Original Article

Recurrent rate of urethral stricture after urethroplasty in Rajavithi Hospital

Danson Punsanguansuk, Vorapot Choonhaklai

Division of Urology, Department of Surgery, Rajavithi Hospital, Bangkok, Thailand

Key words:
urethral stricture,
urethroplasty,
recurrence

Abstract

Objective: We studied the surgical outcomes of urethroplasty in our center and the risk factors for recurrent urethral stricture after urethroplasty.

Material and method: We retrospectively reviewed all patients with urethral stricture who underwent urethroplasty in Rajavithi Hospital between January 2008 and December 2014. Recurrent stricture was defined as the need to use postoperative instrumentation. Chi-square test or Fisher exact test was used to assess the significance of risk factors for recurrence.

Result: Mean patient age was 37.8±15.7yr. Mean BMI was 22.1±4.5 kg/m^2. The etiology of urethral stricture was trauma (83%). The stricture site was located at anterior urethra (52%) and posterior urethra (43%). Mean stricture length was 1.75±0.92 cm. End-to-end anastomosis was performed in 82%, flap urethroplasty in 17%, and two stage urethroplasty in 1%. Mean operative time was 219.8±68 min. Recurrence occurred in 28% at a mean time of 6.66±12.7 months. Treatments after recurrence were urethral dilation 57.1%, direct visual internal urethrotomy 17.9%, urethroplasty 14.3%, and suprapubic cystostomy 10.7%. We found no association of the risk factors and recurrent stricture in our study.

Conclusion: Recurrence rate after urethroplasty was 28% in our study. Mean time to recurrence was 6.6 months. We found no association of the risk factors and recurrent stricture in our study.

Corresponding author: Danson Punsanguansuk, Division of Urology, Department of Surgery, Rajavithi Hospital, Bangkok, Thailand

Email: danson_phoenix@yahoo.co.th

นิพนธ์ต้นฉบับ

การศึกษาอัตราการตีบซ้ำของท่อปัสสาวะในผู้ป่วยที่ได้รับการผ่าตัดตกแต่งท่อปัสสาวะในโรงพยาบาลราชวิถี

แดนสันติ์ พันธ์สงวนสุข, วรพจน์ ชุณหคล้าย

หน่วยศัลยกรรมระบบปัสสาวะ, กลุ่มงานศัลยกรรม โรงพยาบาลราชวิถี กรุงเทพฯ

คำสำคัญ :
ท่อปัสสาวะตีบ
การผ่าตัดตกแต่งท่อปัสสาวะ
การตีบซ้ำของท่อปัสสาวะ

บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาผลการผ่าตัดตกแต่งท่อปัสสาวะในผู้ป่วยท่อปัสสาวะตีบ ที่เข้ารับการรักษาในโรงพยาบาลราชวิถี และศึกษาปัจจัยที่ทำให้เกิดการตีบซ้ำของท่อปัสสาวะภายหลังการผ่าตัดตกแต่งท่อปัสสาวะ

ผู้ป่วยและวิธีการศึกษา: การศึกษานี้ เป็นการเก็บข้อมูลย้อนหลังจากแฟ้มเวชระเบียนผู้ป่วยที่ได้รับการวินิจฉัยท่อปัสสาวะตีบและได้รับการรักษาโดยการผ่าตัดตกแต่งท่อปัสสาวะในโรงพยาบาลราชวิถี ตั้งแต่เดือนมกราคม พ.ศ. 2551 ถึง เดือน ธันวาคม พ.ศ. 2557 จำนวน 114 ราย

