Robotic-Assisted Radical Prostatectomy with the Use of Barbed Sutures

ANGELO PORRECA, MD
UROLOGIST/CHIEF
DEPARTMENT OF UROLOGIC ROBOTIC SURGERY
POLICLINICO DI ABANO TERME
ABANO TERME, ITALY

ANTONIO SALVAGGIO, MD
UROLOGIST
DEPARTMENT OF UROLOGIC ROBOTIC SURGERY
POLICLINICO DI ABANO TERME
ABANO TERME, ITALY

MATTEO DANDREA, MD
UROLOGIST
DEPARTMENT OF UROLOGIC ROBOTIC SURGERY
POLICLINICO DI ABANO TERME
ABANO TERME, ITALY

EMANUELE CAPPA, MD
UROLOGIST
DEPARTMENT OF UROLOGIC ROBOTIC SURGERY
POLICLINICO DI ABANO TERME
ABANO TERME, ITALY

ALESSIO ZUCCALA, MD
UROLOGIST
DEPARTMENT OF UROLOGIC ROBOTIC SURGERY
POLICLINICO DI ABANO TERME
ABANO TERME, ITALY

ALESSANDRO DEL ROSSO
UROLOGIST
DEPARTMENT OF UROLOGIC ROBOTIC SURGERY
POLICLINICO DI ABANO TERME
ABANO TERME, ITALY

DANIELE D’AGOSTINO
UROLOGIST
DEPARTMENT OF UROLOGIC ROBOTIC SURGERY
POLICLINICO DI ABANO TERME
ABANO TERME, ITALY

ABSTRACT

Objectives: The aim of this study is to analyze the principal advantages of posterior muscolo-fascial reconstruction using knotless barbed sutures (BS) during robot-assisted radical prostatectomy (RARP).

Materials and Methods: We analyzed the available evidence regarding the efficacy and safety of principal BS (Quill™ SRS Angiotech Pharmaceuticals Inc., Vancouver, Canada; V-Loc™ Medtronic, Dublin, Ireland; STRATAFIX™ Ethicon Inc., Somerville, New Jersey; Filbloc® Assut Europe S.p.A., Rome, Italy).

Results: We analysed the principal outcomes (operative time and suturing time of urethra-vesical anastomosis, length of catheterization, hospital stay, and postoperative complications rate) reported in literature.
Urethrovesical anastomosis with posterior muscolofascial reconstruction is a critical step in robot-assisted radical prostatectomy (RARP) and may play a role in urine leak, bladder neck contracture, continence, and duration of catheterization. The surgical technique was first described by Rocco et al. in 2006. In this analysis, the posterior part of the rhabdoshincter is joined with the proximal edge of the Denonvilliers’ fascia (DF). Subsequently, Van Velthoven et al. described a single knot urethrovesical anastomosis in RARP. Currently, the combination of both techniques provides the best guarantees in terms of risk of urinary leakage and achievement of early continence. In actuality, barbed sutures (BS) are used for the realization of urethrovesical anastomosis with clear advantages in terms of surgical outcomes.

The aim of this work is to evaluate the use of BS during RARP, particularly with regard to urethrovesical anastomosis in comparison to the conventional suture (CS).

The main BS currently in use are represented by:
- Quill™ SRS
- V-Loc™ Absorbable Wound Closure device
- STRATAFIX™
- Filbloc®

To perform a valid vesicourethral anastomosis, there are some key points that the surgeon should always keep in mind. First, the anastomosis must be tension-free and must allow precise alignment between the bladder neck and the urethral stump. Second, the suture should be non-ischemic and waterproof to prevent urinary leakage and to avoid postoperative strictures. Third, the method should be easy to learn and of rapid execution. The success of a vesicourethral anastomosis, therefore, depends upon meticulous attention to detail and the optimization of technical factors that affect anastomotic integrity. The single-knot running vesicourethral anastomosis respects these principles and has become a common method of reconstruction. In our experience, we performed the muscolofascial posterior reconstruction and the urethro-vesical anastomosis using a 35 or 45 cm bidirectional BS (Filbloc®). The first step consists of stitching the Denonvilliers’ fascia (DF) with both needles and securing the suture to two ends of the same wire. With the left end, the DF is approximated to the posterior part of the sphincteric apparatus (fibrous part), usually taking two bites from left to right (Fig. 1). To prevent the high tension, the suture is gently pulled. Lastly, the right end of the suture is stitched to secure the fascia to the posterior part of the sphincteric apparatus. In the second step, with the left end of the suture at the posterior edge of the bladder neck, the posterior edge of the urethra is stitched with two running bites from left to right, then gently approximated. The step is completed with the right end stitched from the posterior edge of the bladder neck to the posterior edge of the urethra from right to left (Fig. 2). Then, in the third step, the urethrovesical anastomosis is completed using the left end starting clockwise from the 7 o’clock to 12 o’clock position and the right end starting anticlockwise from the 5 o’clock to 12 o’clock position to meet the other suture (Fig. 3). The two needles are cut and the two ends of the suture are left in place without the knot. The 18 F catheter is changed and the balloon is inflated with 10 ml of water. Lastly, the bladder is inflated with 200 ml of water to check for any leaks (Fig. 4).

