A new suture technique for anastomosis in radical retropubic prostatectomy and early removal of urethral catheter

Levent N. Türkeri, MD, Yusuf Temiz, MD, Cenk M. Yazici, MD, Ilker Tinay, MD

Department of Urology, Marmara University School of Medicine, Istanbul, Turkey

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Introduction: *A modified suture technique for urethro-vesical anastomosis during radical retropubic prostatectomy was developed and utilized in a cohort of patients. Comparative analysis of postoperative outcome was performed with a previous group of patients who had an anastomosis with the conventional technique.*

Material and methods: *A consecutive group of patients who underwent radical retropubic prostatectomy in our department with the diagnosis of localized prostate cancer was included in this retrospective study. Urethro-vesical anastomosis was performed either with the new or conventional method (CM). Outcome data of these two different patient sets were compared.*

Results: *One-hundred and one consecutive patients (mean age of 61.9 years) who were operated by either one of the two anastomotic suture techniques composed our study group. The mean follow-up period was 18 months (min: 12-max: 24). Urethro-vesical "U" (UVU) suture was performed in 51 patients, and CM in 50 patients. Foley catheter was removed at postoperative fourth day in 33 (64.7%) and 18 (36%) patients in UVU and CM groups, respectively ($p < 0.01$). Incontinence rate was significantly lower in the UVU group at postoperative first year ($p < 0.0005$). Anastomotic strictures were observed in only 1.9% of the cases in UVU group, compared to 4% in CM group.*

Conclusion: *Outcome data from our patient group indicate that UVU suture may allow a high quality urethro-vesical anastomosis with a very favorable outcome in terms of early catheter removal, high continence and low stricture formation rates in patients undergoing radical retropubic prostatectomy. Further validation of these results requires a prospective randomized trial.*

Key Words: anastomosis, prostate neoplasm, radical prostatectomy

Introduction

Urethro-vesical anastomosis is one of the most critical steps of the radical prostatectomy (RP) operation in terms of functional outcome. Proper apposition of the bladder neck with the urethra by evenly placed sutures after the removal of the prostate is essential for a watertight anastomosis, decreased post-operative drainage, early removal of the catheter and normal voiding without any stricture formation. So far, a variety of suture methods were described including interrupted sutures,[1,2] circumferential continuous suture[3,4] and Vest suture[5,6] or use of a semi-automatic device.[7] Continuous type of suture is more commonly used during laparoscopic radical prostatectomy and appears to give the best results in terms of prevention of leaks and allowing early catheter removal.[3,4] We developed a new anastomotic suture technique, which can be utilized both in open and laparoscopic radical prostatectomy and we herein report our initial results with this technique.

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Address correspondence to Dr. Levent N.Türkeri, Prof. of Urology, Department of Urology, Marmara University Hospital, Tophanelioglu Cd. 13-15, Altunizade (34662), Istanbul, Turkey

Material and methods

Patients who underwent radical retropubic prostatectomy between January 2004 and December 2005 in our department with the diagnosis of localized prostate cancer were included in this retrospective, non randomized study. A total of 101 consecutive patients, who had an urethro-vesical anastomosis with either suture technique composed our study group. UVU study group was composed of the most recent 51 consecutive patients in our series, while CM study group was the previous 50 consecutive patients. All patients were operated by the same surgeon (LNT).

Surgical technique

Lymph node dissection was performed as described previously.[8] Dorsal vein complex was controlled as described by Walsh,[9] and anterior urethra was incised, exposing the Foley catheter. In the UVU group, monofilament synthetic absorbable sutures (00 Polyglytone) were placed in the distal urethral stump in a "U" shaped fashion (inside-out and outside-in) at the upper right and left quadrants with an average of 4 mm-5 mm of urethral bite, leaving approximately 50 degrees of angle between each arm of the respective sutures, Figure 1. Catheter was removed and remaining posterior anastomotic sutures were placed symmetrically at the lower quadrants. In CM suture groups, six single anastomotic monofilament absorbable sutures were passed in the distal urethral stump inside-out.

