

Procedure

Knotless “three-U-stitches” technique for urethrovesical anastomosis during laparoscopic radical prostatectomy

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Abbreviations & Acronyms

AUR = acute urinary retention
EBL = estimated blood loss
ECOG = Eastern Cooperative Oncology Group
IIEF-EFD = International Index for Erectile Function–Erectile Function Domain
LERP = laparoscopic extraperitoneal radical prostatectomy
PSM = positive surgical margin
RP = radical prostatectomy

Abstract: We describe a new technique for urethrovesical anastomosis that consists of placing three “U” stitches of Monocryl 2-0 to connect the bladder neck and urethral stump together. The margins are united by a double passage of the suture, without tying any knots. The sutures are tied on the bladder’s surface using Lapra-Ty clips fixed at a certain distance from where two mucosal margins have been joined. We carried out this technique on 90 patients who underwent laparoscopic extraperitoneal radical prostatectomy. The good joining of the margins, the absence of knots and the minimum trauma to the urethral wall together enable to create an anastomosis that is both “sealed” and “tension free”, allowing a quick “welding” of the margins and an early catheter removal. Regarding urinary continence, 56.6% (51) of patients were continent at catheter removal, 87.6% (78) were continent 3 months later and 98.9% (89) were continent after 6 months. In nine patients (10%), an episode of acute urinary retention occurred within 24 h after the removal of the catheter. We did not encounter any cases of vesicourethral anastomosis stenosis.

Key words: laparoscopic radical prostatectomy, prostate cancer, radical prostatectomy, urethrovesical anastomosis.

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Introduction

RP is the only treatment for localized prostate cancer to show a benefit in cancer-specific survival, compared with conservative management;¹ the laparoscopic technique presents a “minimally” invasive approach and has facilitated the ability of the surgeon, consequently decreasing the complication rate and improving cancer treatment. The main advantages are lower blood loss and transfusion rate, optical magnification, less postoperative pain with more rapid resumption of normal activities, and better cosmesis.^{2,3}

The ideal urethrovesical anastomosis should ensure: a good coupling of the urethral stump to the bladder neck with a quick “welding” of their margins allowing an early removal of the catheter, a complete and quick recovery of urinary continence, absence of postoperative stenosis, and ease and speed of execution for the surgeon.

Technique

From June 2010 to July 2011, 90 patients underwent extraperitoneal laparoscopic RP that used the “three-U-stitches” technique to accomplish final vesicourethral anastomosis; all the procedures were carried out by the same surgeon (Giovanni Zarrelli M.D.; Table 1).

The technique consists in carrying out three “U” sutures of Monocryl 2-0 (Ethicon, Somerville, NJ, USA) between the bladder neck and the urethral stump. Then the mucosal margins are joined by modulating the tension on the sutures, which are then fixed with the application of Lapra-Ty clips (Ethicon Endosurgery, Cincinnati, OH, USA) against the surface of the bladder (Fig. 1).⁴

