

Mucosal coaptation technique for early urinary continence after robot-assisted radical prostatectomy: a comparative exploratory study

Santosh Kumar¹, Praveen Kumar Soni¹, Abhishek Chandna¹, Kalpesh Parmar¹, Pramod K. Gupta²

¹Department of Urology, PGIMER, Chandigarh, India

²Department of Biostatistics, PGIMER, Chandigarh, India

Citation: Kumar S, Soni PK, Chandna A, Parmar K, Gupta PK. Mucosal coaptation technique for early urinary continence after robot-assisted radical prostatectomy: a comparative exploratory study. Cent European J Urol. 2021; 74: 528-534.

Article history

Submitted: Feb. 19, 2021

Accepted: May 19, 2021

Published online: Sept. 18, 2021

Corresponding author

Santosh Kumar

Post Graduate Institute
of Medical Education
and Research

Department of Urology
Sector 12,

160012 Chandigarh, India

phone: +91 94 173 740 67

santoshsp1967jaimatadi@
yahoo.co.in

Introduction Urinary incontinence is a troublesome complication following radical prostatectomy. Various robot-assisted radical prostatectomy (RARP). We describe our technique (Santosh-PGI) of urethral and urinary bladder mucosa coaptation for early continence following RARP.

Material and methods We performed a prospective comparative study of patients planned for RARP between July 2018 and December 2019 at our centre. A total of 40 patients were enrolled in the study protocol. Following prostatectomy, patients were alternatively assigned into two groups. In one group, urethral and urinary bladder coaptation sutures were placed in a purse string manner using 3-0 Monocryl sutures and none in the another group. All patients underwent standard end to end vesico-urethral anastomosis as described by Van Velthoven. The urinary catheter was removed on day 10 after surgery. All patients were evaluated on day 1, 30 and 90 after catheter removal.

Results The two groups, each with 20 patients, were comparable in terms of age, clinical staging and D'Amico risk classification. The operative time, blood loss and surgical margin positivity were comparable. Following catheter removal, 75% of patients in Group A (Mucosal coaptation) and 50% in Group B (Standard technique) were continent ($p = 0.264$). At 30 and 90 days, 90% and 95% in Group A and 60% and 80% in Group B reported continence respectively ($p=0.078$). Four patients in group B reported both-ersome incontinence at 90 days follow-up.

Conclusions Urethral and urinary bladder mucosal coaptation is a simple innovative technique for early continence following RARP.

Key Words: urethral mucosal coaptation ↔ robot-assisted radical prostatectomy
↔ prostate cancer ↔ continence

INTRODUCTION

Early urinary incontinence is a bothersome complication following robot-assisted radical prostatectomy (RARP). Although robot assistance has decreased long term incontinence rates as compared to retro-pubic or laparoscopic radical prostatectomy (LRP), it still remains a formidable problem following RARP (up to 30%). To create the vesico-urethral anastomosis, the standard technique of Van Velthoven is used for RARP [1]. Simone et al. reported his simplified

technique of vesicourethral anastomosis with a 'single knot-single running' suture and suggested excellent outcomes [2]. The various techniques described for the early return of continence are posterior rhabdosphincter reconstruction [3], apical dissection modifications [4], anatomic bladder neck preservation [5] and puboprostatic ligament sparing surgery [6]. It is based on the 3 concepts of preservation, reconstruction and reinforcement so as to maintain the normal anatomical and functional status in the pelvis.

Deficiency of the sphincter mechanism is postulated to be the predominant factor in post-prostatectomy incontinence. A number of studies have explored the change in urodynamic parameters following radical prostatectomy [7]. A reduction in urethral pressure and decrease in functional urethral length leading to sphincter dysfunction is the most pertinent finding. Loss of the elastic properties of the proximal urethral urothelium (zone of coaptation) is another proposed mechanism of post-prostatectomy incontinence. Pelvic floor muscle training is a common practice after RARP as it improves pelvic muscle strength and continence occurs faster when adopted [8]. As ageing is associated with late onset incontinence following radical prostatectomy, one should be counselled for the same [9].

