BANGLADESH JOURNAL OF
UROLOGY
Bangladesh J. Urol. 2023; 26(2): 78-83
www.banglajol.info/index.php/BJU
DOI: https://doi.org/10.3329/bju.v26i2.71187

Original Article

ISSN : 2304 - 8514 (Print)
ISSN : 2304 - 8522 (Online)

Labial mucosal Substitution Urethroplasty for Female Urethral Stricture: A Sustainable Technique

Tanbir Al-Misbah[1], ATM Mowladad Chowdhury[2], Abul Bashar Shahriar Ahmed[3], Imtiaz Enayetullah[4], Sarforaj Ali Khan[5]

Received: 16 - 02 - 2023
Accepted: 13 - 04 - 2023
Conflicts of interest: None

Abstract

Background: *Stricture of the female urethra is considered to be a less common disease accounting for 4%–13% of women who present with bladder outlet obstruction. Almost all strictures can have idiopathic, iatrogenic, inflammatory, or traumatic etiologies. The most common symptoms are dysuria, urgency, frequency, and poor flow. FUS can also lead to overt urine retention and recurrent UTIs. We present our experiences in single-stage labial mucosal substitution urethroplasty technique for urethral stricture. The objectives were to evaluate the clinical outcome, symptom improvement, success rate and complications of the performed procedure.*

Methods: *This quasi-experimental study was conducted from January 2016 to December 2021, at the department of Urology, BIRDEM General Hospital, Enam Medical College Hospital, Dhaka Community Medical College Hospital, Evercare Hospital and a Private Clinic in Uttara, Dhaka. The study was conducted on 60 females with urethral stricture who underwent labial mucosal graft urethroplasty. Follow up period for all the respondents was 1 year. Statistical analysis was performed using SPSS version 21.*

Results: *60 patients of urethral stricture underwent labial mucosal graft urethroplasty. The average follow-up time was 12 months, with a mean age of the patients was 41 years. 31 patients (51.67%) had idiopathic urethral stricture, 20(33.33) had iatrogenic disease, 4(6.67%) had traumatic urethral stricture and 5 (8.33%) had history of recurrent (nonspecific) urethritis. The mean±SD of operative time was 90±11.12 min and the success rate was 100%. No patient mentioned having any severe postoperative pain or unpleasant urethral discharge (wound infection). All of the patients had good voiding 1-year follow-up and there was no report of vaginal narrowing or dyspareunia. During routine follow-up, stricture recurrence was found in only two individuals, after 24 months, which were managed by urethral calibration.*

Conclusion: *Labial mucosal substitution urethroplasty is an effective and sustainable reconstructive technique for female urethral stricture with very low rate of recurrence. It is an uncomplicated surgical method with good reproducibility.*

Keywords: Urethroplasty, Female urethral stricture (FUS), Labial mucosal graft, Postvoid residual urine (PVR)

1. Assistant Professor, Department of Urology, Enam Medical College & Hospital, Savar, Dhaka, Bangladesh
2. Professor& Head, Department of Urology, Ibrahim Medical College & BIRDEM General Hospital, Shahbagh, Dhaka, Bangladesh
3. Associate Professor, Department of Urology, Enam Medical College & Hospital, Savar, Dhaka, Bangladesh
4. Assistant Professor, Department of Urology, National Institute of Kidney Diseases and Urology, Sher-e-Bangla Nagar, Dhaka, Bangladesh
5. Associate Professor, Department of Urology, National Institute of Kidney Diseases and Urology, Sher-e-Bangla Nagar, Dhaka, Bangladesh

Correspondence: Dr. Tanbir Al-Misbah, Assistant Professor, Department of Urology, Room no. 591, Block – C, Enam Medical College & Hospital, 9/3 Parboti Nagor, Thana Road, Savar, Dhaka – 1340, Bangladesh. E-mail: dr.tanbir@gmail.com.

