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Robotic simple prostatectomy is a safe and effective technique for benign prostatic hyperplasia: Our single center initial short-term follow-up results for 42 patients

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ABSTRACT

Objective: Benign prostatic hyperplasia is one of the biggest problems of aging men. Prostate surgery is now well defined in the case of failure of medical therapy. Robotic simple prostatectomy is a minimally invasive surgical method with an alternative to open simple prostatectomy in large prostate volumes. We present our simple prostatectomy technique with robot, perioperative, and short-term functional result in our clinic.

Material and methods: Between January 2017 and January 2021, 42 patients underwent simple robotic prostatectomy were retrospectively evaluated. Preoperative, perioperative, and post-operative clinical data were analyzed. Post-operative continence status, voiding, and erectile functions were evaluated using uroflowmetry and international prostate symptom score (IPSS) at sixth week and third month.

Results: The mean age of the patients was 71 (66–78) years. No major complications were observed in any of the patients. Urethral catheters were removed on the fourth post-operative day. Except for one case, all of the cases urinated spontaneously after the catheter was removed. One case could not urinate spontaneously, and urethral catheter was placed again. Three days later, the urethral catheter was removed, and patient urinated spontaneously. None of the patients reported stress urinary incontinence or erectile dysfunction. The mean operative time was 112 minutes, the mean hospital stay was 1.6 days, the mean post-operative IPSS was 6, and the mean post-operative Q max was 24.4 mL s^{-1}.

Conclusion: Robotic simple prostatectomy may be an effective and safe alternative minimally invasive technique in the treatment of large-volume benign prostatic hyperplasia.

Keywords: Laparoscopy; prostate; prostatectomy; prostatic hyperplasia

Introduction

Benign prostatic hyperplasia (BPH) is one of the conditions that negatively affect the quality of life in the aging man of the world. An estimated 1.1 billion man suffer from BPH-associated lower urinary tract symptoms (LUTSs).[1] Although open simple prostatectomy (OSP) is recommended as the gold standard surgical method for BPH over 80cc in the European Association of Urology (EAU) guideline,[2] developments in minimally invasive urology have begun to change surgical approaches in large prostate volumes. Minimally invasive techniques such as robot-assisted simple prostatectomy (RASP), holmium laser enucleation of the prostate (HoLEP), thulium laser enucleation of the prostate, bipolar enucleation of the prostate are presented as an alternative to OSP. Although these techniques are defined as effective and safe treatments with low complication rates, operation times and dependence on technological equipment are seen as disadvantages.[3] In 2008, Sotelo described the first RASP after Mariano, who described laparoscopic prostatectomy in 2002.[4,5] With the development of robotic surgery over the years, cases and results of robotic surgery are improving.

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We present our simple prostatectomy technique with robot, perioperative, and short-term functional result in our clinic.

Material and Methods

After the local ethical review board's approval from Koru Ankara Hospital (approval number: 2, date: March 17, 2021), we retrospectively reviewed our BPH patient files with a prostate volume greater than 80cc between January 2017 and January 2021. Forty-two patients were found to have undergone RASP, and these patients were included in this descriptive retrospective study.

All patients underwent preoperative clinical evaluation including detailed history, physical examination, international prostate symptom score (IPSS), prostate specific antigen (PSA), urine analysis, ultrasonography for prostate volume measurement and evaluation of urinary system, uroflowmetry, and residual urine volume measurement. In some patients, if necessary, an evaluation was made with multiparametric prostate magnetic resonance imaging. All patients were re-evaluated after surgery. Post-operative continence status, voiding, and erectile functions were evaluated by uroflowmetry and IPSS at sixth week and third month. Perioperative and post-operative complications were recorded according to the modified Clavien-Dindo System.[6,7]

All procedures were performed by three surgeons using the Da Vinci Si surgical system (Intuitive Surgical, Sunnyvale, CA, USA) via transperitoneal approach. The patients were placed in the 30° lithotomy position after general anesthesia. Similar to radical prostatectomy, a surgical four-arm configuration was performed. A Veress needle was inserted 2 cm cranial to the midline of the umbilicus. Pneumoperitoneum was created with carbon dioxide insufflation. A 12 mm camera port was placed supraumbilically (first port [A: camera port]). Three 8 mm robotic trocars were used. Two 8 mm ports (B [patient's right side] and C [patient's left side]) for the robot instruments are placed at 8 cm laterocaudal to the camera port. An 8 mm port for the fourth arm is placed at 8 cm laterocaudal to the port on the right side in a direction toward the anterior superior iliac spine (ASIS). A 11 mm port (E) is placed for an assistant instrument at 8 cm laterocaudal to the C port in a direction toward the ASIS. Four robotic instruments were used: monopolar curved scissors, Maryland forceps, ProGrasp forceps, and large needle driver (Intuitive Surgical, Sunnyvale, CA, USA).

