

Effect of Reconstructive Techniques on Continence in Robot-Assisted Laparoscopic Prostatectomy: Novel Combination of Long Urethral Stump and Anterior Suspension Suture

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ABSTRACT

Objective: To investigate the effects of the novel combination of a long urethral stump and anterior suspension suture in patients who underwent Robot-Assisted Laparoscopic Prostatectomy (RALP) for localized prostate cancer

Materials and Methods: Of the 40 participating patients, 20 did not undergo any reconstructive technique, whereas the remaining 20 patients underwent reconstructive technique that included the combination of long urethral stump and anterior suspension suture. Body mass index (BMI) (kg/m²), age, preoperative prostate-specific antigen (PSA) levels, prostate volume, Gleason score, D'Amico risk class, clinical stage, operation type and the application of either perioperative or postoperative reconstructive techniques, and the duration of catheterization were the parameters investigated. Continence rate was measured in the 3rd, 6th, and 12th month after the removal of the catheter. Both techniques were compared statistically.

Results: The control and reconstructive groups each comprised 20 patients. Between the groups, no statistically significant differences were observed in age, BMI, American Society of Anesthesiologists class, risk group, prostate weight, perioperative PSA, duration of surgery, duration of hospitalization, surgical margins, and the total amount of bleeding (p>0.05). Continence rate was significantly higher in the reconstructive group in the 3rd and 6th months compared with the control group (p<0.05).

Conclusion: The combination of anterior suspension suture and long urethral stump contributed to early improvement in the continence rates.

Keywords: Anterior suspension suture, continence, long urethral stump, robot-assisted laparoscopic prostatectomy, reconstructive techniques

Introduction

Radical prostatectomy is the main therapeutic technique for localized prostate cancer (LPCa) in patients who have a life expectancy of over 10 years [1, 2]. The primary goal of this intervention, along with controlling the disease, is to maintain quality of life by preserving both erectile function and continence rate, defined by Salomon et al. [3] as the trifecta. Following radical prostatectomy, several patients complain of urinary incontinence and sexual function disorders regardless of the whether the cancer is under control. Despite advancements in surgical techniques, continence was conserved for only 60%-95% of patients undergoing either open radical prostatectomy (ORP) or laparoscopic radical prostatectomy (LRP) procedures [4-6].

Robot-assisted laparoscopic prostatectomy (RALP) was first described by Menon et al. [7]. The robotic arms of the technology along with the utilization of optic magnification, 3D visualization, and seven degrees of mobility enable the preservation of anatomic regions related to continence and erectile functions and decrease the rate of perioperative complications. A recently introduced reconstructive technique in RALP reported significant improvements in continence rates [8].

In this study, the effects of the novel combination of a long urethral stump and anterior suspension suture were investigated for the first time in patients who underwent RALP for LPCa.

Materials and Methods

This retrospective study was approved by the local ethics committee. Data from patients who underwent RALP for LPCa in the Department of Urology of Erzurum Regional Training and Research Hospital between July 2017 and July 2018 were investigated retrospectively. Of the 40 participating patients, 20 did not undergo any reconstructive techniques (control group), whereas the remaining 20 patients underwent reconstructive technique that included the combination of long urethral stump and anterior suspension suture. Due to the retrospective design, patient consent could not be obtained. Patients were considered continent if they did not use a pad or used only a safety pad as a precautionary measure over a 24-h period. Patients with preoperative bladder dysfunction or complaints of incontinence prior to surgery were excluded from the study. Body mass index (BMI) (kg/m^2); age; preoperative prostate-specific antigen (PSA) level; prostate volume; Gleason score; D'Amico risk class; clinical stage; operation type and the application of either perioperative or postoperative reconstructive techniques; duration of the catheterization; and continence rate in the 3rd, 6th, and 12th month after the removal of catheter were the parameters investigated. The control and reconstructive groups were statistically compared across all measurements.

Statistical Analysis

Statistical data were analyzed using The Statistical Package for the Social Sciences (SPSS) v20.0 software (IBM Corp., Armonk, NY, USA). The Kolmogorov–Smirnov test was used to evaluate data distribution. Categorical data was compared using the Pearson's Chi-square test. The Mann–Whitney *U* test was used to detect differences between the groups, at a significance level of 5% for normally distributed continuous variables. Descriptive statistics are presented as mean \pm SD.