Conclusions: In light of our experience, we believe that the utilization of BS during RARP is safe as the development of new surgical technique of urethrovesical anastomosis offers advantages in terms of continence rate, length of catheterization, and other surgical outcomes. Other studies (prospective trials) are necessary to investigate the real benefits of BS in comparison to conventional sutures (CS).
We analyzed the available evidence regarding the efficacy and safety of principal BS, in particular, we searched PubMed, Embase, and The Cochrane Library to identify all randomized controlled trials (RCTs) and other comparative studies evaluating the principal types of BS during RARP. The outcome measures included anastomosis operative time, posterior reconstruction (PR) time, postoperative leakage (PL) rate, and continence rates at different time points (four to six weeks, three months, six to 12 months) after surgery. Secondary outcomes included estimated blood loss (EBL) and length of catheterization (LOC).

Anastomosis and posterior reconstruction operative time
Of all the studies considered, only a few reported the surgical time considered. The majority of studies considered stated that the anastomosis time was significantly shorter in the BS group than CS. Although the heterogeneity was high, the pooled and individual outcomes all showed significantly shorter time in the barbed group. In our experience, using the Filbloc®, the median time of complete reconstruction (PMFR and urethrovesical anastomosis) was 19 minutes (11–38), three minutes (2–5), and 16 minutes (12–19), respectively. Tewari et al. compared V-Loc™ to MONOCRYL® (Ethicon Inc., Somerville, New Jersey) in anastomosis vesico-urethral; they reported an important decrease in surgical time with V-Loc™, whereas, Moran et al. highlighted minimal differences in operative time when comparing Quill™ to MONOCRYL®. Hemal et al. compared V-Loc™ to MONOCRYL® and reported shorter operative times (eight vs. 14 minutes) and higher surgeon comfort with the V-Loc™.

Estimated blood loss
Few studies reported outcomes of estimated blood loss during urethrovesical anastomosis performed by balrbed sutures. The pooling dates also did not present significant benefits of BS over CS.

Length of catheterization and continence rate
The principal studies did not suggest a statistically significant association between the suture types and catheterization duration. This finding, however, was statistically heterogeneous. In our experience, the median time of catheterization was three days. In the last three months, we have started to take out the catheter on the second day after surgery only in selected patients.
Continence was defined when patients had no need for pads usage postoperatively. Five cohort studies reported continence rates after surgery; however, the data were not ready for pooling. Four of the studies suggested no difference in overall pad usage between two groups at four weeks, six weeks, five months, six months, and 12 months. Furthermore, two studies demonstrated that patients using CS had higher continence rates at two months and six months, respectively.

**Postoperative complications**

The principal anastomosis-related complications are urinary leakage, urethra formation, bladder neck contractures, and anastomotic strictures. After performing a urethral vesical anastomosis with BS, the incidence of anastomotic leakages vary, ranging from 0 to 7.5%. Compared to other sutures, the investigators have found that the BS reduces the urinary leakages.

Other cohort studies reported raw event data on postoperative complications. Sammon et al. randomized 64 patients undergoing RARP to have the urethral vesical anastomosis performed with a BS versus standard monofilament and non-significant differences in urinary leakages and late bladder neck contractures were found. Zorn et al. compared MONOCRYL® versus V-Loc® and observed that neither one resulted in urinary leakages, and late bladder neck contractures occurred in the V-Loc® group (the continence rate was similar).

**DISCUSSION**

In this review, we have analyzed randomized and non-randomized studies to evaluate BS on realization of urethral vesical anastomosis during RARP. Frequently, the short follow-up, small number of patients, and the retrospective evaluation can make the evaluation of results complicated. With regard to continence rate—which is the most critical functional outcome after RARP—we found equivalence between BS and CS. The operative procedures used to improve the recovery urinary continence following radical prostatectomy includes preserving the fascia covering the elevator ani muscle, preserving the bladder neck, preserving neurovascular bundles, suspending the vesico-urethral anastomosis, and performing an anterior reconstruction. However, in light of our experience, we believe that the combination of the musculo-fascial reconstruction and the urethral vesical anastomosis with one bidirectional BS has all the advantages of both techniques plus the stability of a single running suture. Ficarra et al., in a systematic review of the literature concerning the urinary continence recovery after RARP, compared the outcomes of patients that underwent RARP with PMFR vs. patients that underwent RARP with the standard technique. The cumulative analysis showed a small statistical advantage in favour of posterior reconstruction after one month. In 2012, a similar technique of urethral vesical anastomosis with PMFR was described by Ficarra et al. in the first 200 prostate cancer patients. They incorporated the posterior musculofascial in the anastomosis’ posterior plate with a running BS, and the authors reported an immediate urinary continence recovery of 87.5% and 95% at mean follow up of nine months.

The pooled data indicates that BS is, in general, as safe and effective as CS. In fact, we observed a reduction of suture time, operative time, and hospital stay compared with CS. There was no significant change concerning estimated blood loss, length of catheterization, and postoperative complications. In particular, urinary leakage is one of the most important complications of RARP, because it prolongs catheterization time. We observed, in the literature, that the rate of UT was comparable between CS and BS; however, the data are poor and the majority of the analysis are retrospective.

The role of BS during RARP remains controversial due to limitations in this paper—only a small number of RCTs were recruited and the pooled data were not persuasive. In addition, we observed high heterogeneity among studies. Nevertheless, in light of our experience, we believe that the utilization of BS during RARP is safe, and the development of the new surgical technique of urethral vesical anastomosis offers advantages in terms of continence rate, length of catheterization, and other surgical outcomes. Other studies (prospective trials) are necessary to investigate the real benefits of BS in comparison to CS.

**CONCLUSION**

The authors have no conflicts of interest to disclose.

**REFERENCES**