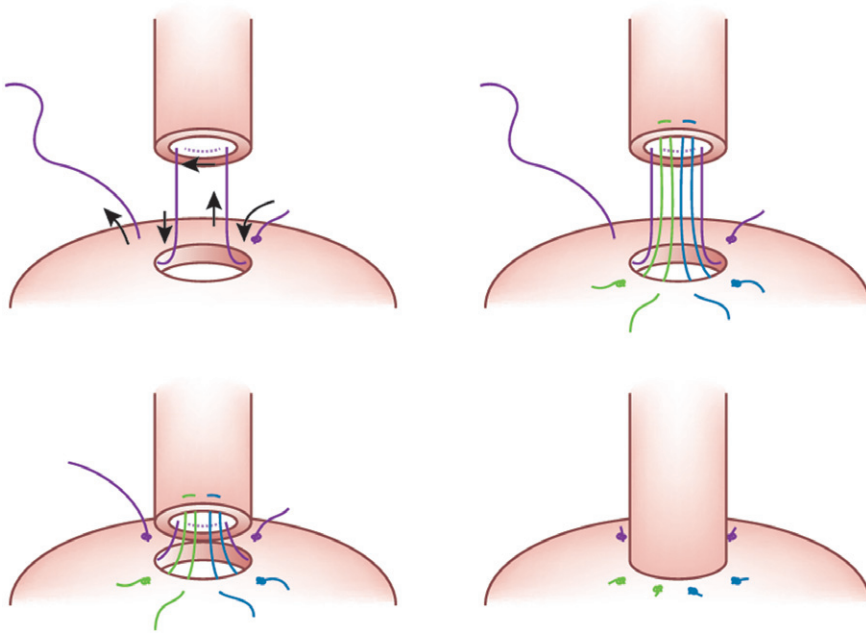


Fig. 1 Urethrovesical anastomosis preparation.

Table 1 Preoperative patients characteristics

	LERP
Patients (<i>n</i>)	90
Age, mean (range)	63.9 (47–72)
Baseline urinary function, mean (range)†	90.1 (79.2–101.0)
Baseline erectile function, mean (%)‡	69 (76.7%)
PSA (ng/mL), mean (range)	7.4 (2.2–14.0)
Gleason score < 7, <i>n</i> (%)	54 (60%)
Gleason score ≥ 7, <i>n</i> (%)	36 (40%)
Clinical stage T1, <i>n</i> (%)	5 (5.6%)
Clinical stage T2a, <i>n</i> (%)	5 (5.6%)
Clinical stage T2b, <i>n</i> (%)	36 (40%)
Clinical stage T2c, <i>n</i> (%)	34 (37.8%)
Clinical stage T3a, <i>n</i> (%)	10 (11.1%)
ECOG performance status 0, <i>n</i> (%)	51 (56.7%)
ECOG performance status 1, <i>n</i> (%)	35 (38.9%)
ECOG performance status 2, <i>n</i> (%)	4 (4.4%)
Risk factors, hypertension, <i>n</i> (%)	45 (50%)
Risk factors, diabetes, <i>n</i> (%)	15 (16.7%)

†Quality of life index. ‡IIEF-EFD >24.

The Lapra-Ty absorbable suture clip is a clip of absorbable polydioxanone that replaces a knot, allowing the surgeon to apply, where necessary, additional tension to the suture. It is completely resorbed in 90 days (Fig. 2).^{5,6}

Three 15-cm sutures with a Lapra-Ty applied at the end are prepared and the anastomosis begins by placing the posterior stitch (5 o'clock and 7 o'clock). The posterior suture runs in this sequence: bladder neck at 5 o'clock

(outside-inside)/urethra at 5 o'clock (inside-outside) and urethra at 7 o'clock (outside-inside)/bladder neck at 7 o'clock (inside-outside). At the end of the suture, to fix the stitch, a Lapra-Ty clip is applied on the side of the bladder tissue at 5 o'clock, approximately 2 cm away from the mucosa. The head of the suture that was connected to the needle remains free.

Then, antero-lateral right (1 o'clock and 3 o'clock) and antero-lateral left (9 o'clock and 11 o'clock) stitches are placed in the same sequence. The clips are thus fixed on the side of the bladder at 3 o'clock (antero-lateral right stitch) and at 9 o'clock (antero-lateral left stitch).

After placing a silastic catheter into the bladder, a little traction is applied on the still free ends of the three sutures in order to connect with the right tension the bladder neck to the urethral stump. At this point, other Lapra-Ty clips are added to fix the, until now, still free ends of the sutures. The first clip to be placed is the one at 7 o'clock, then we follow through with the clips to fix the antero-lateral right and left stitches (respectively at 1 and 11 o'clock).

Therefore, all six Lapra-Ty clips are fastened on the bladder side of the anastomosis, and have been connected by three "U" stitches. The right traction to join and stabilize the margins has been exercised on the free ends of the sutures before the application of the Lapra-Ty clips.

Most of the surgical interventions have been successfully carried out using the bladder-sparing technique. In just seven cases (7.8%), we experienced a large bladder neck that required us to add two sutures on the anterior bladder wall (at 12 o'clock) in order to obtain two surfaces with compatible amplitude before beginning the vesicourethral anastomosis.