We proposed a novel technique of mucosal coaptation in addition to the routine steps of RARP. We proposed that coaptation of the urethral mucosa in the 'zone of coaptation' increases the urethral pressure and augments the sphincter integrity. Furthermore, the coaptation purse-string suture at the bladder neck acts to increase the functional length of the urethra aiding in the early recovery of continence. We evaluated the technique of mucosal coaptation in patients who underwent RARP for localized prostate cancer and compared it with standard RARP.

MATERIAL AND METHODS

Patient selection after institutional ethics approval (NK/4839/MD/099), 40 patients with localized prostate cancer underwent RARP between July 2018 and December 2019 at our center by a single surgeon. This was a comparative study whereby patients undergoing RARP were alternatively assigned to two groups: Group A underwent RARP with mucosal coaptation as a modification and patients in Group B underwent standard RARP. The inclusion criteria were patients diagnosed with localized prostate cancer planned for RARP and consenting to participate in the study. Patients not fit for undergoing RARP/not consenting for RARP, patients not compliant with follow-up, patients who had undergone open prostatectomy, transurethral resection of the prostate, pelvic radiation and patients with a history of neurological disease were excluded from the study. The study was conducted in accordance with good clinical practice rules and ethical principles as contained in the declaration of Helsinki. Each patient was provided with a detailed patient information sheet and informed consent was obtained. Operative data such as duration of surgery, blood loss, lymph node dissection, hospital stay, histopathology, surgical margin status and complications were recorded for all of the

patients. Foley's urethral catheter was removed for all of the patients at 10 days following the surgery. Pre and post-operative pelvic floor muscle training is a routine practice for all of the patients who are planned for RARP in our institute.

The primary objective of the study was to evaluate the continence rate following RARP in the two groups. Continence was defined as use of zero to one pad per day. At times, patients use one diaper/24 hours for the fear of incontinence or because of leakage of a few drops upon exertion. These patients were considered continent. Mild to moderate incontinence was defined as the use of 2 pads/24 hours and severe incontinence was defined as the use of more than 2 pads/24 hours. The patients were asked to follow-up at 24 hours following catheter removal, day 30 and day 90 to assess urinary incontinence.

Surgical technique

The DaVinci Si system was utilized for performing RARP using 5 ports (two 12 mm ports-camera and assistant; two 8 mm robotic ports; one 5 mm laparoscopic port). Pelvic docking was performed for all of the cases and the patient was laid in a Trendelenburg position. The anterior approach via the retzius space as described by Menon et al. [10] was utilized for RARP in all of the patients. Nerve sparing was offered wherever feasible depending on the location of the tumor and the stage of the disease. Maximal urethral length was preserved with meticulous dissection at the apex of the prostate, preserving as much length of the urethra as possible. The Rocco stitch was used to approximate the remnant Denonvillier's fascia, posterior detrusor and posterior rhabdosphincter in all of the cases.

In Group A, the patients underwent our modified technique which is described here. After apical dissection and transection of the urethra as mentioned above, a 3-0 poliglecaprone (Monocryl™) suture was used to create a purse string suture along the urethra involving the seromuscular layers only. Special care is taken so as to avoid including the urethral mucosa in the sutures. Next, the bladder neck was reconstructed and plicated in a purse-string manner using 3-0 poliglecaprone (Monocryl™) sutures. It is essential to avoid ureteric orifices while constructing the bladder neck. The vesico-urethral anastomosis was then completed with a mucosa-to-mucosa approximation using barbed V-lok sutures. After completion of the vesico-urethral anastomosis, the purse-string sutures over the urethra and the bladder neck were tied to each other over the 18 Fr catheter, resulting in an increase in the urethral pressure as well as an increase in the functional urethral length (Figures 1, 2).

Statistical analysis

Data was entered and evaluated using SPSS software version 23 (IBM, Armonk, NY, USA). Categorical variables were expressed as frequency tables and continuous variables were described as mean \pm standard deviation, median and range. Categorical data were compared utilizing Pearson's Chi-square test and Fischer's exact test. Continuous variables were evaluated using Mann-Whitney U test and unpaired student's t-test. Statistical significance was considered with a p-value of ≤ 0.05 .

