

Original Article



Tunica Vaginalis Pedicle Flap Substitution Urethroplasty for Reconstruction of Anterior Urethral Stricture

Md Moktadir Hossain Mridha¹, Mohammad Shah Alam², Md Maidul Islam³,
Md Ali Ashraf⁴, K M Faisal Al Ahsan⁵, Amiya Dev Bhatta⁶, A K M Anwarul Islam⁷

Abstract

Background: In long-segment urethral stricture, substitutional urethroplasty is the best option to get long-term good results. Though buccal mucosa is the most widely used tissue, it has limitations in some oral pathology. In several publications, there is evidence that Tunica vaginalis can be used as a graft or flap to reconstruct fibrotic urethra as well as to provide a vascularized covering to prevent subsequent urethrocutaneous fistula formation. This study evaluated the effectiveness of the tunica vaginalis pedicle flap for managing anterior urethral stricture.

Objectives: To evaluate the clinical efficacy of tunica vaginalis pedicle flap for reconstruction of anterior urethral stricture by assessing change in the maximum flow rate (Q_{max}), International prostatic symptom index (IPSS), postvoid residual urine (PVR) from baseline and the complication of surgery.

Materials and Methods: This prospective clinical trial was conducted in the Department of Urology, Bangabandhu Sheikh Mujib Medical University, Dhaka, from July 2017 to June 2018. A total of 15 patients were selected from the study population according to inclusion and exclusion criteria. The standard operation technique of urethroplasty by tunica vaginalis flap was followed. Patients were followed up after 3 months & 6 months to evaluate IPPS score, Q_{max} , flow time, PVR, and complications.

Results: Study participants' mean age and stricture length were 38.93 ± 11.38 years and 3.55 ± 1.05 cm. The maximum flow of urine was 15.844 ± 3.80 ml/sec at the final follow up, which showed statistically significant improvement from baseline. There was also a significant improvement in IPSS and quality of life during follow-up. Flow time and post-void residue reduced significantly from preoperative measurement. A total of 4 patients developed complications after the substitution of urethroplasty with tunica vaginalis.

Conclusion: Tunica vaginalis pedicle flap may be a practical choice in the reconstruction of anterior urethral stricture.

Keywords: Tunica Vaginalis Pedicle Flap, Urethroplasty, Maximum flow rate (Q_{max}), International prostatic Symptom Index (IPSS), Post Void residual urine (PVR).

Date of received: 17.12.2022

Date of acceptance: 15.05.2023

DOI: <https://doi.org/10.3329/kyamc.v14i02.68563>

KYAMC Journal. 2023; 14(02): 79-82.

Introduction

The acquired anterior urethral stricture is a fibrotic narrowing involving the surrounding corpus spongiosus that leads to spongiofibrosis.¹ In long-segment stricture, substitutional urethroplasty is the best option to get long-term good results. To substitute urethra, several tissues have been used like buccal mucosa, skin graft, bladder mucosa, intestinal mucosa, etc. But none of those are proven ideal for their morbidity and complication.

Though buccal mucosa is the most popular and widely used tissue, in some oral pathology it can't be harvested. So exploration of new options is imperative. The Tunica vaginalis of the testis can be used as a graft or flap to reconstruct the fibrotic urethra. In several publications there is evidence to use it as a second layer providing a vascularised covering to prevent subsequent urethrocutaneous fistula formation for correction of penile curvature (chordee) and surgical treatment of Peyronie's disease.² Experimental studies have shown that tunica vaginalis

01. Assistant Register, Department of Surgery, Shahid M Monsur Ali Medical College, Sirajgonj, Bangladesh.

02. Resident Surgeon, Urology, Sher-E-Bangla Medical College Hospital, Barisal, Bangladesh.

03. Medical Officer, Dept. of Urology, Rangpur Medical College and Hospital, Rangpur, Bangladesh.

04. Assistant Registrar, Dhaka Medical College and Hospital, Dhaka, Bangladesh.

05. Resident Surgeon, 250 Bedded General Hospital, Brahmanbaria, Bangladesh.

06. Assistant Registrar, Department of Surgery, Shaheed M. Mansur Ali Medical College Hospital, Sirajganj, Bangladesh.

07. Clinical Fellow in Urology, (WHO) Ex-Chairman, Department of Urology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

Corresponding author: Md Moktadir Hossain Mridha, Assistant Register, Department of Surgery, Shahid M Monsur Ali Medical College, Sirajgonj, Bangladesh. Cell Phone: +880 1740-378655, E-mail: moktadirmridha@gmail.com

mesothelium was progressively replaced by a more stratified epithelial lining analogous to the urethral lining of the native urethra.³

