

Extraperitoneal robot-assisted laparoscopic radical prostatectomy: Initial experience

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Abstract

Objectives: To report our initial experience and technique of performing robot-assisted laparoscopic radical prostatectomy (RALP) with the extraperitoneal approach.

Materials and Methods: Twenty-seven patients, between September 2010 to January 2012, were included in the study. All patients underwent extraperitoneal robot-assisted radical prostatectomy. Patients were placed supine with only 10-15° Trendelenburg tilt. The extraperitoneal space was developed behind the posterior rectus sheath. A five-port technique was used. After incision of endopelvic fascia and ligation of the deep venous complex, the rest of the procedure proceeded along the lines of the transperitoneal approach.

Results: The mean patient age, prostate size and Gleason score were 67 ± 1.8 years, 45 ± 9.55 g and 6, respectively. The mean prostate-specific antigen (PSA) was 6.50 ng/mL. The mean time required for creating extraperitoneal space, docking of robot and console time were 22, 7 and 94 min, respectively. The mean time to resume full oral feeds was 22 ± 3.45 h. There were no conversions from extraperitoneal to transperitoneal or open surgery in our series. Pathological stage was pT1, pT2a and pT3b in 11 (40.74%), 14 (51.85%) and two (7.4%) patients, respectively. Two patients had positive surgical margins and two had biochemical recurrence at the last follow-up. Our mean follow-up was 12 ± 3.30 (2-17) months. The overall continence rate was 83.33% and 92.4% at 6 and 12 months, respectively.

Conclusions: Extraperitoneal RALP is an efficacious, minimally invasive approach for patients with localized carcinoma of the prostate.

Key Words: Carcinoma prostate, extraperitoneal, prostatectomy, robotics

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INTRODUCTION

Since the time of the first robot-assisted laparoscopic radical prostatectomy (RALP) performed by Binder in 2000, robotic surgery has grown leaps and bounds.^[1-3] The transperitoneal route remains the most accepted approach associated with minimal

perioperative morbidity and good long-term functional and oncological outcomes.^[4-6] There still remain definite concerns arising from violation of the peritoneal cavity and its allied risks. Consequently, a large number of centers, especially in European countries, have switched over to extraperitoneal laparoscopic radical prostatectomy.^[6-8] Robotic surgery was started at our institute in 2006, and we have ever since performed over 200 transperitoneal robot-assisted laparoscopic prostatectomies. The shift to the extraperitoneal approach was necessitated due to readmissions of patients undergoing transperitoneal surgeries mainly pertaining to bowel-related complications (subacute intestinal obstruction). The purpose of this article is to highlight our technique and experience of the extraperitoneal RALP of the first 27 cases performed by a single surgeon.

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MATERIALS AND METHODS

Twenty-seven consecutive patients with localized carcinoma of the prostate were included in the study. All patients underwent RALP by the extraperitoneal approach by a single surgeon (PND). The da Vinci S surgical robotic system was used in all the cases. A detailed database was prospectively maintained for each case. Baseline demographic data like age, body mass index, comorbidities, previous surgery, previous hormonal therapy and sexual health inventory for men (SHIM) score were recorded. Serum prostate-specific antigen (PSA), biopsy Gleason score, TNM staging and prostate size, intraoperative parameters like total operative time, technical or surgical problems during the procedure, blood loss and need for transfusion, details of histopathological assessment like specimen Gleason score, margin positivity, seminal vesicle and lymph node involvement were recorded. Time taken to resume oral feed, drain and catheter removal was also noted along with any postoperative complications.

