Original Article

Evaluating the impact of a urethral reconstruction fellowship on urethral stricture disease management at a regional hospital

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Background: Internationally, there is a trend towards early urethroplasty for treatment of urethral stricture, as opposed to endoscopic management, which is associated with short-lived patency and frequent retreatments. The objective of this study was to compare the outcomes of urethral stricture management before and after gaining urethral reconstruction expertise through a fellowship programme.

Methods: This was a retrospective case-control study that compared the characteristics, management, and outcomes of urethral stricture disease managed over two consecutive periods of time—pre-fellowship period (September 2016 to September 2019) and the post-fellowship period (October 2019 to September 2022).

Results: There were 37 patients in the pre-fellowship group and 30 patients in the post-fellowship group. Regarding treatment choice, the proportion of patients undergoing index urethroplasty significantly increased from 2.7% to 36.7% [odds ratio (OR) 18.9, 95% confidence interval (CI): 2.7 to 209.8, P<0.008], due to early recognition of strictures not amenable endoscopic treatment. Retreatment became less frequent post-fellowship (37.8% *vs.* 16.7%, OR 2.99, 95% CI: 1.6 to 5.9, P=0.001). Average number of procedures per patient also reduced (1.65±0.98 *vs.* 1.23±0.63, P=0.04). Also, there was a trend towards improved overall patency rate at 6-month in the post-fellowship period compared to the pre-fellowship group.

Conclusions: This study has demonstrated that urethral reconstruction expertise was correlated to the increased exposure of urethral stricture patients to urethroplasty as a more efficacious procedure, and was associated with reduced retreatment rates. The expertise can bring cost benefits for patients and regional institutions.

Keywords: Urethroplasty; reconstructive urology; fellowship training

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Introduction

Male urethral stricture disease affects 229–627 per 100,000 males globally and incidence rises with age (1). Although the aetiology of urethral disease remains varied, the anterior urethra is most commonly affected (92%), particularly the bulbar urethra (47%) (2). Classic management options include urinary diversion, endoscopic approaches such as urethral dilatation and direct vision internal urethrotomy (DVIU), or urethroplasty as definitive reconstructive surgery.

Of note, endoscopic methods such as DVIU have shown variable and inconsistent patency rates as compared with urethroplasty, with 1-year patency rates of 8–77% with DVIU as compared to 85–95% with urethroplasty (3). DVIU or urethral dilatation also has well-known limitations, and is unsuitable for multiple strictures, penile urethral strictures, or strictures 2-centimetres or more—

all of which can be successfully addressed with definitive reconstruction (4). As a result, endoscopic management is usually repetitive and often requires clean intermittent catheterisation as a long-term treatment adjunct. More recently, treatment of recurrent anterior urethral strictures ≤3 cm using the Optilume drug-coated balloon (Urotronic, Plymouth, MN, USA) demonstrated a 77.8% freedom from repeat intervention at 2-year follow-up, offering an alternative to repetitive endoscopic management for patients unfit for or decline definitive urethroplasty (5).

An analysis of urethral strictures treated at a tertiary centre showed that penile strictures, penile plus bulbar, and panurethral strictures occurred in 30.5%, 4.9% and 9.9% of patients respectively, and the mean stricture length of pre-treated patients was 4.34 cm, suggesting that a significant proportion of urethral strictures should be treated by upfront or index urethroplasty (4). Recent years have seen a shift towards urethroplasty as index management for complex urethral strictures, as evidenced by the trend in decreasing ratio of endoscopic procedures to urethroplasty over the last 2 decades (58.9:1 in 1994, versus 16.8:1 in 2016) (6).

Despite this, endoscopic approaches continue to dominate the armamentarium of stricture management, despite comparatively lower patency rates and strong evidence reporting the efficacy of urethroplasty as early primary treatment (7). The underutilisation of urethroplasty has been postulated to relate to a steep learning curve, lack of exposure during residency training, as well as lack of specialist fellowship training (8,9). In the United States, limited urethroplasty experience appears to be the primary impediment in offering this as treatment, with 94% of suitable patients undergoing endoscopic procedures *vs.* 6% undergoing urethroplasty (10). Significantly, formal urethroplasty training was noted to independently increase the likelihood of recommending urethroplasty as treatment (11).

