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Article

Simultaneous Robot-Assisted Radical Prostatectomy and Robot-Assisted Partial Nephrectomy for Synchronous Prostate Cancer and Small Renal Tumors: A Single-Center Experience and Literature Review of Concurrent Robotic Multisite Surgery

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Abstract: Introduction: This review explores the literature and presents institutional cases of concurrent robotic multisite surgery—in particular, robot-assisted radical prostatectomy (RARP) and robot-assisted partial nephrectomy (RAPN) for synchronous prostate and kidney cancers. We highlight dual-console synchronous robotic procedures, emphasizing the unique docking technique developed. **Aim**: The aims of the study were to evaluate the feasibility, safety, and clinical outcomes of concurrent RARP and RAPN for synchronous prostate cancer and small renal tumors, as well as other concurrent robotic multisite surgeries, and to compare institutional findings with the existing literature. **Materials and Methods**: We describe the unique docking technique used in our procedures, which facilitates atraumatic transitions between surgeries using the same port sites. Additionally, eligible studies on concurrent robotic multisite surgery that were published in English were retrieved from the MEDLINE, Embase, and Cochrane Library databases. Data on operative time, blood loss, complications, and postoperative outcomes were extracted. **Results**: Eight cases from our institution demonstrated the feasibility and safety of the proposed approach, which is consistent with previous reports. The unique docking technique and dual-console setup enhance surgical precision, offering significant benefits in patient outcomes. As part of the literature review, nine retrospective studies involving 40 cases of concurrent RARP and RAPN were reviewed. Additionally, eleven retrospective studies involving 392 cases of concomitant RARP and robotic transabdominal preperitoneal inguinal hernia repair (RTAPPIHR) were analyzed. **Conclusions**: Concurrent RARP and RAPN for synchronous prostate and kidney tumors is a viable and effective approach. Our early experience suggests that this and other combined procedures can optimize patient care and reduce costs. Prospective trials are needed to validate these findings and further refine the techniques.

Keywords: robotic surgery; robot-assisted partial nephrectomy; robot-assisted radical prostatectomy; concurrent multisite surgery; synchronous prostate and kidney cancers

1. Introduction

Robotic surgery has revolutionized the field of urology, offering enhanced precision and minimally invasive options for complex surgical procedures. The concurrent execution of robot-assisted radical prostatectomy (RARP) and robot-assisted partial nephrectomy (RAPN) is an innovative approach to managing synchronous primary cancers of the prostate and kidney. This combined procedure allows benefitting from the advantages of robotic systems to perform two major

surgeries in a single setting, reducing the patient morbidity and healthcare costs associated with separate operations.

Reports in the literature indicate that single-setting robotic surgeries for both conditions are feasible and safe, providing benefits such as reduced abdominal trauma, shorter recovery times, and lower overall hospitalization costs [1–4]. This is important, as the increasing use of prostate cancer screening and cross-sectional imaging has led to increases in the incidental detection of synchronous renal tumors in patients with diagnosed and staged prostate cancer [1,2]. However, combining these surgical procedures require meticulous surgical planning and advanced expertise in robotic surgery.

This article presents an institutional case series of concurrent robotic multisite surgery from the Urology Department, Institute of Medical Sciences, Faculty of Medicine, Collegium Medicum, Cardinal Stefan Wyszyński University in Warsaw alongside a comprehensive literature review, with particular attention to concurrent RARP and RAPN surgeries performed using the da Vinci X robotic system with dual-console capabilities.

2. Aim

The aim of this study is to evaluate the feasibility, safety, and clinical outcomes of concurrent robotic-assisted radical prostatectomy (RARP) and robotic-assisted partial nephrectomy (RAPN) for the treatment of synchronous prostate cancer and small renal tumors. By presenting an institutional case series and reviewing the literature, this study seeks to demonstrate the efficacy of simultaneous robotic multisite surgery, specifically focusing on the unique docking techniques and surgical approaches utilized. Additionally, by comparing the institutional findings with the existing literature, we can highlight the advantages and potential challenges of this combined surgical procedure. Through detailed analysis of operative times, blood loss, complications, and postoperative outcomes, the study aspires to provide valuable insights that could enhance surgical practices and patient care in the field of urological oncology.

3. Material and Methods

3.1. Patient Selection for the Institutional Case Series

This study includes a retrospective analysis of patients treated at the Urology Department, Institute of Medical Sciences, Faculty of Medicine, Collegium Medicum, Cardinal Stefan Wyszyński University in Warsaw, who were subjected to concurrent robotic multisite surgery.

Between 2021 and 2024, four patients were diagnosed with synchronous prostate cancer and small renal tumors; two of them underwent concurrent robot-assisted radical prostatectomy (RARP) and robot-assisted partial nephrectomy (RAPN). The inclusion criteria were the following:
1. Confirmed diagnosis of localized prostate cancer suitable for radical prostatectomy in patients not suitable for or unwilling to undergo active surveillance;
2. Incidental detection of a small renal tumor (≤4 cm) suitable for partial nephrectomy;
3. Eligibility for minimally invasive robotic surgery based on overall health status and absence of contraindications;
4. The absence of extensive adhesions in the peritoneal cavity after multiple abdominal surgeries and the absence of perirenal "toxic fat" significantly complicating surgical dissection.

The two other patients did not meet these criteria. As a result, they were subjected to non-simultaneous robot-assisted surgical treatment and were therefore not part of our eight-patient case series.

In the same time frame, three patients were diagnosed with synchronous prostate cancer and inguinal hernia, and all of them underwent concurrent robot-assisted radical prostatectomy and robotic transabdominal preperitoneal inguinal hernia repair (RTAPPIHR).

Additionally, three other patients underwent various combinations of robot-assisted surgeries, including partial nephrectomy, adrenalectomy, total trans-obturator tape (TOT) removal, cystolithotomy, and radical prostatectomy, demonstrating the capability and versatility of robotic systems in managing complex multiorgan surgical interventions within a single operative session.

3

3.2. Surgical Techniques

I.   RARP + RAPN

All surgeries were performed using the da Vinci X robotic system with dual-console capabilities (Figure 1). The surgical team consisted of two experienced robotic surgeons. The procedures were carried out under general anesthesia, with the patient in different positions for each procedure.

Figure 1. Dual-console robotic surgery.

1.   **Robot-Assisted Partial Nephrectomy (RAPN):**
   o   The patient was initially placed in the lateral decubitus position (Figure 2).
   o   One 12 mm laparoscopic trocar (assistant trocar) and four 8 mm robotic trocars were used (a total number of five).
   o   The renal artery was isolated (Figure 3), clamped during the tumor resection, and unclamped after renorrhaphy.
   o   The renal tumor was excised with a margin of healthy tissue.
   o   Renal reconstruction (renorrhaphy) was performed using a two-layer closure technique:
      ▪   The inner layer was closed using a 3-0 monofilament suture on a 26 mm needle (Figure 4).
      ▪   The outer layer (fibrous capsule and tumor bed) was closed using a barbed 3-0 V-lock™ suture on a 26 mm needle, with Hem-o-lock™ clips and TachoSil™ hemostatic material placed under the outer sutures.
   o   After decompression of the renal artery, hemostasis was verified at the pressure of a 6 mm column of mercury inside the peritoneal cavity.
   o   The kidney tumor was pulled out in the Endo Bag™ with the assistant's trocar.