Operative technique

In the extraperitoneal approach, patients were placed in low lithotomy position with a mild Trendelenburg tilt (10-15°). A 1.5 cm transverse skin incision was given adjacent to the right side of the umbilicus 20 cm from the superior margin of the symphysis pubis [Figure 1a]. The anterior rectus sheath was incised [Figure 1b]. The rectus abdominis muscle was swept laterally and the extraperitoneal space was developed behind the posterior rectus sheath first by blunt finger dissection and later by preperitoneal balloon dissector [Figure 1c]. The space was further developed under direct vision with a laparoscope and with care taken to prevent dropping of the inferior epigastric vessels. After the space was adequately created, two 8-mm robotic ports were placed at a distance of 8 cm from the camera port as in the transperitoneal approach. The right and left hand assistant ports (12 mm and 5 mm, respectively) were placed just above the anterior superior iliac spines on either side; hence, a five-port [Figure 1d] technique was used instead of six ports as in the transperitoneal approach. In this approach, the surgeon lands directly on the target gland (prostate) rather than dissecting and mobilizing the bladder. The endopelvic fascia was incised and the deep venous complex (DVC) was ligated with a 2-0 vicryl suture [Figure 2a and b]. The rest of the procedure proceeded along the lines of the transperitoneal approach. After incising the prostatovesical junction, the prostate was dissected in an antegrade fashion using electrocautery. The posterior layer of the Denonvillier's fascia was incised and the vas deferens and seminal vesicles were resected [Figure 2c]. The prostatic pedicles were clipped with weck clips and the neurovascular bundles were dissected off the prostate bluntly if indicated or desired. The previously ligated DVC was divided and the urethra was transected at the prostatic apex. The specimen was

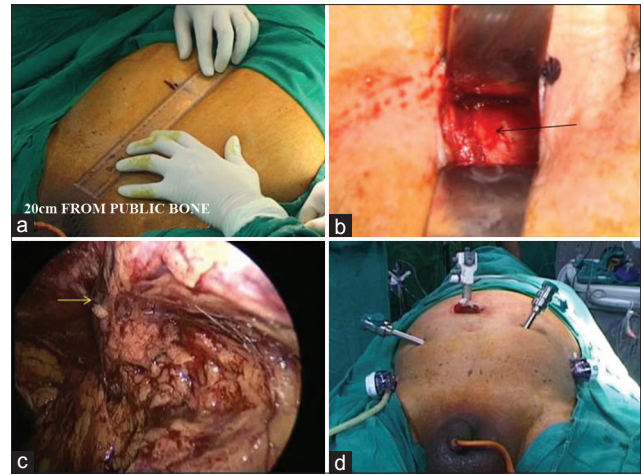


Figure 1: (a) A 1.5 cm transverse skin incision to the right side of the umbilicus, 20 cm from the superior margin of the symphysis pubis. (b) The anterior rectus sheath is incised (arrow). (c) Extraperitoneal space, arrow indicating epigastric blood vessels. (d) External view following placement of the five ports

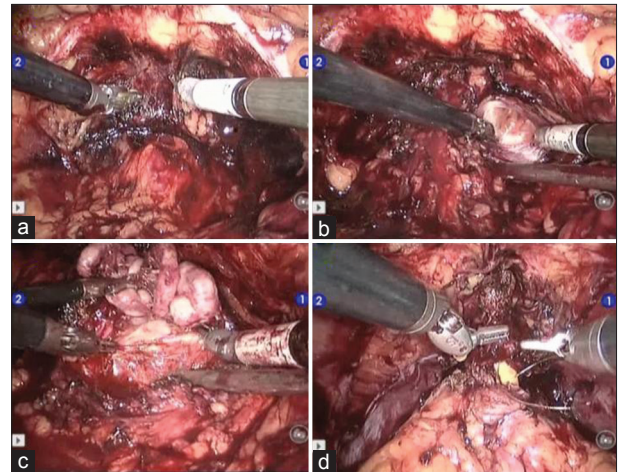


Figure 2: (a) Ligation of the deep venous complex. (b) Incision of endopelvic fascia. (c) Posterior dissection, both seminal vesicles being lifted anteriorly. (d) Vesico-urethral anastomosis over a Foleys catheter

entrapped in an endocatch bag and positioned in the left lateral quadrant to facilitate visualization for the completion of the anastomosis. The vesicourethral anastomosis was performed using 3-0 monocryl in a continuous fashion over a 20 Fr. silicon catheter [Figure 2d]. The specimen was then removed through the 12 mm camera port. A drain was placed in the space of Retzius. All the skin incisions except the camera port site were closed without closing the fascial openings. Lymphadenectomy was performed in two cases having PSA > 10 ng/mL and Gleason score = 7.