RESULTS

Both groups were comparable in terms of age, D'Amico classification and clinical staging. The mean age of the study groups were 66.9 ± 5.73 years and high-risk prostate cancer constituted the most common group of patients undergoing RARP, accounting for 42.5% of the patients (Table 1). The operative time, blood loss and surgical margin positivity rate were comparable across both groups (Table 1). The catheter was removed on postoperative day 10 for all of the patients and continence rate was evaluated on 1-day after catheter removal, day 30 and day

90. There was no drop out from the study. Fifteen patients (75%) in Group A were continent on day 1 following catheter removal whereas 10 patients in Group B remained continent at the same time interval ($p = 0.264$) (Table 2). There was an improvement in continence in both groups over time. The number of patients achieving continence at 90 days increased to 19 (95%) in Group A and 16 (80%) in Group B ($p = 0.323$). At 30 days following catheter removal, 90% of patients in Group A were continent as compared to 60% in Group B. However, the difference between the 2 groups did not reach significance (0.078). None of the patients in Group A suffered from severe incontinence at the last follow-up. Four patients in Group B remained incontinent at 90 days following catheter removal (3 moderate; 1 severe). On univariate analysis, none of the variables such as age, body mass index, comorbidities, clinical staging, lymph node dissection, positive surgical margin and post-operative complication were predictors of urinary incontinence.

DISCUSSION

The present exploratory study demonstrates improved continence with the technical modification

