



VESICO-URETHRAL ANASTOMOSIS DURING ROBOT-ASSISTED RADICAL PROSTATECTOMY USING THE INTERLOCKED BARBED UNIDIRECTIONAL V-LOC 180 SUTURE

Mansour Alnazari, Marc Zanaty, Roger Valdivieso, Assaad El-Hakim, Kevin C. Zorn

Section of Urology, Department of Surgery, Centre Hospitalier de l'Université de Montréal, Montréal, QC, Canada

ABSTRACT

The purpose of this paper is to describe the surgical technique, safety and feasibility of a running posterior reconstruction (PR) integrated with continuous vesicourethral anastomosis (VUA) using self-cinching unidirectional barbed suture in robot-assisted radical prostatectomy (RARP). Upon completion of radical prostatectomy, urinary reconstruction is carried out using 2 knotless interlocked 6-inches 3-0 V-Loc-180 sutures. The left tail of the suture is initially used for PR (starting at 5-o'clock and ran to re-approximate the retrotrigonal layer to the rectourethralis) followed by left-sided VUA (from 6- to 12-o'clock), while the right-sided suture completed the right-sided VUA. Watertight closure is always assured with an intraoperative 300 cc saline visual cystogram prior to case completion.

Key Words: Robotic prostatectomy, Anastomosis, VLoc suture, Outcomes, Prostate cancer



Video of this article can be accessed on www.robotictimes.org

INTRODUCTION

Robot-assisted radical prostatectomy (RARP) has progressively gained popularity amongst urologists and is now the dominant surgical approach for localized prostate cancer. One of the challenging aspects of this operation is producing a watertight vesicourethral anastomosis particularly in obese patients, men with deep and narrow pelvises, those with previous prostate surgery and men with large prostate size. The key elements in the vesicourethral anastomosis are the following: tension-free, well-vascularized, mucosal apposition, sparing of the neurovascular bundles and water-tight closure. Consequences to suboptimal VUA may result in urinary leak, ileus, prolonged catheterization, prolonged hospitalization, long-term incontinence and bladder neck contracture.

SUTURE MATERIAL

Continuous monofilament Van Velthoven suture is commonly used as a standard of care to perform the VUA during RARP. Limitation of monofilament suture include loss of tension due to suture loosening. A new FDA approved self-retaining suture (SRS) has been developed for plastic surgery, which can also be used in urological reconstruction. It is available as a unidirectional barbed suture (V-Loc, Covidien, Mansfield, MA) or bidirectional (Quill, Angiotech, Vancouver, BC) to secure tension-free tissue approximation. The benefits of the V-Loc or the Quill sutures are similar: they allow for "stronger, more water-tight closures"; "fewer gaps and consistent tension and hold around closure"; "reduced tissue recoil during suturing"; and the "elimination of knot tying." Several studies have reported on the improved

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Correspondence Address

Mansour Alnazari

Section of Urology, Department of Surgery, Centre Hospitalier de l'Université de Montréal, Montréal, QC, Canada

E-mail: dr.mansouralnazari@gmail.com

efficiency of the VUA using barbed suture to minimize slippage of suture tension (1).

THE V-LOC SUTURE IN RARP

VLoc suture is prepared from a copolymer of glycolic acid and trimethylene carbonate and consists of a barbed absorbable thread armed with a surgical needle at one end and a loop end effector at the other. It has tensile strength of 80% after 7 days, 75% after 14 days, and 65% after 21 days (2).

The main advantage of the self-retaining suture (SRS) V-Loc during RARP is the fact that both posterior reconstruction and VUA can be performed with the same inter-locked double arm suture, without the help of an assistant and without the need for knot tying. The 40-barbs per inch along its surface significantly reduces operative time, specifically for the VUA component even for expert surgeons (3). It can also be used for vascular pedicle control, dorsal venous complex control and bladder neck reconstruction.

SURGICAL TECHNIQUE

Hemostasis and Preparation

Following radical prostatectomy completion, two 6-inch 3-0 V-Loc 180 barbed sutures are interlocked via the tail loops by the scrub nurse and introduced for robotic reconstruction (Figure 1,2).