ผลการศึกษา: อายุเฉลี่ยของผู้ป่วย คือ 37.8±15.7 ปี สาเหตุของท่อปัสสาวะตีบที่พบมากที่สุด คือ การบาดเจ็บ (ร้อยละ 83) ตำแหน่งของการตีบ พบที่ท่อปัสสาวะส่วนหน้า (anterior urethra) ร้อยละ 52 และท่อปัสสาวะส่วนหลัง (posterior urethra) ร้อยละ 43 โดยรอยโรคมีความยาวเฉลี่ย 1.75±0.92 เซนติเมตร ผู้ป่วยส่วนใหญ่ ได้รับการผ่าตัด end-to-end anastomosis (ร้อยละ 82), flap urethroplasty และ two stage urethroplasty ตามลำดับ โดยมีระยะเวลาผ่าตัดเฉลี่ย 219.8±68 นาที การตีบซ้ำของท่อปัสสาวะพบในผู้ป่วยร้อยละ 28 โดยมีระยะเวลาการเกิดการตีบซ้ำเฉลี่ย 6.66±12.7 เดือน การรักษาหลังมีการตีบซ้ำของท่อปัสสาวะ ใช้วิธีขยายท่อปัสสาวะ (urethral dilation) ร้อยละ 57.1, ใช้วิธีส่องกล้องกรีดขยายท่อปัสสาวะ (direct visual internal urethrotomy) ร้อยละ 17.9, ผ่าตัดตกแต่งท่อปัสสาวะ (urethroplasty) ร้อยละ 14.3 และ ใส่สายสวนปัสสาวะทางหน้าท้อง (suprapubic cystostomy) ร้อยละ 10.7 และไม่พบปัจจัยเสี่ยงที่เกี่ยวข้องกับการตีบซ้ำของท่อปัสสาวะ

สรุป: ผู้ป่วยที่ได้รับการผ่าตัดตกแต่งท่อปัสสาวะมีอัตราการตีบซ้ำ ร้อยละ 28 โดยมีระยะเวลาเฉลี่ยของการตีบซ้ำของท่อปัสสาวะ 6.6 เดือน และไม่พบปัจจัยเสี่ยงที่ทำให้เกิดการตีบซ้ำของท่อปัสสาวะในผู้ป่วยที่ได้รับการผ่าตัดตกแต่งท่อปัสสาวะในการศึกษานี้

ผู้นิพนธ์หลัก: แดนสันติ์ พันธ์สงวนสุข หน่วยศัลยกรรมระบบปัสสาวะ กลุ่มงานศัลยกรรม โรงพยาบาลราชวิถี กรุงเทพฯ
E-mail: danson_phoenix@yahoo.co.th

Introduction

Urethral stricture is a scarring process involving spongy erectile tissue of the corpus spongiosum (spongiofibrosis), which narrows or blocks urine flow from the bladder[1]. Complications of urethral stricture are urinary tract infection, urethral/bladder diverticulum, urethral /bladder stone, chronic prostatitis, hydronephrosis, impaired renal function or chronic renal failure.[2,6]

Incidence of urethral stricture in Thailand is unknown. Urethral stricture has an estimated incidence of 0.6% with treatment costs of about $200 million annually in the United States.3 The most common etiologies are trauma, infection, iatrogenic, and idiopathic.[4,5]

Among several treatment strategies, including dilation and direct visual internal urethrotomy (DVIU), urethroplasty is the most cost-effective management option for almost all strictures and remains the gold standard for longer, complex or recalcitrant strictures.[6,7]

Several studies show recurrent stricture in 2% to 30% of patients after urethroplasty.[8-16] The risk factors associated with recurrence stricture are etiology (Lichen sclerosus, infectious and iatrogenic)[9,10,13,15], stricture length[8,9,10,11,15], prior urethroplasty, failed endoscopic treatment, and smoking.[11]

We conducted a retrospective study of surgical outcomes after urethroplasties in our center and identified risk factors that may lead to stricture recurrence after urethroplasty.