Our institution recognised that expertise in urethroplasty was a key factor to provide comprehensive management for urethral stricture disease. To bridge this gap, our department sent one of our authors (W.L.) for a 1-year fellowship training in andrology and reconstructive surgery at a tertiary centre in the United Kingdom from October 2018 to September 2019. The aim of this study was to review the changing practice of urethral stricture management following the acquisition of expertise in urethral reconstruction. Hence, the objective of this study was to present our institution's experience in the management of urethral stricture disease from September 2016 to September 2022, comparing the pre-fellowship period from September 2016 to September 2019 with the post-fellowship period from October 2019 to September 2022. We present this article in accordance with the STROBE reporting checklist (available at https://tau.amegroups.com/article/view/10.21037/tau-24-550/rc).

Highlight box

Key findings

- Urethral reconstruction expertise was associated with improved utilization of urethroplasty in eligible patients who were not expected to benefit from endoscopic management. This resulted in a reduced retreatment rate and reduced average number of procedures each urethral stricture patient received.

What is known and what is new?

- Formal urethroplasty training was noted to increase the likelihood of recommending urethroplasty as a treatment modality. Urethroplasty was associated with a much better 1-year patency rate compared to endoscopic management.
- This study described how a fellowship programme in urethral reconstruction changed the practice on urethral stricture management at a regional hospital through centralization of management, more accurate diagnosis of stricture length and location, early recognition of the need for urethroplasty, a greater capacity to perform oral graft substitution urethroplasty, and more comprehensive follow-up for surveillance of stricture recurrence. Such a practice improved the overall care of patients with urethral stricture disease.

What is the implication, and what should change now?

- Regional hospitals with a urology service should strive to gain urethral reconstruction expertise through appropriate fellowship programmes to improve the care of patients with urethral stricture disease.

Methods

This was a retrospective case-control study that compared the characteristics, management, and outcomes of urethral stricture disease managed over two consecutive periods of time. Male patients over the age of 18 years with a diagnosis of urethral stricture disease were identified through clinical coding via the institution's electronic medical chart and operating theatre records, with a 6-year timeframe spanning from September 2016 to September 2022. Patients were stratified into pre-fellowship period (September 2016 to September 2019) and post-fellowship period (October 2019 to September 2022) for further analysis. Patency rate was the primary outcome measure; secondary outcome

Table 1 Patient and disease characteristics

Patient and disease characteristics	Pre-fellowship (n=37)	Post-fellowship (n=30)
Age (years)	56.9±14.6	57.4±18.1
ASA status (median)	2	2
Initial presentation		
Lower urinary tract symptoms	25	15
Incidental	0	4
Intraoperative	1	0
Difficult urethral catheter insertion	2	0
Urinary retention	9	8
Unspecified	0	3
Stricture aetiology		
Spontaneous/idiopathic	24	20
Radiation	2	2
Post-catheterisation	3	0
Post-instrumentation	1	4
Lichen sclerosis	1	0
Pelvic trauma	2	3
Other/unspecified	4	1
Stricture location		
Bulbar	22	20
Meatal/submeatal	5	3
Penile	4	3
Posterior urethra	1	3
Unspecified	5	1
Stricture length (cm)	1.73±1.35	2.29±1.58

Data are presented as mean ± SD or number unless otherwise stated. ASA, American Society of Anaesthesiologists; SD, standard deviation.

measures included secondary treatments, as well as the proportion treated with endoscopic versus reconstructive surgery. A sample size calculation indicated that at least 25 patients per group were required to detect a statistically significant difference in treatment strategies between the two groups using a Chi-square test, with 80% power and an alpha level of 0.05. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Ethics committee approval was obtained from the National Healthcare Group Domain Specific Review Board (No. 2022/00943). As this was a retrospective case control study reviewing clinical case records before and after fellowship in reconstructive training, written informed patient consent was not required.

