

Robot-assisted laparoscopic radical prostatectomy: A single center initial experience

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Abstract

Aim: The aim of this study is to present the surgical, oncologic and functional results of the first 34 robotic radical prostatectomy (RARP) procedures performed in our clinic.

Material and Methods: Data of 34 patients who underwent RARP between July 2017 and October 2019 were evaluated.

Results: The mean patient age was 58.73±4.94 years, and the mean preoperative serum prostate-specific antigen level was 8.9±2.07 ng/mL. Bilateral neurovascular bundle (NVB) sparing, unilateral NVB-sparing, and non-NVB-sparing surgery were performed in 7.5, and 22 cases, respectively. The mean prostate weight was 58.73±26.03g. Anterior reconstruction suture was performed in 22 (64.7%) cases. Mean console time, intraoperative blood loss, duration of hospital stay, and urethral catheter removal time were 195.2±14.03min, 120.3±21.2cc, 7.34±1.62 days, and 7.26±1.26 days, respectively. Biochemical recurrence was observed in two patients, one of whom received maximal androgen blockage (MAB), and the other one received pelvic radiotherapy+MAB. All the patients with at least one-year follow-up were fully continent (0 pads/day). Of the 16 (47%) patients with no preoperative erectile dysfunction (ED) and with at least three-month follow-up, 9 (62.5%) had no ED, with or without any additional medication including phosphodiesterase-5 (PDE5) inhibitors.

Conclusion: RARP is a safe minimally invasive procedure with acceptable morbidity, excellent operative, pathological and oncological outcomes, and satisfactory functional results.

Keywords: Robot assisted radical prostatectomy; prostat ca; D'amico

INTRODUCTION

Prostate cancer (PCa) is the most common cancer among men in the United States (USA) after the non-cutaneous tumors and is the second most common cancer type in Turkey (1,2). The increasing use of prostate-specific antigen (PSA) has led to an increase in the incidence of localized prostate cancer (LPCa) (3). In parallel with the increasing incidence of LPCa, an increase has been observed in the number of radical prostatectomy applications performed as the treatment protocol (4). Radical prostatectomy (RP) is the gold standard for LPCa cases with an average life expectancy of more than 10 years (5,6). This method can be applied as open, laparoscopic or robot-assisted depending on the technical equipment and experience of the clinics. Robot-assisted laparoscopic prostatectomy (RALP) is a good

alternative since it is less invasive than open surgery and provides similar oncologic outcomes (7). At the present time, most of the surgical procedures for LPCa in the USA are performed using the RALP method (8). When RALP outcomes are evaluated, it has been found to have advantages such as less catheterization and hospital stay, and less intraoperative bleeding compared to open RP (ORP) and it has been further observed to provide oncological and functional results similar to ORP (9).

The aim of this study was to present the oncological and functional results of transperitoneal RALP procedures performed in our clinic in the light of literature.

MATERIAL and METHODS

Approval was obtained from the Ethics Committee of Atatürk University Faculty of Medicine with the number

Received: 22.11.2019 Accepted: 17.12.2019 Available online: 23.12.2019

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B.30.2.ATA.0.01.00/546 before the study. Patients who underwent robot-assisted radical prostatectomy (RARP) for LPCa between July 2017 and October 2019 were reviewed retrospectively. Patients 40-75 years old who had a diagnosis of LPCa in our clinic and had undergone RARP and did not interfere with follow-up and had not previously received hormone and / or radiotherapy were included in the study. Patients with advanced prostate cancer, who needed lymph node excision and did not come to follow-up were excluded from the study. The diagnosis of PCa was made through the transrectal ultrasound-guided 12 quadrants Tru-cut biopsy for patients with an elevated PSA level and those with suspicious signs on digital rectal examination. The robot-assisted surgical procedure was performed through the anterior transperitoneal approach using the Four-Arm da Vinci Xi robotic system.

Age, body mass index (BMI), preoperative total PSA value, Gleason score, clinical and surgical staging, duration of surgery, estimated intraoperative blood loss, duration of the transurethral catheterization and drainage, and length of hospital stay data of all patients were recorded. Modified Clavien classification system was used for the classification of complications (10).

D'Amico Risk Classification was used to estimate the risk before the operation (11). Partin Nomogram was used to determine the necessity of lymph node dissection for patients who were in the high-risk group according to the D'Amico classification. All patients were first called for follow-up control in the first month and they were followed every three months during the following period. Patients were evaluated for continence status, erectile function and PSA levels during these follow-up periods. During the follow-ups, biochemical recurrence was accepted as two consecutive PSA values higher than 0.2 ng/mL (12).