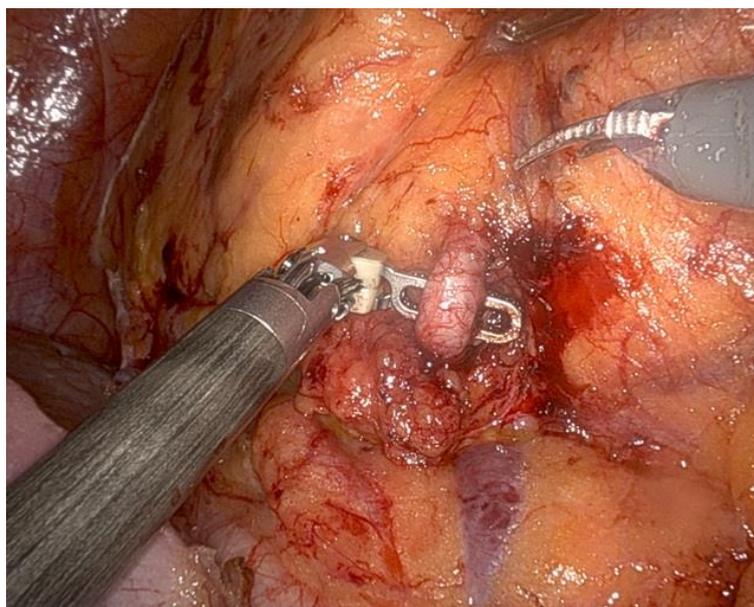**Figure 2.** Patient in the lateral decubitus position during robot-assisted partial nephrectomy (RAPN).

Figure 3. Left renal artery isolation.

2. **Repositioning**:
   o   After the completion of RAPN, the robotic system was undocked.
   o   Arm 4 switched position to the opposite side in the da Vinci X robotic system.
   o   The patient was repositioned to the supine Trendelenburg position at a 30-degree angle, and the robotic system was re-docked for RARP.
3. **Robot-Assisted Radical Prostatectomy (RARP)**:
   o   Trocar placement for RARP was modified by using the previous incisions from the RAPN procedure. Four 8 mm robotic trocars and two 11 mm laparoscopic trocars were used (a total number of six) (Figure 5).
   o   The fourth robotic arm port was closed, and two new incisions were made: one for a laparoscopic trocar and one for a robotic trocar.
   o   The key steps included the dissection of the prostate with bladder neck sparing when possible (Figure 6), control of the dorsal venous complex, nerve-sparing techniques when applicable, and vesicourethral anastomosis with a continuous double-needle suture.
   o   A bladder–urethral anastomosis leak test of 300 mL in the bladder was performed.
   o   The prostatectomy specimen was pulled out with the assistant's trocar in the Endo Bag™.
   o   Only one 18 Ch Redon drain was inserted into the peritoneal cavity after the combined procedure.
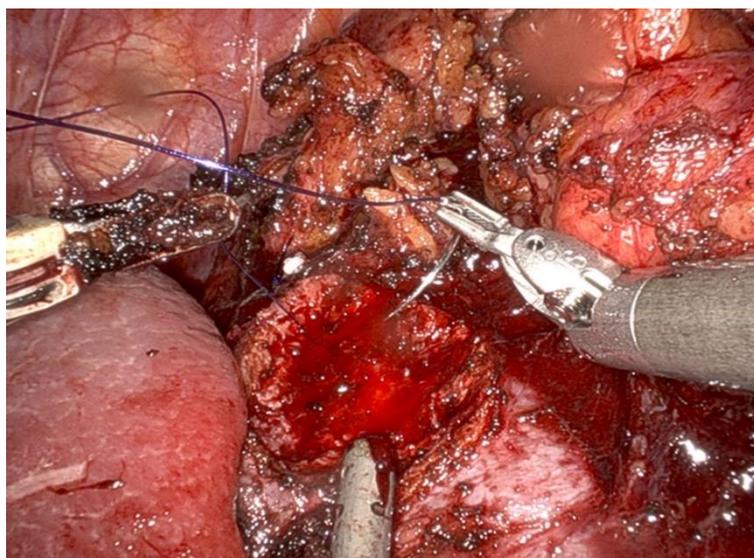
Figure 4. Renorrhaphy of the tumor bed (inner layer).

4. Robotic Instruments
   - The same robotic instruments were used for both procedures:
     - Large needle driver;
     - ProGrasp forceps;
     - Monopolar curved scissors;
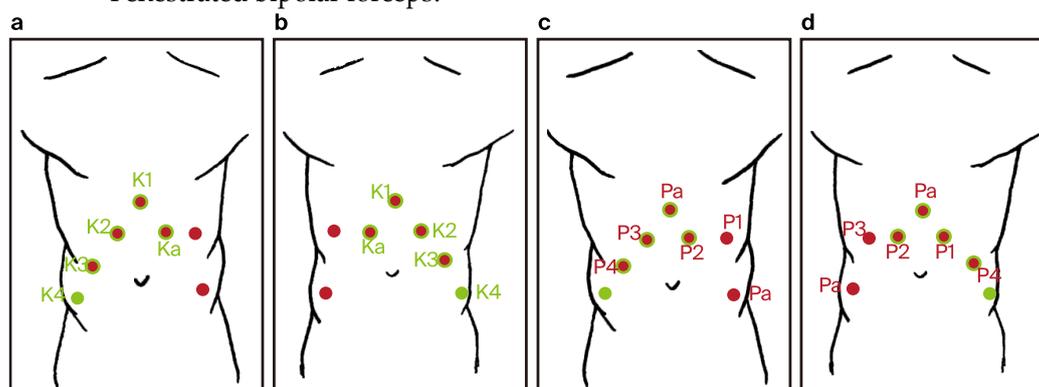   - Fenestrated bipolar forceps.

Figure 5. Trocar port placement for the combined robot-assisted radical prostatectomy (RARP) + robot-assisted partial nephrectomy (RAPN) procedure (**a–d**): red dots—trocar sites used only during RARP, green dots—trocar sites used only during RAPN, red dots with green rim—trocar sites common to both RARP and RAPN, P1–P4—trocar sites for robotic arms during RARP, K1–K4—trocar sites for robotic arms during RAPN, Pa—trocar sites for the assistant during RARP, Ka—trocar sites for the assistant during RAPN.
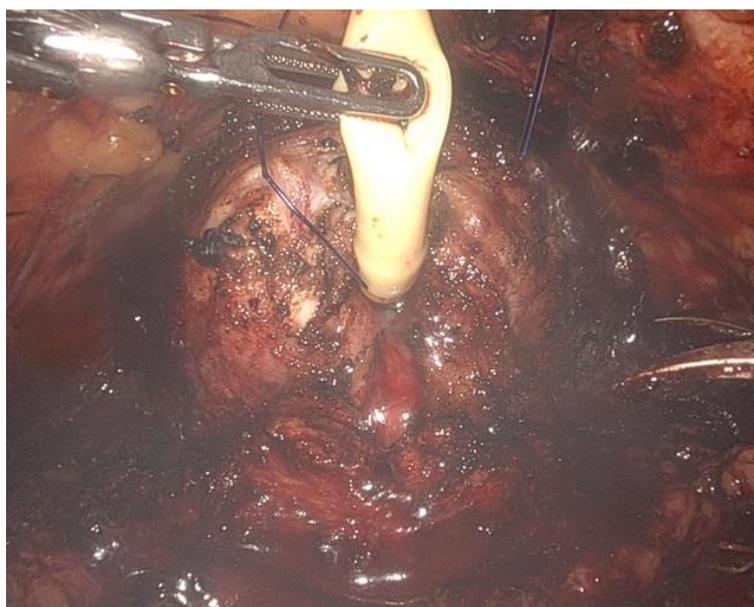
Figure 6. Bladder neck sparing technique.

