwent a lower pelvic port placement configuration and underwent en bloc modified posterior exenteration with total intracorporeal sigmoid rectal anastomosis with pelvic peritonectomy to achieve an optimal cytoreductive surgery.

Results: Optimal cytoreductive surgery achieved with residual disease < 5mm. Total operative time 277 minutes, EBL 200 cc, length of hospitalization 4 days, no intraoperative and postoperative complications. 28 months disease free to date.

Conclusion: Robotic-assisted primary cytoreductive surgery for advanced stage ovarian cancer is feasible and safe.

G16

MULTI-QUADRANT ROBOTIC-ASSISTED PRIMARY CYTOREDUCTIVE SURGERY FOR STAGE IIIC OVARIAN CANCER, ABDOMINAL DISSECTION: COMPLETE OMENTECTOMY AND DIAPHRAGM PERITONECTOMY

Peter Lim Center of Hope @ Reno, Reno, NV, USA

Purpose: To demonstrate the feasibility of primary robotic cytoreductive surgery (PRCS) for the treatment of advanced-stage ovarian cancer (ASOC) via robotic-assisted multi-quadrant approach, abdominal dissection complete cytoreductive of omental caking (splenic, gastric and infracolic omentectomy), and diaphragm peritonectomy to achieve and optimal cytoreductive surgery.

Materials and Methods: The patient is a 56-year-old female who presents with a pelvic mass, no ascites with omental caking (see Figure below), and elevated CA 125. She underwent a lower pelvic port placement configuration and underwent an upper abdominal dissection (diaphragm peritonectomy) followed by abdominal dissection (complete omentectomy).

Results: Optimal cytoreductive surgery was achieved. Total operative time 272 minutes, EBL 200cc, and the total length of hospitalization was 4 days. There were no intraoperative or postoperative complications. Disease-free interval is 28 months.

Conclusion: Multi-quadrant robotic-assisted primary cytoreductive surgery: upper abdominal and abdominal dissection for stage IIIC ovarian cancer is feasible.

G17

ROBOTIC ADENOMYOMECTOMY- "FOUR PETAL TECHNIQUE" IN 6 SIMPLE STEPS USING 3D - MAPPING.

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Purpose: To describe our robotic adenomyomectomy "Four Petal technique" in 6 simple STEPS using 3D - Mapping

Materials and Methods: We present a case of a 30 year female patient, nulligravida presenting with severe dysmenorrhea (VAS 9/10) and heavy menstrual periods. She also desired future fertility. Her MRI pelvis suggested diffuse adenomyosis with thickened junctional zone (max thickness 4.7 cm along the anterior wall). Her BMI - 42.1 kg/m². Her Ca¹²⁵ - 123, LDH - 308.4 U/L, Hb 13.5 gm/dl after receiving an iron infusion. ASA grade II

Intervention(s):

(Step 1) preoperative assessment with pelvic MRI and 3D mapping.

(Step 2) Control the hemorrhage with a diluted solution of vasopressin (20 ml in 200ml NS) is administered at uterine fundus.

(Step 3) intraoperative measurement of incision length using ureteric catheter.

(Step 4) Raising serosal flaps: we use a vertical and a horizontal uterine incision (10 cm) with monopolar scissors, extending anteriorly and posteriorly and lateral to medial end.

5. (Step 5) Resection of adenomyosis: carried with monopolar scissors using pure cut current. We preserved 1 cm of the myometrium at the subendometrial region and around a 1 cm thickness of the serosal flap was also left in each "petal."

6. (Step 5) Flap reconstruction: continuous sutures with barbed suture (Vloc no 0) are used to approximate serosal flap to the subendometrial tissue, avoiding dead space

Results: The operating time was 210 min. The specimen removed was 200g in weight with an estimated blood loss 1500ml. She was discharged on day 4. Follow up after 1 week, 1 month dysmenorrhea improved from visual analog scale 9 to 1 postoperatively

Conclusion: A Robotic assisted adenomyomectomy for fertility-sparing management of diffuse adenomyosis is safe and feasible with good anatomical results. 3D mapping helps in presurgical precision planning and positively affects surgical outcome.

G18

STRATEGIC AND STRUCTURED APPROACH TO LARGE UTERUS IN ROBOTIC HYSTERECTOMY (DA VINCI XI)

MOUMITA BAGAPOLLO HOSPITALS, HYDERABAD, India

Purpose: Large uterus poses technical limitations in performing Minimal Access Surgery. The usual surgical approach in a large uterus remains open world-wide. There are no clear guidelines regarding what should be the maximum size of uterus that should be attempted by laparoscopy either for myomectomy or hysterectomy.

The issues with large uterus are – I) vision and access to pedicles,

II) difficulty in manipulating a large specimen and

III) concern for haemorrhage.

We present our 5 strategies that we use in our practice for hysterectomy since last 8 years with “2 arms and 2 instruments” technique.

Materials and Methods: Our 5 strategies are as follows-

Strategy 1: During hysterectomy we place the primary port at umbilicus irrespective of the size of the uterus with a 30-degree endoscope. This gives the view of all ligaments and is especially helpful at the cardinal ligaments transection & colpotomy.

Strategy 2: Next, we use the fenestrated bipolar forceps in arm 2 just like a “human hand” to push the uterus cranially to access the uterovesical fold and help dissect the bladder beyond the colpotomy cup with hot shears.

Strategy 3: The strategy of intra-abdominal manipulation using both the instruments in arm 1 & 2 in a “hugging fashion” moving from one side of pedicles to another.

Strategy 4: The management of uterine vessels with the coordinated movements of fenestrated forceps and hot shears is described by us the “Salsa Movement”.

Strategy 5: Finally, the skillful rotation of the 30-degree scope with the ability to do intraoperative myomectomy or partial amputation of uterus near the colpotomy ring are the strategies used.

Results: Here, we have shown our mesmerising experience of last 20 months with 36 cases of robotic hysterectomy in large uterus using our strategic and structured approach and da Vinci Xi . We have successfully handled maximum BMI of 38kg/m², maximum uterine size of 24-26 weeks, maximum uterine weight of 1200gm with average total operative time of 119.30mins, average docking time of 3.74mins, average blood loss of 120.56ml, 29.5 hours of average length of stay, zero conversion rate and no intraoperative and postoperative complications.

Conclusion: Our strategic and structured approach in large uterus in Robotic Hysterectomy with special highlight on “2arms and 2 instruments” technique as part of our 5 strategies is simple, feasible and economical.

HN 146

TORS VIDEO FOR CARCINOMA SOFT PALATE -VIDEO PRESENTATION

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Purpose: To highlight the role of TORS for excision of early stage oropharyngeal cancer utilizing the da vinci SI surgical robotic system.