Bladder neck preservation as described previously[10] was performed in all patients. After the prostate and seminal vesicles were removed as a single specimen, the bladder mucosa was everted with interrupted 4/0 polyglactin sutures. At this stage of the operation, a modification of subvesical plication described by Moinzadeh et al[11] (Pagano suture) and Walsh[12] was then performed with a No. 1 polyglactin suture placed across the fascial edges, to form a loop at the ventral side of the bladder, Figure 2, and left untied until all anastomotic sutures were in place. Distal urethral anastomotic sutures were placed at their corresponding sites at the bladder neck, both arms inside-out in the UVU group, Figure 1 and all single sutures in the CM group. Finally, all anastomotic sutures were carefully tied down and the urethro-vesical anastomosis was completed. Verification of the water-tightness was confirmed by filling bladder with saline.

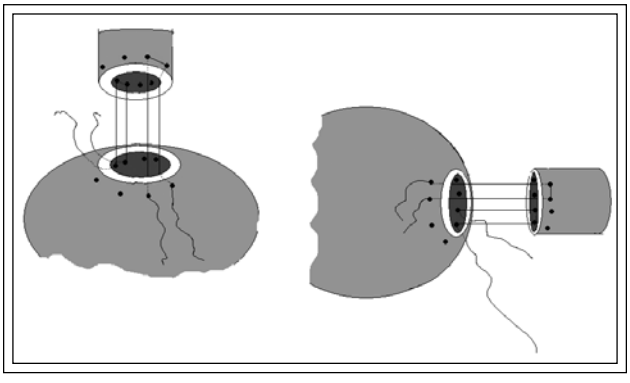

Figure 1. Anastomotic sutures passed through the urethra at each quadrant and at corresponding sites at the bladder neck.

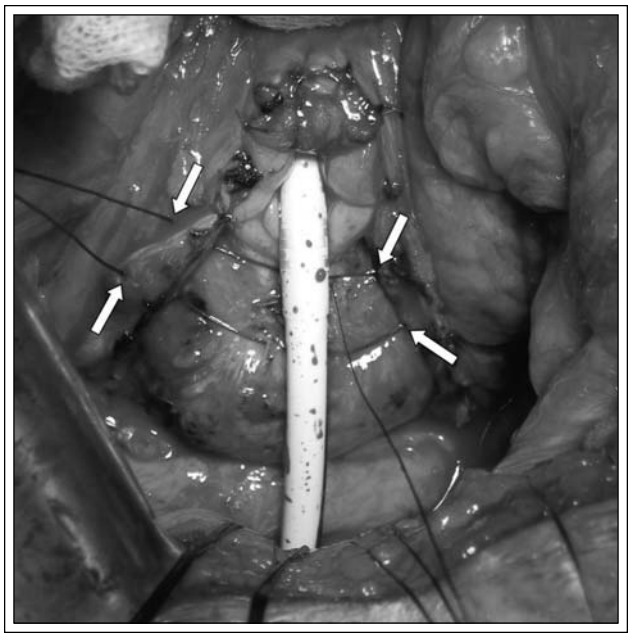

Figure 2. No 1 vicryl passed through the fascial edges beneath the bladder neck (arrows) forming a loop to create sub-vesical plication.

Results from these two different groups were compared with regards to operative time, peroperative blood loss, removal time of the drain and Foley catheter, and postoperative urinary continence which was assessed with International Continence Society Male Short Form (ICS-SF). Statistical analysis was performed by Fisher's exact test and Student t- test. Multivariate analysis by Binary Logistic Regression test was performed to identify the predictor(s) of postoperative continence.