Surgical Technique

All patients underwent multiparametric magnetic resonance imaging (Magnetom Avanto, Siemens Healthcare, Forchheim, Germany) before the surgical procedure. The presence or absence of a lesion in the apical region, which may affect the oncological outcome, was examined. Reconstructive technique involved keeping the membranous urethral stump as long as possible (Figure 1) while simultaneously performing an anterior reconstructive technique, which suspended the rhabdosphincter and puboprostatic ligaments to the pubic periosteum (Figure 2). Patients in the control group did not undergo any reconstructive techniques. The robotic surgical procedure was carried out by the same

experienced surgical team using the Robotic Unite (Da Vinci Xi Intuitive Surgical; Sunnyvale, California, USA). Follow-up examinations were performed by a second team, which was blind to the implemented techniques.

Results

A total of 40 patients were included in the study; the control and reconstructive groups each comprised 20 patients. Between the groups, no statistically significant differences were observed in age, BMI, American Society of Anesthesiologists class, risk group, prostate weight, perioperative PSA, duration of surgery, duration of hospitalization, surgical margins, and the total amount of bleeding ($p>0.05$) (Table 1).

In addition, no statistically significant difference was observed between the groups for D'Amico risk class, Gleason score, final pathology, and 3rd

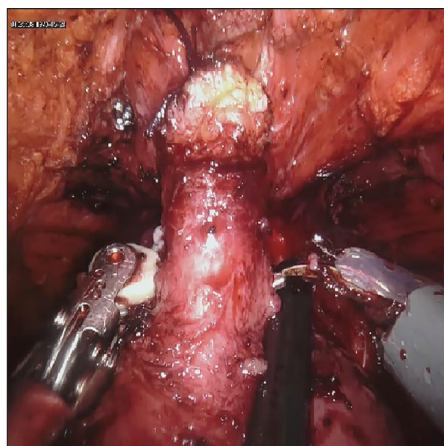


Figure 1. Long urethral stump.

month PSA levels ($p>0.05$). Although no significant difference was observed between each group's continence rate in the 12th month, the reconstructive group had a statistically higher continence rate in the 3rd and 6th month ($p<0.05$, Table 2).

Discussion

Incontinence following radical prostatectomy may result from direct traumatization to the sphincter during surgery or secondary to injury of the nerve that passes over the prostate and controls sphincter functions [9]. The increased use of RALP, newly developed neuroprotective surgical methods, posterior and anterior reconstructive techniques, and approaches that preserve the bladder neck have all contributed to high levels of urinary continence preservation.

In the study conducted by Coehlo et al. [10], the continence rates after ORP, LRP, and RALP were reported as 79%, 84.8%, and 92%, respec-



Figure 2. Anterior suspension suture.

Table 1. Demographic data and comparison of preoperative and postoperative variables

	Reconstructive group (n:20)	Control group (n:20)	p
Age (years)	60.15 \pm 5.72	61.5 \pm 5.29	0.297 ^a
BMI (kg/cm^2)	25.75 \pm 3.24	26.15 \pm 3.78	0.462 ^a
ASA (I/II/III)	9/10/1	6/13/1	0.609 ^b
Risk Group (Low/Middle)	11/9	9/11	0.752 ^b
Concomitant Disease (none/HT/COPD/DM/DM+HT)	9/4/3/4/0	11/3/3/2/1	0.734 ^b
Preoperative PSA	8.49 \pm 3.43	10.65 \pm 3.84	0.093 ^a
Weight of Prostate	76.20 \pm 16.8	69.00 \pm 6.69	0.223 ^a
Duration of Surgery (min)	196.20 \pm 12.64	200.30 \pm 10.82	0.136 ^a
Duration of Hospitalization (d)	6.40 \pm 0.82	6.25 \pm 0.91	0.626 ^a
Surgery Border (0/1)	15/5	15/5	1.000 ^b
Total Amounts of Bleeding	108.1 \pm 23.24	113.25 \pm 28.52	0.183 ^a

Values are expressed as mean \pm standard deviation or number. ASA: American Society of Anesthesiologists; kg: kilogram; cm: centimeter; min: minutes; HT: hypertension; COPD: chronic obstructive pulmonary disease; DM: diabetes mellitus; PSA: prostate-specific antigen; d, day