54 years old smoker ,male presented with history of discomfort in the throat and odynophagia of 3 months duration . He took treatment from some practioner but there was no relief and symptoms persisted. Patient was evaluated with CECT oral cavity and neck and was diagnosed with stage I oropharyngeal carcinoma of soft palate (T1N0M0). Patient was planned for TORS resection of the tumor from soft palate under general anesthesia. Proper counselling regarding the trans-oral robotic surgery procedure ,it's advantages and disadvantages and complications was done and patient and family agreed for the TORS after informed consent.

Biopsy from the lesion on soft palate revealed squamous cell carcinoma.

TORS has been highly successful treatment option with very good outcome for early stage oropharyngeal cancer treatment. Primary closure of the defect in soft palate rehabilitates speech and swallowing after TORS for soft palate cancer.

Materials and Methods: 1 male patient age, 54 years presenting with T1 squamous cell carcinoma of soft palate which was confirmed by histopathological examination of the biopsy from lesion. After thorough clinical examination and radiological examination ,patient was found with an UPG involving the free margin of soft palate more on left side and involving the anterior pillar , uvula and just crossing the midline . There was no involvement of tonsils and posterior pillars. nasopharyngeal surface of soft palate was not involved. Patient was worked up for

CECT oral cavity and neck was done for exact extent of the lesion and also to rule out neck lymph node metastases.

TORS excision was done with da vinci SI robotic system and defect was repaired with robotic suturing technique.

Patient was successfully extubated and shifted to recovery and was discharged on 4th post operative day.

TORS excision of the tumor and no neck dissection was planned in view of NO neck clinically and radiologically . Systemic investigations were normal . Metastatic work up was done with USG abdomen and CXR PA view and was negative for metastatic disease. Da vinci surgical robotic system with FK retractor was used and nasotracheal intubation was used for general anesthesia.

Results: Follow up at 4 weeks after surgery revealed well healed wound in the soft palate with no regurgitation of food and no speech problems.

Post op HPE revealed Squamous cell carcinoma of soft palate with staging as pT1 N0M0. Patient is doing well at 6months follow up .

Abstract content appears as submitted.

There is no evidence of locoregional disease recurrence at 6 months follow up with very good outcome in relation to speech and swallowing after TORS for early stage carcinoma of soft palate.

Conclusion: TORS is the best and viable option for treatment of early stage oropharyngeal cancers . Primary closure of the defect in soft palate after excision gives best results and faster healing of the wound in soft palate with less painful outcome and early rehabilitation of speech and swallowing after trans-oral robotic surgery .

T 121

FROM U-VATS TO U-RATS: A SINGLE-CENTER EXPERIENCE IN MELBOURNE, AUSTRALIA

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Purpose: The advent of uniportal robotic-assisted thoracic surgery (U-RATS) introduced by Dr Diego Gonzalez is an exciting new frontier in minimally-invasive thoracic surgery. We highlight the transferability of the skills of thoracic surgeons experienced in both uniportal video-assisted thoracoscopic surgery (U-VATS) and multiportal robotic-assisted thoracic surgery (RATS) to U-RATS. We demonstrate its safety and feasibility of U-RATS for a variety of complex thoracic procedures. The excellent perioperative and short-term post-operative outcomes at our centre reflect those documented in the current literature.

Materials and Methods: Following the description of this technique in the written and video literature¹, we chose to adopt the pure U-RATS approach, defined as “robotic thoracic surgery performed by a single intercostal incision without rib-spreading” using all robotic camera, dissecting instruments and staplers². We concur with their recommendation that this approach is preferred over the hybrid technique, particularly where the reliance upon an inexperienced table surgeon, for critical and complex steps such as stapling, would be challenging^{1,3}. Informed consent was obtained from all patients. For each case a single 3-4cm uniport was created in the 6th-7th intercostal space and three robotic arms were utilised. For right-sided operations, arm No. 1 was cancelled, whilst for left-sided operations, No. 4 was stowed⁴. The principles of U-VATS “traffic-light” orientation were applied⁵. Formal targeting of the robotic camera is not required^{4,6}. The camera arm is positioned at the postero-superior incision apex with traction applied to maximise remaining space. We prefer the Maryland Bipolar Forceps and Bipolar Fenestrated Grasper for general dissection. We found the long-curved metal sucker and long grasper were the most useful for the assistant surgeon. The ability to place the ports directly onto the robotic arm and then precisely position them in the uniport simplifies and improves the efficiency of the docking process.

Results: Since the first pure U-RATS segmentectomy was performed at our institution in August 2022, 10 segmentectomies and lobectomies plus a single chest wall resection have been performed by two surgeons with extensive experience in U-VATS and M-RATS. Comparison of mean operative time of these first 10 U-RATS cases to 10 comparable M-RATS cases performed in 2021, demonstrated U-RATS was consistently faster than RATS. Significant time was saved between first skin incision and first use of console actuators. Further analysis is required to determine the influence of case selection on these results, however we propose this trend reflects how readily experience in U-VATS and standard RATS techniques translates into successful adoption and utilisation of this technique.

Conclusion: Our single-centre experience of U-RATS for performing anatomic resection demonstrates the safety and feasibility of this technique. We propose that the observation of reduced operative time validates the ease of adoption of this technique for surgeons with sufficient prior experience in U-VATS and M-RATS. The emergence of U-RATS appears to fulfill a natural evolution from which our patients will benefit for years to come.

U 17

COMBINED APPROACH OF ROBOT ASSISTED LAPAROSCOPIC AND TRANSVAGINAL EXCISION OF LARGE DEEP SEATED PARAURETHRAL LEIOMYOMA IN MIDDLE AGED FEMALE: SURGICAL CHALLENGE WELL DEALT BY ROBOTIC ASSISTANCE.

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Purpose: Leiomyomas are benign tumours arising from the smooth muscles. Paraurethral leiomyoma are benign, hormone sensitive tumours originating from mesenchymal layer of paraurethral region. They are common in middle aged ladies. They can present either with anterior vaginal mass or voiding lower urinary tract symptoms (LUTs) or both. In literature transvaginal route was commonly used for their excision. Purpose of this video is to demonstrate ease of doing transvaginal excision once majority of dissection is completed with Robot assisted laparoscopic surgery in cases of large deep seated paraurethral leiomyoma.

