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Post-Urethroplasty Outcomes in Malaysia: A Tertiary Referral Center Long-Term Experience

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Abstract

Background: Urethral stricture disease involves fibrotic narrowing of the urethra, leading to obstructive urinary symptoms. Urethroplasty, including EPA and BMG techniques, offers high success rates, yet recurrence and other complications remain a concern. This study aims to assess stricture recurrence and other outcomes in a Malaysian tertiary center and identify associated risk factors to improve future treatment strategies. **Objective:** To evaluate stricture-free survival, identify recurrence risk factors, and analyze postoperative complications following urethroplasty at Hospital Serdang. **Methods:** A retrospective review of 76 patients who underwent urethroplasty from 2019 to 2024 at Hospital Sultan Idris Shah Serdang was performed. Patients were categorized based on surgery type: excision and primary anastomosis (EPA) or buccal mucosa graft (BMG) augmentation. Data on demographics, stricture characteristics, surgical details, and outcomes were analyzed. **Results:** 85% of the patients were stricture-free for 5 years. Mean postoperative uroflow was 11.61 ml/s. Postoperatively, 14 (18.2%) had erectile dysfunction, 4 (5.2%) hematoma, and 1 (1.3%) surgical site infection. 12 cases (15.6%) had restricture. The majority of these cases underwent serial dilatation (83.3%), and 2 of these cases underwent revision urethroplasty (16.7%). **Conclusion:** Urethroplasty is feasible for a wide range of urethral stricture cases, with great outcomes and minimal complications. Diabetics have an increased risk of stricture recurrence postoperatively (odds ratio 3.6).

Keywords

Urethra, Stricture, Erectile Dysfunction, Recurrence, Factors, Survival, Reconstructive, Urology

1. Introduction

Urethral stricture disease is a common and often debilitating condition characterized by the narrowing of the urethral lumen due to fibrotic scarring of the urethral epithelium and underlying corpus spongiosum [1]. This pathological process results in obstructive lower urinary tract symptoms (LUTS), including decreased urinary stream, incomplete bladder emptying, and recurrent urinary tract infections, significantly impacting the quality of life of affected individuals. The etiology of urethral strictures is diverse and includes trauma (iatrogenic, external), infection, inflammatory conditions (e.g., lichen sclerosus), and idiopathic causes [2]. Globally, the incidence of urethral stricture varies, with higher rates reported in regions where sexually transmitted infections (STIs) and inadequate medical access are prevalent [3]-[6].

Surgical intervention is the cornerstone of definitive management for urethral strictures, with urethroplasty being considered the gold standard, particularly for long, complex, or recurrent strictures [7]-[10]. Urethroplasty techniques are broadly classified into Excision and Primary Anastomosis (EPA) and Augmentation Urethroplasty.

Despite its high success rate, urethroplasty is not without complications. One of the primary concerns is stricture recurrence, which has been reported in 2% to 36% of cases, depending on factors such as surgical technique, patient comorbidities, stricture characteristics, and post-operative care [11]-[13]. Importantly, up to 75% of recurrences occur within the first six months post-surgery, emphasizing the need for vigilant follow-up and early identification of at-risk patients [14].

In Malaysia, data on urethral stricture disease and surgical outcomes, particularly in tertiary referral centers, are sparse. Understanding the recurrence rate of urethral strictures and identifying risk factors in a local context are crucial for optimizing patient care pathways and improving surgical outcomes. Hospital Serdang, a tertiary urology referral center, serves a diverse patient population and performs a substantial number of urethroplasty procedures annually, making it an ideal setting for such a study.

This retrospective study aims to bridge the gap in local epidemiological data by evaluating stricture recurrence rates post-urethroplasty, identifying contributory risk factors, and assessing postoperative complications. The findings are expected to inform clinical practice, enhance patient counseling, and guide future research into more effective management strategies for urethral stricture disease.