Retrospective chart review was performed for each patient with documentation of basic demographics, American Society of Anaesthesiologists (ASA) physical classification status, initial presentation, stricture aetiology, stricture location and stricture length. Quantitative data such as the number of treatments and maximum flow rate (Qmax) in mL/s over the course of treatment was also recorded (index, 3 months, 6 months and 12 months). Patients with subclinical urethral strictures and low-grade strictures that were not flow significant were excluded. Data extraction was performed by a non-study team member for eligible cases as identified via clinical coding in order to maintain patient confidentiality. Anonymised data was subsequently passed to the lead author for further analysis to eliminate bias.

Statistical analysis

Data analysis was performed with SPSS (IBM SPSS Statistics, version 29, Chicago, IL, USA). Patient demographics and disease characteristics were described. The Shapiro-Wilk test or D'Agostino-Pearson test was applied to verify that quantitative variables followed a normal distribution. Results were expressed as means and standard deviations or percentages. *T*-test was used to compare outcomes between pre- and post-fellowship cohorts and Fisher's exact test was employed to assess the probability of index urethroplasty before and after fellowship training. Missing data was addressed with complete case analysis. The level of statistical significance was <0.05.

Results

A total of 246 cases of urethral stricture were identified via clinical coding. Female patients and those with subclinical urethral strictures and low-grade strictures that were not flow significant were excluded. Overall, 67 men were identified via the inclusion criteria previously outlined and treated for urethral stricture disease between September 2016 to September 2022. The pre-fellowship cohort comprised 37 patients with a mean age of 56.9±14.6 years, whilst the post-fellowship cohort comprised 30 patients with a mean age of 57.4±18.1 years (*Table 1*). Median ASA status across both groups was 2. Two patients, whose

urethral stricture was diagnosed pre-fellowship, but had definitive urethroplasty during post-fellowship period, were analysed as part of the post-fellowship group. Across both cohorts, the most common initial presentation was lower urinary tract symptoms (67.6% versus 50% pre- and post-fellowship respectively), the bulbar urethra was most frequently involved (59.5% versus 66.7%) and stricture aetiology was mostly idiopathic (64.9% versus 66.7%). Mean stricture length was 1.73±1.35 cm in the pre-fellowship cohort as compared to 2.29±1.58 cm post-fellowship (P=0.13).

In the pre-fellowship cohort, 5 patients underwent suprapubic catheterisation (SPC) as primary treatment due to a combination of the complexity of their stricture disease (n=1), poor premorbid status precluding further surgical intervention (n=3), and refusal for definitive management (n=1). Fourteen (37.8%) patients required 2 or more interventions, with 3 patients undergoing 4 treatments during their journey (*Table 2*). Only one patient (2.7%) underwent index urethroplasty, as the majority (31 of 37, 83.8%) underwent endoscopic management. Endoscopic approaches were favoured even in the context of stricture recurrence, with only 2 patients undergoing urethroplasty after initial treatment failure (*Table 3*).

In the post-fellowship cohort, 1 patient underwent upfront SPC as primary treatment in view of poor premorbid status. Notably, there was a significant paradigm shift in both index and subsequent treatment following failure. The proportion of patients undergoing index urethroplasty significantly increased from 2.7% (1 of 37 patients) to 36.7% (11 of 30 patients) [odds ratio (OR) 18.9, 95% confidence interval (CI): 2.7 to 209.8, P<0.008]. Further analysis showed that 20 patients in the pre-fellowship group had bulbar stricture >2 cm, recurrent

Table 2 Frequency of intervention (pre- and post-fellowship)

Total no. of treatments	No. of patients	Proportion of patients (%)
Pre-fellowship		
1	23	62.2
2	7	18.9
3	4	10.8
4	3	8.1
Total	37	100
Post-fellowship		
1	25	83.3
2	4	13.3
3	0	0
4	1	3.3
Total	30	100[a]

[a], adds up to 100% instead of 99.9% due to rounding of preceding values.