Venous bleeding control should be managed as significant oozing can hamper visualization of key anatomic structures. In

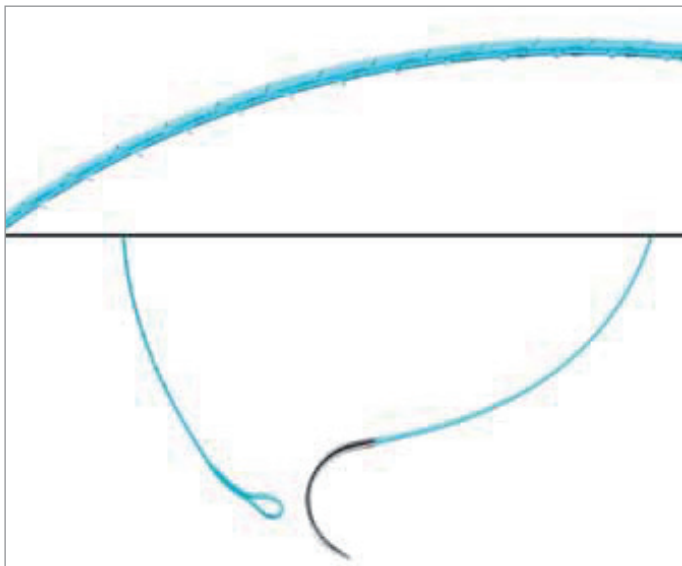


Figure 1: Close up view of the V-Loc 180 suture demonstrating the unidirectional barbs (40 barbs/inch) along the circumference of the suture, the terminal loop and the tapered V-20 needle. Note the lack of barbs along the last 2 cm proximal to the needle.

this effect, bleeding can be controlled by an increase in intra-abdominal pressure to 20 mm Hg, usage of spot coagulation, hemostatic suture placement or clipping. In difficult cases where continued oozing is encountered, use of Surgicel and fibrin-based hemostats can be applied (3).

Bladder Neck Assessment

Larger prostates, the presence of a median lobe and a difficult bladder neck dissection could lead to a size discrepancy between the bladder neck and the urethral stump. To help with reducing the diameter of the bladder neck opening in these patients, an anterior "tennis racket" running suture can be used. Alternatively, lateral closure at the 3' and 9' o'clock positions can also be carried out with an absorbable suture.

Posterior Rhabdosphincter Reconstruction

Posterior reconstruction is first performed with a first bite taken from the 5-o'clock retrotrigonal area followed by periurethral rectourethralis muscle. The suture is pulled through until the interlocked loops abut with the tissue providing resistance, as a knot would. A second bite is then taken from the midline retrotrigonal area behind the bladder followed by a 6-o'clock bite of the periurethral tissue. Care is made to ensure there is no cephalad traction on the bladder prior to cinching. Finally, a final 7-o'clock suture is taken on the bladder-side retrotrigonal tissue again ensuring not to include any mucosa. The left arm of the interlocked V-Loc suture is then lifted cephalad and anteriorly with the left needle driver, while the open right needle driver set on the bladder tissue to serve as a fulcrum point to avoid tissue tearing. The bladder is thus cinched down with repetitive, short pulls until the bladder neck mucosa

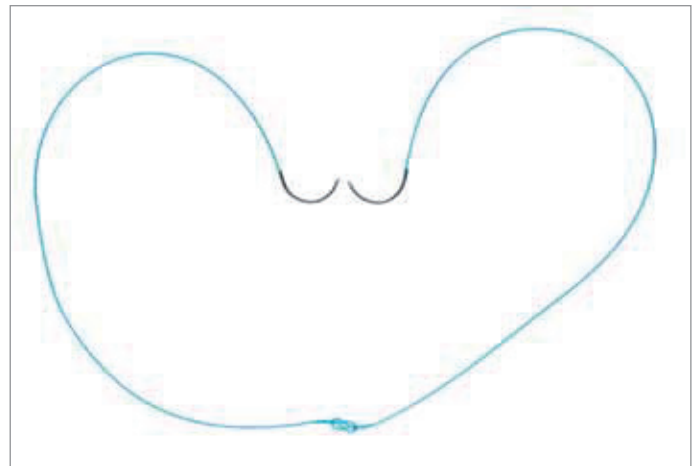


Figure 2: Interlocked V-Loc configuration for posterior reconstruction and vesicourethral anastomosis. Note the use 2 six-inch sutures in which the loops of both suture are threaded by the opposite needles. As such, an efficient, knotless setup.