Main Points

- The robotic simple prostatectomy is a safe and effective surgical technique.
- This surgery is not performed through the urethral route; the rates of urethral stricture are quite low.
- Early and late incontinence rates are very low compared to other surgical techniques.
- Compared to open transvesical prostatectomy surgery, it provides less pain, less bleeding, less hospital stays, and a shorter return to normal life.

Bladder was filled with 100 mL of saline via Foley urethral catheter. A midline sagittal incision was made to the bladder to reach the prostate. Polyglactin stay suture used to evert the bladder edges to improve visualization (Figure 1a). Bilateral ureteral orifices were identified, and incision was made at edge of prostate circumference and bladder neck (Figure 1b). After the correct plan was found between the adenoma and the prostate capsule, the dissection was extended to the prostate apex sharply and bluntly. After reaching to the apex and external sphincter, we made an anterior commissurotomy. Prostate adenoma was collected in specimen retrieval bag (Endo Catch; Medtronic) and placed in abdominal space (Figure 1c).

For the hemostasis, bleeding vessels were coagulated using bipolar energy, and prostatic cavity was sutured with 3-0 polyglactin suture if necessary. Prostatic cavity re-trigonized by bladder neck mucosa as far distally to the prostate apex to used running suture (Figure 1d). A 22F Foley three-way urethral catheter was placed, and the bladder was repaired with a 3.0 barbed suture (V-Loc; Medtronic). An intraperitoneal drain was placed and removed on the second post-operative day. Urethral catheter was removed on the fourth post-operative day.

Statistical Analysis

Statistical analysis was done using Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM SPSS Corp.; Armonk, NY, USA). Descriptive statistics of noncontinuous samples were expressed with numbers and percentiles. Shapiro–Wilk, Kurtosis, and Skewness tests were used to assess the continuous variables' normalization. After this procedure, descriptive statistics of continuous variables without normal distribution were expressed as median (minimum–maximum), and descriptive statistics of continuous variables with normal distribution were expressed as mean ± standard deviation (minimum–maximum). The Paired Sample T test was used to compare the pre- and post-procedure-dependent scale parameters with normal distribution. The Wilcoxon test was used to compare the pre- and post-procedure-dependent