Material and method

We retrospectively reviewed all patients with urethral stricture who underwent urethroplasty in Rajavithi Hospital between January 2008 and December 2014. Medical records were reviewed. Data included age, comorbidities (diabetes mellitus, hypertension, chronic renal disease), smoking status (smoking was defined as smoking within 1 month of surgery) and previous procedures (such as dilatation, direct visual internal urethrotomy (DVIU), urethroplasty), as well as stricture length, location, etiology, surgical technique, follow-up result, and treatment after recurrent urethral stricture. Patients were excluded from the study if their data was incomplete or they were lost to follow-up. Stricture length was measured intraoperatively by the excised length of the urethra. Urethroplasty was performed by the staff of Rajavithi Hospital in the standard fashion. After initial urethroplasty, catheter was removed at 2 weeks. Patients were followed up in our clinic and underwent cystoscopic evaluation at 1 month and 3 months, postoperatively. If cystoscopy looked favorable, patients were then followed up symptomatically. Cystoscopy and urinary flow rate were performed if subjective obstructive symptoms were present. Recurrent stricture was noted when any postoperative instrumentation, such as urethral dilatation, direct visual internal urethrotomy (DVIU), urethroplasty, was required.

The statistical analysis software was SPSS version 17.0. Descriptive statistics are shown as a number, percentage, mean, median, and standard deviation. In terms of inferential statistics, categorical data were analyzed with the chi-square test and Fisher's exact test in order to assess the significance of risk factors for recurrence of stricture. The level of statistical significance was set at $p\text{-value} < 0.05$.

Result

One hundred of 114 patients (87.7%) with urethroplasty had adequate data and were included in our analysis. The mean follow-up was 15.5 months. Mean patient age was 37.8 ± 15.7 yr. Mean BMI was 22.1 ± 4.5 kg/m^2. Underlying diseases found were hypertension in 8 (8%) patients, diabetes mellitus in 3(3%) patients, and chronic kidney disease in 1(1%) patient. Thirty-nine (39%) patients were current smokers. History of urinary tract infection was found in 29 (29%) patients.

The etiology of urethral stricture was trauma (83%), infection (11%), iatrogenic (3%), and idiopathic (3%). The stricture site was located at the posterior urethra (43%), bulbous urethra (40%), penile urethra (11%), bulbomembranous (5%), and pan urethra (1%). Thirty-two (32%) patients had previous interventions before urethroplasty, including DVIU in 17 (17%), dilation in 8 (8%), and previous urethroplasty in 7 (7%). Sixty-eight (68%) patients had no previous interventions.

Mean excised stricture length was 1.75 cm (range, 0.5 to 5 cm). Stricture length was < 3 cm in 85 patients (85%) and ≥ 3 cm in 15 patients (15%).

End-to-end anastomosis (EEA) urethroplasty was the most common surgical approach performed in 82 (82%) patients, followed by flap urethroplasty (prepuce, penile skin, scrotal skin) in 17 (17%) patients, and two stage urethroplasty in 1(1%) patient. No graft urethroplasty was performed in our study. The mean operative time was 219.75±68 minutes. The clinic-pathologic and demographic data are show in Table 1.

Table 1. Clinicopathologic and demographics

Patient data	No. (%) n=100
Mean age (years)	37.8
Mean follow-up (months)	15.5
BMI(kg/m2)	22.1
Smoking	39 (39%)
Underlying disease	12 (12%)
History of urinary tract infection	29 (29%)
Previous Treatment	32 (32%)
Stricture characteristics:	
Average length (cm)	1.75
Location	
Anterior	52 (52%)
Posterior	48 (48%)
Etiology	
Trauma	83 (83%)
Infection	11 (11%)
Iatrogenic	3 (3%)
Idiopathic	3 (3%)
Mean operative time (min)	219.8
Surgical Technique	
EEA	82 (82%)
Flap	17 (17%)
Two stage	1 (1%)

Out of a total 100 urethroplasties, recurrence of urethral stricture after urethroplasty was found in 28 (28%) patients (Figure 1.).