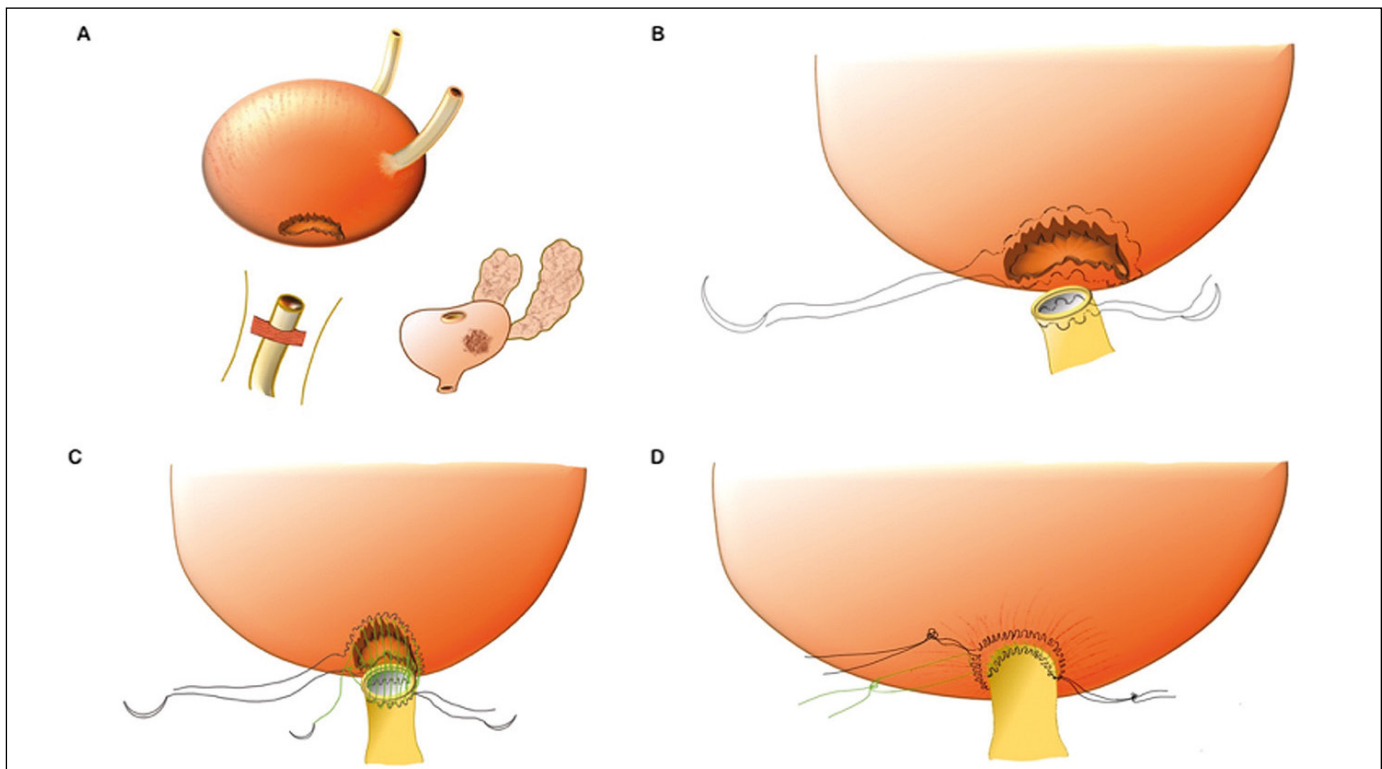


Figure 1. Schematic diagram showing **A.** Completion of prostatectomy; **B.** Purse-string suture application in proximal urethra and bladder neck; **C.** End-to-end vesico-urethral anastomosis performed using barbed double arm suture in continuous fashion; **D.** Tightening of purse-string sutures.

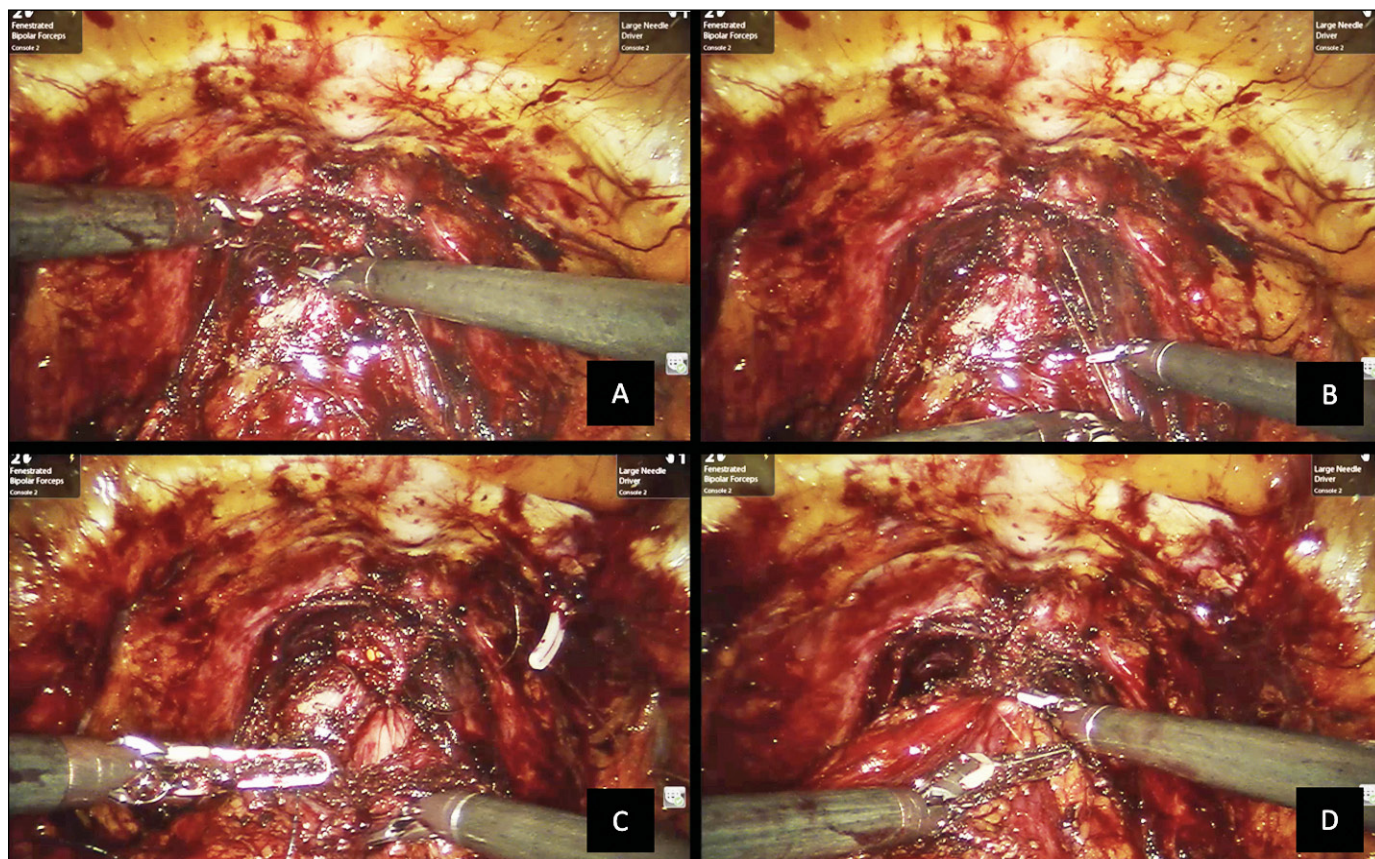


Figure 2. Intra-operative images showing the purse-string suturing of the urinary bladder and proximal urethra and vesico-urethral anastomosis.

