

Retrospective Study

Barbed polyglyconate vs monocryl suture in vesico-urethral anastomosis during robot-assisted radical prostatectomy

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Abstract

AIM: To compare outcomes using barbed polyglyconate (V-Loc 180) vs monofilament monocryl suture in forming vesico-urethral anastomosis (VUA) during robot assisted radical prostatectomy.

METHODS: Review of prospectively collected robot assisted radical prostatectomy data between July 2011 and September 2012. VUA technique: VUA was performed using 2 cm × 15 cm 2/0 V-Loc 180 continuous sutures or 3/0 monofilament monocryl sutures. Anastomotic integrity was tested intra-operatively with a water leak test. All patients had a post-operative cystogram at day 7 to 10.

RESULTS: There were 189 patients in the study with 113 in the V-Loc group and 76 in the monocryl group. Demographics were similar for both groups ($P > 0.05$). The median operative time for V-Loc group was 130 min and monocryl group was 145 min, which was statistically significant ($P < 0.001$). The median blood loss for both groups was 200 mL with no significant difference ($P = 0.260$). The pathology results of the 2 groups were similar ($P = 0.537$). Four patients in the V-Loc group and two patients in the monocryl group had radiological urinary leak. This was not statistically significant ($P = 1.00$) and all patients improved with conservative management. The continence rates were comparable for both groups.

CONCLUSION: V-Loc suture significantly reduced operative time facilitating ease of VUA formation. Overall functional outcome and urinary morbidity were not significantly different from the monofilament group.

Key words: Prostatectomy; Prostate cancer; Robotic surgery; V-loc, Monocryl; Anastomosis; Operative time; Gleason score; Prostate volume; Incontinence

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Core tip: The V-Loc suture was found to significantly reduce the operative time and facilitate ease of vesico-urethral anastomosis formation. The overall functional outcome and urinary morbidity were not significantly different from the conventional monofilament group.

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INTRODUCTION

Robot-assisted radical prostatectomy (RARP) is a common procedure for the management of localised prostate cancer. The formation of vesico-urethral anastomosis (VUA) is an aspect that remains a challenge in RARP. Commonly, a running continuous single knot VUA is implemented as described by Van Velthoven^[1]. However, this can be challenging to perform, and the monofilament suture may slip as the anastomosis is fashioned. Accordingly the surgeon must constantly check suture tension to avoid urine leaks.

The V-Loc 180 is a unidirectional barbed (40 barbs per inch), self-anchoring suture (Covidien, Mansfield, MA, United States), a polyglyconate suture composed of a 180-day absorbable copolymer of glycolic acid and trimethylene carbonate. The barbs prevent sliding of the suture from the tissue whilst providing evenly spread of tension with its barbed points.

The unidirectional barbed suture has been introduced in plastic surgery and has demonstrated good results in tissue apposition and healing^[2,3]. As such it is an appealing choice for VUA formation. Evidence suggests that this suture affords an effective anastomosis with adequate tension without ischaemia or inflammation^[4,5]. With its relative ease of use, it has also been shown to decrease the time to perform VUA in robot-assisted radical prostatectomy^[4-10].

This study aims to report the outcomes of using a barbed suture, V-Loc 180, compared with the conventional monofilament monocryl in forming the VUA in RARP performed by two surgeons in a private hospital setting in Australia.

MATERIALS AND METHODS

This was a prospective study of patients undergoing robot-assisted radical prostatectomy by two urologists at a private hospital in Brisbane, Australia. The hospital committee approved ethics for the study. Consecutive patients undergoing VUA using V-Loc 180 suture and conventional 3/0 monocryl were included from the study period between July 2011 and September 2012. Demographics [age, body mass index (BMI), prostate specific antigen (PSA)] and perioperative data (operative time, blood loss, pathology, anastomosis leak, continence, complications) were collected for analysis.

VUA technique

Following bladder neck reconstruction and the completion of a posterior rhabdosphincter reconstruction (Rocco stitch) where appropriate, vesico-urethral anastomosis was performed using 2 cm × 15 cm 2/0 V-Loc 180 continuous sutures or 3/0 monofilament monocryl sutures. Anastomotic integrity was tested intra-operatively with a water leak test. All patients had a post-operative cystogram at day 7 to 10.

Statistical analysis

Statistical analysis was carried out using mean ± SD for age, BMI, PSA, prostate volume. Median and interquartile range was used for other data. Where appropriate, student *t*-test and Mann-Whitney Wilcoxon (operative time and blood loss) tests were used. Fisher Exact test was used for anastomotic leak comparison. The categorical variables was analysed with χ^2 test. The *P* value was set as < 0.05. Analysis was performed by Devang Desai and Kevin Lah.