^a $p>0.05$ Mann–Whitney *U* test

^b $p>0.05$ Chi-square test

Table 2. Comparison of the D'Amico risk class, Gleason score, final pathology, 3rd month PSA results, and continence rate at the 3rd, 6th, and 12th months between the groups

	Reconstructive group (n:20)	Control group (n:20)	P
D'Amico (low/mild)	11/9	9/11	0.752 ^α
Gleason (3+3/3+4/4+3)	13/6/1	11/6/3	0.558 ^α
Final Pathology (3+3/3+4/4+3)	11/5/4	10/7/3	0.770 ^α
3 months postoperative PSA	0.021±0.017	0.031±0.017	0.644 ^β
Continence rate after 3 months (N/P)	3/17	10/10	0.041 ^γ
Continence rate after 6 months (N/P)	1/19	7/13	0.031 ^γ
Continence rate after 12 months (N/P)	0/20	1/19	1.000 ^α

Values are expressed as mean±standard deviation or number. PSA: prostate-specific antigen; N: negative; P: positive
^α p>0.05 Chi-square test
^β p>0.05 Mann-Whitney U test
^γ p<0.05 Chi-square test

tively. Other studies reported continence rates between 90% and 95% after RALP [11, 12]. In our study, the continence rate was 100% for patients in the reconstructive group. We believe that this high rate was achieved as a result of the combination of the anterior suspension suture and a long urethral stump.

Steiner et al. [13] conducted a study focused on the suturing techniques of periurethral retropubic suspension comparing sutured (n=237) and nonsutured (n=97) groups and found that the continence rates 3 months after surgery were significantly higher for patients with a suspension suture. Nagu et al. [14] investigated urethral suspension to determine continence rate. They reported continence rates of 53%, 73%, and 100% in the 1st, 3rd, and 6th months after surgery, respectively. Hamada et al. [15] reported that preservation of the maximum urethral length combined with anterior or posterior reconstructive techniques increased the continence rates. In our study, the continence rate of patients in the reconstructive group recovered earlier than those in the control group in the 3rd and 6th months, and this difference was statistically significant (Table 2). Continence rates in our cohort were 85%, 95%, and 100% for the 1st, 3rd, and 6th month after reconstructive techniques, respectively, which are higher than the rates reported in the literature. We believe that these relatively higher success rates were due to the use of the novel combination of a long urethral stump and anterior suspension suture. There was no statistically significant difference between the groups regarding the final continence rate at the end of the 12th month.

Jeong et al. [16] randomized and compared continence rate in patients who underwent RALP or LRP and developed normograms. In their study, RALP, young age, and membra-

nous urethral length were significant indicators for recovery of continence rate in the 1st, 3rd, and 6th months after surgery. In our study, we found that the implementation of the anterior suspension suture in addition to the long urethral stump contributed to early improvement in continence rates.

Currently, there is no consensus on the relationship between prostate volume and continence [17, 18]. Kontey et al. [19] suggested that prostate volumes >50cc were associated with low continence rates. However, this study did not find any relationship between prostate volume and continence.

Several studies have reported advanced age and increased BMI as risk factors for postoperative incontinence [20, 21]. In our study, no statistically significant association was found between age, BMI, and continence rate in the 3rd, 6th, and 12th month after surgery.

The retrospective study design, limited number of study groups, the inclusion of patients from only low and moderate risk groups, and lack of long-term follow-up were the limitations of our study.

Consequently, we found that the use of anterior suspension suture along with long urethral stump contributed to the improvement in continence rate in the early stages of recovery. Although continence rates were comparable at later stages, an early improvement in continence rate is significant for reducing postoperative treatments. However, because of the rapidly growing number of patients, further prospective randomized studies are needed to support our results.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics

committee of the Ethics Committee of Erzurum Regional Training and Research Hospital.

Informed Consent: Informed consent was obtained from all individual participants included in the study.

Peer-review: Externally peer-reviewed.