Table 3 Types of intervention by treatment level (pre- and post-fellowship)

Treatment type	Primary	Secondary	Tertiary	Quaternary	Number of procedures
Pre-fellowship					
Dilatation	24	10	2	2	38
DVIU	7	3	3	0	13
Urethroplasty	1	1	1	0	3
SPC	5	0	1	1	7
Total	37	14	7	3	61
Post-fellowship					
Dilatation	14	1	0	0	15
DVIU	4[e]	1[b]	1[b]	0	6
Urethroplasty	11	3	0	1	15
SPC	1	0	0	0	1
Total	30	5	1	1	37

[b], two patients received DVIU in the pre-fellowship period before undergoing urethroplasty in the post-fellowship period; one of the 2 patients had 3 DVIU before receiving urethroplasty as a quaternary procedure. DVIU, direct vision internal urethrotomy; SPC, suprapubic catheter.

Table 4 Urethroplasty indications and types of urethroplasty performed

Urethroplasty indications and types of urethroplasty performed	Pre-fellowship	Post-fellowship
Indications for urethroplasty		
Stricture >2 cm	4	6
Recurrent	14	5
Meatal/submeatal	5	3
Penile	4	4
Multiple	1	2
Obliterated lumen not amenable to endoscopic management	2	3
Pelvic fracture urethral injury	1	3
Eligibility for treatment		
Total eligible[c]	20	17
Total who underwent urethroplasty	3	15[d]
Percentage (%)	15.0	88.2
Types of urethroplasty performed		
Anastomotic urethroplasty (excision and primary anastomosis)	3	1
Augmented anastomotic urethroplasty	0	4
Dorsal-onlay BMG urethroplasty	0	4
Panurethral BMG urethroplasty	0	1
Two-stage Johanson BMG urethroplasty	0	2
Posterior urethroplasty	0	3

[c], some patients had overlapping characteristics. [d], including 2 eligible patients from the pre-fellowship group who underwent urethroplasty post-fellowship. BMG, buccal mucosal graft.

stricture, meatal or submeatal, penile strictures, multiple strictures, obliterated lumen not amenable for endoscopic management and pelvic fracture urethral injuries, and these patients would have been best managed with urethroplasty as standard of care. However, only 3 of 20 (15%) of these patients received urethroplasty. Conversely, in the post-fellowship group, urethroplasty was performed on 15 of 17 (88%) patients with these indications (*Table 4*). Within the post-fellowship group, there were also two patients who received urethroplasty after endoscopic management (DVIU) in the pre-fellowship period: one case with a 2.5 cm bulbar stricture underwent urethroplasty as a secondary procedure after 1 unsuccessful DVIU, and another case with a 1cm proximal penile stricture underwent urethroplasty as a quaternary procedure after 3 unsuccessful DVIU.

In comparison with the pre-fellowship cohort, only 16.7% of patients in the post-fellowship group underwent 2 or more treatments, in comparison with 37.8% in the pre-fellowship group (OR 2.99, 95% CI: 1.6 to 5.9, P=0.001). Overall, the average number of procedures was 1.65±0.98 per patient in the pre-fellowship group, compared to 1.23±0.63 per patient in the post-fellowship group (P=0.04).