RESULTS

There were 189 patients who underwent robot-assisted radical prostatectomy during the study period who were included. One hundred and thirteen patients had VUA formed by V-Loc suture and 76 patients *via* monocryl suture. The age, BMI and PSA for the two groups were similar in characteristics (Table 1).

The V-Loc group had a median operative time of 130 min whereas the monocryl group had 145 min which was statistically significant (*P* < 0.001). The median blood loss for both groups was 200 mL with no significant difference (*P* = 0.260). The pathology results of the 2 groups were similar (*P* = 0.537). In the V-Loc group, 70 patients (62%) had pT2 disease with a 2.9% positive margin rate and 43 patients (38%) had pT3 disease with a 42% positive margin rate. The monocryl group had 51 patients (67%) with pT2 disease with a 0% positive margin rate and 25 patients (33%) with pT3 disease and a 36% positive margin rate. There were 4 patients in the V-Loc group with radiological urinary leak and 2 patients in the monocryl group. However this was not statistically significant (*P* = 1.00) and all patients

Table 1 Demographics

Analysis (n = 189)	V-loc (n = 113)	Monocryl (n = 76)	P value
Age (yr)	61.09 ± 6.36	61.45 ± 6.95	0.6439
BMI (kg/m ²)	27.67 ± 3.89	27.65 ± 3.09	0.9686
PSA (ng/mL)	6.98 ± 4.67	6.41 ± 2.74	0.3443
Median prostate volume (mL)	48 (38.87- 56.85)	46.7 (40-57.5)	0.97606

BMI: Body mass index; PSA: Prostate specific antigen.

Table 2 Operative data n (%)

Analysis (n = 189)	V-loc (n = 113)		Monocryl (n = 76)		Test P value
Study demographics	Median	IQR	Median	IQR	
Operative time (min)	130	100-150	145	125-180	< 0.001
Blood loss (mL)	200	100-350	200	120-400	0.26
Gleason score					
3+3	4		1		
3+4	59		40		
4+3	21		22		0.224
4+4	1		1		
4+5	26		9		
5+4	2		3		
Pathology					0.537
pT2	70 (62)		51 (67)		
+ ve margin status	2 (2.9)		0 (0)		
pT3	43 (38)		25 (33)		
+ ve margin status	18 (42)		9 (36)		
Radiological leaks	4 (3.5)		2 (2.6)		1.00
3 mo continence					0.726
0 pads	68 (60)		50 (65)		
1 pad	31 (27)		19 (25)		
2 pads	12 (11)		5 (7)		
3 or more pads	2 (2)		2 (3)		

IQR: Inter quartile range.

improved with conservative management. Two patients required catheterisation for 7 d and one patient for 12 d. There were no clinically significant leaks in both groups. At 3 mo, the continence rate was similar for the 2 groups with 68 patients (60%) in the V-Loc group being pad-free continent and 50 patients (65%) in monocryl group. Thirty-one patients (27%) in the V-Loc group required 1 pad per day and 19 patients (25%) in the monocryl group. 12 patients (11%) in the V-Loc group required 2 pads/d and 5 patients (7%) in the monocryl group. 2 patients in each V-Loc and monocryl groups required 3 or more pads, 2% and 3% respectively (Table 2).

The aim of the study was not to examine potency and that we do not have meaningful long term 12 mo potency data as we were only examining the performance of the anastomosis. However, there were no cases of urethrovesical anastomotic stenosis in this study.

A detailed cost-benefit analysis was not the focus of this study. None-the-less it is worth noting that at our institution, the cost of a single V-Loc suture is \$AU28.67 compared to that of Monocryl at \$AU10.59. However use of the V-Loc was associated with a significantly shorter operating time. Given that the running costs of an operating theatre are around \$AU22.00 per minute, this

reduction in operating time offsets the increased suture cost and indeed may translate into cost savings for the hospital through increased efficiency.

DISCUSSION

Barbed suture is commonly used in the formation of VUA in RARP. The results demonstrated in this study were comparable to that of the literature since its introduction in urology for the VUA formation in RARP^[11].

Williams *et al*^[12] compared the use of one of the first barbed polyglyconate suture materials in the market to the standard polyglactin 910 suture (Vicryl, Ethicon, Somerville, NJ, United States) in the formation of VUA during RARP. Although the VUA time was statistically reduced in the barbed suture group, there was no difference in the overall operative times. With their initial experience, barbed suturing was reported to be more costly and required technical modification to avoid over-tightening, delayed healing and longer catheterisation time. They found that more patients in the barbed suture group had contrast extravasation on day 8 cystogram.

Conversely, Tewari and colleagues demonstrated that the barbed suture, V-Loc, was feasible in formation of the VUA in their study by comparing 50 consecutive patients undergoing RARP with V-Loc and 50 patients with the conventional monofilament suture prior to this new technique^[4]. The V-Loc group had a significantly shorter posterior reconstruction and VUA times. The median operative time was 106 min for the V-Loc group with estimated blood loss of 150 mL. Only one patient in the V-Loc group had a small urinary leak which resolved with conservative measures. The conclusion was that a barbed suture was effective in improving operative times but needed further follow-up for urinary leak rates and functional outcomes.