of mucosal coaptation in patients undergoing RARP. The coaptation of the urethra and the bladder neck offered by this method influences 3 mechanisms: 1. urethral mucosal coaptation and restoration of zone of coaptation, 2. increase in urethral pressure augmenting sphincter integrity and 3. bladder neck coaptation leading to increase in functional urethral length. Seventy-five percent and 90% of patient undergoing mucosal coaptation remained continent as opposed to 50% and 60% of patients undergoing standard RARP at day 1- and day 30 post catheter removal, respectively.

The majority of the patients suffering from urinary incontinence following radical prostatectomy regain continence within the first year. The advent of robotic surgery has led to an improvement in 12-month urinary continence following radical prostatectomy as compared to open and laparoscopic radical prostatectomy [11]. Despite the advances made in this regard, early urinary incontinence remains a formidable problem for surgeons and patients alike. Young age (≤ 67 years), organ confined tumor ($\leq T2$ disease) and lower prostate weight have been proposed as predictors of early return of continence following RARP

[12]. Chiancone et al reported his retrospective analysis of RARP patients and concluded that prostatic volume, clinical stage pT3, pelvic lymph node dissection and the Rocco stitch are the significant determinants of continence in the early stage while body mass index and early post-operative pelvic floor motor therapy (PFMT) are factors influencing late continence [13]. The mean of age patients in both groups was <70 years in the present study. The incidence of organ confined tumor and prostate volume in both of the groups was comparable across (Table 1). Membranous urethral length and bladder neck width have been associated with early return of continence following RARP in studies utilizing preoperative magnetic resonance imaging (MRI) to study these parameters [14]. Though these parameters were not studied in the present exploratory study, principles involved in the technique of mucosal coaptation led to the increase in the functional urethral length and narrowing of the bladder neck, hence improving early continence rates. Bilateral nerve preservation [15] and intrafascial nerve-sparing [16] have been associated with improved continence following surgery, although contrasting evidence also exists. Nerve-spar-

Table 1. Clinico-demographic details of the patients in the two groups

Variables	Group A (Urethral Mucosal Coaptation RARP)	Group B (Standard RARP)	p-value
Age (mean \pm SD; years)	65.7 \pm 5.5	68.25 \pm 5.95	0.176
Presentation			0.705
Symptomatic	16 (80%)	15 (75%)	
Incidental	4 (20%)	5 (25%)	
Smoking			0.113
Yes	7 (35%)	12 (60%)	
No	13 (65%)	8 (40%)	
Comorbidities			0.113
Yes	10 (50%)	11 (55%)	
No	10 (50%)	9 (45%)	
D'Amico Classification			0.45
Low-risk	8 (40%)	5 (25%)	
Intermediate-risk	5 (25%)	5 (25%)	
High-risk	7 (35%)	10 (50%)	
T1c staging			0.549
T2	16 (80%)	18 (90%)	
T3	4 (20%)	2 (10%)	
Prostate volume (ml)	54.8 \pm 18.6	56.9 \pm 23.4	0.755
Operative time (min)	134.5 \pm 11.6	138.3 \pm 9.8	0.264
Blood loss	134 \pm 39.4	133.3 \pm 48.9	0.958
Nerve sparing			0.525
Yes	12 (60%)	10 (50%)	
No	8 (40%)	10 (50%)	
pT staging			0.780
pT2	10 (50%)	9 (45%)	
pT3a	5 (25%)	7 (35%)	
pT3b	5 (25%)	4 (20%)	
Lymph node involvement			0.677
Yes	3 (15%)	4 (20%)	
No	17 (85%)	16 (80%)	
Positive surgical margins	0	0	1.0
Hospital stay (days)	4 \pm 0.9	4.35 \pm 1.2	0.313