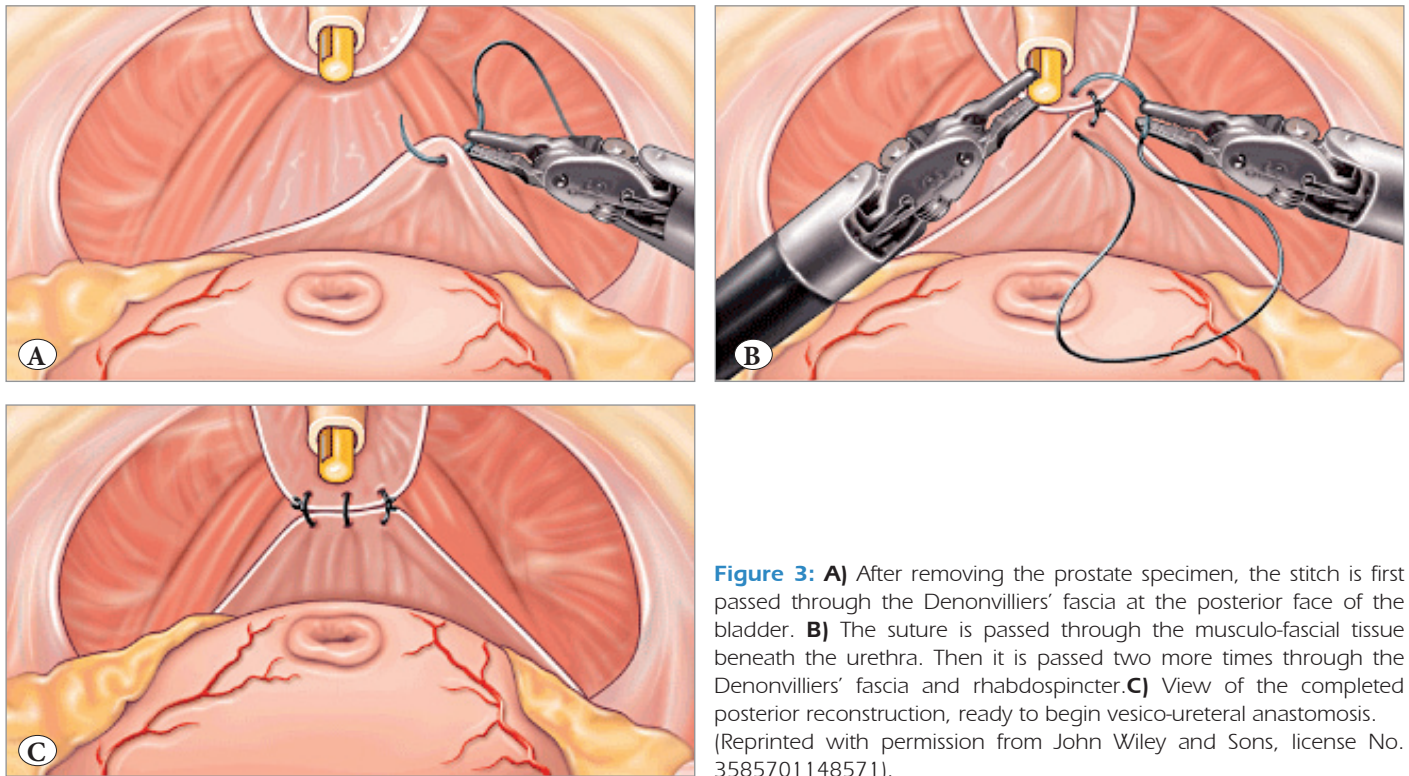


Figure 3: **A)** After removing the prostate specimen, the stitch is first passed through the Denonvilliers' fascia at the posterior face of the bladder. **B)** The suture is passed through the musculo-fascial tissue beneath the urethra. Then it is passed two more times through the Denonvilliers' fascia and rhabdospincter. **C)** View of the completed posterior reconstruction, ready to begin vesico-ureteral anastomosis. (Reprinted with permission from John Wiley and Sons, license No. 3585701148571).

is adjacent to the urethral stump with no gap (3) (Figure 3) (Figure 4, part a).

Vesicourethral Anastomosis and Anterior Retropubic Suspension

Once the posterior reconstruction is complete, the same left arm of the interlocked suture begin the VUA starting with a 6-o'clock, out-side-in, transmural bite of the bladder followed by an inside-out bite of the posterior urethra. The assistant may pass the tip of the urethral catheter if there is any question of backwalling the mucosa. The outside-in bites along the bladder and the inside-out urethral bites are continued from 6- to 10-o'clock, each time cinching the tissue with the right needle driver straddling the suture to avoid urethral earing (Figure 4, part b). Rather than completing the complete left side of the VUA and therefore obscuring the posterior anastomosis, the right arm of the V-LOC stitch is used to complete a synchronous process starting from an outside-in 5- o'clock bladder bite to a 5-o'clock inside-out urethral throw. Care should be made not to incorporate the neurovascular bundles or rhabdospincter muscle with aggressive bites. Repetitious passes are continued for the entire right side (5- to 12-o'clock) with final pass, each time, independently assuring adequate tension (obviating the need for the bedside assistant to follow tension). The right arm is finally brought through the anterior urethral side and cut