Patency rates (defined as per the European Urology Association Guidelines from 2021 as synonymous with clinical stricture recurrence rates) were assessed for index treatment techniques. (4) The overall patency rate was 20/26 (76.9%) in the pre-fellowship group and 23/28 (82.1%) in the post-fellowship group at 6-month follow up (P=0.74). In the pre-fellowship group patency rates were 76.2% for urethral dilatation, 75% for DVIU, 76% for combined endoscopic approaches and 100% for urethroplasty (*Table 5*). In the post-fellowship group, patency rates were 76.9% for urethral dilatation, 75% for DVIU, 76.4% for combined endoscopic approaches and 90.9% for urethroplasty. Patency rates were uniformly

Table 5 Clinical outcomes by type of index treatment performed (excluding long-term SPC insertion)

Clinical outcomes by type of index treatment performed	Endoscopic (combined)[e]	Urethroplasty
Pre-fellowship		
No. of pts	31	1
Age (years)	57.0±14.0	29
Stricture length (cm)	1.5±1.2	1.5
Qmax pre-surgery (mL/s)	7.6±4.9	4.5
Qmax post-surgery (mL/s at 3 months)	15.8±7.8	20.8
Qmax post-surgery (mL/s at 6 months)	14.6±8.4	25
Change in Qmax post-intervention at 6months (mL/s)	6.7±6.6	12.1±14.1
Patency rate (% at 6 months)	76.0	100
Lost to follow-up (n at 6 months)	6	0
Post-fellowship		
No. of pts	18	11
Age (years)	61.3±17.8	48.6±15.3
Stricture length (cm)	2.3±1.7	2.3±1.6
Qmax pre-surgery (mL/s)	7.0±4.1	7.7±1.7
Qmax post-surgery (mL/s at 3 months)	15.4±6.3	19.8±9.2
Qmax post-surgery (mL/s at 6 months)	14.3±8.8[f]	22.8±8.9[f]
Change in Qmax post-intervention at 6months (mL/s)	5.3±6.5	13.4±6.5
Patency rate (% at 6 months)	76.4	90.9
Lost to follow-up (n at 6 months)	1	1

Data are presented as mean ± SD or number. [e], referring to both dilatation and DVIU as endoscopic approaches. [f], post-fellowship group increase in Qmax post-surgery at 6 months, urethroplasty *vs.* endoscopic (combined), P<0.05. SPC, suprapubic catheter; DVIU, direct vision internal urethrotomy; SD, standard deviation.

higher across both groups for urethroplasty over endoscopic methods. Whilst the patency rate appeared to decrease pre- and post-fellowship in those who underwent urethroplasty, it must be noted that only 1 patient underwent index urethroplasty pre-fellowship leading to a 100% success rate, in comparison with 11 patients who underwent the same post-fellowship with a 90.9% patency rate in 10 out of 11 patients.

Maximal flow rate (Qmax) post-urethroplasty was also uniformly higher in comparison with endoscopic surgery in both pre- and post-fellowship cohorts at both 3- and 6-month. For the post-fellowship cohort, Qmax at 6 months between the urethroplasty group and the endoscopic treatment group was also statistically significant (22.8±8.9 *vs.* 14.3±8.8, P=0.02), as was the change in Qmax at 6 months (13.4±6.5 *vs.* 5.3±6.5, P=0.002).

Discussion

Urethral dilatation and DVIU have traditionally been first-line treatment for urethral stricture. Our results showed that endoscopic treatment of urethral strictures provided the patients with a high short term patency rate at 6 months, 76.0% pre-fellowship and 76.4% post-fellowship respectively. These outcomes were consistent with the contemporary 1-year patency rate of 86.7% for patients treated by DVIU and 69% for patients treated by urethral dilatation similarly using S-curve coaxial dilators (12,13).

Whilst endoscopic treatments are valid in providing relief to patients, their impact is often short lived and remain unsuitable for longer strictures, with 40% recurrence at 12 months for strictures 4 cm and 75% recurrence at 48 months for strictures 2 to 4 cm (14).

Additionally, endoscopic approaches are poor options for recurrent strictures independent of length or location, with high recurrence rates of 50% to 70% by 3 months and 60% to 100% by 48 months after a repeat urethral dilatation or DVIU (15). Santucci & Eisenberg suggested that success rates for urethrotomy was no higher than 9% for first or subsequent urethrotomy, and they recommended urethrotomy as a temporizing measure until definitive curative reconstruction can be planned (16). Furthermore, up to 64% of men initially treated by urethrotomy require ongoing self-dilatation as a treatment adjunct in order to combat stricture recurrence (17). As such, the role of urethroplasty has been highlighted in the 2014 International Consultation on Urological Disease (ICUD) guidelines, which recommend that urethroplasty be offered to men with recurrent bulbar strictures within 6 months or those who have failed to respond to a second dilatation or DVIU (18).