Materials and Methods: We present a case of 41 year old lady who presented to us with complaints of dysuria and prolapse of mass per vaginum. On physical examination a large, firm mass of ~10x8x6 cm size was palpable in anterior vagina ~4 cm proximal to urethral meatus. It was firm, non tender, round, with regular margin and smooth surface. CEMRI pelvis showed iso to hyperintense, well defined, well margined broad based mass of size 10x8x7 cm along the posterior wall of urethra. It was compressing vagina posteriorly and urinary bladder anteriorly. Findings were suggestive of giant benign paraurethral leiomyoma/mesenchymal mass. CECT abdomen showed similar findings with no metastasis. After anaesthesia fitness, patient was planned for excision of mass with combined approach. Patient was placed in low lithotomy and Trendelenburg's position. All pressure points were carefully padded. Cystoscopy done and bilateral ureteric catheters placed. Camera port (8mm) was placed in midline 2 cm above umbilicus. Two 8 mm ports were placed inline on right side of camera port with a distance of 8 cm each. Another 8 mm port was placed in left side of camera port at a distance of 8 cm. Bedside assistance port (12mm) was placed on left side lateral to left robotic port. Robotic da Vinci xi HD systems was used. Docking done. Peritoneum between vesico uterine pouch was divided. Main challenge in this case was to continue dissection in compact space between anterior vaginal wall and posterior wall of urinary bladder. Dissection continued till the instrument inserted transvaginally was noticeable. Transverse vaginal incision given. Plane of dissection developed around the mass till the planes of robotic dissection reached. Planes united. Mass delivered in toto within short span of time with all margins intact. Vagina closed with no-1 vicryl. Robot dedocked. Hemostasis achieved and abdominal drain placed. On cut section rubbery, white, encapsulated, bulging growth was noted.

Results: Postoperative course was uneventful. Bilateral ureteric catheters were removed on POD 3. Per urethral catheter was removed on POD4. Abdominal drain was removed on POD4 once the output was minimal. Patient was discharged on POD 5. Histopathology showed encapsulated (pseudocapsule) leiomyoma of 10x8x7 cm. On 2 week follow up she is voiding well.

Conclusion: We conclude that, this combined approach for excision of large urethral leiomyoma, is a safe, easy and feasible option, which in turn gives great cosmetic advantage.

U 20

ROBOTIC INTRACORPOREAL NEOBLADDER USING TRANSVAGINAL BOWEL STAPLERS

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Purpose: Robotic assisted radical cystectomy (RARC) is an established and safe procedure within minimally invasive urologic oncology techniques. After RARC, neo bladder can be fashioned out of the distal ileum by extra corporeal and intra corporeal techniques. Extra corporeal techniques has advantage of an easier learning curve and reduced operating times, but necessitates a larger abdominal incision. Total intracorporeal techniques require smaller or no incision at all but takes longer to perform and has a steeper learning curve. Intracorporeal neo-bladder can be created via various techniques. Here in this video we describe a modification of the Karolinska technique in which bowel staplers are fired through the open vaginal cuff to create a neobladder.

Materials and Methods: We operated on a 73 year old woman with muscle invasive bladder cancer. RARC was performed. After the extirpative component of the procedure specimen was removed via the vaginal cuff, the left ureter was brought under the sigmoid colon mesentery. Stay stitches were placed on the proximal and distal segments of a 50 cm segment of ileum, 15cm proximal to the ileocecal valve. An avascular segment of the mesentery is identified using Indo cyanin green(ICG) dye and firefly technique, and taken down at proximal and distal aspect. Electrocautery was used to divide the ileal loop. Bowel is reconstituted prior to the uretero-ileal anastomosis (UIA). After ensuring proper orientation , two 60 mm Endo-GIA staple loads passed into the peritoneal cavity through the vagina were used to complete the side-to-side anastomosis. One staple load was used for the transverse component. Urethro-ileal anastomosis was performed at a point 12cm away from the distal cut end of the ileum.. The distal 40 cm is detubularised. Rotation and double folding was performed to obtain a spherical reservoir, and a 10 cm of isoperistaltic afferent limb is left as a chimney. Vascularity was confirmed by using ICG dye and Firefly technique. Continuous absorbable suture was used over 6 Fr DJ stent, and ureters were anastomosed in Wallace fashion. Leak test was done and abdominal drain was placed

Results: Console time was 7h 10 minutes. Estimated blood loss was 450ml. No intra operative or post operative complications were encountered.. Abdominal drain was removed on POD5. Patient was discharged on POD 6. final histology showed T2a with negative surgical margins. 12 nodes on left side and 15 from riight side were negative for malignancy Thepatient had uneventful post operative period. There were no incidence of bowel leak, paralytic ileus or bowel obstruction.

Conclusion: Robotic intracorporeal neobladder creation using transvaginal bowel staplers is an ergonomic , easy and reproducible technique.

Advantages include a more favourable end on presentation of the bowel lumen towards the staplers and alleviation of the need for placement of an extra port for intraperitoneal placement of staplers. It will not increase any post-operative complications like infections, incisional hernia also.. This technique also alleviates the need for separate incisions for specimen removal as well as extra trochar placement for bowel stapling, decreased post-operative pain and provides better cosmesis..

U 50

ROBOTIC RETROPERITONEAL PARTIAL NEPHRECTOMY

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Purpose: The purpose of this video presentation is to provide a detailed breakdown of the steps used to perform a robotic retroperitoneal partial nephrectomy. Partial nephrectomy is the gold standard in the treatment of renal masses, with robotic techniques gaining favour over its laparoscopic counterpart due to its decrease in warm ischaemia time whilst maintaining similar rates of operative time, estimated blood loss and conversion rates. A transperitoneal approach has been the most common method utilised by urologists due to its ample working space and familiar intra-abdominal landmarks. However, a retroperitoneal approach has gained popularity in specific cases. Meta-analysis suggests that retroperitoneal partial nephrectomy is just as safe and efficacious as a transperitoneal approach whilst having marginally shorter operative times, possibly explained by its advantages of allowing direct access to posteriorly located tumours, not requiring bowel mobilisation and avoiding a hostile abdomen in patients with previous abdominal surgeries.

Materials and Methods: A robotic retroperitoneal partial nephrectomy was performed on a 57-year-old male with a posteromedially located 5cm interpolar renal mass with the use of the Davinci Xi system. Video was captured with the on-board camera and edited using iMovie.

Results: The total operative time was 158 minutes, with a console time of 96 minutes and an estimated blood loss of less than 50mL. The patient suffered no complications and was discharged 2 days after his operation. Histopathology demonstrated clear cell renal cell carcinoma, stage T1b and ISUP 2 with negative margins. He had no recurrence or progression after 3.5 years of follow up.