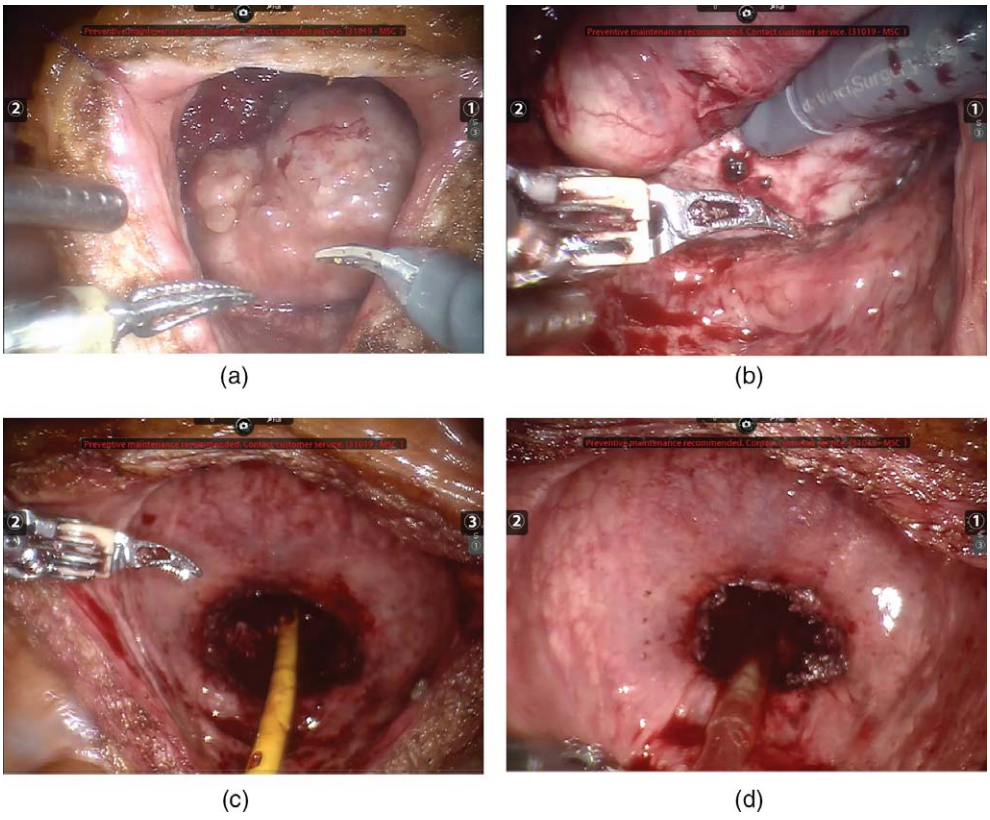

Figure 1. a-d. A midline sagittal incision was made to the bladder to reach the prostate. Polyglactin stay suture used to evert the bladder edges to improve visualization (a). Incision was made at the edge of prostate circumference and bladder neck (b). Prostate adenoma was collected in specimen retrieval bag and placed in abdominal space (c). Prostatic cavity re-trigonized by bladder neck mucosa as far distally to the prostate apex to used running suture (d)

scale parameters without normal distribution. Probability of $P < .05$ was accepted as statistically significant.

Results

The mean age of the patients was 71 (66–78) years. The mean operative time was 112 minutes (87-161). Concomitant bladder stones were removed from the bladder during surgery in six of 42 patients. Table 1 summarizes our patient characteristics and preoperative results.

No major complications were observed in any of the patients. The mean hospital stay was 1.6 days (1-3). Except for one case, all of the cases urinated spontaneously after the catheter was removed. One case could not urinate spontaneously, and urethral catheter was placed again. Three days later, the urethral catheter was removed, and the patient urinated spontaneously. One patient required blood transfusion due to post-operative bleeding. Nonresistant fever, which started on the third post-operative day, was observed in three of 42 patients and was controlled with appropriate antibiotic therapy. These three patients had a history of prostate needle biopsy 10 days before the surgery. Pathology of 42 patients was reported as benign prostate tissue.

The mean post-operative third month IPSS was 5 (2-7), and the mean post-operative third month Q max was 24.4 mL/s^{-1} (21-26.5 mL/s^{-1}). Table 2 summarizes the preoperative and post-operative outcomes. Comparing the preoperative parameters and post-operative third month parameters, there were significant improvements in median IPSS, mean Q max, mean voided volume, and mean post-voided residual urine ($P =$ .001, .012, .026, .041, respectively) (Tables 1 and 2).

Discussion

Current EAU guideline reported that OSP for large prostates is a gold standard surgical procedure. In addition, minimally invasive methods such as prostate enucleation for prostate size >80 mL are also included in the guideline.[2] Improvements in

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Table 1. Patient Demographics and Preoperative Parameters

Parameter	Value
Mean age (year)	71 ± 4.1 (66-78)
Mean prostate volume (mL)	128 ± 25 (90-340)
Median PSA value (ng mL^{-1})	7.6 (1.2-35.8)
Median IPSS	26 (21-28)
Mean Q max (mL s^{-1})*	6.17 ± 2.13 (4.1-9)
Mean voided volume (mL)	155 ± 40 (110-320)
Mean post-voided residual urine volume (mL)	84 ± 44 (20-130)
Concomitant bladder stones	6
Indwelling urethral or suprapubic catheter before surgery	4

IPSS: International Prostate Symptom Score.
*Q max: maximum flow rate.

LUTS symptoms, IPSS, and uroflowmetry parameters after OSP are well known.[8] Although OSP is the gold standard surgical treatment, it has serious complications such as blood loss requiring blood transfusion, reoperation, prolonged hospital stay, and post-operative pain.

