



“OUTCOMES OF DORSAL ONLAY URETHROPLASTY USING BUCCAL AND VAGINAL GRAFTS FOR FEMALE URETHRAL STRICTURES AT A TERTIARY HOSPITAL”

Dr Mohib Ullah^{1*}, Dr Haroon Khalid², Dr Aftab Ahmed³, Dr Shakeel Haseeb Uddin Siddique⁴, Dr Muhammad Akhtar⁵, Dr Adnan Siddiq Awan⁶

¹Postgraduate Resident, Department of Urology, Pakistan Institute of Medical Sciences Islamabad

²Registrar, Department of Urology, University Hospital Waterford

³Assistant Professor, Department of Urology, Shiek Khalifa bin Zaid/ CMH Hospital Muzaffarabad
AJK

⁴Assistant Professor of Urology, Hamdard University, Karachi

⁵Associate Professor, Department of Urology, Ibn e Sina Hospital and Research Institute, Multan/
Multan Medical and Dental College Multan

⁶Specialist Urologist, Sabah Al Ahmad Urology Center, Kuwait

*Corresponding Author: Dr Mohib Ullah,
Email: Mohibhamdard664@Gmail.Com

ABSTRACT

Background: Urethral stricture is a clinical complication that is rather uncommon in females but may result in urinary retention, repeated infections, and poor quality of life. Graft-based dorsal onlay urethroplasty with buccal mucosal grafts (BMG) or vaginal wall grafts (VWG) is a successful reconstructive method that has limited information on Pakistani tertiary care centers.

Objective: To compare the functional and anatomical outcomes, complication rates, and patient satisfaction after dorsal onlay urethroplasty with buccal and vaginal grafts in women with Urethral strictures.

Methods: The study was a cross-sectional study conducted at Department of Urology, Pakistan Institute of Medical Sciences Islamabad in the duration from January, 2025 to June, 2025. Forty adult females who had symptomatic urethral strictures were undergoing dorsal onlay urethroplasty using BMG (n=22) or VWG (n=18). The preoperative evaluation comprised uroflowmetry, post-void residual, urethroscopy, and imaging. Urinary flow, graft success, complications, and patient satisfaction were measured in postoperative follow-up at 1, 3, and 6 months.

Results: Mean patient age was 42.5 ± 12.3 years. Uroflowmetry improved significantly, with a postoperative mean stricture length of 1.8 ± 0.6 cm. Qmax improved significantly preoperatively, 7.2 ± 1.9 mL/s vs. postoperatively 19.6 ± 3.2 mL/s ($p < 0.001$). BMG and VWG had an overall success rate of 90.9% and 88.9%, respectively. Fifteen percent of patients recorded minor complications, and no significant complications. The rate of high patient satisfaction was found in 87.5 percent of cases.

Conclusion: Buccal or vaginal graft dorsal onlay urethroplasty is a safe and efficient method of treating female urethral strictures, offering superior functional results, few complications, and high patient satisfaction. The choice of grafts can be customized by the availability of tissues and the preference of the patient, and the success of this working process requires attention to surgical methods.

Keywords: *Female urethral stricture, Dorsal onlay urethroplasty, Buccal mucosal graft, Vaginal wall graft, Urethral reconstruction, Functional outcomes, Complications, Patient satisfa*

INTRODUCTION

Female urethral stricture disease is not a common but famous urological disease that can lead to a high rate of morbidity, frequent urinary tract infection, urinary retention, and uncomfortable lower urinary tract symptoms (11). The strictures of the female urethra have traditionally undergone underdiagnosis, which in most instances could be attributed to the relatively long length of the female urethra and proximity to other organs in the pelvis, suggesting late diagnosis and treatment (18). Moreover, the European Association of Urology (EAU) guidelines indicate that female urethral strictures are less common than male ones, although they should be treated, as they may adversely affect the quality of life, not to mention the probability of upper tract trauma (10, 18). This is a rare diagnosis, a factor that has limited the supply of massive outcome data, yet new multicenter series have begun to reflect the clinical trajectory and treatment (6, 8). The recent development in reconstructive urology has given patients a ray of hope, and urethroplasty has become a long-lasting treatment option. There has been significant development in female urethral reconstruction, including urethral diverticulectomy, stricture repair, and fistula repair over the last decades (11, 13).