RARP – robot-assisted radical prostatectomy; SD – standard deviation

Table 2. Postoperative continence following surgery

Degree of Incontinence	Group A	Group B	p value
24 hours post catheter removal			
No incontinence	15 (75%)	10 (50%)	0.264
Moderate incontinence	3 (15%)	6 (30%)	
Severe incontinence	2 (10%)	4 (20%)	
30 days post catheter removal			
No incontinence	18 (90%)	12 (60%)	0.078
Moderate Incontinence	1 (5%)	6 (30%)	
Severe Incontinence	1 (5%)	2 (10%)	
90 days post catheter removal			
No Incontinence	19 (95%)	16 (80%)	0.323
Moderate incontinence	1 (5%)	3 (15%)	
Severe incontinence	0	1 (5%)	

ing was not offered in 42.5% of the patients in this study as they had high-risk disease.

Multiple technical modifications have been devised to improve post-prostatectomy incontinence. Reconstruction of the posterior rhabdo-sphincter (Rocco stitch) is a widely adapted technique which provides firm support to the urethral sphincter complex posteriorly and allows for better approximation of the vesicourethral anastomosis, reducing tension on the anastomosis [17]. Rocco et al. [3] demonstrated a significant improvement in continence at 3 days and 30 days following catheter removal in a comparative study comprising of 62 patients undergoing laparoscopic radical prostatectomy. The excellent results of this technique have been replicated in RARP as well [18]. Both of the groups in our study also underwent Rocco's stitch prior to vesico-urethral anastomosis. The addition of anterior reconstruction [19] and retropubic suspension [20] have also demonstrated early return to continence following RARP. Total reconstruction of the vesicourethral junction, a novel but technically demanding technique described by Tewari et al. [21] demonstrated excellent results but has not been replicated thereafter.

Walsh et al. [22] demonstrated earlier return of continence with intussusception of the bladder neck in retropubic radical prostatectomy. Taking cue from this technique, Lee et al. [23] demonstrated earlier return of continence with plication anteriorly only as compared to that described by Walsh [22]. Our technique of purse-string sutures on the bladder neck is similar to that described by Swami et al. [24], achieving apposition without tension. However, the purse-string suture in the urethra and at the bladder neck is tightened after the vesicourethral anastomosis is completed. Multiple techniques have focused on the vesicourethral junction, but urethral coaptation as in our technique has not been described in available literature. It shall be of particular value in apical tumors where conservation of urethral length and the 'zone of coaptation' thereof may not be feasible.

The retzius-sparing RARP allows for preservation of the anatomical support of the bladder as well as the Santorini plexus and puboprostatic ligaments [25]. This technique has demonstrated superior continence outcomes in various studies. However, one caveat associated with this technique is the higher rate of positive surgical margins, especially in high-risk disease. Moreover, it is associated with a longer learning curve [26]. The conventional anterior approach [27] was used in the present study and there were no positive surgical margins in the present study in either of the groups.

There are several reports which suggest that neurovascular bundle (NVB) preservation minimizes incontinence, however it is difficult to mitigate NVB

manipulation in high-risk and advanced cases. Amniotic and umbilical cord (UC) tissues have been used in a wide variety of clinical applications to reduce inflammation and promote regenerative healing. Ahmed et al. reported that an umbilical cord allograft used as a nerve wrap around the NVB resulted in early continence at 1, 3 and 12 months in his retrospective analysis of 200 patients [28]. Krol et al. reported that the use umbilical cord allografts appear to offer an advantage in terms of a faster return to continence as well as potency [29].

The present study demonstrates earlier return of continence utilizing the technique of mucosal coaptation. This study is the first technique described in order to recreate the 'zone of coaptation', apart from preservation of maximal urethral length. Robotic assistance aids in meticulous dissection as well as precise placement of sutures, avoiding the mucosal layer while placing purse-string sutures in the urethra. One may raise concerns over urethral narrowing and stricture following placement of this suture. However, ensuring avoidance of the mucosa and using early absorbing sutures like poliglecaprone shall help avoid the formation of stricture. Albeit the present study has a short follow-up of 3 months, none of the patients in Group A experienced symptoms suggestive of urethral stricture or decrease in urinary flow.