In recent years, we have seen a shift towards adopting urethroplasty as early definitive management. Research based on data from the American Board of Urology showed that urethral stricture management favouring urethroplasty was evident among urologists with more recent training; also urologist expertise with urethroplasty played an important role in favouring urethroplasty early in the treatment algorithm—states with a Genitourinary Reconstructive Surgery (GURS) fellowship maintained an endoscopic management to urethroplasty ratio of 10.5:1 or less, compared to the overall national ratio of 24.5:1 (Liu, 2015) (19). In our series, primary treatment of urethral stricture by endoscopic management was more common in both pre- and post-fellowship cohorts. Endoscopic management formed 83.8% of the pre-fellowship group (64.9% urethral dilatation and 18.9% DVIU), and 60.0% of the post-fellowship group (46.7% urethral dilatation and 13.3% DVIU). On the other hand, initial treatment by urethroplasty increased from 2.7% to 36.7% from the pre-fellowship period to the post-fellowship period. Consequently, the ratio of patients undergoing index endoscopic treatment versus urethroplasty significantly decreased from 31:1 to 1.63:1 (OR 18.9, 95% CI: 2.7 to 209.8, P<0008). This is consistent with the suggestion that increased expertise in the subject of reconstructive urology post-fellowship training can lead to more patients being offered urethroplasty as an option (9). In our context, we demonstrated that technical limitations during the pre-fellowship period led to many patients with definite indications for urethroplasty managed with recurrent endoscopic treatment, and only 3 out of 20 patients (15.0%) needing urethroplasty receiving this procedure. This trend was aborted in the post-fellowship period, with 15 out of 17 patients (88.2%) correctly managed with urethroplasty based on guidelines. Moreover, two cases with definite indications for index urethroplasty in the pre-fellowship period, cases with >2 cm bulbar stricture and penile stricture respectively, were referred for urethroplasty only during the post-fellowship period. This resulted in unnecessary treatment delay and prolonged poor quality of life for these patients.

In the pre-fellowship period, urethral strictures were managed by any urologist within the department. Patients typically underwent flexible cystoscopy for assessment of voiding lower urinary tract symptoms or for re-establishment of urethral lumen in cases of acute retention of urine. Management of urethral strictures diagnosed in this period typically involved dilatation in the same cystoscopy sitting, or urethrotomy when strictures appeared more complex and when patients were unable to tolerate dilatation in the cystoscopy suite. Centralization of urethral strictures under one reconstructive urologist in the post-fellowship period led to less frequent same sitting dilatation, especially when flow dynamics were not severe, and more consistent use of retrograde urethrogram evaluation prior to decision-making. Whenever there was concern with the accuracy of the urethrogram, an on-table urethrogram was repeated by the reconstructive urologist, as it was previously shown that the primary urologist was more accurate in the diagnosis of stricture location and stricture length (20). Furthermore, the post-fellowship period demonstrated greater use of oral graft substitution urethroplasty, either as a dorsal-onlay, panurethral, augmented anastomotic, or two-stage urethroplasty setting (*Table 4*).

Recent research from Choi *et al.*, 2020 suggested that the learning curve of anterior urethroplasty was not as daunting as originally imagined; both penile and bulbar urethroplasty achieved a recurrence-free rate of >80% within the first quintile group (1–8 cases and 1–9 cases respectively) (21). This was compared favourably with an earlier study that showed that proficiency of anterior urethroplasty only occurred after approximately 100 cases (7). In our experience, the shift to favour urethroplasty early in the algorithm was beneficial for patients in expediting a cure. Moreover, the patients avoided worse outcomes from repeated DVIU, which could result in stricture lengthening and spongiofibrosis that may complicate future attempts at urethroplasty. However, we noted that despite a higher frequency of upfront urethroplasty, it was unlikely that urethroplasty would

supersede endoscopic management or urethral dilatation completely as primary treatment particularly in the context of acute urinary retention or profoundly bothersome lower urinary tract symptoms, given how the latter can be performed within a comparatively quick timeframe without the requirement for general anaesthesia.

