

Ventral Onlay Vaginal Graft Urethroplasty for Female Urethral Stricture Disease

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ABSTRACT

Urethral stricture in female patients is rare, usually underdiagnosed and often overlooked. We aim to present our results in a series of woman surgically treated for urethral stricture disease using ventral onlay vaginal graft urethroplasty. All 3 women who were diagnosed with urethral stricture and underwent ventral onlay vaginal graft urethroplasty between October 2019 to October 2020 were included. All women were evaluated preoperatively including history, physical examination, uroflowmetry and Post Void Residual Urine measurement (PVR). Postoperative follow up included a series of standardized questions including if they had symptoms of urinary incontinence or urinary urgency. Follow up uroflowmetry and PVR was also performed in all patients. The criteria of successful reconstruction that we used were no reported subjective complaints from our patients, postoperative Q_{max} greater than 15ml/s with minimal post-void residue (<30 mL). Patient 1 had a significant increase in Q_{max} from 6.7 ml/s to 23.2 ml/s and the PVR were greatly reduced to 10.2 ml. Patient 2 went from urinary retention in preoperative period, to Q_{max} of 15.7 ml/s and PVR of 17.2 ml. Patient 3 had to undergo suprapubic cystostomy before the operation and the post-operative results were minimal post void residue (14.7 ml) with postoperative Q_{max} of 5.5 ml/s. All our patients had no persistent lower urinary tract symptoms, none reported urinary incontinence, bleeding, signs of infection and graft necrosis or vaginal bleeding. Urethroplasty using a ventral onlay vaginal graft may be considered as a first-line surgical option.



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1. INTRODUCTION

Urethral stricture in female patients is reported in 2.7% to 8% of women presenting with lower urinary tract symptoms. [1] It is usually managed with internal urethrotomies and also office repeat dilation. These procedures are uncomfortable, require multiple office visits and sometimes results in acute retention. Bleeding and extravasation due to extreme dilation led to further fibrosis and recurrence of the stricture [2]. A systematic review shows that dilatation success rate varies under 50%, while surgical approach reaches up to 100% [3]. Despite these numbers, repeated dilatation for urethral stricture in female patients is still performed at high rates. Motivated by this, we aim to describe our results in a series of woman, surgically

treated for urethral stricture disease using ventral onlay vaginal graft urethroplasty.

2. CASE PRESENTATION

Patients. Between October 2019 and October 2020, three female patients, ages 43 (patient 1), ages 42 (patient 2), and ages 71 (patient 3), were diagnosed with female urethral stricture. The diagnostic criteria we adapted were from study which were maximum urinary flow rate (Q_{max}) below 10 ml/s or failure to utilize 10 Fr catheter among patients with urinary retention [4]. Urodynamic parameters obtained were pre- and postoperative urinary flow. Post Void Residual Urine measurement (PVR) obtained in postoperative follow up.

Preoperative patient characteristics were shown (Table 1). Patient 1 had poor flow, frequency, dysuria and hesitancy as presented symptoms, patient 2 and 3 presented with urinary retention. The stricture etiology was idiopathic in all of the cases. Patient 2 and 3 did not undergo preoperative uroflowmetry and PVR due to urinary retention. Postoperative follow-up questions consist of whether or not they had urinary incontinence or urinary urgency and if they need further treatment such as dilation after the procedure. All patients had complete postoperative evaluations including uroflowmetry and PVR.

All of the patients were followed up for 9 months. During this time, all of the patients did not have evidence of graft necrosis or vaginal bleeding. No significant postoperative pain or discharge was reported. The follow up results were as follows (Table 2), patient 1 and 2 uroflowmetry results were normal continuous flows. Patient 1 had a significant increase in Q_{max}, from 6.7 ml/s to 23.2 ml/s. The PVR were greatly reduced from 95 ml to 10.2 ml. Patient 2 went from previously experienced urinary retention, to Q_{max} of 15.7 ml/s and PVR of 17.2 ml. Patient 3 had to undergo suprapubic cystostomy due to urinary retention and inability to pass Foley catheter. The post-operative results were minimal post void residue (14.7 ml), but the postoperative Q_{max} was only 5.5 ml/s.

All of our patients did not have persistent lower urinary tract symptoms or signs of urinary tract infection. None of our patients reported urinary incontinence, urgency, bleeding or signs of infection during follow-up based on physician interview and physical examination. The criteria of successful reconstruction that we used were no subjective complaints from our patients, postoperative Q_{max} > 15ml/s and minimal post-void residue (<30 mL).

Table 1. Preoperative patient characteristics

Pt No.	Age	Symptoms	Prior Treatments	Uroflowmetry			Catheterize in Emergency Department	PVR	Urethral Caliber (Fr)
				Q _{max}	Volume	Pattern			
1	43	Poor flow, Frequency, dysuria, hesitancy	Dilation	6.7 ml/s	79 ml	Flattened	No	95 ml	Not needed
2	42	Urinary retention, frequency, dysuria	No	Not Conducted			Yes	Not Conducted	8
3	71	Urinary retention, frequency	No	Not Conducted			No*	Not Conducted	No*

Urodynamics performed in patient who can urinate spontaneously (patient 1); PVR measurement was not performed in patient 2 and 3 as they already experienced urinary retention.

* Patient underwent suprapubic cystostomy as catheter cannot pass (patient 3).