The TV graft is much easier to harvest than other materials. It provides a length of 6-7 cm long flap which is adequate to cover any length of the stricture. TV graft has significantly reduced operative time which helps to prevent complications for the prolonged high lithotomy position. A flap with an abundant capillary network based on the pedicle of the spermatic fascia is promising in urethral reconstruction.⁴

Also, another good side is that the tunica vaginalis pedicle flap does not need a serum imbibition phase early after surgery. So it can be used primarily and in limitation of other tissue harvesting events. There are few publications about using tunica vaginalis flap in substitution urethroplasty. Moreover, in the department of urology at BSMMU we have used tunica vaginalis as the second layer of urethroplasty and in repairing curvature in Peyronie's disease which influenced us to comment on this study. This study is designed to evaluate the clinical efficacy of tunica vaginalis pedicle flap for reconstruction of anterior urethral stricture.

Materials and Methods

This was a hospital-based prospective clinical trial conducted from July 2017 to June 2018 in the Department of Urology, Bangabandhu Sheikh Mujib Medical University, Dhaka. The study population was all patients diagnosed with anterior urethral stricture who attended the outdoor of Department of Urology, BSMMU. Male ambulatory patients of 15 to 70 years old with >2 cm, anterior urethral stricture were the study subjects. Patients who had a history of previous failed attempts of urethroplasty, neurogenic bladder, surgery to the bladder neck, active urinary tract infection, severe comorbidities (renal, hepatic, and cardiovascular), and any abnormalities of scrotum or testis were excluded from the study.

Fifteen study subjects were selected by purposive sampling. Ethical clearance for the study was taken from the Ethical Review Committee of BSMMU before the commencement of this study. Written informed consent was taken from all the study subjects. A detailed history was taken and a clinical examination and all necessary investigation to detect the size and length of stricture and to assess the patient's general condition was done and advised for admission. Demographic patient profile, IPSS, Qmax, flow time, and PVR was recorded in the data collection sheet. The length of stricture was measured on RGU film and recorded.

The standard procedure of urethroplasty was followed under spinal anesthesia. The skin incision was made and the urethra was opened dorsolateral over the strictured segment and continued up to the normal urethra. The testis was delivered by blunt and sharp dissection of the penoscrotal or scrotoperineal junction. The attachment of the tunica vaginalis with the scrotal wall was dissected. According to the length and stricture status,

the parietal tunica vaginalis testis was harvested in the form of a vascularized pedicle, then the harvested flap was transferred to the stricture site and fixed by dorsolateral on lay technique over a 16 Fr catheter. On the 4th postoperative day, the patient was discharged with a per-urethral catheter and advised to use a scrotal suspensor and antibiotic ointment along the incision line. The catheter was removed on the 14th postoperative day. Patients were followed up after 3 months & 6 months. IPSS score was calculated by interviewing the patient for urinary symptoms. Qmax, flow time & PVR were calculated by uroflowmetry & USG. Any complication before or after follow-up was addressed properly and treated accordingly. After compilation, the data were presented as tables, figures, and graphs, as necessary.

Statistical analysis of the results was done by using computer-based statistical software, SPSS (SPSS Inc, Chicago, IL, USA version 23). Results were expressed as mean \pm SD and compared by ANOVA, Paired t-test. A 'p-value of < 0.05 was considered significant.



Figure 1: Urethroplasty is done by tunica vaginalis flap.

Results

The mean age of study participants was 38.93 years, with a standard deviation of 11.38. The minimum and maximum age is 21 and 52 years. The mean stricture length was 3.55 ± 1.05 cm. IPSS of the patients in the pre-operative period was 27.44 ± 2.00 cm. At three months after the operation, it was found 9.11 ± 3.44 and at six months postoperatively, it was 9.67 ± 4.33 cm. The patient's quality of life (QoL) also improved significantly in the postoperative period.

A month after the operation, Qmax was 15.844 ± 3.80 ml/sec, which improved significantly from preoperative measurement ($p=0.001$). PVR and flow time were significantly reduced during follow-up compared to preoperative findings.

Comparison of IPSS, QoL, Qmax, Flow to, me, and PVR between follow-up at the 3rd and 6th month postoperatively was statistically non-significant. A total of 4 patients developed postoperative complications.