II.   RARP + RTAPPIHR

This discussion will primarily focus on the transabdominal preperitoneal (TAPP) approach, which is frequently chosen during RARP due to its compatibility with the transperitoneal surgical route of the prostatectomy. The same robotic instruments were used for both procedures:
- Large needle driver;
- ProGrasp forceps;
- Monopolar curved scissors;
- Maryland bipolar forceps.
1. Patient Preparation and Port Placement:
    o   The patient is positioned in a steep Trendelenburg position to enhance access to the abdominal cavity and pelvic anatomical structures.
    o   A six-port configuration is typically employed to facilitate optimal access to both the prostate and the inguinal regions.
2. Dissection and Identification of the Hernia:
    o   Following mobilization of the prostate and incision of the endopelvic fascia, the surgeon inspects the inguinal regions for the presence of hernias.
    o   Indirect hernias are identified by a dilated internal ring (Figure 7), while direct hernias are recognized due to defects medial to the epigastric vessels.
3. Reduction of the Hernia Sac:
    o   The hernia sac is carefully dissected and reduced back into the abdominal cavity, ensuring that no contents remain within it.
4. Mesh Placement:
    o   A polypropylene mesh is selected for its strength and compatibility with biological tissues. The size of the mesh is determined by the dimensions of the defect.
    o   The mesh is introduced into the abdominal cavity and positioned over the hernia defect (Figure 8) through the assistant laparoscopic port, ensuring adequate coverage to prevent recurrence.
5. Fixation of the Mesh:
    o   The mesh is secured using non-absorbable sutures, with fixation points typically including Cooper's ligament and the transversalis fascia. Care is taken to avoid major blood vessels and nerves to prevent complications such as bleeding or chronic pain.
6. Completion of Prostatectomy:
    o   After the hernia repair, the prostatectomy is completed, including lymph node dissection (if indicated), specimen extraction, and vesicourethral anastomosis.
7. Reperitonealization:

- o The peritoneal flap is closed over the mesh using a continuous suturing technique at the end of surgery. This step is vital to prevent bowel adhesions and mesh migration, which are potential complications of intra-abdominal mesh placement.
- o A final inspection ensures hemostasis and the integrity of the repair before the abdominal incisions are closed.
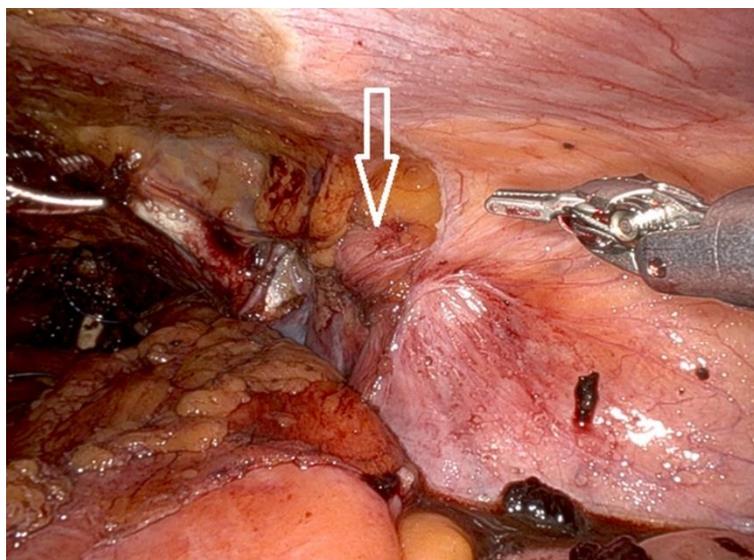

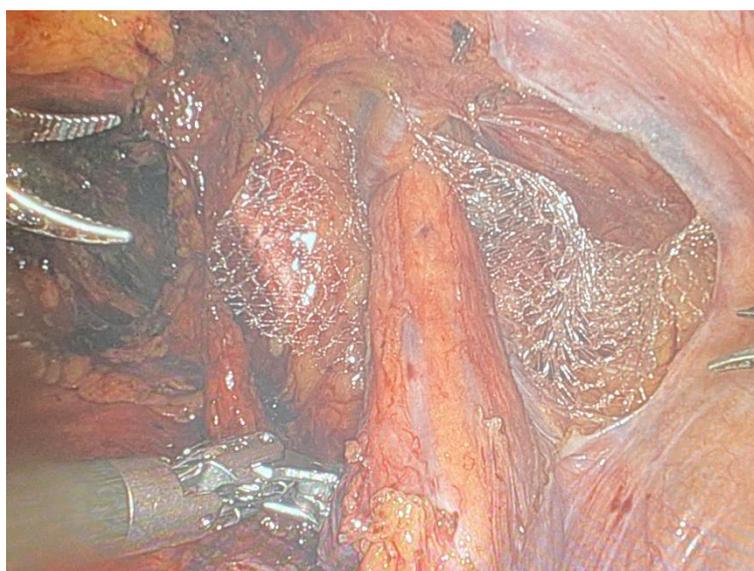**Figure 7.** Indirect hernia sac with dilated inguinal ring (arrow).

Figure 8. Mesh positioning over the hernia defect.

3.3. Data Collection and Analysis for the Review of the Literature

Data, if available, were collected retrospectively from patient medical records pertaining to cases treated at our institution, as well as from relevant studies published in English and retrieved in full-text versions from the MEDLINE, Embase, and Cochrane Library databases. The literature search was conducted using keywords such as "robot-assisted surgery," "radical prostatectomy," "partial nephrectomy," "simultaneous surgery," "synchronous cancers," "robotic inguinal hernia repair," "combined surgical procedures," and "simultaneous robotic-assisted interventions." All identified articles were thoroughly reviewed, and only those studies that provided detailed and relevant clinical or perioperative data pertinent to the outcomes of interest were included in the analysis. The collected data included the following:

1. Operative time (total surgery time and console time for each separate procedure, if available);
2. Estimated blood loss;
3. Perioperative complications;
4. Pathological outcomes, including biopsy results and post-prostatectomy histopathology in Gleason scores, as well as post-partial nephrectomy histopathology;
5. Hemoglobin levels pre- and post-operation;
6. Estimated glomerular filtration rate (eGFR) levels pre- and post-operation (24 h after surgery if available);
7. Hospitalization period;
8. Indications for surgery (if needed to be explained).

Descriptive statistics were used to summarize the data. For continuous quantitative variables, such as operative time, estimated blood loss, hemoglobin levels, and eGFR levels, arithmetic means were calculated to provide central tendency of the data. For categorical qualitative variables, such as perioperative complications and pathological outcomes, frequencies and percentages were used to describe the distribution of these events. These descriptive statistics provided a comprehensive summary of the collected data, which was essential for comparing the institutional outcomes with those reported in the existing literature. This approach facilitated a robust assessment of the feasibility, clinical effectiveness, and safety of the concurrent procedures by contextualizing our findings within the broader scope of published research.

3.4. Ethical Considerations

The study was conducted in accordance with the ethical standards of the institutional and national research committee and with the 1964 Declaration of Helsinki and its later amendments. Informed consent was obtained from all individual participants included in the study.

4. Results

4.1. Overview

The outcomes documented in this study offer a thorough analysis of robotic multisite surgical procedures conducted at our institution, with detailed data provided in Tables 1–4.

Table 1 focuses on simultaneous procedures involving robot-assisted radical prostatectomy (RARP) and robot-assisted partial nephrectomy (RAPN), highlighting key clinical outcomes including operative time, estimated blood loss, and postoperative complications. Table 2 examines cases where RARP and RAPN were performed at different intervals, offering insights into the surgical approach and patient recovery associated with staged operations. Table 3 delves into the integration of RARP with robotic transabdominal preperitoneal inguinal hernia repair (RTAPPIHR) focusing on perioperative outcomes and complication rates, while Table 4 encapsulates the results from other complex, concurrent robotic interventions carried out at our facility.

To contextualize our institutional findings, we compared them with data from existing literature on robotic multisite surgery, as synthesized in Tables 5–7.

Table 5 contrasts our concurrent RARP and RAPN outcomes with those reported globally, evaluating parameters such as operative time, blood loss, and renal function preservation. Table 6 aggregates results from studies on the combination of RARP with robot-assisted inguinal hernia repair, juxtaposing them against our institutional experience. Finally, Table 7 reviews additional concurrent robotic procedures analogous to those performed in our institution, offering a comparative perspective on the safety and feasibility of these complex surgeries.

Table 1. Detailed outcomes for institutional cases of concurrent robot-assisted radical prostatectomy (RARP) + robot-assisted partial nephrectomy (RAPN). *estimated glomerular filtration rate.