The present study has a few limitations. Firstly, it is a non-randomized comparative exploratory study consisting of a small number of cases in each arm. The small sample size accounts for the non-significant difference between the two groups. Secondly, only short-term outcomes are reported. However, the technique aims at reducing the incidence of early incontinence and hence, a short-term follow-up focusing on early incontinence was decided

for the present study. Thirdly, a significant proportion of patients enrolled in both arms were high-risk and hence did not undergo nerve-preservation.

CONCLUSIONS

Mucosal coaptation is a simple technique leading to the early return of continence as compared to standard RARP. Robotic assistance aids in the execution of this novel technique, especially sparing the mucosa in the urethral purse-string sutures. Randomized multi-center studies with larger cases and longer follow-up are needed to confirm the reproducibility and outcomes of this technique.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

STATEMENT OF ETHICS

Institute ethics committee clearance taken. Ref. no NK/3880/MS/148

AUTHOR CONTRIBUTIONS:

SK and KP – initial concept, design, draft. PS – collection of data, AC – revision of manuscript, SK, PG – critical comments. All authors read the manuscript and contributed equally.

ACKNOWLEDGEMENTS

We sincerely thank all our patients for being compliant during hospital stay and follow up.

We sincerely thank Mrs. Kusum for doing statistical analysis during preparation of manuscript.

DEPARTMENT AND INSTITUTION WHERE THE WORK WAS CARRIED OUT:

Post Graduate Institute of Medical Education and Research, Chandigarh, India

References

1. Van Velthoven RF, Ahlering TE, Peltier A, et al. Technique for laparoscopic running urethrovesical anastomosis: the single knot method. *Urology*. 2003; 61: 69-702.
2. Simone G, Papalia R, Ferriero M, Guaglianone S, Gallucci M. Laparoscopic 'single knot-single running' suture vesico-urethral anastomosis with posterior musculofascial reconstruction. *World J Urol*. 2012; 30: 651-657
3. Rocco B, Gregori A, Stener S, Santoro L, Bozzola A, et al. Posterior reconstruction of the rhabdosphincter allows a rapid recovery of continence after transperitoneal videolaparoscopic radical prostatectomy. *Eur Urol*. 2007; 51: 996-1003.
4. Terakawa T, Takenaka A, Tunemori H, et al. Modifications in the technique for apical dissection of radical retropubic prostatectomy to improve urinary incontinence. *Nihon Hinyokika Gakkai Zasshi*. 2006; 97: 1-9.
5. Freire MP, Weinberg AC, Lei Y, et al. Anatomic bladder neck preservation during robotic-assisted laparoscopic radical prostatectomy: description of technique and outcomes. *Eur Urol*. 2009; 56: 972-980.
6. Poore RE, McCullough DL, Jarow JP. Puboprostatic ligament sparing improves urinary continence after radical retropubic prostatectomy. *Urology*. 1998; 51: 67-72.
7. Lee H, Kim KB, Lee S, et al. Urodynamic assessment of bladder and urethral function among men with lower urinary tract symptoms after radical prostatectomy: a comparison between men with and without urinary incontinence. *Korean J Urol*. 2015; 56: 803-810.
8. Marchioni M, Primiceri G, Castellan P, et al. Conservative management of urinary incontinence following robot-assisted radical prostatectomy. *Minerva Urol Nefrol*. 2020; 72: 555-562.
9. Naselli A, Simone G, Papalia R, et al. Late-onset incontinence in a cohort of radical prostatectomy patients. *Int J Urol*. 2011; 18: 76-79.