Conclusion: Robotic retroperitoneal partial nephrectomy is a safe and effective alternative to a transperitoneal approach in select cases of renal masses. Its main advantages are its ability to access more posteriorly located tumours, lack of bowel mobilisation and the need to operate in hostile abdomens of patients with previous abdominal surgeries.

U 51

ACUTE HEMORRHAGE MANAGEMENT SIMULATOR

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Purpose: Intraoperative hemorrhage is one of the most feared and life-threatening complications of surgery and yet, there is no standardized curriculum to prepare and train urologic residents for potentially catastrophic complications. Most urologic residents today rely on unstructured, anecdotal experiences to develop the appropriate skill set required to successfully manage intraoperative hemorrhage, and for the few trainees that have personal experience, these encounters are almost always high-stress, emergent situations, not conducive to learning. We sought to create a life-like, hands-on bleeding simulation that recreates major vascular injuries as may be encountered during robot-assisted laparoscopic nephrectomy.

Materials and Methods: We placed a submersible utility pump into a receptacle containing 5L of artificial blood made from corn starch, water and red dye. The pump was then connected to a pressure gauge and flow control valve to accurately set a flow rate of 1 L/min. The artificial blood was pumped through the closed-loop system via a series of silicone tubes attached to an artificial vessel with the dimensions of an average renal artery. The artificial vessel was then placed in an artificial terrain made from flour, water, and silicone rubber to emulate the pliability of organic tissue. This apparatus was then placed in a basin that integrated well with the Intuitive abdominal dome trainer, allowing for the robot arms of the da Vinci surgical system to dock. Objective measures for data collection will include: time to inform the team of crisis, type of bleeding mitigation (increase pneumoperitoneum, proximal and distal clamping, compression), time to temporary and complete control, time spent on vascular repair, total estimated blood loss, and transfusion amount.

Results: The machine pump was able to maintain a flow rate of 1 L/min, and the system as a whole was able to simulate a major vascular injury without complications in a reproducible manner. The concavity of the artificial terrain allows for the pooling of blood, simulating the realistic challenge of maintaining visualization during acute hemorrhage, while the collateral flow effectively simulates back-bleeding after vascular clamping. We simulated two vascular injury scenarios; a Veress needle puncture, and a partial arterial transection, in which eight urologic residents (PGY level 2-5) were tasked with recognizing the injury, controlling and mitigating active blood loss, and attempting vascular repair using robotic, and, if necessary, open techniques. The median time to complete vascular control for Veress needle puncture was 22.2 (IQR 21.1 to 23.4) minutes, while the median time to complete vascular control for partial transection was 19.9 (IQR 16.0 to 24.7) minutes. Senior residents were no more adept at managing either scenario than newer trainees, demonstrating significant opportunities for learning and technical skills acquisition across all PGY levels.

Conclusion: Our simulation proved successful in immersing trainees in life-threatening scenarios without the inherent risks of intraoperative learning. Urologic trainees were able to test their baseline technical skills in managing acute hemorrhage while attending physicians were able to assess their trainee's skill level and provide real-time feedback on surgical technique and critical decision-making abilities during crisis in a controlled and reproducible environment.

U 61

ROBOTIC LEFT URETERIC RECONSTRUCTION WITH URETEROURETEROSTOMY + NEPHROPEXY + CYSTOSCOPY + FLEXIBLE URETEROPYELOSCOPY + LEFT STENT - POST L4-5 INTERBODY FIXATION

Daniel Feng, Daniel Chia, Lawrence Kim Westmead Hospital, Sydney, Australia

Purpose: We present a video describing a successful combined robotic and endoscopic approach to ureteric reconstruction for ureteric obstruction due to L4-5 interbody fixation.

Materials and Methods: A 58-year-old female presented with left flank pain post L4/5 interbody fixation via anterior approach 2 months prior. Ultrasound and computed tomography (CT) showed hydroureteronephrosis. Subsequent left retrograde pyelogram (RGP) showed a moderate degree of hydroureteronephrosis down to level of the cage with the ureter very close proximity to edge of cage. There was no extravasation or filling defect. A robotic ureteric reconstruction was planned.

Results: A combined robotic (with Davinci Xi) and endoscopic approach was employed. Patient was placed in a modified combined lateral decubitus/lithotomy (modified Valdivia) position. Ports were placed in a standard partial nephrectomy configuration. Descending colon was carefully mobilised. Ureter/gonadal complex was dissected off the Psoas fascia and the gonadal vein clipped and divided. The proximal end of the ureter was carefully mobilised ensuring adequate periureteric vascular tissues was preserved. The healthy distal end of the ureter from the diseased segment was identified just below the pelvic brim with the help of transmitted light from a flexible ureteroscope and firefly technology. The ureter was carefully freed until hardware was seen. It was deemed unsafe to continue dissection with risk of ischaemia and potential infection. Decision was made to perform nephropexy to allow tension free anastomosis. Kidney was mobilised while preserving the main hilum and upper pole branch and nephropexy up to 2.5-3cm performed using 2'0 PDS sliding Haemolok clip technique to psoas fascia and lateral abdominal wall. The proximal and distal healthy ends of the ureter were then transected with vascularity confirmed with ICG. The peritoneal flap was used to cover the spinal hardware. Due to no significant tension an intraoperative decision was made to perform primary ureteroureterostomy. This was performed with 4'0 vicryl ensuring a well vascularised, spatulated, tension free and watertight anastomosis. Leak test was performed via irrigation from flexible ureteroscope with no leak demonstrated. A wide open anastomosis was confirmed with easy passage of 8.5fr ureteropyeloscope. A 6fr 26cm stent placed via guidewire with the help of cystoscopy. Pericolonic vascularised fat wrapping (vascularity confirmed with ICG) using 3'0 Vicryl was performed to intraperitonealise the ureter away from the hardware and help facilitate blood supply to avoid ischaemia or stricture reinforced with perirenal vascularised fat placement, secured with Haemolok clips. ICG was again used to confirm vascularity of the ureter and vascularised fat wrapping. 1x15fr drain placed.

Post op RGP and stent removal 8 weeks post op showed no obstruction. Progress DTPA showed no obstruction and improved renal function.

Conclusion: A combined robotic and endoscopic approach with use of ICG for a ureteric reconstruction, resulted in a favourable outcome for the patient.

U74

ROBOTIC ASSISTED SACROCOLOPEXY AND HYSTEROSACROCOLPOPEXY

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Purpose: Vaginal vault prolapse is a common complication following hysterectomy with negative impact on women's quality of life due to mass per vagina, urinary, anorectal and sexual dysfunction. Sacro-colpopexy offers long term benefits in patients quality of Life. Minimal invasive methods utilising a Robot for the same , offers faster recovery, shorter hospital stay and improved quality of life.