Introduction

Stricture of the female urethra is thought to be less common disease accounting for 4%–13% of women who present with bladder outlet obstruction.[1,2] Bladder outlet obstruction is seen in 3%–8% of women who present to urologists with voiding complaints.[3] Almost all strictures (from most to least common) can have idiopathic, iatrogenic, inflammatory, or traumatic etiologies.[4] A small percentage of cases are caused by uncommon etiologies, including urethral TB, urethral carcinoma, locally advanced cervical cancer, fibroepithelial polyps, and infection.[5-7] The most common iatrogenic causes are previous urethral dilations, prior urethral diverticulectomy, sling insertion or excision, transvaginal fistula repair, and/or transurethral bladder surgeries. FUS symptoms might vary, but the most common ones are dysuria, urgency, frequency, and poor flow. FUS can also lead to overt urine retention and recurrent UTIs.[5] Female urethral strictures are typically treated by internal urethrotomy and urethral dilatation. While intermittent catheterization and dilatation also have positive results, more reported problems are associated with these procedures. Restoring function, enabling obstruction-free urination, maintaining continence, avoiding vaginal voiding, and preserving sexual function are the objectives of female urethral reconstruction. As a form of minimally invasive FUS treatment, doctors are considering reconstructive surgery. The surgical management of urethral strictures varies depending on the origin, location, length, density, and involvement of the surrounding tissue in the fibrosis of the lesion.[8,9] The procedure of mucosal graft replacement urethroplasty yields encouraging outcomes. Onlay and inlay are the two types of substitution methods.[10-11] These methods may have flap reconstruction methods.[12,13] and free graft reconstruction methods.[14-19] Free grafts such as buccal mucosal grafts[14–19], lingual mucosal grafts[15,19], vaginal grafts[20], and labial grafts[21] have been used in much different research. These treatments are proven to be more effective with better results and fewer reported complications.[22,23] We present our experiences in single-stage substitution labial mucosal urethroplasty technique for urethral stricture. The objectives were to evaluate the clinical outcome, symptom improvement, success rate and complications of the performed procedure.

Materials and methodology

The quasi-experimental study was conducted on 60 females with urethral stricture who underwent labial mucosal graft urethroplasty in the department of Urology, BIRDEM General Hospital, Enam Medical College Hospital, Dhaka Community Medical College Hospital, Evercare Hospital and a Private Clinic in Uttara, Dhaka from January 2016 to December 2021. Female patients visited Urology OPD with complaints of frequency of micturition, poor flow, straining, incomplete voiding, urgency, urge incontinence, and recurrent urinary tract infections were sorted out. Then we confirmed the diagnosis of urethral stricture by clinical examination. And routine investigations like Urine RME & C/S, S Creatinine, Uroflowmetry, and USG of KUB region with MCC & PVR were advised. Voiding cystourethrogram done in these cases. Urine flow less than 10 ml/sec, high PVR in USG, and narrowing of the urethra with proximal dilatation on the micturating cystourethrogram were taken into consideration for the diagnostic criteria. Occasionally, Cystoscopy was done with a narrow paediatric urethroscope to assess the length of stricture, specially suspected proximal urethral stricture cases. Individuals with abnormal focal neurological examinations or neurogenic bladders were excluded. After adequate pre-operative preparation, the patient underwent labial mucosal graft urethroplasty. Graft was harvested from the inner side of labia mejora. For the initial few cases, we did ventral inlay urethroplasty. Then we shifted to dorsal inlay graft urethoplasty for its advantages like reduced chance of wound infection & urethrovaginal fistula and sparing anterior vaginal wall to facilitate future anti-incontinence procedures. Moreover, after dorsal inlay substitution urethroplasty, transient mild catheter traction with fixing it to lower abdomen, prevents sub-graft haematoma formation and improves graft survival. But in our long-term follow-up, we found the outcome and success rate of both ventral & dorsal inlay techniques are identical. After the grafting, urethral catheter was deployed for 14 days. During one-year follow-up, our patient visited urology OPD at 3, 6, and 12 months. All patients were investigated with Urine RME & C/S, Uroflowmetry, and USG of KUB region with PVR. Some patients with voiding problem were advised for Cystoscopy to monitor the status of the graft. Recurrence of the stricture was defined as a return of symptoms, maximum flow rate (Qmax) less than 10 ml/sec in uroflowmetry, high PVR, and failure to calibrate the urethra with a 12 Fr catheter. The statistical analysis was performed using SPSS version 21.