The principles of tissue vascularity, absence of tension, and continence are the foundations upon which modern techniques are based (15). However, even with the anatomical difficulties, the graft-based solution is increasingly becoming popular among reconstructive surgeons to restore urethral patency with minimal morbidity (13, 15). However, the choice of graft material and surgical method is one of the most critical issues in this category of patients because it is necessary to maximize functional and anatomical outcomes. The dorsal onlay urethroplasty involving buccal mucosal grafts (BMG) or vaginal wall grafts (VWG) is among the graft-based strategies that have been in the limelight. There are a number of theoretical benefits of dorsal placement of the graft, such as enhanced mechanical support, a rich vascular bed, and decreased diverticulum formation (1). Prabhuswamy et al. have provided positive outcomes with the dorsal onlay BMG in women showing good graft take and long-term urinary functioning (1). On the same note, Kore and Martins had a two-institution study where they compared BMG and VWG, and the two grafts showed high success rates with low complication profiles (2).

Bajoria et al. reported their experience on dorsal onlay BMG urethroplasty in women in a tertiary-care center in Eastern India, with satisfactory long-term results (3). Recently, Babelay et al. performed a comparative analysis of the results of dorsal onlay urethroplasty with or without the use of buccal and vaginal wall grafts, demonstrating the legitimacy of the use of both tissues with acceptable morbidity (4). Other donor tissues should also be considered since the grafts all have different sources. Labial mucosal graft substitution urethroplasty has been reported as a long-term method of urethral repair in an environment where the harvest of the buccal mucosa might not be optimal (7). This provides the flexibility to reconstructive choices, especially in resource-constrained or patient-sensitive contexts (7). The additional application of the urethral grafting technique to transgender men in gender-affirming surgery also indicates the novelty of urethral grafting: de Rooij et al. wrote about the graft complications and outcomes of metoidioplasty, reminding us of the flexibility of the methods of reconstructing the urethra to other patient groups (14).

Moreover, preputial spiral grafts have been used in male penile urethral stricture disease, which has shown the general applicability of graft strategies outside of conventional locations (16). Urethroplasty is not risk-free despite such advances. Sexual and urinary performance post-surgery is a critical issue, and there is scant randomized data. Nilsen et al. examined the topic of sexual dysfunction following urethroplasty in a Scandinavian cohort, which is essential in raising safety concerns among surgical patients (12). In addition, care standardization is required: the 2023 amendment of the urethral stricture disease guideline by Wessells et al. discusses the emergent technologies, but also requests enhanced patient-reported outcome information (10). The information is limited in terms of female urethroplasty in Pakistan. The researchers have studied the results of

dorsal onlay urethroplasty with buccal and vaginal grafts in local women and have reported promising short-term outcomes of such a procedure (5). Concurrently, the larger issues of urethral stricture repair in resource-limited environments have been highlighted in international reporting: patient comorbidity, surgical skill, and patient follow-up compliance are all determinants of outcome (17). Since the practice of reconstruction is still developing, it is important to align the local experience with international standards, especially according to the evidence-based guidelines of the guideline bodies (18). Overall, the literature confirms the effectiveness and safety of dorsal onlay urethroplasty with buccal and vaginal grafts among women. But the inconsistency in center, graft, and patient results points to the necessity of additional data, particularly in regions that are underrepresented. We have chosen to investigate our own experience of Karachi, a top-tier referral center in Pakistan, in the study of dorsal onlay urethral stricture in women who have undergone buccal and vaginal grafts.

Objective: To compare the functional and anatomical outcome, complications, and patient satisfaction of dorsal onlay urethroplasty with buccal grafts and vaginal grafts in women with urethral strictures in a tertiary hospital.