The British Association of Urological Surgeons (BAUS) also recommended that urethroplasty was more cost-effective than repeated endoscopic intervention (22). Although short-term outcomes comparing DVIU and urethroplasty were similar, the multicentre OPEN trial reported that men undergoing DVIU were twice as likely to undergo reintervention than those who underwent urethroplasty (HR 0.52, 95% CI: 0.31–0.89) (23). Despite the higher reintervention rates for DVIU, the OPEN trial suggested that urethroplasty only had a 14% chance of being cost-effective for the treatment of recurrent bulbar strictures compared to DVIU (24). The context where the OPEN study took place must be taken into consideration, as the UK had a relatively high cost of urethroplasty (22). Furthermore, the study did not consider the requirement to perform lifelong intermittent self-dilatation in the DVIU group for cost calculations (25). For our study, in the pre-fellowship cohort, 37.8% of patients required 2 or more interventions as compared with 16.7% post-fellowship, as urethroplasty was more readily adopted for suitable cases. This is despite the pre-fellowship cohort being monitored mainly by development of urinary symptoms, while the post-fellowship cohort were monitored by a combination of urinary symptoms and uroflowmetry. Re-calibration in the post-fellowship cohort by flexible cystoscopy was conducted when there was a reduction in Qmax and plateau of the uroflowmetry curve. Arguably, the urethral stricture cases managed in the post-fellowship period were more challenging given the longer stricture length managed during this period although statistical analysis did not reach significance (2.29±1.58 *vs.* 1.73±1.35, P=0.13). Within the post-fellowship group, urethroplasty performed better than endoscopic management for average change in maximal flow rate. From the institution's perspective, the lower number of procedures per patient in the post-fellowship group compared the pre-fellowship group (1.23±0.63 *vs.* 1.65±0.98, P=0.04) could be more cost-effective as patients with repeated procedures would undergo more office evaluation, diagnostic retrograde urethrograms, and cystoscopies (26).

From our literature review, there has been no previous study that attempted to evaluate how a urethral reconstruction fellowship programme influenced the practice of urethral stricture disease management. Another strength of our study relates to its design – patients were identified by clinical coding rather than treatment to ensure that all patients with clinically significant urethral stricture disease were identified for analysis. The retrospective nature of the study limited the ability to control for consistency in follow-up. Due to high attrition rates (up to 56.7% of patients lost to follow up at 12 months), we were unable to obtain outcome data greater than 6-month follow up. Also, this study did not compare the complication rate between the two periods, which would be a factor to consider in cost-effectiveness analysis. However, we note that both endoscopic management and urethroplasty were associated with a low complication rate in our experience. Moreover, the institution managed 67 cases of urethral stricture disease over a 6-year duration, which reflected the infrequent nature of this disease at a regional hospital in Singapore. However, the results of our study argue for urethroplasty expertise at all regional hospitals, as urethral stricture management appears to improve with a urologist participating in a urethral reconstruction fellowship.

Conclusions

In conclusion, this study has demonstrated that urethral reconstruction expertise gained from fellowship training improved the management of patients with urethral stricture disease. Specifically, this expertise has allowed patients increased exposure to urethroplasty as an efficacious option. However, there remains a role for further inquiry into functional outcomes and cost-effectiveness analyses. Further incorporation of complication rates, hospitalisation costs related to urethroplasty, and outpatient costs related to office evaluation, diagnostic retrograde urethrograms, and cystoscopies would provide a better understanding of the overall costs of endoscopic management and urethral reconstruction.

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Footnote

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