TABLE 1. **Comparison of continence rates in study groups at different time points (Fisher's Exact test).**

Times	UVU group		CM group		p value
	Completely dry patients (no pads required) (%)	Patients with no or single pad (%)	Completely dry patients (%)	Patients with no or single pad (%)	(comparison of completely dry patients)
1st week	29 (56.9)	39 (76.4)	11 (22)	30 (60)	< 0.0005
1st month	35 (68.6)	40 (78.4)	28 (56)	35 (70)	0.22
3rd month	38 (74.5)	46 (90.1)	28 (56)	42 (84)	0.06
6th month	40 (78.4)	46 (90.1)	29 (58)	43 (86)	< 0.05
1st year	47 (92.2)	50 (98)	30 (60)	43 (86)	< 0.0005

Results

UVU study group was composed of the latest 51 consecutive patients in our series, while CM study group was the previous 50 consecutive patients. Mean age of the UVU study group and CM groups were similar as 61.6 (min: 47- max: 73) and 62.3 (min: 48-max: 75) years, respectively. Mean follow-up period of whole study group was 18 (min: 12-max: 24) months. Mean operative time for UVU suture group was 3.28 hours where it was 3.1 hours for CM suture group. Mean blood loss was 880 ml (min: 200 ml - max: 2500 ml) in UVU and 1280 (min: 500 ml –max: 3000 ml) in CM groups ($p = 0.26$). There was no statistically significant difference for nerve sparing procedures performed in each group (94.1% versus 82%; $p = 0.116$). Drains were removed on postoperative second and fourth day in 49% and 100% in the UVU and 42% and 100% in the CM groups, respectively ($p = 0.61$ for second day). Removal of the Foley catheter was possible on postoperative day 3 in one (1.9%) and postoperative day 4 in 32 (62.7%) patients in the UVU group after a cystogram demonstrated no urinary leakage. In the CM group, Foley catheter could be removed on postoperative day 4 in 18 (36%) patients ($p < 0.001$, odds ratio: 3.25). Catheter-free rate on day 7 was 88.2% and 66% in UVU and CM groups, respectively ($p < 0.01$, odds ratio: 3.86). All patients were prescribed Tamsulosin to prevent urinary retention, however a total of four (two in each group) patients (8%) whose catheters were removed on day 4 were re-catheterized due to inability to void within 24 hours of catheter removal. Voiding without any difficulty subsequent to 3 days of catheterization was possible in all of these patients. Continence was achieved early on and overall 56.9% compared to 22% of the patients were completely dry (full continence) at the end of the first week postoperatively in the UVU and CM groups, respectively ($p < 0.0005$; OR: 4.67, Table 1). Continence (no or single protective pad) rate was 98 % in UVU and 86% in CM suture groups, respectively at 12 months after the operation ($p < 0.0005$; OR: 7.83).

Multivariate analysis by logistic regression test identified the UVU technique (OR: 7.83, 95% CI: 0.016-1.150, $p < 0.05$) and removal time of Foley catheter (OR: 3.25, 95% CI: 0.349-0.963, $p < 0.05$) as the only independent predictors of postoperative continence. Urinary control was better in patients who had an anastomosis with the UVU technique and had their catheters removed early.

Only one patient (1.9%) in UVU and two patients (4%) in the CM groups developed anastomotic stricture which were treated successfully by a single internal urethrotomy session without any recurrence.

Discussion

Radical prostatectomy remains the treatment of choice for young, otherwise healthy men. Quality of life issues have become a major focus because of the low tolerance of complications in this age group.[13,14] Although, urethral catheter appears absolutely necessary for anastomotic healing after RP, duration of catheterization is a much debated topic. Many urologic centers adapted a policy of removing urethral catheters at postoperative 7 to 15 days after RP, while a few groups reported successful early removal.[15]