2. Methods

A study was conducted at Hospital Sultan Idris Shah Serdang between 2018 and 2024. Patients with a history of hypospadias repair or pelvic radiotherapy were excluded from the study. 76 patients were included in this study, and data such as demographic information, including age and body mass index (BMI), were recorded. Existing medical conditions such as hypertension, hyperlipidemia, diabetes mellitus, and coronary artery disease were also documented. Past procedures for

urethral stricture, such as internal urethrotomy, urethral dilatation, or earlier urethroplasty, were noted. The anatomical location and length of the stricture and the underlying cause were documented. Surgical techniques were classified into two categories: excision and primary anastomotic urethroplasty (EPA), and buccal mucosa graft (BMG) augmentation urethroplasty.

Postoperatively, patients were managed with an indwelling urethral catheter and a suprapubic catheter—retained for 21 days following EPA and 28 days after BMG. A pericatheter urethrogram was performed to evaluate anastomotic integrity. If no contrast leakage was observed, both catheters were removed; otherwise, they were replaced and maintained for an additional week. No patients required catheterization beyond this period. Follow-up evaluations occurred at one month, three months, and every six months thereafter. These assessments included patient history, physical examination, uroflowmetry, and measurement of post-void residual (PVR) urine volume. Postoperative complications such as erectile dysfunction, hematoma, surgical site infection, and pain were documented during every clinic visit. A Qmax of less than 10 mL/s during follow-up prompted further investigation with cystoscopy. Patients with a urethral caliber of 16-Fr or greater were considered free of recurrence, while those with calibers below 16-Fr were categorized as having recurrent strictures, regardless of any additional interventions. Data were analyzed using SPSS version 25.0. Continuous variables were summarized using means and standard deviations, while categorical variables were reported as frequencies and percentages. Kaplan-Meier survival curves were utilized to assess stricture-free survival. Censoring occurred at the last follow-up or upon urethroplasty failure. To identify predictors of recurrence, univariate Cox proportional hazards regression was applied, followed by multivariate Cox regression to adjust for potential confounding factors. A p-value of less than 0.05 was considered statistically significant.

3. Results

A total of 76 patients underwent urethroplasty at Hospital Sultan Idris Shah, Serdang, from 2018 to 2024. All operations were performed directly by a single experienced urology consultant with >5 years of experience. The mean patient age is 42.3, with a mean BMI of 27.2 (±4.7). Most of the urethral strictures in this study are iatrogenic (59.7%), followed by motor vehicle accident-induced (28.6%) and idiopathic (8%). The mean stricture length is 2.45 cm, and most of the patients in this study have penile urethral stricture 42 (55.3%), followed by membranous urethral stricture 34 (44.7%). Interestingly, 40 (51.9%) patients underwent augmented urethroplasty, and 36 (47.4%) underwent excision and primary anastomosis (**Figure 1**, **Table 1**).

Mean duration was 64.6 months (95% confidence limits 59.3, 70.0). Mean restricture was 64.6 months (**Figure 2**).

As per **Table 2**, the shortest time for restricture is 2 months, and the median restricture duration is 53 months. Twelve cases (15.6%) had restricture. The ma-

jority of these cases underwent serial dilatation (83.3%), and 2 of these cases underwent revision urethroplasty (16.7%). The 2 cases selected for revision urethroplasty had long restrictures (~5 cm).