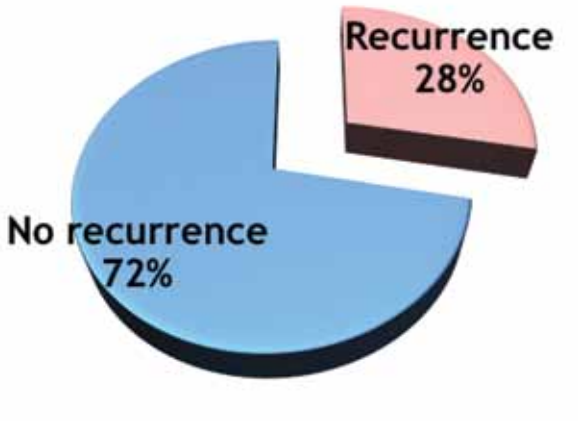

Figure 1. Urethroplasty outcome

In 28 patients with recurrent stricture, treatment after recurrence was urethral dilatation in 16 (57.1%), directed visual internal urethrotomy in 5 (17.9%), urethroplasty in 4 (14.3%), and in 3 patients suprapubic cystostomy was performed. Mean time to recurrence was 6.66 months (range 0.5 to 57 months) (Table.2)

Table 2. Treatment after recurrent stricture

Treatment	N=28	%
Dilate	16	57.1
DVIU	5	17.9
Urethroplasty	4	14.3
SPC	3	10.7
Time to recurrence (mo)	6.66±12.73 (0.5-57)	

Risk factors for recurrent stricture using univariate analysis are shows in Table 3. The factors were comorbidity, smoking, history of urinary tract infection, stricture length, stricture location, etiology, previous treatment, surgical technique, and operative time. We found that all factors had no statistical significant association with recurrent stricture in our study. Follow-up duration was significantly longer in the recurrence group (12.21±14.15 vs.24.04±24.73, p = 0.023).

Discussion

Previous studies show recurrent stricture in 2% to 30% of patients after urethroplasty. In our study, the recurrence rate of urethral stricture after urethroplasty was 28%, which is in arange similar to previous studies.

Comorbid status was associated with recurrent stricture in previous studies. Smoking and diabetes mellitus may predict the failure rate of urethroplasty and potentially secondary to microvascular damage[11]. In our study, smoking was found in 39% of patients. No statistically significant difference in recurrent urethral stricture between smoking and non-smoking was found (p=0.18). We did find that comorbidities, such as diabetes mellitus, hypertension, and chronic kidney disease, were not risk factors for recurrent urethral stricture, but in our study most patients were young males (mean age 37.8 y); thus a low number of comorbidities may have limited our ability to assess the association of comorbidities with recurrent urethral stricture. Additionally, history of urinary infection was studied and it may be a risk factor for recurrent urethral stricture; however, we found no statistically significant difference in outcomes between the group with a history of urinary tract infection and the non-history of urinary tract infection group.

The most common etiology of urethral stricture from the previous studies show varied results, such as trauma, iatrogenic, and unknown.[4,9,10,13,15] A study by Daniel M. Stein et al.[4] concerned with the etiology of urethral stricture found that in developed countries (US, Italy) the most common etiology was idiopathic (41%), followed by iatrogenic (35%) and trauma (15.8%); whereas in a developing country (India), the most

Table 3. Risk factors for recurrent urethral stricture using univariate analysis

Factor	No recurrence (n=72)	Recurrence (n=28)	p-value
Age (y)	37.04 ± 15.98	39.82 ± 15.20	0.422
BMI	22.68 ± 3.92	20.67 ± 5.49	0.085
Smoking	31 (43.1%)	8 (25.6%)	0.182
Underlying disease			
Hypertension	5 (6.9%)	3 (10.7%)	0.683
Diabetes Mellitus	3 (4.2%)	0 0.577	
Chronic kidney disease	0	1 (3.6%)	0.280
History of urinary tract infection	19 (26.4%)	10 (35.7%)	0.356
Stricture length(cm)			0.262
<3	63 (87.5%)	22 (78.6%)	
≥3	9 (12.5%)	6 (21.4%)	
Stricture location			0.986
Posterior urethra	30 (41.7%)	13 (46.4%)	
Bulbous	29 (40.3%)	11 (39.3%)	
Penile	8 (11.1%)	3 (10.7%)	
Bulbomembranous	4 (5.6%)	1 (3.6%)	
Panurethra	1 (1.4%)	0	
Etiology			0.256
Trauma	62 (86.1%)	21 (75%)	
Infection	7 (9.7%)	4 (13.4%)	
Iatrogenic	1 (1.4%)	2 (7.1%)	
Idiopathic	2 (2.8%)	1 (3.6%)	
Previous Treatment	23 (31.9%)	9 (32.1%)	0.985
None	49 (68.1%)	19 (67.9%)	
Dilate	5 (21.7%)	3 (33.3%)	0.770
DVIU	12 (52.2%)	5 (55.6%)	
Urethroplasty	6 (26.1%)	1 (11.1%)	
Surgical Technique			1.000
EEA	59 (81.9%)	23 (82.1%)	
Flap	12 (16.7%)	5 (17.9%)	
Two stage	1 (1.4%)	0	
Operative time (min)	212.92 ± 63.99	237.32 ± 75.79	0.139
Follow up duration (mo)	12.21 ± 14.15	24.04 ± 24.73	0.023