Patient Number	Operation Date	Hospitalization Period	Preoperative Hemoglobin (mmol/L)	Postoperative Hemoglobin (mmol/L)	Preoperative eGFR* (mL/min/1.73 m²)	Postoperative eGFR* (mL/min/1.73 m²)	Preoperative Prostate Cancer Clinical Stage and Biopsy Result	Post-Prostatectomy Stage and Histopathology Result	Preoperative Kidney Tumor Clinical Stage and Side	Postoperative Kidney Tumor Histopathology Result	Total Operative Time (min.)	Console Time (min.)	Estimated Blood Loss (mL)	Complications (Clavien–Dindo)
1 (of 4)	30.06.2023	27.06.2023–04.07.2023 7 days in total 4 days postoperatively	8.9	8.3	66.1	99.5	Adenocarcinoma Gleason 8 (4 + 4) ISUP Grade 4 cT2bN0M0	Adenocarcinoma Gleason 8 (4 + 4) ISUP Grade 4 pT2cN0M0R0 5 lymph nodes dissected during extended pelvic lymph node dissection	cT1a solid tumor right side, upper pole	Oncocytoma without involvement of surrounding fatty tissue R0	345	RAPN 105 REPOSITIONING 50 RARP + extended pelvic lymph node dissection 190	350	None
2 (of 4)	13.12.2023	12.12.2023–16.12.2023 4 days in total 3 days postoperatively	9.4	9.1	73.6	89.9	Adenocarcinoma Gleason 7 (3 + 4) ISUP Grade 2 cT2bN0M0	Adenocarcinoma Gleason 7 (3 + 4) ISUP Grade 2 pT2cN0M0R0 without end	cT2a cystic tumor Bosniak III right side, posterior aspect	pT0 Necrotic connective tissue fragments in the form of a cyst; neoplastic tissue was not found.	285	RAPN 65 REPOSITIONING 30 RARP 180	250	None

Table 2. Detailed outcomes for institutional cases of multitemporal robot-assisted radical prostatectomy (RARP) + robot-assisted partial nephrectomy (RAPN). *estimated glomerular filtration rate.

Patient Number	Operation Date	Hospitalization Period	Preoperative Hemoglobin (mmol/L)	Postoperative Hemoglobin (mmol/L)	Preoperative eGFR* (mL/min/1.73m²)	Postoperative eGFR* (mL/min/1.73m²)	Preoperative Prostate Cancer Clinical Stage and Biopsy Result	Post-Prostatectomy Stage and Histopathology Result	Preoperative Kidney Tumor Clinical Stage and Side	Preoperative Kidney Tumor Histopathology Result	Total Operative Time (min.)	Console Time (min.)	Estimated Blood Loss (mL)	Complications (Clavien–Dindo)
3 (of 4)	RARP (2nd) 11.09.2023 RAPN (1st) 05.07.2023 extensive adhesions in the peritoneal cavity, perirenal "toxic fat"	RARP (2nd) 06.09.2023—15.09.2023 9 days in total 4 days postoperatively RAPN (1st) 28.06.2023–09.07.2023 11 days in total 4 days postoperatively	RARP 8.5 RAPN 8.5	RARP 6.9 RAPN 7.7	RARP 96.5 RAPN 93.6	RARP 95.6 RAPN 87.4	Adenocarcinoma Gleason 7 (3 + 4) ISUP Grade 2 cT2bN0M0	Adenocarcinoma Gleason 7 (3 + 4) ISUP Grade 2 pT2cN0M0R0 without extended pelvic lymph node dissection	cT1a solid tumor left side, upper pole	pT0 Histo-oncological changes in the examined material were absent	RAPN 210 RARP 225	RAPN 170 RARP 205	RAPN 350 RARP 550	Grade II Fever, treated with antibiotic therapy
4 (of 4)	RARP + extended pelvic lymph node dissection 13.02.2024 RAPN 27.05.2024	RARP + extended pelvic lymph node dissection (1st) 12.02.2024–17.02.2024 5 days in total 4 days postoperatively RAPN (2nd) 26.05.2024–31.05.2024 5 days in total 4 days postoperatively	RARP + extended pelvic lymph node dissection 8.4 RAPN 8.8	RARP + extended pelvic lymph node dissection 7.6 RAPN 7.9	RARP + extended pelvic lymph node dissection 88.9 RAPN 79.1	RARP + extended pelvic lymph node dissection 63.6 RAPN 72.3	Adenocarcinoma Gleason 7 (4 + 3) ISUP Grade 3 cT3N1M0 locally advanced tumor, preoperative PSA 64 ng/ml	Adenocarcinoma Gleason 8 (4 + 4) ISUP Grade 4 pT2cN0M0 7 lymph nodes dissected during extended pelvic lymph node dissection	cT1b cystic tumor Bosniak III left side, posterior aspect	Papillary renal cell carcinoma, type 1, the tumor mass showed foci of necrosis and congestion. pT1bR0	RAPN 230 RARP + extended pelvic lymph node dissection 230	RAPN 200 RARP + extended pelvic lymph node dissection 195	RAPN 300 RARP 250	None

Table 3. Detailed outcomes for institutional cases of concurrent robot-assisted radical prostatectomy (RARP) + robotic transabdominal preperitoneal inguinal hernia repair (RTAPPIHR). *estimated glomerular filtration rate.

Patient Number	Operation Date	Hospitalization Period	Preoperative Hemoglobin (mmol/l)	Postoperative Hemoglobin (mmol/l)	Preoperative eGFR* (ml/min/1,73 m²)	Postoperative eGFR* (ml/min/1,73 m²)	Preoperative Prostate Cancer Clinical Stage and Biopsy Result	Post-Prostatectomy Stage and Histopathology Result	Hernia side	Total Operative Time (min.)	RARP Console Time (min.)	Inguinal Hernia repair Console Time (min.)	Estimated Blood Loss (ml)	Complications (Clavien–Dindo)
1 (of 3)	17.08.2021	11.08.2021–20.08.2021 9 days in total 3 days postoperatively	9,8	N/A	92,2	N/A	Adenocarcinoma Gleason 6 (3 + 3) ISUP Grade 1 cT2aN0M0	Adenocarcinoma Gleason 6 (3 + 3) ISUP Grade 1 pT2aN0MxR0	RIGHT SIDE	195	135	25	150	Grade I SARS-CoV-2 infection requiring antipyretics
2 (of 3)	20.10.2021 + extended pelvic lymph node dissection	18.10.2021–25.10.2021 7 days in total 5 days postoperatively	9,7	9,2	81	N/A	Adenocarcinoma Gleason 7 (3 + 4) ISUP Grade 2 cT3N0M0	Adenocarcinoma Gleason 7 (4 + 3) ISUP Grade 3 pT3aN0MxR0	RIGHT SIDE	200	165	40	225	NONE
3 (of 3)	09.02.2023 + extended pelvic lymph node dissection	08.02.2023–13.02.2023 5 days in total 4 days postoperatively	8,6	5,9	66,3	82,5	Adenocarcinoma Gleason 7 (3 + 4) ISUP Grade 2 cT2bN0M0	Adenocarcinoma Gleason 8 (4 + 4) ISUP Grade 4 pT3bN0MxR1 single-point positive surgical margin	BOTH SIDES + EPIGASTRIC HERNIA (LINEA ALBA)	270	155	65	700	Grade II Red Cell Concentrate Transfusion

Table 4. Detailed outcomes for institutional cases of other concurrent robotic multisite surgery procedures. *estimated glomerular filtration rate.