10. Menon M, Hemal AK, VIP team. Vatikuti Institute prostatectomy: a technique of robotic radical prostatectomy: experience in more than 1000 cases. *J Endourol.* 2004; 18: 611-619.
11. Ficarra V, Novara G, Rosen RC, et al. Systematic review and meta-analysis of studies reporting urinary continence recovery after robot-assisted radical prostatectomy. *Eur Urol.* 2012; 62: 405-417.
12. Shao IH, Chang YH, Hou CM, Lin ZF, Wu CT. Predictors of short-term and long-term incontinence after robot-assisted radical prostatectomy. *J Int Med Res.* 2018; 46: 421-429.
13. Chiancone F, Meccariello C, Fedelini M, Fabiano M, Langella, Fedelini P. Independent predictors of early and late continence after robot-assisted radical prostatectomy. A single-institution experience. *Eur Urol Open Science.* 2020; 21 (Suppl 1): S2.
14. Nakane A, Kubota H, Noda Y, et al. Improvement in early urinary continence recovery after robotic- assisted radical prostatectomy based on postoperative pelvic anatomic features: a retrospective review. *BMC urology.* 2019; 19: 1-7.
15. Ko YH, Coelho RF, Chauhan S, et al. Factors affecting return of continence 3 months after robot-assisted radical prostatectomy: analysis from a large, prospective data by a single surgeon. *TJ Urol.* 2012; 187: 190-195.
16. Xylinas E, Ploussard G, Salomon L, et al. Intrafascial nerve-sparing radical prostatectomy with a laparoscopic robot-assisted extraperitoneal approach: early oncological and functional results. *J Endourol.* 2010; 24: 577-582.
17. Rocco F, Carmignani L, Acquati P, et al. Restoration of posterior aspect of rhabdosphincter shortens continence time after radical retropubic prostatectomy. *J Urol.* 2006; 175: 2201-2206.
18. Coelho RF, Chauhan S, Orvieto MA, et al. Influence of modified posterior reconstruction of the rhabdosphincter on early recovery of continence and anastomotic leakage rates after robot-assisted radical prostatectomy. *Eur Urol.* 2011; 59: 72-80.
19. Hurtes X, Rouprêt M, Vaessen C, Pereira H, Faivre d'Arcier B, Cormier L, Bruyère F. Anterior suspension combined with posterior reconstruction during robot-assisted laparoscopic prostatectomy improves early return of urinary continence: a prospective randomized multicentre trial. *BJU Int.* 2012; 110: 875- 883.
20. Patel VR, Coelho RF, Palmer KJ, Rocco B. Periurethral suspension stitch during robot-assisted laparoscopic radical prostatectomy: description of the technique and continence outcomes. *Eur Urol.* 2009; 56: 472-478.
21. Tewari A, Jhaveri J, Rao S, et al. J. Total reconstruction of the vesico-urethral junction. *BJU Int.* 2008; 101: 871-877.
22. Walsh PC, Marschke PL. Intussusception of the reconstructed bladder neck leads to earlier continence after radical prostatectomy. *Urology.* 2002; 59: 934-938.
23. Lee DI, Wedmid A, Mendoza P, et al. Bladder neck plication stitch: a novel technique during robot- assisted radical prostatectomy to improve recovery of urinary continence. *J Endourol.* 2011; 25: 1873- 1877.
24. Swami KS, Lam T, Nabi G. A novel circumferential bladder neck suture to facilitate vesicourethral anastomosis during radical retropubic prostatectomy. *BJU Int.* 2011; 107: 2006-2010.
25. Galfano A, Di Trapani D, Sozzi F, et al. Beyond the learning curve of the Retzius-sparing approach for robot-assisted laparoscopic radical prostatectomy: oncologic and functional results of the first 200 patients with ≥ 1 year of follow-up. *Eur Urol.* 2013; 64: 974-980.
26. Checcucci E, Vecchia A, Fiori C, et al. Retzius-sparing robot-assisted radical prostatectomy vs the standard approach: a systematic review and analysis of comparative outcomes. *BJU Int.* 2020; 125: 8-16.
27. Menon M, Hemal AK, VIP team. Vatikuti Institute prostatectomy: a technique of robotic radical prostatectomy: experience in more than 1000 cases. *Journal of endourology.* 2004; 18: 611-649.
28. Ahmed M, Esposito M, Lovullo G. A single-center, retrospective review of robot-assisted laparoscopic prostatectomy with and without cryopreserved umbilical cord allograft in improving continence recovery. *Journal of robotic surgery.* 2019; 31: 1-7.
29. Krol BC, Hemal AK, Peak T, Liu S, Pathak RA. Early return to continence and potency with use of dehydrated human umbilical cord graft at the time of robot-assisted radical prostatectomy: A case study and analysis of relevant literature. *IJU Case Reports.* 2021; 4: 151-153. ■