Result

We identified 60 patients with urethral stricture who underwent labial mucosal graft urethroplasty. The total follow-up time for our study participants was 12 months (after 3, 6, and 12 months), with a mean age of 41 years [Table 1 and 3]. Most 31 patients (51.67%) had an idiopathic urethral stricture, 20(33.33) had iatrogenic disease, 4(6.67%) had traumatic urethral stricture and 5 (8.33%) had recurrent (nonspecific) urethritis [Table: 2]. Forty (66.67%) patients had a history of poor flow and straining, which resolved after the surgery. Thirty-four (56.67%) of the 60 women had incomplete voiding, twenty-eight (46.67%) women had a history of urgency and urge incontinence, 19- (31.67%) had recurrent urinary tract infections, 15 (25%) had urinary retention and 10(16.67%) had frequency problem. All of the symptoms were resolved after the surgery [Table: 3]. The mean±SD of operative time was 90±11.12 min. No patient had any severe postoperative pain or unpleasant urethral discharge (wound infection). All of the patients had good results at the 1-year follow-up and there were no reports of vaginal narrowing or dyspareunia. After 2 years, 2 patients had stricture recurrence at the proximal graft-urethral anastomosis and were managed by urethral calibration. Our cohort's mean preoperative urethral calibration size was 11.58 F, while the mean postoperative calibration size was 23.63 F; the improvement is significant (p<0.05). The postoperative Qmax was 24.48 ml/s on average compared to the mean preoperative Qmax of 6.93 ml/s; this improvement is statistically significant (p<0.05). The difference between the mean preoperative PVR and the mean postoperative PVR, 10.32 ml and 138.41 ml, respectively, is significant (p<0.05). [Table: 4]

Table 1: *Age distribution of the study patients*

Age	N	Percentage
20-30	5	8.33
31-40	22	36.67
41-50	25	41.67
51-60	8	13.33
Mean±SD	41±2.9	

Table II: *Etiology of urethral stricture*

Cause	N	%
Iatrogenic (Instrumentation, Catheterization, Radiation for pelvic malignancies)	20	33.33
Idiopathic	31	51.67
Traumatic (Obstetric labor, Pelvic fracture)	4	6.67
Recurrent(Non specific) urethritis	5	8.33

Table III: *Preoperative symptoms and post-operative follow up*

Symptom	N	%
Poor flow, straining	40	66.67
Incomplete voiding	34	56.67
Urgency, urge incontinence	28	46.67
Recurrent UTI	19	31.67
Urinary retention	15	25.00
Frequency	10	16.67

Table IV : *Comparison between the pre- and postoperative variables*

Variables (Mean)	Pre-Operative	Post-Operative	p-value
Q_{max} (ml/s)	6.93	24.48	0.001
PVR(ml)	138.41	10.32	0.001
Calibre	11.58	23.62	0.001