Urethral catheters were removed since cystography taken in the first postoperative week showed no leakage. Urethral catheters were removed when no leakage was observed in cystography taken at the first, 21st day or first month postoperatively in patients with leakage. Postoperative continence status was determined according to the number of pads used daily by the patient.

International Index of Erectile Function 5 (IIEF-5) questionnaire was used to evaluate the erectile capacity of patients in the preoperative period. Scores of 22 and above were accepted as normal. The questionnaire was repeated in the sixth and 12th postoperative months. All patients were started on phosphodiesterase type 5 (PDE5) inhibitor postoperatively.

Statistical Method

Data analysis was performed with the IBM Statistical Package for the Social Science (IBM SPSS Statistics Corp.; Armonk, NY, USA) version 20 for Windows software. Categorical variables were expressed as number and percentage, and numerical variables as mean plus standard deviation.

RESULTS

The preoperative data of 34 patients are presented in Table 1. The mean age of the patients included in the

Table 1. Preoperative patient characteristics

All patients (n=34)	
Age (years)	58.73±4.94
BMI (kg/m ²)	25.31±2.16
Serum PSA (ng/mL)	8.9±2.07
Prostate volume (cc)	58.73±26.03
Biopsy Gleason score, n (%)	
3+3	23 (88.2%)
3+4	7 (7.5%)
4+3	4 (4.3%)
Preoperative IIEF score	
No ED (22-25): n (%)	16 (47.05%)
Mild ED (17-21): n (%)	8 (23.5%)
Mild-to-moderate ED (12-16): n (%)	5 (14.7%)
Moderate ED (8-11): n (%)	3 (8.8%)
Severe ED (5-7): n (%)	2 (8.7%)
Mean follow-up time (month)	15.4±3.02

PSA: prostate-specific antigen; BMI: body mass index; ED: erectile dysfunction; IIEF: International Index of Erectile

Table 2. Perioperative and postoperative patient characteristics

All patients (n=34)	
Mean operative (console) time (min)	195.2±14.03
Mean blood loss (cc)	120.3±21.2
NVD-protective technique, n (%)	
Not applied	22 (64.7)
Unilateral	5 (14.7)
Bilateral	7 (20.5)
Bladder neck reconstruction, n (%)	8 (23.5)
Anterior reconstruction suture, n (%)	22 (64.7)
Mean length of hospital stay (days)	7.34±1.62
Mean time to removal of urinary catheter (days)	7.26±1.26
Pathological Gleason scores, n (%)	
3+3	27 (79.4)
3+4	4 (11.7)
4+3	3 (8.8)
Positive surgical margin, n (%)	
Total	4 (8.8%)
Pathological T stage, n (%)	
pT2a	25 (73.5%)
pT2b	5 (14.7%)
pT2c	4 (11.7%)
Biochemical recurrence, n (%)	2 (5.8%)
Adjuvant ADT, n (%)	1 (2.9%)
Adjuvant ADT + radiotherapy, n (%)	1 (2.9%)

NVB: neurovascular bundle; ADT: androgen deprivation therapy

study was 58.73 ± 4.94 (52–70) years and BMI was 25.31 ± 2.16 (21–29) kg/m^2 . The mean operation time was 195.2 ± 14.03 (180–230) min and the mean estimated blood loss was calculated as 120.3 ± 21.2 (80–150) ccs. The mean follow-up period was 15.4 ± 3.02 months.

Table 2 shows the perioperative and postoperative data of the patients. The mean length of hospital stay was 7.34 ± 1.62 (4–9) days and urethral catheter removal time was 7.26 ± 1.26 (5–11) days. Surgical margin positivity was detected in four patients (8.8%) and additional treatment adjuvant, Diprivan, radiotherapy) was applied for two (5.8%) of them due to the detection of biochemical recurrence.

Table 3. Postoperative functional outcomes

All patients (n=34)	
Urinary continence, n (%)	34 (100.0)
Early continence (from catheter removal), n (%)	12 (35.2%)
First month n (%)	24 (70.5)
Third month, n (%)	26 (76.4%)
Sixth month, n (%)	29 (85.2%)
12th month, n (%)	33 (97%)
Potency (IIEF \geq 22), n (%) (Preoperative potency includes normal patients)	16 (100%)
6 months, n (%)	6 (37.5%)
12 months, n (%)	9 (62.5%)

IIEF: International Index of Erectile

Table 4. Perioperative and postoperative complications

	All patients (n=34)
Perioperative complications (0–30 days) (Clavien–Dindo classification), n (%)	6 (17.6)
Grade 1	3 (8.8)
Grade 2	0 (0.0)
Grade 3a	0 (0.0)
Grade 3b	3 (8.8)
Grade 4	0 (0.0)
Grade 5	0 (0.0)
Postoperative complications (30–90 days), n (%)	0 (0.0)

Nerve-sparing surgery was performed in 12 (35.3%) patients. The erectile function and urinary continence status of the patients are shown in Table 3. Continence was achieved in almost all patients in the 12th postoperative month (97%). However, nine (62.5%) of 16 patients with normal erection capacity (IIEF-5 $>$ 22) returned to the preoperative state after 12 months.