Materials and Methods: This is a hospital based prospective study in the Department of Urology.

Study Population: Patients undergoing Robotic assisted Sacro-colpopexy procedure for vault prolapse.

Patients were provided with the appropriate information sheet briefing about the procedure. A prior appropriate informed consent was taken. Pre-operative patient details like age, gender, medical history, surgical history, co morbidities, renal function tests, urine culture and imaging studies like Ultrasound abdomen and pelvis were documented in the study proforma and excel sheet after the patient's consent. The Prolapse Quality of Life Questionnaire (P QoL) is a simple, reliable and easily comprehensible instrument to assess the severity of POP symptoms and its impact on women's quality of life. P QoL was used in this study.

Exclusion criteria: Patients undergoing Robotic assisted sacrocolpopexy who refuse to give consent for the study and patients undergoing add on procedure for incontinence

Results: Out of 50 patients studied, 55 % were between 61-70 years ,60 % were overweight (BMI 25-29.9), Most of them presented with mass per vagina(92%) and remaining presented with obstructive symptoms. 84% patients had Stage 3 vault prolapse . 26 (52%) patients had dense adhesions as complications of previous surgical procedure, 4 (8%) patients had tissue injury and majorly 36 (76%) patients had blood loss less than 50 ml, 8 (16%) patients had 50 to 200 ml of blood loss in the procedure and only 4 (8%) patients had blood loss between 200 to 250 ml. Mean Total operative time was 148.6±24.64 minutes.

Around 18 (36%) patients had post-operative pain and 4 (8%) patients had urinary retention after procedure.

2 patients (4%) developed mesh erosion at 24 month follow up.

Conclusion: Our study has demonstrated that Robotic assisted sacrocolpopexy results in good anatomic outcome and subjective cure in vault prolapse patients. The peri and post operative complications were low, with early discharge from hospital. The procedure significantly improves quality of life of prolapse patients.

Proportion of patients with recurrence is significantly higher in patients with stage IV vault prolapse (50%) than patients with stage III vault prolapse (0%). ($p < 0.05$; Significant)

Factors such as mean age, mean BMI, presenting complaints, amount of intra-operative blood loss and post-operative blood loss are not showing any significant difference between the patients with recurrence or without recurrence. ($p > 0.05$; Not significance)

U 75

POST CHEMOTHERAPY BILATERAL TEMPLATE ROBOTIC RPLND WITH DA VINCI XI IN A 14 YEAR OLD BOY

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Purpose: Post chemotherapy bilateral template robotic Retroperitoneal Lymphnode dissection with da Vinci xi in a 14 year old boy: Demonstration of technique

Materials and Methods:

- 14 years, boy
- BMI = 23.62 kg/m² (74 kg, 1.77 m)
- Right scrotal swelling x 3 weeks
- No H/O Undescended testis
- Right High Inguinal Orchidectomy
- HPR – mixed GCT
- Embryonal – 60%
- Yolk sac – 30%
- Teratoma – 10%

CECT TAP – Post 4 BEP

Precaval lymphnodal mass –

1.2 x 2 x 1.9 cm

at the level of IMA

Normal tumor markers.

Results: • Console Time – 298 mins

- Total Blood Loss – 50 ml
- Liquid Diet – At 6 hours
- Post operative course – Low Output Chyle Leak on POD 1
- Discharged on POD 4 with Drain & Fat Free Diet
- Drain Removed on POD 10
- Histopathology - 1 out of 32 Lymphnodes shows Metastatic Viable NSGCT – ypN2
- Advised Further Chemotherapy & Followup

Conclusion: Robotic approach for Post chemotherapy RPLND improves early recovery, shorter hospitalization and is feasible in pediatric patients with adult dimensions.

U 97

VALIDATION OF THE HYDROGEL MODEL FOR SURGICAL PROFICIENCY BASED TRAINING USING GEARS AND RACE, A VIDEO DEMONSTRATION

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Purpose: Over the past few decades, the field of surgery has been transformed by the use of robotics, resulting in less invasive and more precise procedures. However, mastering the necessary skills for robotic surgery requires comprehensive training. To become proficient in robotic surgery, a linear simulation training with objective scoring is required. Unfortunately, the current training practices are non-standardized and lack structure. Trainees usually begin with online modules provided by the vendors, followed by a mix of laboratory sessions, pig procedures, and proctored human surgical encounters where they mostly observe and don't operate. The training events are often fortuitous and unplanned, with no clear framework.

Materials and Methods: To address these shortcomings, robotic simulation exercises have now become mandatory for efficient training. To this end, we have developed a comprehensive training program that includes metrics and evidence-based feedback for formative learning. In this study, we demonstrate the effectiveness of using a hydrogel model for robotic simulation exercises, and we employ scoring metrics such as GEARS and RACE to assess the trainees' proficiency.

Results: We demonstrate this process through the use of high quality video recording with professional quality post production and narration. We successfully show validation of the model as it clearly demonstrates the gap in proficiency between an adept novice and an expert robotic surgeon.

Conclusion: Our findings show that the hydrogel model is a simple yet effective platform for multi-platform robotic basic skills training, and we provide novel validation of its use.

U 125

LOW ANTERIOR ABDOMINAL ACCESS FOR RETROPERITONEAL SINGLE-PORT ROBOTIC PARTIAL NEPHRECTOMY

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Purpose: To demonstrate the feasibility and early outcomes of Robotic Retroperitoneal Partial Nephrectomy performed via a low anterior abdominal incision using the purpose-built Single-Port (SP) robotic platform.

Materials and Methods: In this video, we present a case of a 69-year-old man with a cT1a left upper pole renal mass who underwent a partial nephrectomy using the Da Vinci SP robotic system (Intuitive Surgical Inc., Sunnyvale, California). Direct retroperitoneal access was obtained via a 3cm low anterolateral abdominal incision. After incising the transversalis fascia, blunt dissection was performed to develop a space above the peritoneum for the insertion of the dedicated SP Access Port. Perioperative outcomes were evaluated for this patient and the additional three patients that constituted our initial series (n = 4).

Results: The procedure was completed successfully under general anesthesia without the need for conversion or additional ports. The operating time was 2.5 hours with a warm ischemia time of 25 minutes and an estimated blood loss of 15 mL. There were no intraoperative or postoperative complications. The patient was discharged 6.5 hours following the completion of his surgery without requiring any opioid analgesia, both as an inpatient and on discharge. Similar outcomes were achieved in the other cases, with our technique being reproducible for anterior, posterior, and laterally-located tumors.