Patient Number	Operation Date and Type of Robotic Procedure	Indication	Hospitalization Period	Pre-operative Hemoglobin (mmol/L)	Postoperative Hemoglobin (mmol/L)	Preoperative eGFR* (mL/min/1.73 m²)	Postoperative eGFR* (mL/min/1.73 m²)	Preoperative Prostate Cancer Clinical Stage and Biopsy Result	Post-Prostatectomy Stage and Histopathology Result	Postoperative Kidney Tumor Histopathology Result	Total Operative Time (min)	Console Time (min)	Estimated Blood Loss (mL)	Complications (Clavien–Dindo)
1 (of 3)	08.05.2023 RAPN + IPSILATERAL ROBOT-ASSISTED ADRENALECTOMY (RAA)	cT4N0M0 PERIPHERAL UPPER POLE KIDNEY TUMOR WITH ADRENAL INVOLVEMENT	07.05.2023–15.05.2023 8 days in total 7 days postoperatively	8.6	8.0	107.7	123.2	N/A	N/A	Clear cell renal cell carcinoma (RCC Fuhrman 2 WHO G2 R0)	265	230	800	Grade II Red Cell Concentrate Transfusion
2 (of 3)	27.06.2023 ROBOT-ASSISTED TOTAL TRANS-OBTURATOR TAPE (TOT) REMOVAL + ROBOT-ASSISTED CYSTOLITHOTOMY (RACLT)	INTRAVESICAL TRANS-OBTURATOR TAPE (TOT) EROSION WITH CONCOMITANT BLADDER STONE	27.06.2023–04.07.2023 7 days in total 7 days postoperatively	7.5	6.5	96.1	82.9	N/A	N/A	N/A	125	100	250	None
3 (of 3)	29.12.2023 RALP + ROBOT-ASSISTED CYSTOLITHOTOMY (RACLT)	ORGAN-CONFINED PROSTATE CANCER WITH CONCOMITANT BLADDER STONE	28.12.2023–03.01.2024 6 days in total 5 days postoperatively	8.7	8.2	98.1	103.6	Adenocarcinoma Gleason 6 (3 + 3) ISUP Grade 1 cT2aN0M0	Adenocarcinoma Gleason 9 (4 + 5) ISUP Grade 5 pT2cN0M0R0	N/A	165	130	200	None

Table 5. Summary of cases of concurrent robot-assisted radical prostatectomy (RARP) + robot-assisted partial nephrectomy (RAPN) from the literature in comparison with the authors' own (institutional) surgical results (chronological order).

Study (Year of Surgery)	Country	Number of Patients	Robotic System	Institution	Mean Operative Time (min.)	Mean Console Time (min.)	Mean Estimated Blood Loss (mL)	Complications (Clavien-Dindo)	Positive Surgical Margins	Mean Preoperative eGFR* (mL/min/1.73 m²)	Mean Preoperative eGFR* (mL/min/1.73 m²)	Calculated Mean Difference in eGFR* before and after Surgery (mL/min/1.73 m²)	Follow-Up	Mean Hospitalization Time (Days)
Patel et al. (2009) [4]	USA	1	da Vinci S	Henry Ford Hospital	427	335	200	None	None	N/A 1.1 mg/dL creatinine level	N/A	N/A	4 months	2
Boncher et al. (2010) [1]	USA	4	da Vinci S	Michigan State University	410	270	310	None	1	82	78	−4	1 month	7
Guttilla et al. (2011) [5]	Italy	3	da Vinci S	University of Padua	390	250	290	None	0	83	78	−5	1 month	6
Jung et al. (2012) [6]	South Korea	5	da Vinci Si	Seoul National University Hospital	415	275	305	None	2	84	79	−5	1 month	7
Raheem et al. (2016) [2]	South Korea	6	da Vinci Xi	Yonsei University College of Medicine	395	255	315	None	2	80	75	−5	1 month	5
Valero et al. (2017) [7]	USA	3	da Vinci Xi	Cleveland Clinic	405	265	300	None	1	85	80	−5	1 month	6
Akpinar et al. (2019) [8]	Turkey	5	da Vinci Xi	Istanbul University	400	260	300	None	1	85	80	−5	1 month	7
Cochetti et al. (2020) [3]	Italy	6	da Vinci Xi	University of Perugia	420	280	320	None	1	80	75	−5	1 month	8
Piccoli et al. (2021) [9]	Brazil	7	da Vinci Xi	Hospital de Clínicas de Porto Alegre	430	290	330	None	1	86	82	−4	1 month	7
Drobot et al. (2023)	Poland	2	da Vinci X	Multidisciplinary Hospital in Warsaw-Miedzylesie	315	270	300	None	0	69.85	94.7	+24.85	12 months	5.5

Table 6. Summary of concurrent robot-assisted radical prostatectomy (RARP) + robot-assisted inguinal hernia repair (IHR) cases from the literature in comparison with the authors' own surgical results (chronological order). *estimated glomerular filtration rate.

Author (Year of Study)	Center (Country)	Number of Surgeries	Number of Hernia Repairs	Repair Method	Mean Operative Time (min.)	Blood Loss (mL)	Complications (Clavien-Dindo)	Follow-Up (Months)	Recurrence Rate	Hernia Side (Left–L/Right–R/Bilateral–B)	Average BMI (kg/m²)	Hospital Stay (Days)	Years of Surgeries—Time Frame
Finley et al. (2007) [10]	University of California-Irvine (USA)	533	49	Mesh	+10 over RARP	N/A	None	15.3	2%	31 L 9 R	N/A	N/A	2002–2006
Joshi et al. (2010) [11]	North Shore University Hospital, NY (USA)	4	6	Mesh	+24 over RARP	N/A	None	34	0%	2 L 2 R 2 B	N/A	N/A	2008–2009
Kyle et al. (2010) [12]	Royal Melbourne Hospital (Australia)	700	37	Mesh	+5–10 over RARP	N/A	None	29	2.7%	18 L 14 R 5 B	27.1	2	2005–2009
Lee et al. (2013) [13]	University of Iowa, Iowa (USA)	1118	91	Mesh	185	170	1 recurrence, others not significant	9–12	1.1%	41 L 29 R 22 B	27.5	1	2010–2012
Mourmouris et al. (2016) [14]	Acibadem Maslak Hospital, Istanbul (Turkey)	1005	29	Nonprosthetic	147	175	None	32.1	0%	7 L 14 R 8 B	26.47	4,3	2013–2015
Ludwig et al. (2016) [15]	University of Pittsburgh Medical Center (USA)	71	11	Mesh	160	100	Minor	36	0%	5 L 3 R 3 B	27.0	2	2010–2014
Rogers et al. (2017) [16]	Florida Hospital, Celebration, FL (USA)	1139	39	Mesh transabdominal preperitoneal (TAPP)	188	110.87	10.26% Minor	N/A	0%	N/A	26.8	N/A	2008–2015
Atmaca et al. (2018) [17]	Health Sciences University (Turkey)	100	38	Mesh	160	50	7% (Minor)	36.6	11%	19 L 12 R 7 B	N/A	N/A	2014–2017
Xia et al. (2018) [18]	Johns Hopkins University School of Medicine (USA)	198	25	Mesh	155	110	None	20	1.5%	10 L 8 R 7 B	27.3	2	2015–2017
Bajpai et al.	Miami Cancer Institute	104	35	Mesh	140	120	None	18	2%	15 L	27.5	2	2017–2019

(2020) [19]	(USA)									12 R 8 B			
Bedir et al. (2021) [20]	Erzurum Regional Training Hospital (Turkey)	26	32	Mesh	192.5	100	None	18	3.8%	10 L 11 R 5 B	28.0	6	2018–2020
Drobot et al. (2024)	Multidisciplinary Hospital in Warsaw-Miedzylesie (Poland)	241	3	Mesh transabdominal preperitoneal (TAPP)	221.6 151.6 mean RARP console time 43.3 mean IHR console time	358,3	Minor (Grade I–II)	15–35	0%	2 B 1 B	N/A	7 (4 postoperative days)	2021–2024

Table 7. Summary of cases of other corresponding concurrent robotic multisite surgery procedures from the literature (chronological order).