Follow-up

The first follow-up visit was at 2 weeks following surgery when the biopsy report was reviewed and decision regarding catheter removal was taken after reviewing the cystogram. The second follow-up visit was at 6 weeks when the PSA report

was evaluated. This was followed by regular 3-monthly visits. At each visit, the serum PSA was recorded and patients were asked about their continence and potency status. Continence was defined as the use of no pads or a maximum of 1 pad per day.^[9] Potency was defined as achieving erections sufficient for intercourse with or without the help of phosphodiesterase inhibitors.^[9] Biochemical recurrence was defined by a PSA of 0.2 ng/mL or higher, which rises on a subsequent occasions.

RESULTS

The mean patient age was 67 ± 1.8 years. The mean prostate size was 45 ± 9.55 g. The mean PSA was 6.50 ng/mL and the mean Gleason score was 6. Clinical stage was T1c in 14 patients, T2a in 11 and T3 in two [Table 1]. The mean time for creation of extraperitoneal space was 22 ± 2.4 min, the mean time for docking of robot was 7 ± 2.2 min and the mean console time was 94 ± 5.86 min, with a total mean operative time (from the first skin incision to the final closure) of 127 ± 11.23 min. There were no conversions from extra to transperitoneal or open conversion in our series. The mean intraoperative blood loss was 210 mL. None of the patients required any blood transfusion [Table 2]. The mean time to drain removal was 1 day. The mean time to passage of flatus was 1 ± 0.85 days and the mean time to resume full oral feeds was 22 ± 3.45 h. The mean pain scores (Visual Analogue Scale) were 2.8 and 2.2 on Day 1 and Day 2, respectively. The mean hospital stay was 2.5 days. None of the patients had any postoperative ileus or readmission due to bowel-related complications [Table 3].

Table 1: Patient profile

Parameters	
Mean age (years)	67±1.8
Mean prostate size (gm)	45±9.55
Mean PSA (ng/mL)	6.50±2.55
Clinical stage	
T1c	14
T2	11
T3	2
Mean biopsy Gleason score	6
Mean preoperative SHIM score	22
Past surgical history	Open cholecystectomy-1, Transurethral resection of prostate-3
Medical comorbidities	Coronary artery disease-3, Diabetes-2, Chronic obstructive airway disease-4

SHIM: Sexual health inventory for men, PSA: Prostate-specific antigen

Table 2: Intraoperative parameters

Parameters	
Mean time for creation of extraperitoneal space (min)	22±2.4
Mean time for docking of robot (min)	7±2.2
Mean console time (min)	94±5.86
Mean total operative time	127±11.23
Mean blood loss	210±18.44
Transfusion	None

Oncological outcomes

The pathological stage was pT1, pT2 and T3b in 11 (40.74%), 14 (51.85%) and two (7.4%) patients, respectively. Two patients had positive surgical margins (PSM) and biochemical recurrence. Both the cases with PSM had T3b disease and were then started on combined radiotherapy and hormonal therapy, and are doing well at the last follow-up.

Functional outcomes

The overall continence rate was 83.33% and 92.4% at 6 and 12 months, respectively. Our mean follow-up is of 12 ± 3.30 (2-17) months. Forty percent of the patients regained continence right after catheter removal [Table 4]. Erectile function was objectively assessed using the SHIM-validated questionnaire in all patients who had at least 6 months of follow-up after surgery. Erectile function was classified as potent (score 22-25), mild erectile dysfunction (16-21), moderate erectile dysfunction (11-15) and impotence (less than 11). Fifty percent of the patients were potent following surgery, and were satisfied with the current level of sexual function [Table 4]. Although the follow-up is short, the results are still encouraging.