MATERIALS AND METHODS

Study Design: Cross-sectional observational study

Study Setting: Department of Urology, Pakistan Institute of Medical Sciences Islamabad.

Duration of the Study: From January, 2025 to June, 2025.

Inclusion Criteria: Women aged 18 years or older who were diagnosed with symptomatic urethral strictures through uroflowmetry, urethroscopy, and imaging studies were considered. The patients who needed urethral reconstruction because of recurring urinary retention, recurrent urinary tract infections, or unsuccessful prior dilatation were eligible to be included. The study enrolled all patients who gave their consent to be subjected to dorsal onlay urethroplasty with buccal or vaginal grafts.

Exclusion Criteria: Patients who had active urinary tract infection, urethral carcinoma, neurogenic bladder, or had a concomitant prolapse of the pelvic organs and needed further surgical repair were excluded. A patient with previous complicated urethral reconstructions, systemic coagulopathies, or low-quality oral and vaginal tissues not fit to harvest grafts was also not included in the study.

Methods: Preoperative assessment included an extensive history and physical, uroflowmetry, post-void residual, urethroscopy, and imaging when indicated. Patients who have undergone dorsal onlay urethroplasty were eligible patients who were subjected to general anesthesia or regional anesthesia. Graft harvesting was done using buccal mucosa or vaginal wall, based on the availability of tissues and patient preference. The placement of the graft was on the dorsum of the urethra with the strictured part under it to ensure that the anastomosis is tension-free and that continence is maintained. The postoperative regimen included 2-3 weeks of Foley catheterization, prophylactic therapy, and regular visits after 1 month, 3 months, and 6 months to assess the voiding ability, check for recurrence of the condition, and monitor complications. The outcomes were quantified as the degree of functional improvement, preservation of anatomical passage, and patient-reported satisfaction.

Results

The study was conducted in Department of Urology, Pakistan Institute of Medical Sciences Islamabad, which had 40 female patients who underwent dorsal onlay urethroplasty as the treatment of the urethral strictures. Out of them, 22 patients (55 percent) were administered buccal mucosal grafts (BMG) and 18 patients (45 percent) were administered vaginal wall grafts (VWG). The study population's mean age was 42.5 ± 12.3 years (19-68 years). Recurrent urinary tract infections (65%),

poor urinary stream (57.5%), and urinary retention (30%) were the most common presenting symptoms. The mean stricture length was 1.8 ± 0.6 cm, and preoperative uroflowmetry was 7.2 ± 1.9 mL/s (mean maximum flow rate, Qmax), and this was significantly better after the operation of 19.6 ± 3.2 mL/s at six months follow-up ($p < 0.001$).

Table 1: Demographic and Clinical Characteristics of Patients

Parameter	Buccal Graft (n=22)	Vaginal Graft (n=18)	Total (n=40)
Age (years, mean $\pm$ SD)	43.2 ± 11.9	41.6 ± 12.8	42.5 ± 12.3
Recurrent UTI (%)	14 (63.6%)	12 (66.7%)	26 (65%)
Poor urinary stream (%)	13 (59.1%)	10 (55.6%)	23 (57.5%)
Urinary retention (%)	7 (31.8%)	5 (27.8%)	12 (30%)

Success rate was 90.9% for BMG and 88.9% for VWG, which was defined as unobstructed voiding without recurrence or need for intervention at six months. Minor complications occurred in 6 patients (15%), including temporary hematuria, mild pain at the graft harvest site, and urinary tract infection. However, there were no reports of major complications such as graft failure, incontinence, or urethrovaginal fistula.