RASP is an alternative to OSP. In our study, we report initial experience with RASP in the treatment of large prostatic adenoma. When we review the literature on RASP, it is seen that the method is safe and effective.[9,10] In the literature, blood losses in OSP are significantly higher than in RASP.[11,12] The average blood loss in these studies is reported to be between 500 and 1,000 mL. For RASP, this value is reported to be between 100 and 300 mL.[11–13] In our study, the mean blood loss was 210 mL, and it is in accordance with literature. The hospital stay is between 2.7 and 10 days for OSP and 1 and 5 days for RASP.[14] Our mean hospital stay was 1.6 days.

Other studies have reported operative time of 78-345 minutes for RASP and 60-120 minutes for OSP.[14] Our mean operation time was 112 minutes, similar to the literature. The length of the operation time is seen as a disadvantage for RASP. However, we think that the increase in the experience of the surgical team in robotic surgery will reduce the operation time.

Romero-Otero et al.[15] published their 10-year results of HoLEP surgery for BPH. In their study, they reported that the HoLEP had to be converted to 3.4% Transurethral resection of the prostate (TURP) and 0.3% OSP. It is known that the conversion from HoLEP surgery to TURP surgery is more frequent, and a long learning curve is needed in the HoLEP surgery. In their study, these conversions were reported due to mechanical device malfunction, bladder perforation, prostate capsule perforation, and incomplete procedure. In clinics performing robotic surgery, the rate of completion of surgery with

Table 2. Peroperative and Post-operative Parameters

Parameter	Value
Mean operative time (minutes)	112 ± 25 (87-161)
Median blood loss (mL)	210 (103-300)
Mean hospitalization time (day)	1.6 ± 0.7 (1-3)
Median IPSS at 3 month	5 (2-7)
Mean Q max* post-operative at 6 weak (mL s^{-1})	19.3 ± 2.92 (17-25)
Mean Q max* post-operative at 3 month (mL s^{-1})	24.4 ± 7.3 (21-26.5)
Mean voided volume (mL) at 3 month	263 ± 65 (150-350)
Mean post-voided residual urine volume at 3 month (mL)	28 ± 11 (15-53)

IPSS: International Prostate Symptom Score.
*Q max: maximum flow rate.

RASP is considerably higher than HoLEP surgery due to the short learning curve for OSP. In all of our patients, the operation was completed with RASP without any problems.

It is reported that 5-7% blood transfusion is required during the HoLEP.[15] In our study, the need for transfusion was required only in one patient (3.1%). This patient was our third case. As the number of cases increased, so did our experience in bleeding control, and we did not experience any serious bleeding afterward. We think that the need for transfusion is lower with RASP than with OSP and HoLEP, since enucleation is performed under direct vision in large prostate volumes, and bleeding can be controlled immediately with suturing or cauterization if necessary.

It is reported in the literature that transient or total urinary incontinence cases after HoLEP are between 7 and 14%.[15,16] Romero-Otero et al.[15] reported that post-operative transient and total urinary incontinence rates were 12.8% at third month, 7.1% at sixth month, and 2.3% at 11th month. In accordance with the literature, urinary incontinence was not observed in any of our cases following urethral catheter removal. In addition, the rate of urethral stricture seen at a rate of 4-7% after HoLEP. It was not observed in any case, since no procedure was performed through the urethral canal in RASP.[15,16] Compared to RASP with HoLEP, it seems to be a more advantageous surgery in terms of the risk of developing urethral stricture and urinary incontinence in the post-operative period. In addition, the RASP learning curve is considerably shorter than HoLEP. However, RASP is seen as a disadvantage in terms of cost and accessibility.

The main limitation of our study is its retrospective nature and the relatively small sample size. However, our sample size is not small compared to the literature. Considering the number of robotic simple prostatectomy operations performed in our country, we can say that our study has a very high number.

In conclusion, we believe that robotic simple prostatectomy is an effective and reliable technique in the treatment of especially large volume BPH.

Ethics Committee Approval: Ethics committee approval was received from Koru Ankara Hospital (approval number: 2, date: March 17, 2021).

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Conflict of Interest: The authors have no conflicts of interest to declare.

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