Conclusion: The improved manoeuvrability of the SP robotic platform has allowed for robotic partial nephrectomy to be safely and effectively performed with direct access to the retroperitoneum via a low anterior abdominal incision for any tumor location. The technique facilitated opioid-sparing enhanced postoperative recovery with all patients being discharged within 24 hours without any clinical sequelae.

U 133

SINGLE-PORT TRANSVESICAL ROBOTIC RADICAL PROSTATECTOMY: DESCRIPTION OF TECHNIQUE AND PERIOPERATIVE OUTCOMES

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Purpose: To describe the technique and perioperative outcomes of the novel transvesical (TV) robotic radical prostatectomy (RARP) performed using the purpose-built single-port (SP) robotic platform.

Materials and Methods: With patients positioned in a supine position, a 3.5cm suprapubic incision was made followed by a direct entry into the bladder. The surgical steps for the SP TV RARP were as follows: 1) Bladder neck dissection; 2) Vas deferens and seminal vesicle dissection; 3) Posterior dissection; 4) Anterior dissection; 5) Pedicle and neurovascular bundle dissection; 6) Removal of the prostate specimen; 7) Posterior reconstruction and vesicourethral anastomosis; and 8) Robot undocking and bladder closure.

Results: SP TV RARP was successfully completed in 190 patients between November 2020 and March 2023 without any need for conversion or additional ports. The median total operating time and estimated intraoperative blood loss were 197 minutes and 72.5mL, respectively. Perioperative outcomes were reassuring with 92.3% being discharged within 24 hours and 94.7% not requiring any opioid analgesia on discharge. The novel approach provided additional benefits of shorter Foley catheter duration (median 4 days) and earlier return of urinary continence (median time to continence 3.5 days following Foley removal). Despite positive margins being identified in 23.3%, the majority (80%) were limited margin involvement (<3mm). The biochemical recurrence rate was also relatively low at 2.8%.

Conclusion: The SP robotic platform allowed for the regionalization of RARP with the introduction of the novel TV approach. The technique conferred significant benefits in enhancing perioperative and functional outcomes while maintaining satisfactory oncological outcomes.

U 134

THE LISBON ZERO CLIP ROBOTIC-ASSISTED RADICAL PROSTATECTOMY, STEP BY STEP

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Purpose: Robotic radical prostatectomy (RARP) technique is constantly evolving since the first RARP performed in 2000. Despite surgical advances, functional impairment, such as urinary incontinence and erectile dysfunction, is still a significant concern in development of RARP surgical technique. In the search for always improving functional and oncological outcome we present a step-by-step “Zero-Clip” RARP that we named the “Lisbon zero clip RARP”.

Materials and Methods: An edited video recording of a Zero Clip radical prostatectomy performed on a DAVINCI Xi system in Hospital da Luz, in Lisbon.

Results: After positioning in 29 degrees Trendelenburg and docking the robot in a right handed diamond chape form with two assistant ports on the left, we start by dropping the bladder and opening the Retzius space. Retraction and elevation of bladder dome with the 4th arm prograsp forceps and mobilization of the bladder catheter balloon facilitates bladder neck identification and preservation. Subsequently, urethra and retro-trigonal layer are sectioned exposing the fatty tissue which will lead to seminal vesical space. We then proceed to seminal vesical release, starting medially in between the two vas deferens then laterally. No clips are used. When both seminal vesicles are freed and vas deferens sectioned with bipolar energy, the 4th arm grasps and elevates the middle portion of the prostate to access the Denonvilliers fascia which is incised at this moment. Subsequently we dissect the fascia from the prostatic posterior plane. First, medially, until the prostatic apex, then, moving lateral.

At this stage we demonstrate the anterograde preservation of the neurovascular bundle with sharp and blunt dissection and selective bipolar and monopolar pin-point coagulation without the use of clips. Afterwards, dorsal vein complex is transected and a barbed Fill-block 3/0 suture is then used to ligate the sectioned plexus, starting laterally on the left, crossing it transversally and then return to the middle to finish with a suspension stitch. The prostatic apex and urethra is meticulously dissected until as close as possible to the verumontanum in order to preserve the maximum urethral length. A total anatomical reconstruction is performed using barbed Fill bloc 3/0 suture. First a modified posterior reconstruction is done including the Denonvilier’s fascia and recto-urethral muscle followed by the approximation of the posterior part of the bladder neck with the posterior urethral stump. Second, a running vesico-urethral anastomosis as described by Van Velthoven is performed. Third and finally, the anterior reconstruction connects de Dorsal venous complex (parietal layer of the pelvic fascia) with the tissue anterior to the bladder neck (visceral layer of the pelvic fascia) by means of a 2/0 barbed running suture. A 18 F catheters is left indwelling. No drains are left.

Conclusion: The Lisbon Zero Clip RARP technique combines maximal anatomical preservation, limited energy use and omission of clips and total anatomic reconstruction. This voice guided video explains the surgery step by step.

U 143

ROBOT-ASSISTED RADICAL PROSTATECTOMY ON A PATIENT WITH LARGE MULLERIAN DUCT CYST

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Purpose: Mullerian duct cysts (MDC) are embryonic rudiments formed from abnormal Mullerian duct regression and subsequent saccular dilatation, located in the midline retroperitoneal space between the scrotum and prostatic utricle. Although 60% of MDCs present asymptotically, larger cysts may cause a diverse range of genitourinary symptoms including but, not exclusively, urinary obstruction, frequency, urgency, pain, hematospermia, genitourinary tract infections and infertility. Historically, asymptomatic MDCs are managed through active surveillance while smaller cysts have been treated with minimally invasive procedures (percutaneously or endoscopically). Larger cysts may require more complex and invasive procedures.

After a detailed literature review, there is an apparent lack of guidelines regarding the management of midline prostatic cysts, including large MDCs, in the literature and currently, no reported case on a robot-assisted radical prostatectomy (RARP) and large MDC dissection on a patient.

We present the 1st ever case report of RARP with a large MDC.

Due to its unique nature and the deficiency in the literature, we hope this case report will prove to be a useful reference for urologic surgeons undertaking similar cases in the future.

Materials and Methods: A 58-year-old male presented with obstructive lower urinary tract symptoms (LUTS) and a previous history of basal cell carcinoma. The patient's prostate-specific antigen (PSA) was 35 ng/mL and digital rectal examination (DRE) displayed a clinical staging of T2b on the right lobe. A magnetic resonance imaging (MRI) was performed and revealed a 28-cc prostate with a 21 mm PI-RADS 5 lesion on both the peripheral and transitional zones of the right lobe. There was significant capsular involvement, right seminal vesicle base invasion and a 62 mm cyst in the left seminal vesicle. All biopsies from the right lobe were ISUP Grade Group 5 and one sample from the left lobe was positive for ISUP Grade Group 5. A decision was made to perform a robot-assisted radical prostatectomy (RARP) with extended lymphadenectomy and a trimodal treatment option.