Author	Year	Institution	Country	Procedure	Condition	Discharge Day	Surgery Time	Console Time	Complications
Tan, G.Y. et al. [21]	2012	Weill Cornell Medical College	USA	Robotic-assisted radical prostatectomy and cystolithotomy	Prostate cancer with bladder stones	Postoperative day 1 discharge	N/A	N/A	None
Macedo, F.I.B. et al. [22]	2013	James Buchanan Brady Foundation	USA	Robotic removal of eroded vaginal mesh into the bladder	Vaginal mesh erosion with bladder involvement	N/A	N/A	N/A	None
Sappal, S. et al. [23]	2016	Virginia Commonwealth University	USA	Robotic-assisted partial nephrectomy and adrenalectomy	Intrarenal adrenocortical adenoma	Postoperative day 1 discharge	2 h 10 min	14 min	None
Gul, Z.G. et al. [24]	2020	Icahn School of Medicine at Mount Sinai	USA	Robotic-assisted partial nephrectomy and adrenalectomy	Pheochromocytoma	Postoperative day 1 discharge	N/A	N/A	None
Olive, E.J. et al. [25]	2024	Mayo Clinic	USA	Robotic-assisted intravesical mesh excision	Intravesical mesh erosion with stone	Postoperative day 1 discharge	N/A	N/A	None

4.2. Cumulative Analysis

I.   Concurrent RARP + RAPN
1.   Operative Time:
     o   The mean operative time across studies ranged from 390 to 430 min. In comparison, our institutional study reported the shortest operative time of 315 min, demonstrating higher efficiency (Figure 9).
2.   Console Time:
     o   Console times varied between 250 and 335 min across the studies. Our institutional data showed a console time of 270 min, which falls within this range and indicates a consistent performance.
3.   Estimated Blood Loss:
     o   Blood loss was generally low across studies, averaging between 200 and 330 mL. Our study reported an estimated blood loss of 300 mL, which is consistent with the range observed in other studies (Figure 9).
4.   Complications:
     o   None of the reviewed studies, including ours, reported significant perioperative complications (Clavien–Dindo), confirming the overall safety of the procedure.
5.   Positive Surgical Margins:
     o   While positive surgical margins were observed in a small percentage of cases across various studies, none were reported in our study, highlighting the precision of our surgical technique.
6.   Renal Function:
     o   The postoperative estimated glomerular filtration rate (eGFR) generally showed a slight decline immediately but had stabilized by the one-month follow-up in most studies, with values ranging between -4 and -5 mL/min/1.73 m². Notably, our study showed an increase in eGFR of $+24.85$ mL/min/1.73 m², indicating an exceptional renal function outcome compared with the other studies. Comprehensive postoperative care, including meticulous management of hydration and renal perfusion, can aid in the recovery of renal function.
7.   Hospitalization:
     o   The length of hospital stay varied between 2 and 8 days in the reviewed studies. Our institutional study reported a hospitalization time of 5.5 days, which is within this range and suggests comparable postoperative recovery times.

Summary

Our study shows a significantly shorter operative time and a notable increase in postoperative eGFR compared with those in other studies while maintaining consistent console times, blood loss, complication rates, and hospitalization durations. These results highlight the safety, efficiency, and effectiveness of our surgical approach, particularly in renal function outcomes.
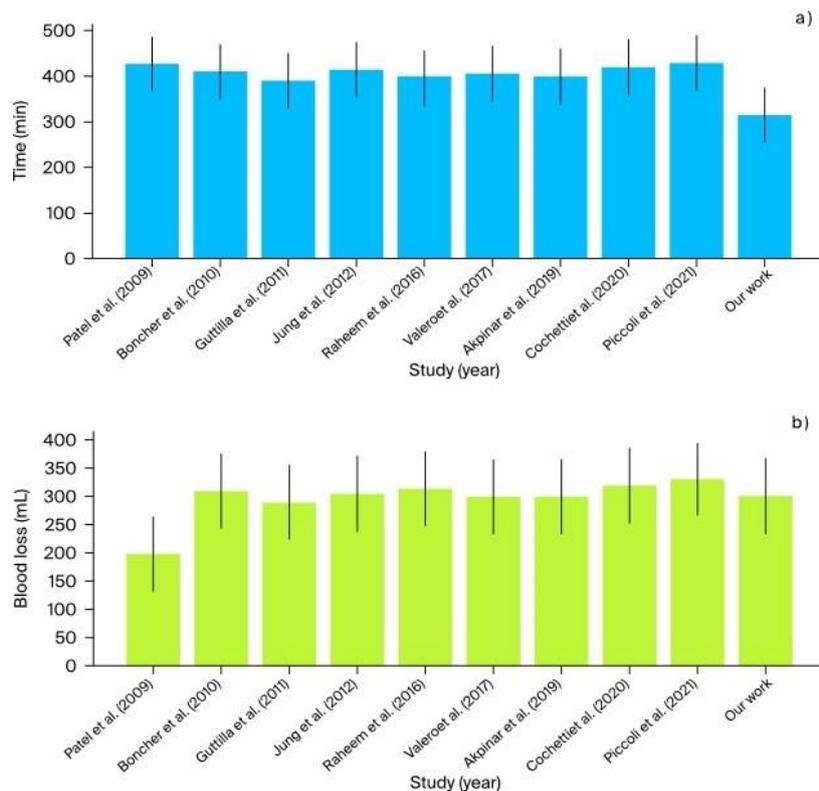
Figure 9. a) Mean operative time (min) and b) mean estimated blood loss (mL) with confidence intervals among scientific reports [1–9] on concurrent RALP + RAPN.

II. Concurrent RARP + Robotic Inguinal Hernia Repair (IHR)

1. Operative Time:
    o   The operative time reported in the literature ranged from 140 to 192.5 min, with additional values being indicated as "+10 over RARP" and "+24 over RARP". In our study, the average operative time was 221.6 min, exceeding the upper end of this range. This extended duration may be attributed to the complexity and precision required in our surgical procedures (one patient with concomitant locally advanced prostate cancer and three hernia sites), which could involve more intricate steps and careful handling of anatomical structures.

2. Estimated Blood Loss:
    o   The blood loss reported in the studies varied from 50 to 175 mL. Our study documented an average estimated blood loss of 358.3 mL, which was significantly higher than the values reported in the literature. This notable difference might be due to various aforementioned factors, patient comorbidities, and the meticulous recording of intraoperative blood loss in our institution. Further investigation into intraoperative blood management strategies could be beneficial.

3. Complications:
    o   Complications were generally minimal across all studies, with descriptions ranging from "None" to "Minor". In our study, complications were classified as "Minor (Grade I–II)", aligning with the literature and confirming the procedural safety. The low rate of significant complications underscores the efficacy of our surgical technique and postoperative care protocols.

4. Recurrence Rate:
    o   The recurrence rate in the literature ranged from 0% to 11%. Our study noted an absence of recurrences, which is consistent with the best outcomes in the literature. This suggests that

our surgical methods are highly effective in achieving durable repairs and preventing recurrence (Figure 10).

5. Hernia Side:
   o The reviewed studies predominantly reported unilateral hernias, with bilateral cases being less common. In our study, we observed two cases of a right-sided hernia and one bilateral case with an additional epigastric (linea alba) hernia. This distribution is in line with the literature, indicating that our patient cohort is representative of the general population undergoing similar procedures.

6. Patient BMI:
   o The average BMI reported in the studies ranged from 26.47 to 28.0 kg/m². Our study did not provide data on BMI, which limits direct comparison. However, future studies should include BMI as a variable to better understand its impact on surgical outcomes and to allow for a more comprehensive analysis.

7. Hospital Stay:
   o The length of hospital stay varied from 1 to 6 days in the reviewed studies. Our study reported an average hospital stay of 7 days, slightly exceeding the upper range reported in the literature. This prolonged hospitalization might reflect our institution's cautious approach to pre-, intra-, and postoperative care, ensuring complete recovery before discharge in complex cases. Reviewing and optimizing postoperative protocols could potentially reduce the length of stay without compromising patient safety.

8. Follow-Up Period:
   o The follow-up period in the literature ranged from 9 to 36.6 months. Our study had a follow-up period ranging from 15 to 35 months, which is consistent with the literature. Adequate follow-up is crucial for monitoring long-term outcomes and ensuring the durability of surgical repairs.