DISCUSSION

Robotic surgery has now become firmly ingrained in the armamentarium of urology since its inception. RALP has surpassed the litmus test and is now an established minimally invasive treatment for localized carcinoma prostate achieving trifecta outcomes.^[2,10-12] The challenge of this new procedure has always been to deliver results similar to those of the standard open retropubic approach while decreasing the associated morbidity. The extraperitoneal approach has also been described

Table 3: Perioperative parameters

Parameters	
Mean time to drain removal (days)	1±1.45
Mean time to passage of flatus (days)	1±0.85
Mean time to resume full oral feeds (h)	22±3.45
Mean pain scores (VAS)	
Day 1	2.8±2.10
Day 2	2.2±1.75
Mean hospital stay (days)	2.5
Postoperative ileus/intestinal obstruction	0

VAS: Visual analogue score

Table 4: Functional and oncological outcomes

Parameters	
Mean duration of follow-up (months)	12±3.30
Continence (at 6 and 12 months)	83.33%, 92.4%
Potency	50%
Pathological stage	
pT1	11 (40.74%)
pT2	14 (51.85%)
pT3b	2 (7.4%)
Biochemical recurrence and positive surgical margin	2

with equivalent efficacy to the transperitoneal approach.^[7,13-17] After performing more than 200 transperitoneal RALPs, we switched over to extraperitoneal RALP using a five-port technique. Our operative time of 128 min is comparable to the other reported series performing extraperitoneal RALP.^[15-17] In our series, we did not find any abdominal complications like ileus and obstruction, and the overall morbidity was low and similar to that reported in the literature.^[18] The mean blood loss in our series was 210 mL. Based on this result, we believe that the early control of DVC, precise ligation of vessels and tamponade effect created by pneumoperitoneum contributed to the diminished blood loss.^[7,15,19] Our functional results are heartening and largely as a result of preservation of functional urethral length leading to early return of continence. 83.33% patients were continent at 6 months of follow-up. Forty percent of the patients were potent using a validated questionnaire at the last follow-up, and we believe that potency is likely to improve further. Recovery of erectile function can occur several years after surgery.^[15] Our prior experience with performing the transperitoneal RALP has most probably played a part to an overall low incidence of complications and improved functional and oncological efficacy. Using extraperitoneal RALP, we have been successful in achieving the trifecta goals of cancer removal with the preservation of continence and potency. Extraperitoneal RALP is certainly beneficial for the patient in achieving rapid convalescence as ileus, urine leakage and bleeding is certainly lesser. The peritoneal barrier also seals off any urine leak resulting from inadvertent tear in urethrovesical anastomosis. Whether the extraperitoneal approach offers any advantage is a debatable subject, but the evidence can be corroborated from various groups that were having a large experience with the transperitoneal route have now almost completely changed to the extraperitoneal route.^[7,17,20] The repeatedly cited disadvantages of the extraperitoneal approach, specifically a limited working space and increased tension on the vesicourethral anastomosis, were not found in our experience as well as by others.^[15] Another disadvantage of this technique is difficulty in using the fourth robotic arm because of the limited available space. Hoznek *et al.* have also previously reported shorter operative times and more rapid return to a normal diet using the extraperitoneal approach.^[7] Cathelineau *et al.* performed a large study comparing the two approaches and found no difference.^[20] Our initial experience with the extraperitoneal approach has been gratifying and offers several advantages and eliminates the likelihood of certain complications as injury due to Veress needle. The balloon dilator used for creation of the extraperitoneal space allows rapid access to the target organ (prostate), thereby saving time. The extreme Trendelenburg position required during transperitoneal RALP, to displace the bowel out of the pelvis, is not required with extraperitoneal RALP as the peritoneum serves as a natural retractor. The extraperitoneal

RALP approach requiring only a 10-15 degree Trendelenburg position thus avoids anesthetic stresses during ventilating the patient, which is helpful in patients with chronic obstructive airway disease. Transperitoneal insufflation is more likely to cause diaphragmatic splinting and impair oxygenation, which is detrimental in patients with chronic obstructive airway disease. Thus, our initial clinical experience using this approach has been encouraging.

CONCLUSIONS

Extraperitoneal RALP is an efficacious, minimally invasive approach for patients with localized carcinoma of the prostate.

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