Complications in the early postoperative period are given in Table 4. Complications developed in six patients (17.6%).

Transfusion was not required for any of the patients. None of the patients had long-term complications.

DISCUSSION

Minimally invasive techniques are good alternatives to open surgery since the incisional morbidity and intraoperative bleeding rates are low, there is less transfusion requirement, and recovery time is shorter (12). Studies comparing RARP with ORP also support the use of RARP (13).

The estimated intraoperative blood loss is less in the RARP procedure which is a minimally invasive procedure compared to ORP. Factors that are effective in this regard have been identified as increased intra-abdominal pressure, 3-dimensional enlarged visual field, and effective use of robotic instruments to prevent bleeding (14). In their first 30-patient RAP series, Menon et al. (15) calculated the mean blood loss as 329 ccs whereas it was found to be 225 ccs in the 200-case series by Hashimoto et al. (16). In the present study, mean blood loss was found to be 120 ccs and transfusion was not required in any of the patients. Estimated blood loss was found to be compatible with the literature.

In a study comparing the RP techniques in terms of the operation time, duration was found to be longer in RALP than in ORP, but shorter than in the laparoscopic approach (17). In a multicenter study of 1,499 cases conducted by Taşçı et al. (18) in Turkey, the mean operation time has been reported to be 181.9 minutes. In the present study, the mean operation time was 195.2 min, which was compatible with the literature.

Erectile function and urinary continence are important parameters evaluated during the follow-up period after RARP. Fraota et al. (19) reported a continence rate of 95% in a meta-analysis involving 416 patients. In their 300-case series, Zorn et al. (20) reported the continence rates as 23%, 68%, and 90% in the first, sixth and 12th months, respectively. In the present study, continence rates were found to be 35.2% in the first month and 85.2% in the sixth month. These rates are comparable with the literature.

Preservation of erectile functions after RP is known to be associated with the protection of the neurovascular bundle (NVB) (21). Zorn et al. (20) and Tewari et al. (22) %97 reported the potency rates after RARP as 80% and 97%, respectively. In a study comparing retropubic RP and RARP, erectile functions were found to recover earlier after RARP (23). In our study, 37.5% and 62.5% of patients with the IIEF-5 score of greater than 22 had sufficient erectile capacity for sexual intercourse in the third and sixth months, respectively.

The main purpose of all treatment modalities for PCa is to provide cancer-free survival. The data that will show the true success of the RARP method are long-term oncologic outcomes (3). Biochemical recurrence-free survival is the final outcome that shows the effectiveness of the method. Positive surgical margin (PSM) is predictive of PSA

recurrence. In the study by Menon et al. (24), PSM positivity was reported to be 9% whereas it was reported to be 14.9% in the series published by Taşçı et al. (18). In the present study, the PSM rate was found to be 8.8%. Two (5.8%) of the patients with PSM were included in the additional treatment program due to biochemical recurrence. Late biochemical recurrence was observed in both patients (13.5 months). Ga-68 PSMA / PET was requested from the patients. Maximum androgen blockage (mab) was started in 1 patient with distant organ metastasis, mab and radiotherapy was started in the patient with distant metastasis and local recurrence.

In our study, ileus (Clavien-Dindo 1) recovered with medical treatment postoperatively in 3 patients and bleeding at the port entrance was observed in 3 patients (Clavien-Dindo 3b). The bleeding site was treated under anesthesia.

In our study, the length of hospital stay was longer than in the literature (14,18). We believe that the most important factor in this is the longer follow-up of the learning curve, especially at the beginning of cases against possible complications.

This study has some limitations. First of all, it was planned as a retrospective study and performed on a small and selected study group.

CONCLUSION

Robot-assisted laparoscopic prostatectomy is a safe and effective minimally invasive approach as it has acceptable morbidity rates and provides excellent oncological and pathological results, as well as satisfactory functional results. Better oncological and functional results will be achieved with the increasing surgical experience.

Competing interests: The authors found that the conflict of interest did not fully coincide.

Financial Disclosure: There are no financial supports.

Ethical approval: Approval was obtained from the Ethics Committee of Atatürk University Faculty of Medicine with the number B.30.2.ATA.0.01.00/546 before the study.