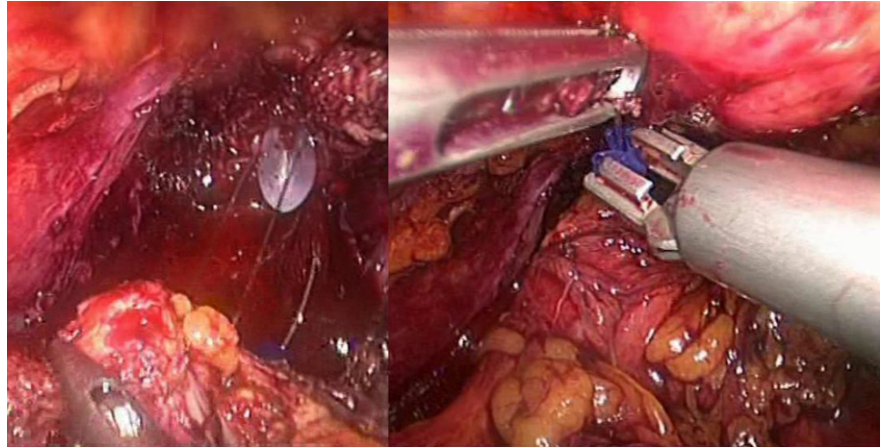


Fig. 2 Urethrovesical anastomosis preparation (intraoperative photos).

On the fifth postoperative day, a retrograde cystography was carried out and, in the absence of perianastomotic leakage, the catheter was removed.

We evaluated the patients' continence, potency and urinary symptoms by asking them to complete a questionnaire. We used the International Consultation of Incontinence Questionnaire in order to evaluate continence and the International Index of Erectile Function – Erectile Function Domain to assess erectile function.

In 88 patients (97.8%), the catheter was removed on the fifth postoperative day. Only in those patients (2.2%) who presented perianastomotic leakage, the catheter was removed after another 5 days (10th postoperative day).

In nine patients (10%), an episode of acute urinary retention occurred within 24 h after the catheter was removed and was treated with its repositioning for 3–5 days.

Regarding urinary continence, 56.6% of patients (51) were continent at catheter removal, 87.6% of patients (78) were continent 3 months after the surgery and 98.9% of patients (89) were continent after 6 months. We did not encounter any case of vesicourethral anastomosis stenosis (Table 2).

Discussion

A good anastomosis should be watertight, reproducible and efficient. Recently, some new procedures have been described in order to preserve continence and gain its quick recovery, Brunocilla *et al.* described a technique with the preservation of the smooth muscular internal (vesical) sphincter and of the proximal urethra during retropubic radical prostatectomy.⁷

Simone *et al.* described good results, in terms of continence recovery, of a simplified technique to configure the vesicourethral anastomosis and to restore posterior musculofascial plate during laparoscopic radical prostatectomy with a “single knot single running suture”, obtaining better outcomes than conventional Van Velthoven anastomosis.⁸

Table 2 Operative and postoperative patients' characteristics

	LERP
Total operative time (min), mean (range)	154 (113–222)
Anastomosis operative time (min), mean (range)	21 (13–32)
EBL (mL), mean (range)	195 (90–810)
Difficulty with intraoperative catheter change, <i>n</i> (%)	6 (6.7%)
PSM, <i>n</i> (%)	10 (11.1%)
Nerve sparing bilateral, <i>n</i> (%)	14 (15.6%)
Nerve sparing monolateral, <i>n</i> (%)	33 (36.7%)
5th day catheter removing, <i>n</i> (%)	88 (97.8%)
Leakage – 10th day catheter removal, <i>n</i> (%)	2 (2.2%)
AUR, <i>n</i> (%)	9 (10%)
Early urinary continence†, <i>n</i> (%)‡	51 (56.6%)
Third month urinary continence, <i>n</i> (%)‡	78 (87.6%)
Sixth month urinary continence, <i>n</i> (%)‡	89 (98.9%)
Anastomosis stricture, <i>n</i> (%)	0 (0%)
Sixth month erectile function, <i>n</i> (%)§	27 (30%)

†At catheter removal. ‡International Consultation of Incontinence Questionnaire. §IIEF-EFD >24.