Table 2: Surgical Outcomes by Graft Type

Outcome	Buccal Graft (n=22)	Vaginal Graft (n=18)	Total (n=40)
Successful urethroplasty (%)	20 (90.9%)	16 (88.9%)	36 (90%)
Minor complications (%)	3 (13.6%)	3 (16.7%)	6 (15%)
Major complications (%)	0 (0%)	0 (0%)	0 (0%)

Table 3: Uroflowmetry Parameters Pre- and Post-Operatively

Parameter	Preoperative (Mean $\pm$ SD)	Postoperative (Mean $\pm$ SD)	p-value
Qmax (mL/s)	7.2 ± 1.9	19.6 ± 3.2	<0.001
Post-void residual (mL)	110 ± 35	28 ± 12	<0.001

The average length of hospital stay was 3.2 ± 1.1 days, whereas the mean duration of catheterization was 15.4 ± 2.7 days. High patient satisfaction with the procedure was reported, with 87.5% of patients rating their outcome as "good" or "excellent" at six months.

Table 4: Postoperative Recovery Parameters

Parameter	Buccal Graft (n=22)	Vaginal Graft (n=18)	Total (n=40)
Hospital stay (days)	3.1 ± 1.2	3.3 ± 1.0	3.2 ± 1.1
Catheterization duration (days)	15.2 ± 2.8	15.6 ± 2.6	15.4 ± 2.7
Patient satisfaction (%)	20 (90.9%)	15 (83.3%)	35 (87.5%)

Discussion

Female urethral stricture is an uncommon and difficult-to-treat condition that can immensely influence the urinary function and the quality of life of a person (11). In the present study, it was shown that dorsal onlay urethroplasty, either with buccal mucosal graft (BMG) or with vaginal wall graft (VWG), led to remarkable functional outcomes, high success rates, and very few complications in a tertiary care center. Our results are in line with those of earlier studies, which described long-lasting outcomes of dorsal onlay urethroplasty in females (1, 2, 3). Prabhuswamy et al. reported that BMG provides a strong, well-vascularized graft, ideal for urethral reconstruction, resulting in high

success and low complication rates (1). Likewise, Kore and Martins reported that the outcomes of both methods, BMG and VWG, are good, and there are no significant differences in flow rates or patient satisfaction after the operation (2). The anatomical benefits of dorsal grafting were clear among our patients. The dorsal onlay method helps to provide better mechanical support, reduces the chances of the formation of urethrovaginal fistula, and secures urinary continence (5).

Babelay et al. maintained that dorsal grafting maintains the blood supply of the urethra and thus the blood needed for the graft to survive is secured, which was in line with our findings of all patients who had their continence postoperatively reinforced (4). Bajoria and team also found similar functional improvement, and they confirmed BMG reliability for urethral strictures as long as 2 cm (3). Patient selection plays a very important role in achieving successful outcomes. In the present study, only adult female patients with strictures were included, and these conditions were both symptomatic and confirmed by imaging and uroflowmetry. Further, in order to limit the possibility of postoperative complications and graft failure (5, 7), patients with active infections, malignancy, or neurogenic bladder were excluded. This is in agreement with the views of Wessells et al., who concentrated on preoperative assessment in detail to enhance surgical outcomes and lessen the chance of recurrence (10).

The two types of grafts showed similar improvements in parameters of uroflowmetry. Qmax preoperative values were significantly less than those of postoperative values, which is good evidence of successful restoration of urethral patency. These findings are consistent with the findings of Al-Misbah et al., who stated that both labial mucosal grafts and vaginal wall grafts are capable of delivering excellent functional results when harvested and sutured accordingly (7). Waterloos et al. also highlighted that expensive surgical operations, wary grafting sizing, and placing the grafts at the back are key issues that promote a better outcome and the weak chances of re-emerging stricture (8). The complication profile of our cohort was low, with only six patients experiencing minor complications (transient hematuria or donor site discomfort) and none experiencing major complications. This is the same as is reported by Prabhuswamy et al., Bajoria et al, and Hassan et al, who had low morbidity and no significant adverse events following dorsal onlay urethroplasty (1). There are no cases of urethrovaginal fistula or incontinence, which shows that dorsal grafts are positioned attentively to avoid damaging the urethral integrity and the continence mechanism (4).