Results: The procedure took a total of 221 mins with a robot consult time of 201 minutes. There was 300cc of blood loss, no post-operative complications and the patient was discharged 2 days later. At the 1-month postoperative consultation, the patient continued androgen deprivation therapy (ADT), had a PSA <0.05 ng/mL and good urinary flow requiring 2-3 pads per day.

The final report showed a 23 mL, T3b, ISUP Grade Group 5 lesion involving both lobes of the prostate with a focal margin of 0.1 mm on the right lobe and a confirmed diagnosis of Mullerian duct cyst.

Conclusion: Based on the findings of our case, we concluded that a robot-assisted radical prostatectomy (RARP) in a patient with a large Mullerian duct cyst is a safe and feasible procedure.

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CHALLENGES IN PERFORMING ROBOTIC-ASSISTED RADICAL PROSTATECTOMY WITHIN A WEEK POST-PROSTATE BIOPSY

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Purpose: Traditionally, it has been widely accepted that radical prostatectomy (RP) should be performed at least 4–6 weeks after biopsy to allow for sufficient recovery time from biopsy-induced inflammation and bleeding. A study conducted by S. Ikonen et al., utilizing endorectal MRI following a prostate biopsy, indicated that the changes induced by the biopsy can persist for up to 21 days, gradually diminishing by day 28. Several studies have evaluated the outcomes of RP performed within 2 weeks after a prostate biopsy, and the results suggest that immediate RP does not lead to increased surgical difficulty or complications. A meta-analysis conducted by Jie Li et al. revealed that the time interval between biopsy and RP does not have a negative impact on intraoperative outcomes, with the exception that shorter intervals are associated with a lower rate of bilateral nerve sparing and a higher rate of positive surgical margins. No study has provided a demonstration of the intraoperative situation through either imaging or video. In our video, we will showcase the experiences encountered by surgeons during robotic-assisted radical prostatectomy within one week of a prostate biopsy.

Materials and Methods: A 60-year-old male with a pre-operative PSA level of 7.322 ng/mL was diagnosed with prostate cancer (Gleason score of 3+4=7) following a MRI fusion biopsy. A robotic-assisted radical prostatectomy was scheduled and successfully performed on December 20, 2022.

The procedure entailed approaching the posterior aspect and dividing seminal vesicles and vas deferens. Challenges were encountered due to the presence of a hematoma in the seminal vesicles and sticky fat in the area. Further procedural steps included bladder release through a peritoneum incision, pelvic lymph node dissection, and endopelvic fascia incision. The sticky fat in the retropubic space added to the complexity.

Cautery was employed to perform the bladder neck transection, seminal vesicles were used to elevate the prostate, and a careful dissection was carried out between the prostate and rectum. The sticky fat in the area and hematomas within the prostate complicated the transection of prostatic pedicles and division of the lateral aspect. However, the urethral transection was performed smoothly and the anastomosis was successfully accomplished.

Results: The surgery was completed in 180 minutes with a minimal blood loss of 100mL. The post-operative pathology report revealed negative surgical margins, confirming the complete removal of the tumor. The patient was classified as pT2N0M0 post-operatively. After a 7-day hospital stay, the patient's recovery progressed well.

Conclusion: In conclusion, an RP performed shortly after a prostate biopsy introduces specific difficulties. The post-biopsy inflammatory reaction causes the surrounding fat to become sticky, complicating the dissection process for a clear anatomical plane. Furthermore, numerous hematomas in the prostate and seminal vesicles can pose additional challenges during the operation. Despite these obstacles, an experienced surgeon can successfully conduct the procedure. The primary challenges typically surface at the posterior aspect when dividing the seminal vesicles and vas deferens, and at the lateral aspects which complicate neurovascular bundle preservation. However, with proficiency and expertise, these challenges can be effectively addressed, ensuring a successful robotic radical prostatectomy.

U 170

POSTERIOR RECONSTRUCTION IN RETZIUS SPARING ZERO CLIP RARP, "THE LISBON STITCH"

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Purpose: RARP (Robot-Assisted Radical Prostatectomy) is the most common treatment approach for Prostate Cancer representing more than 85% of performed Radical Prostatectomies.

Multiple anterior and posterior reconstruction techniques, and the combination of both, have been described to restore as much as possible original pelvic anatomy and to minimize side effects due to cancer prostate surgery. The posterior reconstruction, preventing caudal retraction of the urethra and providing posterior support for the sphincteric mechanism, improves early continence results and allows a tension-free vesicourethral anastomosis.

Despite reported results of its efficacy in the retropubic RARP, to the best of our knowledge, no posterior reconstruction has ever been described in RS-RARP and is still unknown if it could additionally improve continence outcome. We reconsidered to add a posterior reconstruction in the RS-RARP in an attempt to also introduce the total anatomical reconstruction in this technique and further improve continence recovery.

We presented a RS-RARP demonstrating and describing, for the first time, a posterior reconstruction technique that we named "The Lisbon Stitch". We even more performed a surgery without using clips called "zero clip".

Materials and Methods: An edited video recording of a "Zero Clip" Retzius sparing radical prostatectomy with posterior reconstruction performed on a DAVINCI Xi system in January 2022 in our institution.

Continence was defined by zero pads used per day.

Erectile Dysfunction recovery was defined as, self-reported, erection sufficient for intercourse (ESI) with or without use of erectile medications.

Surgical Technique: The posterior reconstruction is performed with two separated 2-0 barbed sutures.

First suture is passed through Denonvillier's Fascia and posterior rhabdosphincter. Moving from right to left side, three stitches are passed and the suture is tightened.

Consecutively, the posterior median raphe and posterior bladder wall are approximated with another similar running suture, in the opposite direction, completing the posterior reconstruction.

Results: A 63-year-old male diagnosed with a low-risk prostate cancer, ISUP-1, underwent RS-RARP with posterior reconstruction. Prostate volume was 73 cc.

Histology of the specimen revealed a ISUP 1 adenocarcinoma, pT2cNxR0. PSA at 3 and 6 months was undetectable (<0,01 ng/mL).

The patient was fully continent immediately after bladder catheter removal, remaining continent during the follow-up.

Abstract content appears as submitted.