Our technique further simplifies the anastomosis-making process: it takes just six passes through the bladder neck and six passes through the urethral stump, and does not require any knots. The time spent to achieve the anastomosis is greatly reduced. There is no risk of an ischemic side-effect caused by an excessive number of knots, too tight knots or excessive suture tension.

In the present study, we reported early continence in 56.6% of cases and sixth month continence in 98.9% of cases; we experienced no urethral stricture. It is important to remark that in the literature there is an extremely variable incidence of anastomosis stenosis ranging from 0.5% to 32%.^{9,10}

The main risk factors related to the pathogenesis of anastomotic strictures are perianastomotic urinary extravasation, blood loss, cervical/urethral ischemic damage, catheter withdrawal time and previous transurethral resection of the prostate.

Acute urinary retention occurred in nine patients (10%) and is an event frequently associated with early catheter removal.

The incidence in the literature is similar to the present findings, and the etiopathogenesis appears to be related to edema and postoperative bladder neck overtone.^{11,12}

In conclusion, the “three-U-stitches” technique to carry out vesicourethral anastomosis allows an optimal margin connection, absence of knots, less trauma to the urethral wall and anastomosis that is both “sealed” and “tension free”, which allows rapid “welding” of the margins and early catheter removal.

Conflict of interest

None declared.

References

- 1 Bill-Axelsson A, Holmberg L, Ruutu M *et al.* Radical prostatectomy versus watchful waiting in early prostate cancer. *N. Engl. J. Med.* 2011; **364**: 1708–17.
- 2 Coelho RF, Rocco B, Patel MB *et al.* Retropubic, laparoscopic, and robot-assisted radical prostatectomy: a critical review of outcomes reported by high-volume centers. *J. Endourol.* 2010; **24**: 2003–15.
- 3 Stolzenburg JU, Rabenalt R, Do M *et al.* Endoscopic extraperitoneal radical prostatectomy: oncological and functional results after 700 procedures. *J. Urol.* 2005; **174**: 1271–5.
- 4 Zarrelli G, Ginepri A, Mastrangelo P, Di Giacomo A, Iacovitti S, Crafa F. Anastomosi uretro-vescicale con tecnica “three U stitches”. *Collana Italiana di Video Urologia* 2008.
- 5 Andrews SM, Lewis JL. Laparoscopic knot substitutes: an assessment of techniques of securing sutures through the laparoscope. *Endosc. Surg. Allied Technol.* 1994; **2**: 62–5.
- 6 Anderson KR, Clayman RV. Laparoscopic lower urinary tract reconstruction. *World J. Urol.* 2000; **18**: 349–54.
- 7 Brunocilla E, Pultrone C, Perneti R, Schiavina R, Martorana G. Preservation of the smooth muscular internal (vesical) sphincter and of the proximal urethra during retropubic radical prostatectomy: description of the technique. *Int. J. Urol.* 2012; **19**: 783–5.
- 8 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; doi: 10.1007/s00345-012-0840-2.
- 9 Salomon L, Sebe P, De La Taille A *et al.* Open versus laparoscopic radical prostatectomy: part I. *BJU Int.* 2004; **94**: 238–43.
- 10 Salomon L, Sebe P, De La Taille A *et al.* Open versus laparoscopic radical prostatectomy: part II. *BJU Int.* 2004; **94**: 244–50.
- 11 Patel R, Lepor H. Removal of the urinary catheter on postoperative days 3 or 4 following radical retropubic prostatectomy. *Urology* 2003; **61**: 156–60.
- 12 Noguchi M, Shimada A, Yahara J, Suekane S, Noda S. Early catheter removal 3 days after radical retropubic prostatectomy. *Int. J. Urol.* 2004; **11**: 983–8.