with a 2 to 3 cm stump. The left wall is then completed in a running fashion from the 10- to 12-o'clock location again finishing on the anterior urethra. Prior to cutting the left arm V-Loc suture, the integrity of the VUA should be verified with 300 cc normal saline instilled in the bladder (Figure 4, part c). If any leakage is seen, further cinching of the suture or placement of additional V-Loc bites would be required. Now the anastomosis is completed, the left arm of the V-Loc is used for anterior retropubic suspension taking 2 passages into the posterior part of pubic symphysis, and then cutting it with a 2-3cm stump. The two cut-ends are left untied thus allowing for a completely, knot-free reconstruction (3).

Catheter Removal: Urinary Retention and VUA Leakage

In our experience, we always test the anastomosis, intra-operatively, with 300 cc of normal saline to verify watertightness. If leakage is detected, urethral catheter is left in place for 7-10 days. However, if there is no evidence of leakage, urethral catheter is removed after 4 days. In a recently published article, we presented the results of 722 patients, who underwent RARP for localized prostate cancer (4). We reported 0 bladder neck strictures, 3 vesico-urethral anastomosis leakage (0.4%) and 4 urinary retention needing Foley catheter replacement (0.6%), demonstrating the excellent outcome of our vesico-urethral anastomosis.

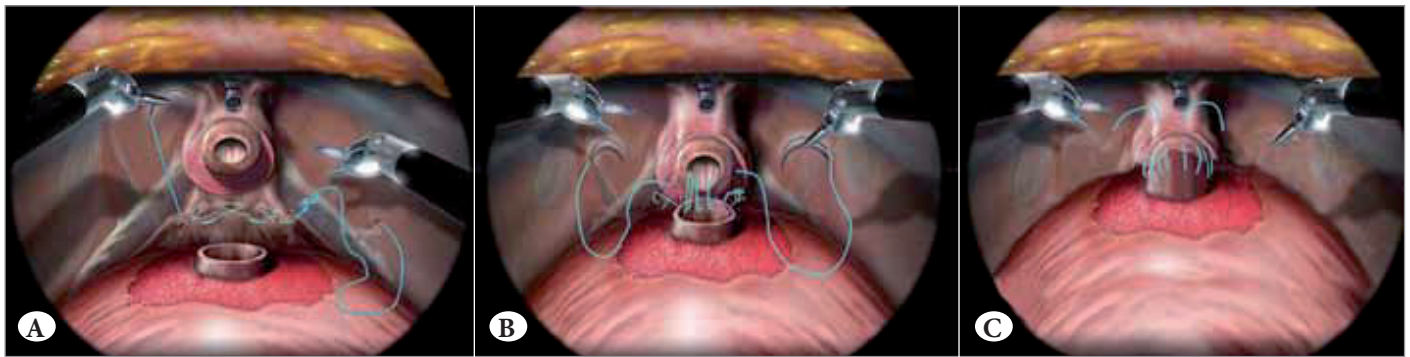


Figure 4: Overview of the posterior reconstruction (PR) and vesicourethral anastomosis using the interlocked V-LOC suture. **A)** the left-arm of the hybrid suture is passed initially at the 5-o'clock position of the retrotrigonal tissue. The suture is pulled through until the inter-twined loops oppose the tissue providing resistance. (red *) Using 3 consecutive bites, the PR helps approximate the edge of the bladder neck to the peri-urethral tissue. **B)** The left arm of the suture is then passed transmurally through the 6-o'clock bladder neck and used to commence a standard Van Velthoven anastomosis. The right arm is then used to close the right-sided VUA. **C)** A visual cystogram with 300mL of saline is performed to ensure no leakage after which the needles are cut and the remaining suture is left in-situ (no knot).

TAKE HOME MESSAGE

- Before starting the anastomosis venous bleeding control should be managed well as significant oozing can hamper visualization.
- Posterior reconstruction and VUA can be performed with the same inter-locked double arm V-Loc suture, without the help of an assistant and without the need for knot tying, with trustable anastomotic strength and less operative time.
- Maximizing urethral length has been correlated with better and earlier recovery of urinary continence.
- Anterior suspension gives more support for the anastomosis and add additional compression and control of DVC.
- Bladder filling at the end can verify watertight anastomosis and detect leakage.

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