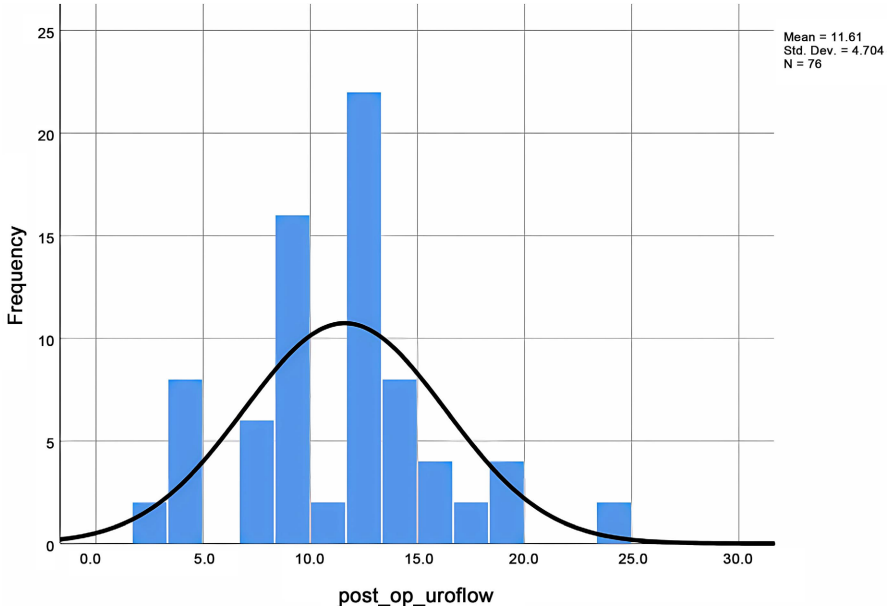


Figure 1. Normal distribution curve of patients' postoperative urine flow (mL).

Table 1. Preoperative patient comorbidities.

	Yes (%)	No (%)
Smoker	18 (24.7)	58 (75.3)
Diabetic	18 (23.4)	58 (75.3)
Hypertensive	26 (33.8)	50 (64.9)
Heart condition	14 (18.2)	62 (80.5)
hyperlipidemia	18 (23.4)	58 (75.3)

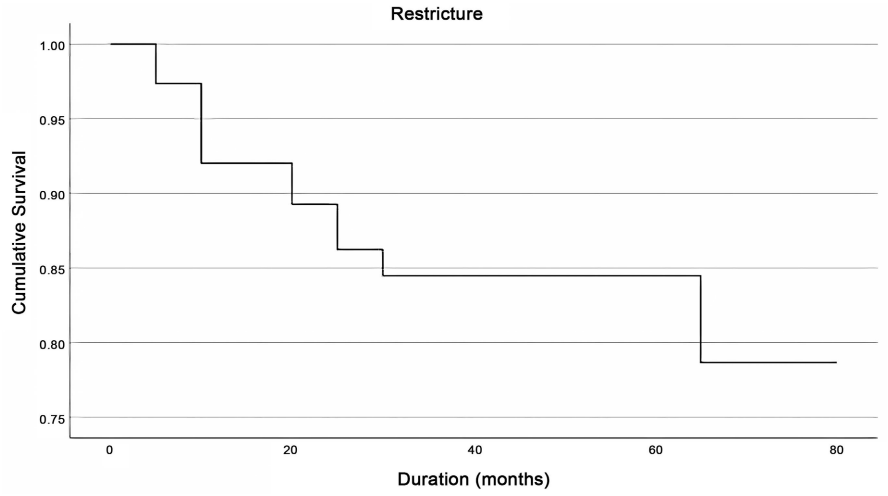
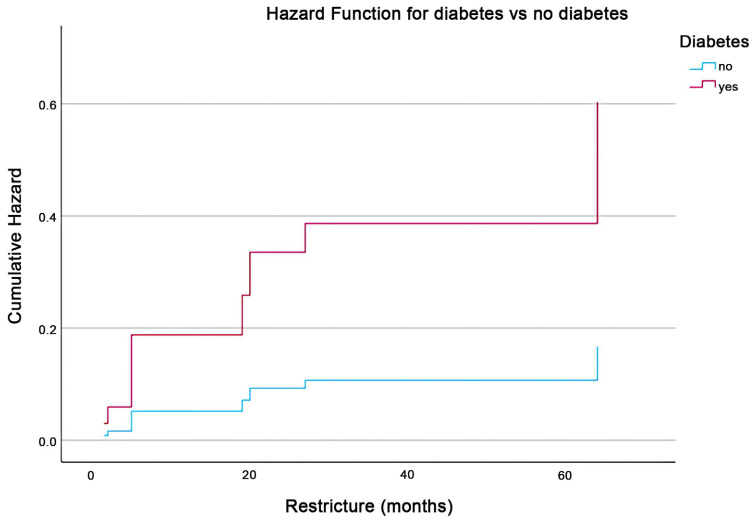


Figure 2. Survival chart for stricture recurrence.