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REFERENCES

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2017. *CA Cancer J Clin* 2017;67.
2. Sağlık İstatistik Yıllığı 2016 Web site <http://www.saglik.gov.tr>.
3. Çimen Hİ, Direk HC, Halis F., ve ark. Sakarya Üniversitesi'nde Robot Yardımlı Laparoskopik Radikal Prostatektomi: Başlangıç Deneyimlerimiz. *Sakarya Tıp Dergisi* 2017;8:134-40.
4. Schröder FH, Carter HB, Wolters T, et al. Early detection of prostate cancer in 2007. Part 1: PSA and PSA kinetics. *Eur Urol* 2008;53:468-77.
5. Walsh PC. Anatomic Radical Retropubic Prostatectomy; in Walsh PC, Retik AB, Vaughan ED, Wein AJ (Eds.): *Campbell's Urology 7th Edition*, 1998;2565-88.
6. Bianco FJ Jr, Scardino PT, Eastham JA. Radical prostatectomy: longterm cancer control and recovery of sexual and urinary function ("trifecta"). *Urology* 2005;66:83-94.
7. Binder J, Brautigam R, Jonas D, et al. Robotic surgery in urology: fact or fantasy *BJU international* 2004;94:1183-87.
8. HU, Jim C, et al. Comparative effectiveness of minimally invasive vs open radical prostatectomy. *JAMA*, 2009;14:1557-64.
9. Novara G, Ficarra V, Rosen RC, et al. Systematic review and meta-analysis of perioperative outcomes and complications after robot assisted radical prostatectomy. *Eur Urol* 2012;62:431-52.
10. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg* 2004;240:205-13.
11. D'Amico AV, Whittington R, Malkowicz SB, et al. Biochemical outcome after radical prostatectomy, external beam radiation therapy, or interstitial radiation therapy for clinically localized prostate cancer. *JAMA* 1998;280:969-74.
12. Fracalanza S, Ficarra V, Cavalleri S, et al. Is robotically assisted laparoscopic radical prostatectomy less invasive than retropubic radical prostatectomy? Results from a prospective, unrandomized, comparative study. *BJU Int* 2008;101:1145-9.
13. Berryhill R Jr, Jhaveri J, Yadav R, et al. Robotic prostatectomy: a review of outcomes compared with laparoscopic and open approaches. *Urology* 2008;72:15-23.
14. Patel VR, Thaly R, Shah K. Robotic radical prostatectomy: outcomes of 500 cases. *BJU Int* 2007;99:1109-12.
15. Menon M, Tewari A, Baize B, et al. Prospective comparison of radical retropubic prostatectomy and robot-assisted anatomic prostatectomy: the Vattiku Urology Institute experience. *Urology* 2002;60:864-8.
16. Hashimoto T, Yoshioka K, Gondo T, et al. Learning curve and perioperative outcomes of robot-assisted radical prostatectomy in 200 initial Japanese cases by a single surgeon. *J Endourol* 2013;27:1218-23.
17. Ficarra V, Novara G, Artibani W, et al. Retropubic, laparoscopic and robot-assisted radical prostatectomy: a systematic review and cumulative analysis of comparative studies. *Eur Urol* 2009;55:1037-63.
18. Tasci AI, Tufek I, Gumus E, et al. Oncologic results, functional outcomes, and complication rates of robotic-assisted radical prostatectomy: multicenter experience in Turkey including 1,499 patients. *World J Urol* 2015;33:1095-102.

19. Frota R, Turna B, Barros R, et al. Comparison of radical pros-tatectomy techniques: open, laparoscopic and robotic assisted. *Int Braz J Urol* 2008;34:259-69.
20. Zorn KC, Gofrit ON, Orvieto MA, et al. Robotic- assisted laparoscopic prostatectomy: functional and pathologic outcomes with interfascial nerve preservation. *Eur Urol* 2007;51:755-63.
21. Walsh PC, Donker PJ. Impotence following radical prostatectomy: in- sight into etiology and prevention. *J Urol* 1982;128:492-7.
22. Tewari AK, Bigelow K, Rao S, Tet al. Anatomic restoration technique of continence mechanism and preservation of puboprostatic collar: a novel modification to achieve early urinary continence in men undergoing robotic prostatectomy. *Urology* 2007;69:726-31.
23. Mikhail AA, Orvieto MA, Billatos ES, et al. Robotic- assisted laparoscopic prostatectomy: rst 100 patients with one year of follow-up. *Urology* 2006;68:1275-9.
24. Menon M, Tewari A, Peabody J, et al. Vattikuti Institute prostatectomy, a technique of robotic radical prostatectomy for management of localized carcinoma of the prostate: experience of over 1100 cases. *Urol Clin North Am* 2004;31:701-7.