Summary

Our institutional study demonstrates outcomes that are largely consistent with those reported in the literature concerning the safety and efficacy of surgical procedures. Despite a longer operative time and higher blood loss in our cohort, these factors did not adversely affect the low recurrence and complication rates. The slightly prolonged hospital stay suggests a need to review and optimize postoperative care protocols to reduce recovery times. These findings underscore the effectiveness of our surgical approach while highlighting areas for potential improvement, such as minimizing blood loss and hospital stay duration.
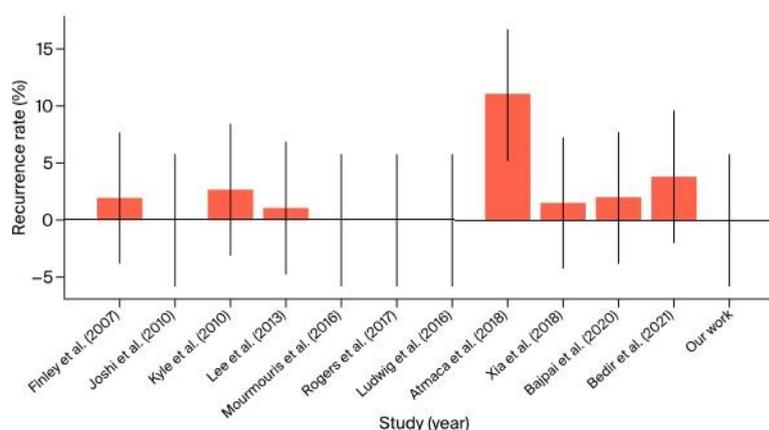
Figure 10. Hernia recurrence rate with confidence intervals among scientific reports [1–9] on concurrent robot-assisted radical prostatectomy (RARP) and robotic inguinal hernia reiair (IHR).

III. Other Concurrent Robotic Multisite Surgery Procedures

1. Limited Case Volume:

- The surgical interventions discussed, including robot-assisted adrenalectomy (RAA) in conjunction with robot-assisted partial nephrectomy (RAPN) and robot-assisted cystolithotomy (RACLT) performed concurrently with robot-assisted radical prostatectomy (RARP), are rarely performed surgical procedures. Both our institutional data and existing literature emphasize that these procedures reserved for selected cases, reflecting their niche status in urological robotic surgery.

2. Non-Standardized, Individualized Approaches:
   - These procedures often represent customized surgical solutions tailored to the unique clinical situations of patients with complex or concurrent pathologies. The inherent variability in these surgical combinations presents a challenge in establishing a standardized protocol or reliably predicting outcomes across different patient populations.

3. Limitations in Deriving Conclusive Evidence:
   - The small number of cases analyzed makes it difficult to derive definitive conclusions regarding the overall safety and efficacy of these interventions. Although the outcomes from both our institution and the broader literature suggest that these surgeries can be performed with a favorable safety profile and minimal complications, the limited scope of available data necessitates cautious interpretation when considering broader applications.

4. Contextual Understanding and Observational Insights:
   - Despite the constraints imposed by the small sample size, certain trends emerge from the data. The operative times, intraoperative blood loss, and complication rates observed in our cases are consistent with those documented in the literature, implying that these complex procedures can yield satisfactory outcomes with meticulous patient selection and surgical precision. However, the slightly prolonged hospital stays in our cohort, in comparaison to those reported in the literature, might indicate a more conservative approach to postoperative care, which should be reevaluated in order to streamline recovery protocols.

Summary

Although the limited case volume and non-standardized nature of these concurrent robotic multisite surgeries restrict the ability to generalize findings, the similarity in outcomes across various reports and out institutional data provides valuable context. These observations suggest that, with appropriate surgical planning and expertise, even complex and uncommon multisite robotic procedures can be performed successfully, with outcomes that align with established safety and efficacy standards.

5. Discussion

I. RARP + RAPN

Feasibility and Safety

The concurrent performance of RARP and RAPN offers a unique approach to managing patients with synchronous primary cancers of the prostate and kidney. The concurrent execution of RARP and RAPN has been demonstrated to be feasible and safe across multiple studies. For instance, Boncher et al. reported a mean operative time of 410 min with no perioperative complications in a series of four patients [1]. Similarly, Guttilla et al. observed no significant complications in their study of three patients, with a mean operative time of 390 min [5]. In our institutional experience, both procedures were completed without significant intraoperative complications or conversions to open surgery, with a mean operative time of 315 min and minimal blood loss. This aligns with the findings from Akpinar et al., who reported an average operative time of 400 min and low blood loss [8]. Additionally, Piccoli et al. demonstrated that simultaneous robotic surgeries are feasible, highlighting their efficiency and safety in a larger cohort of seven patients [9].

Oncological Outcomes

Pathological examination of our patients revealed no cases of positive surgical margins following RARP or RAPN, although they have been reported in the literature. For example, Jung et al. reported two cases of positive margins in a study of five patients [6]. The importance of achieving

negative margins cannot be overstated, as positive margins are associated with a higher risk of cancer recurrence [5,9,26].

Renal Function

Postoperative renal function was closely monitored in our patients, with eGFR measurements being taken several hours and several dozen hours postoperatively. None of our patients experienced a temporary decline in eGFR immediately following surgery. This finding is inconsistent with the transient renal impairment that is often observed after partial nephrectomy due to ischemia-reperfusion injury [7]. Similar findings were also reported by Raheem et al., who observed temporary declines in eGFR that stabilized within a month [2]. Long-term preservation of renal function remains a critical consideration in partial nephrectomy, and our results suggest that concurrent surgery does not significantly compromise renal outcomes [3,4].

Technical Considerations

The use of the da Vinci X robotic system with dual-console capabilities allowed for the efficient execution of both procedures. The need for repositioning and re-docking adds complexity but is manageable with a well-coordinated team. Modifications to trocar placement, as described by Valero et al., facilitate the transition between procedures, optimizing efficiency and minimizing additional incisions [7]. Additionally, Cochetti et al. emphasized the importance of dual-console systems in improving surgical outcomes by allowing the simultaneous participation of two surgeons, thereby enhancing the learning curve and surgical efficiency [3]. Notably, our docking method has not been previously described in the literature, and it additionally uses the dual-console technique.

Limitations and Future Directions

Our study's limitations include its small sample size and retrospective design. Further research with larger cohorts and prospective data is necessary to validate these findings and refine the surgical approach. Similar recommendations were made by multiple studies, emphasizing the need for larger studies to confirm their findings [2,7,8]. Additionally, long-term follow-up is essential to assess the durability of oncological control and renal function, as highlighted by multiple authors [4,6,9].

II.   RARP + RTAPPIHR

Feasibility and Safety

The concurrent performance of RARP and RTAPPIHR has proven to be both feasible and safe. Multiple studies have confirmed that the addition of IHR during RARP does not significantly increase operative time or complication rates. For example, Mourmouris et al. reported that the addition of RTAPP IHR only minimally increased the mean console time by 24 min and did not result in significant postoperative complications or hernia recurrences during an average follow-up of 32.1 months [14]. Joshi et al. also demonstrated no postoperative complications or hernia recurrences at a mean follow-up of 34 months [11]. Moreover, Rogers et al. found that combining RARP with IHR did not significantly alter perioperative outcomes. Their study highlighted that simultaneous hernia repair reduced the need for subsequent surgical interventions for hernia repair, demonstrating the safety and efficiency of this combined approach. The median follow-up in their study was 36.6 months, with no mesh-related complications reported, further supporting the safety of this procedure [16].