Table 2. Postoperative complications.

	Yes (%)	No (%)
ED	14 (18.2)	63 (81.8)
Hematoma	4 (5.2)	72 (93.5)
Surgical Site Infection	1 (1.3)	75 (97.4)
Restricture	12 (15.6)	64 (83.1)



Regression

							95.0% CI for Exp(B)	
	B	SE	Wald	df	Sig.	Exp(B)	Lower	Upper
Diabetes	1.287	0.580	4.931	1	0.026	3.624	1.163	11.289

B: regression coefficient, Exp(B) odds ratio. The Wald chi-square tests the null hypothesis that the constant is 0.

Figure 3. Hazard function for stricture recurrence in diabetic vs non diabetic patients.

Persons with diabetes have 3.6 times higher odds of restricture rate, as per the Chart 3 regression coefficient (**Figure 3**).

4. Discussion

In our study, we observed that all the restrictures occur within 1 year, and they plateau thereafter for 5 years. 85% of the patients were stricture-free for 5 years. This study shows an improved outcome from a previous similar article, which shows a 72.7% stricture-free outcome post-urethroplasty [15]-[21]. While late recurrences can occur—as late as 87 months post-surgery [22]-[24]—Barbagli's long-term data suggest that recurrence rates tend to stabilize after five years. He recommended considering patients disease-free after seven years of follow-up, with further monitoring based on clinical judgment.

Stricture length has been commonly linked to urethroplasty outcomes. A systematic review by Meeks *et al.* revealed higher failure rates for strictures longer

than 5 cm, with a notable difference of 16.6% vs. 12.4% favoring shorter strictures [25]. Typically, stricture length influences the surgical approach. According to the 2025 EAU guidelines, shorter strictures (≤2 cm) are often managed with excision and primary anastomosis, while longer ones require graft-based repairs [26] [27]. The increased complexity and greater tissue damage associated with longer strictures may contribute to reduced surgical success. We positively identified that patients with diabetes have a 3.6 times higher risk of stricture recurrence. Diabetes mellitus (DM) is a significant risk factor for urethral stricture recurrence after urethroplasty, potentially due to microvascular damage and impaired healing. Poor glycemic control in diabetic patients can further exacerbate this risk, leading to stricture development in the early postoperative period [28] [29].

In our study, 5 patients experienced complications such as surgical site infection and postoperative hematoma, all of which were managed conservatively. Around 14 (18.2%) of the subjects reported erectile dysfunction after the operation. Surprisingly, all of these patients underwent anastomotic urethroplasty for membranous urethral stricture. Erectile dysfunction (ED) following urethroplasty is a well-documented complication, with journals reporting incidences of 1% - 40% [30]. Mundy reported erectile dysfunction in patients undergoing membranous anastomotic urethroplasty, explained by compromised spongiosal vascular supply and nerve disruption. Erectile dysfunction is mostly transient, and 96% of patients recover within 1 year [31]. This can be explained by more periurethral dissection and mobilisation in anastomotic urethroplasty compared to BMG urethroplasty. Postoperative inflammation and tissue edema, which resolve slowly within this 1-year timeframe, explain the transient nature of erectile dysfunction.

5. Conclusion

Based on the findings of this study, urethroplasty should be considered the first-line treatment for urethral strictures, as it offers definitive management with excellent and durable outcomes in experienced hands. Concentrating cases in a centralised center would allow for increased procedural volume and improved stricture-free survival outcome. High-volume centers specialising in urethroplasty have higher success rates due to increased surgical experience and resources [30]. We would like to highlight and reinforce from our study that urethroplasty is feasible for a wide range of urethral stricture cases with great outcomes and minimal complications. Transient ED is expected in patients with anastomotic urethroplasty, and it will resolve within a year of operation.

Ethics Approval

This study was registered with the National Medical Research Register (NMMR) and received approval from the Medical Research Ethics Committee (MREC). NMRR ID: 25-00459-RWG.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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