Erectile function began to recover at 1 and 3 months but still no erections sufficient per intercourses were reported (ESI 0) at that time. At 6 months sexual intercourse was possible (ESI 1) with daily use of PDE5-I.

No peri-and post-operative complications were noted.

Conclusion: We described the technique of the posterior reconstruction in RS-RARP and its feasibility and named it “The Lisbon Stitch”.

The short time required to perform it, the simplicity of its execution and published data available on efficacy in the retropubic approach suggests the value of this posterior reconstruction also in Retzius sparing technique.

Further studies are necessary to prove the usefulness of posterior reconstruction in RS-RARP.

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SINGLE PORT RADICAL PROSTATECTOMY COMPARING SHURUI AND DA VINCI SP ROBOTS: TECHNOLOGY ILLUSTRATION AND INTRAOPERATIVE PERFORMANCES

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Purpose: The single port (SP) approach to robotic-assisted radical prostatectomy have expanded after the da Vinci SP platform release in 2018. In consequence, these technological advancements provided conditions to novel robotic platforms in the recent years. Our video aims to illustrate and compare the radical prostatectomy step-by-step technique using the da Vinci SP and Shurui robots.

Materials and Methods: We presented a video compilation describing the details of the SP approach to radical prostatectomy using the da Vinci SP and Shurui robots since the trocar placement until the anastomosis.

Results: Both robots are able to operate using a pure single trocar or an assistant port on the right lower quadrant. When using the extraperitoneal approach, the robotic trocar is placed on the midline under the umbilicus, while the transperitoneal technique has the trocar higher than the umbilical scar. The da Vinci instruments consist of three arms with 6-millimeter instruments with two points of articulation and an oval-shaped scope (1 x 1.2 cm), while the Shurui has three arms with 8 millimeters with one articulation point and a round-shaped scope with 10 mm. The instrument setup is similar to both robots (Bipolar on the left, scissors on the right, and Cadere on the center). Some modifications are evident in the Shurui robot regarding hand controls, four arms instead of a single tower, instrument articulation, and scope angulations.

After dropping the bladder, we access the anterior bladder neck with bipolar and scissors. Then, the prostate is lifted by the Foley catheter, and the posterior bladder neck is accessed until the seminal vesicles (SV) plane. After clipping the SV with Hem-o-lock, we perform the posterior prostate dissection and nerve-sparing between the Denonvilliers fascia layers. The lateral prostatic dissection is performed, preserving the lateral prostatic fascia, and the vascular pedicles are controlled with Hem-o-lock clips. Furthermore, we perform the apical dissection underneath the puboprostatic ligaments and incise the urethra with cold scissors. The DVC is controlled with a barbed running suture. Finally, we complete the posterior reconstruction and anastomosis with a bidirectional barbed suture.

Conclusion: Our video illustrates the Single Port approach to radical prostatectomy using the da Vinci SP and Shurui robotic platforms. Both provided safe and feasible procedures and some structural differences are evident in the Shurui platform in terms of platform model with four arms, hand control, instrument management, and articulations. However, the patient positioning, trocar placement, and surgical steps are similar in both. Studies are on the way to compare surgical outcomes.

U 185

MANAGEMENT OF CHALLENGING UPJ OBSTRUCTIONS

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Purpose: The purpose of this video is to demonstrate the variability in causes of ureteropelvic junction obstructions. Additionally, on top of a review of the general pyeloplasty procedure, this video serves to provide a visual representation of several specific corrective techniques in each unique obstruction presented.

Materials and Methods: Three patients with ureteropelvic junction obstructions underwent a pyeloplasty procedure during a two-week period at our academic medical center using the DaVinci Xi robot (Sunnyvale, CA) by a single urologic surgeon (RJL). One patient had anterior crossing vessels, the second had kidney stones and secondary obstruction due to scar tissue from prior lithotripsies, and the third had a high ureteral insertion and renal ptosis. Each patient represented unique challenges, however, a systematic approach was used to successfully delineate the best corrective measure and highlight each major step in the surgery.

Results: All surgeries were successfully performed under general anesthesia, with minimal blood loss. Patients were discharged after a one-night stay in the hospital with no post-operative complications.

Conclusion: Pyeloplasty is the mainstay of treatment for ureteropelvic junction obstructions. There are multiple different causes of this pathology. Understanding the underlying cause allows one to apply surgical correction unique to that particular situation. The surgical technique can be modified accordingly to best correct the underlying problem.

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ADVANCED SURGICAL APPROACH: ROBOTIC-ASSISTED RADICAL PROSTATECTOMY AND PELVIC LYMPH NODE DISSECTION FOR REGIONAL LYMPH NODE METASTASIS PATIENTS

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Purpose: Despite the lack of randomized controlled trials, prospective cohort studies suggest that Radical Prostatectomy (RP) may improve survival outcomes over forgoing RP in patients with node-positive prostate cancer. While RP alone may not be curative, it serves as a potential first step in a multimodality treatment approach, aiming to optimize cancer control outcomes. This study will illustrate the detailed surgical technique of Robotic-Assisted Radical Prostatectomy (RARP) and Pelvic Lymph Node Dissection (PLND) in patients with regional lymph node metastasis.

Materials and Methods: This is a 63-year-old man who presented with a high pre-operative PSA level of 225.9 ng/mL. Upon performing a digital rectal examination (DRE), a firm and palpable nodule was detected on the left side of the prostate. A prostate biopsy was conducted, revealing a Gleason score of 4+5=9.

Further imaging studies, including a CT scan, showed evidence of prostatic cancer with left seminal vesicular invasion and left pelvic lymphadenopathy, suggesting local spread of the disease. However, a whole-body bone scan yielded negative results.

To address the condition, the patient underwent a RARP along with PLND on May 16, 2023. The surgical details are demonstrated in the video, with a focus on the dissection of lymph nodes.

Results: The surgery was successfully performed with a console time of 300 minutes. There was minimal blood loss, approximately 300mL. There were no perioperative complications, and the surgical margins were negative. Based on the pathology report, the patient had a Gleason score of 4+5=9. The tumor stage was determined to be pT3bpN1M0. The patient had a hospital stay of 7 days following the surgery.

Conclusion: In conclusion, the use of RARP with PLND is a potentially beneficial surgical approach for patients with node-positive prostate cancer. The procedure is technically feasible and allows for careful dissection of lymph nodes during surgery.

However, it is important to note that the use of this approach should be limited to patients who meet specific criteria outlined in the NCCN (National Comprehensive Cancer Network) guidelines. These criteria include a life expectancy of over 10 years, resectable disease, and the procedure should be conducted within the framework of a clinical trial or planned multimodality approach.