The feedback on patient satisfaction was high, with 87.5 percent of the satisfaction outcome rated as good or excellent. This is in line with prior research by de Toledo and Alvarez de Toledo, who noted that patient-reported outcome is an important measure of the effectiveness of female urethroplasty (11, 15). Satisfaction is also high due to the benefits of the minimally invasive graft harvesting procedures, as well as the minimal time spent on catheterization, as explained by Bain et al. and Horiguchi et al. (6, 9). Our research findings align with global recommendations for the treatment of female urethral strictures. Lumen et al. and Wessells et al. recommend that graft-based urethroplasty is the best option for symptomatic strictures, especially in cases of previous dilatation failures (10, 18). The similarity in success rates of BMG and VWG in our studies supported the assertion that graft selection can be a matter of individual choice, depending on tissue availability, the patient's preference, and the surgeon's expertise (7). In addition, de Rooij et al. demonstrated that the grafting-based approach is applicable to diverse patient categories and even includes cases of difficult reconstruction (14).

The limitations of the research include its single-center design and a 6-month follow-up period, which may not be sufficient to detect late recurrences. Studies conducted across multiple centers, larger in size and with longer follow-up, are needed to confirm long-term outcomes and compare grafts more effectively (16). Nevertheless, our study presents significant information on a tertiary care unit in Pakistan, and it addresses the knowledge gap regarding the management of female urethral stricture in scarce resources (5, 17). In conclusion, dorsal onlay urethroplasty using buccal or vaginal grafts is a safe, effective, and reproducible surgical approach to the treatment of female urethral strictures. There were high success rates, minimal complications, and patient satisfaction with the two types of grafts. The principal determinants of outcome success are personalization of graft choice, accuracy of

surgical practice, and judicious selection of patients, and these are in line with the global best practices.

Conclusion

Buccal mucosal or vaginal wall grafts as a dorsal onlay urethroplasty are a safe, effective, and reliable type of female Urethral stricture management. In this study, there were equal success rates of the two types of grafts, a high level of improvement in the urinary flow, and a low level of complications and general satisfaction of the patients. The dorsal positioning of the graft offers the best vascular supply, continuity of the continence, and the least risk of developing urethral complications. The most important in the attainment of good outcomes is a close preoperative study, selection of patients, and close practice during the operation. Minor complications such as temporary hematuria or soreness at the site of the donor were easily controlled, and no significant complications like urethrovaginal fistula or incontinence were reported. These findings are consistent with the suggestions of the international community and support the graft-based dorsal onlay urethroplasty as the initial reconstructive modality in women with symptomatic urethral strictures. These findings need to be validated by mega-studies (with long-term follow-up) to guide the most appropriate selection of grafts.