Table 2. Postoperative patient characteristics

Pt No	Age	Persistent Symptoms	Infections	Uroflowmetry			PVR	Urethral Caliber (Fr)	Follow-up (mos.)
				Q _{max}	Volume	Pattern			
1	43	None	No	23.2 ml/s	446 ml	Normal	10.2 ml	16	9
2	42	None	No	15.7 ml/s	225 ml	Normal	17.2 ml	16	6
3	71	None	No	5.5 ml/s	140 ml	Flattened	14.7 ml	16	9

Surgery. The patient was placed in the dorsal lithotomy position and povidone-iodine preparation was used in the perineal area. The anus was covered from the operative area. Vaginal speculum was placed in the vagina and an inverted U-shaped vaginal graft was outlined on the anterior vaginal wall (Figure 1). The graft should be approximately 2 to 3 cm long (Figure 2). After that 20 Fr dilator was inserted into the urethral meatus and the stricture area was incised posteriorly at the 6 o'clock position (Figure 3). The dilator was advanced into the urethra as the incision was made to ensure that the most proximal portion of the stricture was incised. The vaginal graft was then sutured on the dorsal surface of urethra as onlay graft (Figure 4). First suture was taken at the apex of the urethra and then onto the graft. Then the suturing of right and left margin of the urethra was done. After suturing the apex, right and left margin of the urethra, the graft of vaginal tissue was mobilized and advanced into the defect and tied in place.

An 18 Fr Foley catheter was then placed. The patient was hospitalized overnight for observation and discharged home the next day. Generally, the catheter was left in place for 7 to 10 days. The first follow up was 1 month after the surgery.



Figure 1. Vaginal speculum was placed in the vagina and inverted U-shaped vaginal graft was outlined.



Figure 2. The vaginal graft approximately 2 to 3 cm long.



Figure 3. 18 Fr dilator inserted; urethra incised at 6 o'clock position



Figure 4. The graft was sutured on the urethra and to its normal position



Figure 5. Final postoperative appearance after suturing urethra back to its normal position.

3. DISCUSSION

Numbers of women still experienced stricture recurrence after managed with multiple internal urethrotomies and repeated dilations [5]. Despite these facts, only a handful of series about female urethroplasty's techniques are available, making it difficult to create a consensus for female urethral stricture. The diagnosis and treatment of choice rely on the skill and preference of the surgeon. Our management for female urethral stricture is ventral onlay vaginal graft urethroplasty. Our patients who underwent this treatment were women with a history of lower urinary tract symptoms and poor urine flow. Two of our patients presented with urinary retention. One of our patients presented with suprapubic catheter and the other one presented with 8 Fr Foley catheter. All of our patients matched our criteria which is either maximum urinary flow rate of less than 10 ml/s or inability to pass urethra with 10 Fr catheter. After the ventral onlay vaginal graft urethroplasty, the PVR of our patients decreased dramatically (< 30 ml). Two of our patients achieved the targeted Q_{\max} (> 15 ml/s). The Q_{\max} in patient 1 improved significantly, from 6.7 ml/s to 23.2 ml/s. The PVR decreased significantly from 95 ml to 10.2 ml. One of our patients' postoperative Q_{\max} was only 5.5 ml/s, but the PVR

was 14.7 ml. The low postoperative Qmax could be due to several factors, such as age and low voided volume during the test (Table 2). However due to the COVID-19 pandemic situation, we could not conduct further testing. This patient required further follow up to identify the cause of her uroflowmetry's result. Overall, our cases demonstrates an increase in Qmax and decrease in PVR during the follow-up. Similar studies of surgically treated female urethral stricture were reported to have a satisfying result for the patients [3], [4], [6].

Currently, female urethroplasty has many different approaches using both grafts and flaps. The grafts used were reported to be buccal mucosal, vaginal wall, lingual and labia minus [7- 9]. Flaps technique from vaginal vestibule, lateral vaginal wall and anterior vaginal wall were also reported to be used [10- 12]. We chose to use the vaginal graft as it is relatively easy to harvest and also its hairless elastic nature. The ventral approach was chosen as there are several advantages to this technique. We chose to preserve the clitoral bed which in turn will preserves its vascular supply [13]. Preserving clitoral bed will also lead to lesser sexual dysfunction. The fear of injuring the external urinary sphincter in dorsal technique could potentially result in restricted incision which would increase the chance of failure. The dorsal procedure is also more challenging as it has greater risk of bleeding. The terminology of dorsal and ventral used in female is different than in male. In females, the ventral part of the urethra is pointing towards the vagina and the dorsal part is pointing towards the pubic bone.

This study's limitation is that it is only small sample cases with a follow up of 9 months. We acknowledged that the follow up duration is relatively short, thus we cannot get a sufficient information about the re-stricture rate. At this stage, we are satisfied by the patient's satisfaction and objective outcomes that we had. Ventral onlay vaginal graft urethroplasty could be tested in a larger sample with longer follow- up duration and compared with other urethroplasty techniques to assess the advantages and pitfalls. In our series all patients had significant improvement in symptoms with no major or minor complications. They also had dramatic improvement in uroflowmetry and PVR results.

4. CONCLUSION

Urethroplasty using the ventral onlay vaginal graft has the potential as a simple curative option in the management of female urethral stricture.

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