Lepor et al reported no extravasation in 75% of the cystograms on postoperative day 7, however 15% of these patients developed acute urinary retention when their catheters were removed.[16] At postoperative 3 months, continence rate (no or single protective pad) was achieved in 72% of these patients.[16] Santis et al demonstrated that 76% of their patients after catheter removal on day 8 to 9 following RP were completely continent after a mean follow-up of 21 months.[17] Tiguert et al reported that full continence was achieved in 58%, 85% and 92% at 3, 9 and 12 months, respectively after early catheter removal and the only factor predictive of continence after surgery was the duration of urinary indwelling catheter.[15] In our study, catheter free rate was 88.2 % on postoperative day 7 and no-pad continence rates were 74.5% and 92.2% at 3 and 12 months, respectively in the UVU group. Urinary retention (1.9%) was not common among these patients. Utilization of our new suture technique as well as the duration of catheterization emerged as independent prognostic factors for continence. In a study by Patel et al when the catheters were removed on day 3 or 4 after RP, retention was observed in 19.3 % of the patients which required catheter replacement.[18] At 3 months after RP, 75% of their patients required no or single pad during 24 hours.[18] Our results with UVU suture were very satisfactory in this cohort, achieving a 74,5% and 92.2% of complete urinary control at 3 and 12 months, respectively. Almost all of our patients required no or single pad at the end of this period. Urinary retention was also infrequent most probably due to the routine prescription of an alpha adrenergic blocking agent in all patients.

Stricture formation at the site of anastomosis appears to be influenced by the timing of catheter removal as well. In a study analyzing the impact of timing, the rate of stricture formation was three times greater in the group in whom the catheters were removed on day 8 compared to day 4 (6% versus 2%, $p = 0.071$).[15] Similarly, Santis et al reported 9% bladder neck contracture rate in their study group that required dilatation or incision, when the catheters were removed on day 8 or 9.[17] However, contradictory findings were also reported and Filocamo et al observed symptomatic anastomotic strictures which required endoscopic treatment in only 3.3 % of their patients after removal of catheters on day 8.[19] Patel et al found a stricture rate of 12.1% in patients after the removal of catheters on post-operative day 3 or 4.[18] As a result of this study they recommended that removal of the catheters should be delayed until postoperative day 7 or later. Although, the incidence of anastomotic stricture after RP ranged widely in the literature, it was observed in only one patient in our UVU group, which is in support of the findings of Tiguert et al[15] and Noguchi et al,[20] all arguing against any untoward effect of early catheter removal in terms of anastomotic stricture formation. Indeed, early catheter removal appears to have beneficial effects concerning continence and possible decrease in the frequency of anastomotic strictures, alongside the early relief from the disturbance of the catheter. This issue has been raised previously by Lepor and co-workers who suggested that urethral catheterization causes patient discomfort and anxiety.[16] Thus, removal of the catheters as early as possible appears to be important for the quality of life of the patients. Discontinuation of the catheter earlier (day 4) was possible in almost twice as many patients in our UVU group (64.7% versus 36%) and in comparison to previously reported.[15]

Thus, removal of the catheter at an earlier time without any incontinence and stricture formation at the site of anastomosis can be considered as a factor improving the quality of life of the patients and functional outcome. One of the most critical steps to achieve this goal is a high quality, water-tight anastomosis. It is our understanding that bladder neck and urethral coaptation may be better with the increased flexibility provided by the UVU suture. Instead of fixing the anastomosis at a single point by the conventional sutures, this new technique appears to allow bladder neck to adapt better with the urethra by a greater flexibility of the tissue staying in the "loop" between the two arms of the suture, which in turn may be responsible for better continence. No urethral tear by the suture(s) was observed in any patients. Since the knot was placed over a relatively broad buttress of tissue on both the urethral and bladder neck sides, the risk of jeopardizing tissue perfusion was further decreased with dissipation of the tying force. These factors may also explain the infrequency of stricture formation in this cohort with a minimum follow-up of 12 months. Another advantage concerns the cost, since only four sutures were used forming eight arms through the anastomosis, which decreases the number of suture material used, yet provides more support than the conventional six suture technique.

Conclusion

Our results in this cohort of patients indicate that UVU suture may allow a high quality urethro-vesical anastomosis with a favorable outcome in terms of early

catheter removal, improved continence and decreased stricture formation in patients undergoing RP. The reproducibility of this observation requires further investigation in a multi-center setting with higher number of patients operated by different surgeons. □

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