Q_{max} = maximum urine flow, PVR= post-void residual volume

Discussion

There aren't many results for female urethral reconstruction because female urethral stricture illness is relatively uncommon. Moreover, there are several techniques for doing female urethroplasty, including labial and vaginal flaps and circumferential, ventral, or dorsal approaches. Yet, most published data come from brief time frames and typically employ various reconstruction techniques.[24] Due to this, data on results are varied, which makes it difficult to compare the effectiveness of multiple strategies. In this study, all of the patients had a history of urgency, frequency, poor flow, urine retention, and recurrent UTIs (66.67% patients had a history of poor flow and straining, 56.67% had incomplete voiding, t46.67% women had

a history of urgency and urge incontinence, 31.67% had recurrent urinary tract infections, 25% had urinary retention and 16.67% had frequency problem) which was resolved after the surgery. Similar findings were found in Keegan KA[5] and Elisa Berdondini et al.[25] studies. In their research, before surgery, each patient experienced different and severe lower urinary tract symptoms i.e. poor flow, frequency, urgency, dysuria, recurrent urinary tract infection, overt urinary retention, and painful urination. In this study, 51.67% of patients had an idiopathic urethral stricture, 33.33% had an iatrogenic disease, 6.67% had a traumatic urethral stricture, and 8.33% had recurrent (nonspecific) urethritis. Similar results were found in the study of Sarin I et al.[4] and Faiena I et al.[26], where the leading cause of FUS was idiopathic, iatrogenic, inflammatory, or traumatic etiologies. In this study, the average patient age was 41±2.9 years. Which was similar to Sharma et al.[15] & Nayak et al.[27] where the patient's average age was 42 and 41 years, respectively. According to Morey AF, Guido Barbagli, and Arlen AM et al., the operative time was 123 minutes [28-30]. Similar findings were also made by Hassan R. U. et al., where the average age was 44 years old, and the average operating time was 129 minutes [31]. In our study, the typical length of an operation was 90±11.12 minutes which was relatively lower. Operating time depends on surgical difficulties (i.e. length & location of stricture) and reflex & expertise of the surgeon. This study has the largest series to date devoted only to labial mucosal urethroplasty, with a total follow-up of 12 months (3, 6, and 12 months); there was no seen complication in the participants, but after 2 years, only one patient experienced recurrence and after 2.5 years another one. So, the success rate of this study was 100% at the 12-month follow-up. The patients (3.33%) who experienced recurrence after the follow-up period were managed by urethral calibration. Similar results were found in Önol et al.[18], Kowalik et al.[32], Coguplugil et al.[10] studies where the success rate was 100%. Some other studies by Sharma et al.[15], Goel et al.[14] Nayak et al.[27] Lane et al.[25] reported less satisfactory success rate of 93%,63%, 92%, and 77%, respectively. Similar results from urethroplasty have been reported in some other series, with success rates of 62.5–100% and mean follow-ups is 6–30 months[33-35]. Sharma et al.[15], who evaluated a few other trials that reported failures, note that the time to failure in their series' one failure was at 3 months who finally underwent repeated dilations for several months until becoming stricture-free at 12 months. In Goel et al.[14] series, 3 of 8 patients experienced recurrence; all of them underwent dilation therapy and afterward needed self-catheterization to preserve patency. In our series, we found two patients with recurrence beyond the usual follow-up time and managed with urethral calibration. The preoperative mean Qmax in this study was 6.93 ml/s, and the postoperative mean Qmax was 24.48 ml/s; the improvement is statistically significant ($p<0.05$). Similar to the preoperative PVR, the postoperative PVR was, on average, 44.32 ml, a considerable decrease from the preoperative PVR of 138.41 ml. Similar results were found in the study by Joy Narayan Chakraborty and Nachiket Vyas[36], where preoperative Qmax was, on average, 6.35 (3.8-8.4) ml/s, postoperative Qmax was 25.12 (19.6-30.4) ml/s, and preoperative PVR was on average 148.12 (86-200) ml, while postoperative PVR was on average 41.67 (10-125) ml.

Conclusion

In conclusion, Labial mucosa urethroplasty is an effective, low-morbidity reconstructive surgery for female urethral stricture. It is an uncomplicated surgical method with good reproducibility. The current experience also demonstrates that labial mucosa urethroplasty has the ability to establish itself as one of the standard technique having high success rate and very low recurrence potential.

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