Outcomes

The outcomes from concurrent RARP and IHR have generally been favorable, with low recurrence rates and minimal postoperative complications. Finley et al. reported no hernia recurrences or mesh-related complications in their series of 49 herniorrhaphies performed during RARP [10]. In a similar way, Atmaca et al. found no significant difference in operative time or estimated blood loss between patients undergoing RARP alone and those undergoing concurrent RARP and IHR, with no mesh-related complications during a median follow-up of 13 months [17]. Bajpai et al. demonstrated that the addition of IHR to RARP did not adversely affect perioperative outcomes, including estimated blood loss and hospital stay [19]. Furthermore, a study by Jaber et al.

indicated that the combined procedure resulted in low rates of mesh-related complications, reaffirming the positive outcomes associated with this surgical approach [27].

Technical Considerations

Several technical considerations are crucial for optimizing outcomes in concurrent RARP and IHR. Key factors include the type of mesh used and its placement and fixation techniques. Mourmouris et al. used a non-prosthetic, tissue-based technique for direct inguinal hernias involving suturing the lateral edge of the rectus abdominis muscle sheath to the ileopectineal ligament [14]. Atmaca et al. employed various mesh types, such as Ventralight ST and 3DMax, fixed with laparoscopic tackers and absorbable sutures, to prevent mesh migration and postoperative complications such as seroma formation and adhesions [17]. Joshi et al. utilized both polypropylene and polyester meshes, secured with titanium tacks and closed with a running absorbable suture, to ensure effective fixation and minimize the risk of postoperative complications [11]. Bajpai et al. highlighted the importance of using adhesion-resistant meshes to reduce the risk of postoperative complications, particularly given the proximity of the mesh to the vesicourethral anastomosis during the transperitoneal procedure [19].

Limitations and Future Directions

Despite the encouraging results, several limitations must be acknowledged. Most studies on concurrent RARP and IHR are retrospective and involve relatively small sample sizes, limiting the generalizability of their findings. Additionally, longer follow-up periods are needed to fully assess the long-term outcomes and potential complications associated with this combined approach. Soto-Palou et al. emphasized the need for standardized surgical techniques and mesh types to ensure consistent outcomes across different institutions [28].

Future research should focus on prospective multicenter studies with larger patient cohorts to validate the current findings and refine surgical techniques. Investigating the cost-effectiveness of concurrent RARP and IHR compared with separate procedures could also provide valuable insights for clinical practice. Additionally, exploring the impact of various mesh types and fixation methods on long-term outcomes and patient quality of life would help optimize the procedure.

In conclusion, concurrent RARP and RTAPPIHR is a feasible and safe approach with favorable outcomes. Further research is needed to confirm these findings and refine the surgical techniques and materials used in this combined approach to optimize patient care.

III.   Other Concurrent Urological Robotic Multisite Surgery Procedures

Feasibility and Safety

The feasibility of concurrent urological robotic surgery multisite procedures has been demonstrated across various studies. Pisipati et al. reported on the safety and technical feasibility of combined upper and lower urinary tract robotic surgery, highlighting acceptable complication rates and good oncological outcomes [29]. Similarly, Ferrari et al. successfully performed the concurrent excision of a retroperitoneal paraganglioma and radical prostatectomy using a robotic approach, with no complications reported, reinforcing the feasibility of these complex procedures [30]. Furthermore, Gul et al. conducted a study on RAPN and robot-assisted adrenalectomy, showing that these concurrent procedures not only were feasible but also did not result in any significant postoperative complications [24].

The safety outcomes for concurrent robotic urological multisite surgeries are promising. Tan et al. reported no significant complications in patients undergoing RARP and robot-assisted cystolithotomy, highlighting the procedure's safety [21]. Moreover, Tonooka et al. highlighted that in complex cases, such as concurrent RAPN and robot-assisted laparoscopic ileocecal resection for synchronous cancers, the minimally invasive approach reduced surgical risks and facilitated quicker recovery, emphasizing the advantages of concurrent procedures in managing multiorgan medical conditions [31]

Outcomes

The outcomes of concurrent robotic multisite urological surgery procedures are generally favorable, with multiple studies documenting successful results. Tan et al. documented no significant

complications in patients undergoing combined RARP and robot-assisted cystolithotomy procedures, with early discharge and improved urinary symptoms [21]. Ferrari et al. emphasized no postoperative complications in concurrent excision of retroperitoneal paraganglioma and radical prostatectomy [30]. Flavin et al. noted the benefits of robotic surgery, such as lower morbidity, improved convalescence, reduced postoperative pain, a shorter hospital stay, and better cosmetic outcomes compared with open procedures [32].

Technical considerations

The technical considerations for performing concurrent robotic urological multisite surgeries encompass several critical aspects. Preoperative planning necessitates meticulous imaging and strategic preparation. Manfredi et al. underscored the importance of utilizing 3D augmented-reality models to enhance perioperative outcomes and inform surgical approaches in robot-assisted urologic procedures [33]. Intraoperatively, advanced robotic instruments are essential for achieving precision. Hashira et al. demonstrated the feasibility and safety of a humanoid hand system for robotic urological surgery, providing stable assistance through a small incision port [34]. Zhang et al. highlighted the use of 3D image reconstruction in robotic urological surgery, reporting no conversions to open surgery and minimal blood loss, thus emphasizing the significance of advanced imaging techniques in postoperative management [35].

Limitations and Future Directions

Smaller healthcare facilities may struggle with the financial and logistical demands associated with the implementation of concurrent urological robotic surgeries. To address these challenges, effective training programs and strategic resource allocation are imperative. Furthermore, continuous technological advancements and robust policy support are crucial for the broader adoption of these surgical techniques. The coordination of multisite surgeries necessitates the intricate integration of various systems and teams, which requires robust real-time communication to mitigate potential errors [36]. Additionally, the training of surgeons presents a significant challenge, as mastering robotic systems necessitates substantial investment in simulation-based programs and ongoing assessment [37]. In summary, the future of concurrent urological robotic surgery hinges on overcoming these multifaceted barriers.

The da Vinci™ system, developed by Intuitive Surgical in Sunnyvale, USA, has been the cornerstone of robotic-assisted laparoscopic surgeries, including radical prostatectomies, nephrectomies, and cystectomies. The success of this technology has catalyzed the development of several new platforms, such as Versius™ (by CMR Surgical in Cambridge, UK), Hugo™ RAS (by Medtronic in Minneapolis, USA), Senhance™ (by Asensus Surgical in Durham, USA), Avatera™ (by Avateramedical GmbH in Jena, Germany), Revo-I™ (by Meere Company Inc. in Yongin, South Korea), and Hinotori™ (by Medicaroid Inc. in Kobe, Japan) which promise to enhance the versatility, cost effectiveness, and accessibility of robotic surgical systems [38,39]. The recently developed single-port robotic surgery systems aim to reduce surgical trauma by operating through a single incision, potentially improving cosmetic outcomes and reducing recovery times and tissue trauma. These systems offer the benefits of minimally invasive surgery while overcoming the limitations associated with traditional multi-port systems, such as increased complexity and longer operative times [38]. The integration of artificial intelligence, machine learning, and augmented reality into robotic systems could enhance precision, reduce errors, and provide real-time assistance to surgeons [39]. Increased competition and technological advancements are expected to drive down costs, making these systems more accessible to a broader range of healthcare providers and patients [38]. Proctoring, whether in person or remotely, positively impacts surgical performance, particularly in intermediate tasks. This approach can significantly enhance training and proficiency, making robotic surgery more accessible globally [40].

6. Conclusions

Concurrent RARP and RAPN for patients with synchronous prostate cancer and small renal tumors is a feasible and safe approach. Our institutional experience and review of the literature

suggest that this combined procedure offers advantages in terms of reduced morbidity and healthcare costs, with acceptable oncological and renal outcomes. Careful patient selection, meticulous surgical techniques, and thorough postoperative monitoring are essential to optimize the outcomes of the procedure.

The future of concurrent urological robotic multisite surgery procedures is promising, with significant advancements in single-port systems, training programs, and the integration of new technologies. These developments are expected to enhance the precision, cost effectiveness, and accessibility of robot-assisted surgery, ultimately improving patient outcomes and expanding the reach of minimally invasive surgical options in urology.

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