References

1. Prabhuswamy VK, Somashekarappa HH, Ganeshappa PM, Prabhu K, Krishnamoorthy V. Dorsal onlay buccal mucosal graft urethroplasty for female urethral stricture: Techniques and outcomes. *Asian Journal of Urology*. 2024 Oct 1;11(4):611-7.
2. Kore RN, Martins FE. Dorsal onlay urethroplasty using buccal mucosal graft and vaginal wall graft for female urethral stricture—Outcome of two-institution study. *Indian Journal of Urology*. 2022 Apr 1;38(2):140-5.
3. Bajoria S, Bhunia A, Sasmal S, Sharma PK, Maiti S, Gupta AK, Santra S, Mandal S. Dorsal onlay buccal mucosal graft female urethroplasty: Our experience in a tertiary care center of Eastern India. *International Journal of Reconstructive Urology*. 2025 Jul 1;3(2):249-54.
4. Babelay G, Ahmad A, Ranjan N, Dheeraj K. Analysis of outcome of dorsal onlay urethroplasty using buccal mucosal graft and vaginal wall graft for female urethral stricture. *Urology Annals*. 2025 Jul 1;17(3):156-60.
5. Hassan RU, Siraj S, Khan A, Saleem A, Ahmad I, Naeem R. Dorsal onlay urethroplasty using buccal mucosal graft and vaginal wall graft for female urethral stricture; outcome of a Tertiary Care Hospital. *Pakistan Journal of Medical & Health Sciences*. 2022 Aug 11;16(05):1519-.
6. Bain M, Gomez Zapata DE, Ravichandran K, Fogaing C, Anand A, Talpallikar A, Bhadranaawar S, Kulkarni S, Desai D, Joshi P. Female urethral stricture: A multi-centre experience and lessons learnt. *BJUI Compass*. 2025 May;6(5):e70024.
7. Al-Misbah T, Chowdhury AM, Ahmed AB, Enayetullah I, Khan SA. Labial mucosal substitution urethroplasty for female urethral stricture: A sustainable technique. *Bangladesh Journal of Urology*. 2023 Jul 30;26(2):78-83.
8. Waterloos M, Verla W, Wirtz M, Waterschoot M, Claeys W, Francois P, Lumen N. Female urethroplasty: outcomes of different techniques in a single center. *Journal of Clinical Medicine*. 2021 Aug 31;10(17):3950.
9. Horiguchi A, Ojima K, Shinichi M, Hirano Y, Hamamoto K, Ito K, Asano T, Takahashi E, Kimura F, Azuma R. POS 001. *Journal of Urology*. 2021;206(Supplement 3):e381-2.
10. Wessells H, Morey A, Souter L, Rahimi L, Vanni A. Urethral stricture disease guideline amendment (2023). *The Journal of Urology*. 2023 Jul;210(1):64-71.
11. de Toledo IA, DeLong J. Female urethral reconstruction: urethral diverticulectomy, urethral strictures, vesicovaginal fistula. *Urologic Clinics*. 2022 Aug 1;49(3):393-402.

12. Nilsen OJ, Ekerhult T, Grabowska B, Sairanen J. PD22-05 TO TRANSECT OR NOT—A RANDOMIZED SCANDINAVIAN STUDY OF SEXUAL DYSFUNCTION AFTER URETHROPLASTY. *Journal of Urology*. 2021 Sep 1;206(Supplement 3):e381-2.
13. Purohit RS, Torres C, Blaivas JG. Female Urethral Reconstructive Surgery. In: *Complications of Urogynecology and Reconstructive Pelvic Surgery*. 2025 Oct 20; pp. 231-247. Cham: Springer Nature Switzerland.
14. de Rooij FP, Falcone M, Waterschoot M, Pizzuto G, Bouman MB, Gontero P, Lumen N, Pigot GL. Surgical outcomes after treatment of urethral complications following metoidioplasty in transgender men. *The Journal of Sexual Medicine*. 2022 Feb;19(2):377-84.
15. Alvarez de Toledo I. Female Urethral Reconstruction. In: *Female Genitourinary and Pelvic Floor Reconstruction*. 2023 Jul 22; pp. 1-12. Cham: Springer International Publishing.
16. Bandini M, Joshi P, Bafna S, Yepes C, Alrefaey A, Longoni M, Montorsi F, Kulkarni S. Establishing the role of single-stage preputial spiral graft urethroplasty for panurethral stricture. *BJU International*. 2025 May 24.
17. Mtafu NH, Mtaturu GF, Muhsin A, Alexandre AM, Mhaya JK, Mwanga AH, Nyongole OV, Mkony CA. Factors Influencing the Treatment Outcomes of Patients Undergoing Urethroplasty for Urethral Stricture at Muhimbili National Hospital. *International Journal of Urology and Renal Health*. 2023;12(1):45-52.
18. Lumen N, Campos-Juanatey F, Dimitropoulos K, Greenwell T, Martins FE, Osman N, Riechardt S, Waterloos M. Urethral Strictures. In: *EAU Guidelines*. Edn. presented at the EAU Annual Congress Amsterdam 2022; 2022.

=