common etiology was trauma (36%), followed by idiopathic (23%) and iatrogenic (16%). In our study, the most common etiology of urethral stricture was trauma (83%) followed by infection (11%). And the most common trauma was associated with traffic-related accidents, which is similar to the study in India and may be due to a greater number of traffic-related accidents and a lack of appropriate emergency urological intervention, which may increase the risk of pelvic-fracture-related urethral injury (PFUI), and subsequent urethral stricture. Adam S. Kinnaird[10] found that Lichen sclerosus, infection, and iatrogenic etiology were associated with an increased risk of recurrence. A study byJun-GyoSuh[13] found that non-trauma etiology was associated with recurrent urethral stricture. Our study shows a different result: etiology was not associated with stricture recurrence (p=0.26). The common location of urethral stricture in our study was the posterior urethra 43(43%) and bulbous 40 (40%), which may be associated with trauma. In pelvic-fracture-related urethral injury, the most common location was the posterior urethra, and a straddle injury may cause bulbous urethral stricture. A similar result was observed in a study by Daniel M. Stein et al[4], which found that in India the most common location was the bulbous and posterior urethra. In our study, stricture location was not associated with stricture recurrence.

Stricture length is a prognostic factor and may be used when choosing the type of urethroplasty. When strictures are <2 cm end-to-end, anastomosis is the preferred choice. Strictures> 2 cm, surgical techniques such as flap urethroplasty, graft urethroplasty, or two stage urethroplasty, can be performed. The cut point of stricture length that can predict a recurrent stricture varies from >3 cm to > 5 cm. In our study, we used a cut point of stricture length < 3 cm and ≥ 3 cm, according to previous studies. Mean stricture length was 1.75 cm (range 0.5-5cm) and most patients (82%) underwentend-to-end anastomosis urehtroplasty. We found that both stricture length and surgical technique were not associated with increased risk of recurrence. Prior urethroplasty and failed endoscopic therapy are predictive of recurrence after urethroplasty. An inflammatory process further along the already traumatized tissue makes future urethroplasty difficult. Successful posterior urethroplasty after trauma has been noted to decrease dramatically if there was previous urethral manipulation.[11] In our study, 32 patients (32%) had previous interventions before urethroplasty, including DVIU 17 (17%), dilation 8 (8%), previous urethroplasty 7 (7%) or no preoperative intervention 68 (68%). There was no association between previous procedure and risk of stricture recurrence

Additionally, mean time to recurrence was 6.6 months. Treatment after recurrence was mostly with dilation of urethra (57%). There was no need for DVIU or re-urethroplasty. Follow-up duration was significantly longer in the recurrence group (24 vs. 12.2 months). This may be due to recurrent patients needing further investigation, treatment, and closer follow-up than non-recurrent patients.

The limitations of our study: Due to its retrospective design, some data were missing. The sample size was too small to obtain statistical significance in multivariate analysis. A large multicenter prospective study is required to ensure adequate collection of data in order to perform multivariate analyses of a larger number of patients.

Conclusion

Recurrence rate after urethroplasty was 28% in our study. Mean time to recurrence was 6.6 months. Comorbidity, smoking, etiology, stricture length, stricture location, previous treatment, and surgical technique were not risk factors for recurrent stricture in our study.

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