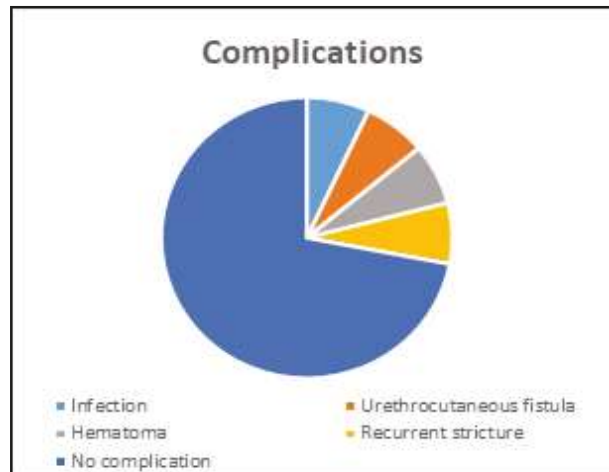


Figure 2: Complications Chart

Table I: Comparison of IPSS, PVR, Qmax, QoL from baseline during follow-up.

	Mean ±SD	Maximum to minimum	Statistics
IPSS			
Preoperative	27.44±2.00	25-31	
Follow up at 3 months	9.11±3.44	7-18	0.01
Follow up at 6 months	9.66±4.33	7-21	
Qmax			
Preoperative	4.91±1.11	3.2-6.0	
Follow up at 3 months	16.02±3.46	7.5-19.60	0.001
Follow up at 6 months	15.84±3.79	6.5-19.70	
PVR			
Preoperative	105.00±17.32	80-130	
Follow up at 3 months	45.88±20.35	25-95	0.001
Follow up at 6 months	44.88±27.49	22-115	
QoL			
Preoperative	5.11±0.33	5-6	
Follow up at 3 months	2.11±0.92	1-4	0.001
Follow up at 6 months	2.00±0.86	1-4	

Discussion

Surgical reconstruction of the urethra for stricture disease is expanding because of the discouraging long-term outcome after dilatation or urethrotomy. Substitutes from various sources have individual limitations and comorbidities related to the donor site and reconstruction of the urethra. Tunica vaginalis, the intimate covering of the testis, is another type of tissue that can also be used as a urethral substitute. We clinically evaluated the usefulness of the tunica vaginalis pedicle flap for reconstruction of anterior urethral stricture. The mean age of our patients was 38.93±11.73. It is identical to the study.^{4,6}

The mean stricture length in our study was 3.55±1.05 cm, which is a little shorter than the study group, which was 4.26±1.1 cm.⁴ But in the study, it was longer as 6.7±4.5 cm.⁵ The tunica vaginalis pedicle flap was used like ours, whereas the tunica vaginalis free graft was used in the other two studies.⁴

Improvement of IPSS and QoL scores from preoperative measurement was statistically significant (P value= 0.001) in this study, indicating favorable outcomes in short-term follow-up. The improvement of postoperative scores is also identical to our study.⁴ These variables are not used in any other study. Both studies expressed similar results, i.e., all patients had Qmax > 14ml/ second. All these results are almost comparable with our study.^{5,6}

After the operative procedure, PVR reduced significantly (p = 0.001) from baseline in this study, which is identical to a study where PVR reduced from 85.6±6.0 ml to 25.6±8.5 ml at three months postoperatively.⁴

The study reported the usage of tunica vaginalis as a dorsal graft in 11 patients with a 100% success rate⁶ and another study stated that their clinical success rate was 86.6%.⁴ In our study, we had a 72% success rate and 28% of cases had a complication. Moreover, there was no significant difference in all the parameters between 3 and 6 months after surgery. This result leads us to extrapolate a positive long-term outcome of our study. In this study, one patient developed UTI, 1 developed stricture recurrence, 1 developed a urethral-cutaneous fistula and another developed a hematoma postoperatively. But the study mentioned meatal stenosis as their major complication postoperatively.⁷

Based on the literature, making sweeping recommendations for best practices for reconstructive urethral surgery is unwise because each patient requires an individualized approach based on individual circumstances. However, our result showed that the tunica vaginalis is a good choice of tissue flap to be used clinically for the reconstruction of the bulb-penile stricture with good clinical outcomes and acceptable complications.

Conclusion

The tunica vaginalis pedicle flap seems effective in reconstruction surgery of anterior urethral stricture. The tunica vaginalis pedicle flap can be a good option for substitution urethroplasty for its favorable characteristics.

Acknowledgement

We thanks to all our patients who consent to be included in this study. Also all the Faculty members Department of Urology, Bangabandhu Sheikh Mujib Medical University.

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