Similarly, Zorn *et al*^[13] found this novel technique to be safe and efficient. Their case series of 30 consecutive patients showed a mean operative time of 166 min, VUA time of 11.3 min and posterior reconstruction time of 3.3 min. They implemented Lapra-Ty clips, an absorbable anchoring device at the ends of V-Loc sutures to prevent slippage. The 3 mo pad-free continence was 65%, which was comparable to our 60%. Zorn *et al*^[5] later published a prospective randomised controlled trial comparing V-Loc with standard monofilament suture in RARP. Although the total operation time was similar for both groups, the VUA time was significantly less in the V-Loc group. The 3 mo pad-free continence rate was better than their previous result with 81% in the V-Loc group and 76% in the monofilament group. Their overall conclusion was that use of barbed suture, V-Loc, was more efficient and cost effective, especially in minimising nurse set-up time and avoiding the use of absorbable suture clips.

Sammon *et al*^[6] similarly performed a randomised controlled trial comparing barbed vs standard monofilament sutures in RARP. In their multi-surgeon trial, 33 patients underwent V-Loc VUA and 31 patients had the

conventional monofilament VUA. Similar to the literature, the authors found the new barbed suture to be safe and efficient in reducing the VUA time. Their median operative time was 184 min and 201 min for the V-Loc and monofilament groups, respectively. Six week pad-free continence rate was 51.6% for the V-Loc group and 50% for the monofilament group.

Furthermore, Massoud and team in France demonstrated that the V-Loc suture was effective and economically sound in VUA formation during RARP, whilst showing no difference in continence rates and complications compared with the conventional monofilament suture^[10]. There have been many studies favouring the use of barbed suture in VUA during RARP^[7,8,14].

Interestingly, Manganiello *et al*^[15] found no difference in VUA time between barbed suture and standard monofilament suture in their prospective study of 35 patients in each group. The authors commented that the involvement of residents in operative cases could have contributed to the lack of difference. Other outcomes of urinary morbidity was comparable to the control group and the authors state that they prefer the use of V-Loc in VUA as it obviates the need for an assistant to follow the suture to continually reapply tension to previous throws.

Our outcomes of operative time, blood loss and urinary morbidity are comparable to that of the literature. We have found that the V-loc suture simplifies the formation of the VUA and allows the anastomosis to be fashioned with confidence. Whilst the suture can be brittle, careful handling of the needle only, while minimizing direct handling of the suture itself has minimised any issues related to the suture snapping. One could also be concerned with regard the potential for a cheese-wire effect to occur when tension is present. However, in such cases the suture has been particularly useful as it keeps the anastomosis nicely together, while monofilament sutures by comparison would slip. It is important though to ensure that the suture is drawn through at right angles to the tissue to mitigate any cheese-wire effect. Limitations of the study include its relatively small sample size and lack of randomisation. None-the-less the series demonstrates the usefulness of the V-loc suture in VUA formation in a local Australian series.

In conclusion, the V-Loc suture was found to significantly reduce the operative time and facilitate ease of VUA formation. The overall functional outcome and urinary morbidity were not significantly different from the conventional monofilament group.

COMMENTS

Background

Barbed suture is commonly used in the formation of Vesico-urethral anastomosis (VUA) in robot-assisted radical prostatectomy (RARP). The results demonstrated in this study were comparable to that of the literature since its introduction in urology for the VUA formation in RARP.

Research frontiers

Larger randomized trial is required to evaluate the efficiency of barbed suture in

performing VUA in RARP.

Innovations and breakthroughs

Their outcomes of operative time, blood loss and urinary morbidity are comparable to that of the literature. We have found that the V-loc suture simplifies the formation of the VUA and allows the anastomosis to be fashioned with confidence. Whilst the suture can be brittle, careful handling of the needle only, while minimizing direct handling of the suture itself has minimised any issues related to the suture snapping. One could also be concerned with regard the potential for a cheese-wire effect to occur when tension is present. However, in such cases the suture has been particularly useful as it keeps the anastomosis nicely together, while monofilament sutures by comparison would slip. It is important though to ensure that the suture is drawn through at right angles to the tissue to mitigate any cheese-wire effect.

Applications

VUA can be safely and effectively performed using V-loc suture during RARP.

Terminology

RARP Robot assisted radical prostatectomy; VUA: Vesicourethral anastomosis.

Peer-review

This study aimed to compare the barbed polyglyconate suture (V-Loc 180) with standard monofilament monocril suture in VUA during robot-assisted radical prostatectomy. It is simple and well written.

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