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References

- Walsh PC. Anatomic Radical Retropubic Prostatectomy. In: Walsh PC, Retik AB, Vaughan ED, Wein AJ (Eds): *Campbell's Urology 7th Edition* 1998; 2565-88.
- Bianco FJ Jr, Scardino PT, Eastham JA. Radical prostatectomy: long term cancer control and recovery of sexual and urinary function('trifecta'). *Urology* 2005; 66: 83-94. [CrossRef]
- Salomon L, Saint F, Anastasiadis AG, Sebe P, Chopin D, Abbou CC. Combined reporting of cancer control and functional results of radical prostatectomy. *Eur Urol* 2003; 44: 656-60. [CrossRef]
- Ficarra V, Novara G, Rosen RC, et al. Systematic review and meta-analysis of studies reporting urinary continence recovery after robot-assisted radical prostatectomy. *European Urology* 2012; 62: 405-17. [CrossRef]
- Ficarra V, Novara G, Artibani W, et al. Retropubic, laparoscopic and robot assisted radical prostatectomy: a systematic review and cumulative analysis of comparative studies. *European Urology* 2009; 55: 1037-63. [CrossRef]
- Guillonnet B, Cathelineau X, Barret E, Rozet F, Vallancien G. Laparoscopic radical prostatectomy: technical and early oncological assessment of 40 operations. *Eur Urol* 1999; 36: 14-20. [CrossRef]
- Menon M, Tewari A, Peabody JO, et al. Vakutiti 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: 701-17. [CrossRef]
- Ficarra V, Novara G, Rosen RC, et al. Systematic review and meta-analysis of studies reporting urinary continence recovery after robot-assisted radical prostatectomy. *European Urology* 2012; 62: 405-17. [CrossRef]
- Carlson KV, Nitti NW. Prevention and management of incontinence following radical prostatectomy. *Urol Clin North Am* 2001; 28: 595-612. [CrossRef]

10. Coehlo RF, Rocco B, Patel MB, et al. Retropubic, laparoscopic and robot assisted radical prostatectomy: a critical review of outcomes reported by high volume centres. *J Endourol* 2010; 24: 2003-15. [\[CrossRef\]](#)
11. Kural AR, Altuğ F. The applications of robotic surgery in Urology. *Turk J Urol* 2010; 36: 248-57. [\[CrossRef\]](#)
12. Patel VR, Palmer KJ, Coughlin G, Samavedi S. Robotic-Assisted Laparoscopic Radical Prostatectomy: perioperative outcomes of 1500 cases. *J Endourol* 2008; 22: 2299-306. [\[CrossRef\]](#)
13. Steiner MS. The puboprostatic ligament and male urethral suspensory mechanism: an anatomic study. *Urology* 1994; 44: 530-4. [\[CrossRef\]](#)
14. Noguchi M, Kakuma T, Suekena S, Nakashima O, Mohammed R, Matsuoka K. A randomized clinical trial of suspension technique for improving early recovery of urinary continence after radical retropubic prostatectomy. *BJU Int* 2008; 102: 958-63. [\[CrossRef\]](#)
15. Hamada A, Razdan S, Etafy MH, Fagin R. Early Return of Continence in Patients Undergoing Robot-Assisted Laparoscopic Prostatectomy Using Modified Maximal Urethral Length Preservation Technique. *J Endourol* 2014; 28: 930-8. [\[CrossRef\]](#)
16. Jeong SJ, Yeon JS, Lee JK, et al. Development and validation of nomograms to predict the recovery of urinary continence after radical prostatectomy: comparisons between immediate, early, and late continence. *World J Urol* 2014; 32: 437-44. [\[CrossRef\]](#)
17. Link BA, Soga H, Jsephon DY, et al. The impact of prostat gland weight in robot asisted laparoscopic radical prostatectomy. *J Urol* 2008; 180: 928-32. [\[CrossRef\]](#)
18. Zom KC, Orvietto MA, Mikhail AA, et al. Effect prostat weight on operative and postoperative outcomes robot-assisted laparoscopic prostatectomy. *Urology* 2007; 69: 300-5. [\[CrossRef\]](#)
19. Kontey BR, Sadetsky N, Carroll PR; CaPSURE Investigators. Recovery of urinary continence following radical prostatectomy: the impact of prostate volume analysis of data capsule database. *J Urol* 2007; 177: 1423. [\[CrossRef\]](#)
20. Wolin KY, Luy J, Sutcliffe S, Androile GL, Kibel AS. Risk of Urinary Incontinence Following Prostatectomy: the role physical activity and obesity. *J Urol* 2010; 183: 629-33. [\[CrossRef\]](#)
21. Sugaya K, Oda M, Nishijima S, et al. Risk factors for duration of urinary incontinence after radical prostatectomy. *Nihon Hinyokika Gakkai Zasshi* 2002; 93: 444. [\[CrossRef\]](#)