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Predictors of recurrence of urethral stricture disease following optical urethrotomy

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ABSTRACT

Objective: To assess the predictors of recurrence in Optical urethrotomy (OU) for male urethral strictures.

Methods: 148 male patients treated with OU with intent to treat during the period of January 2003–December 2008 were included in the study. Charts were reviewed for demographics, cause of stricture, stricture length and need for ancillary procedure following OU. The time to recurrence following OU was noted. All patients were evaluated postoperatively with uroflowmetry monthly for the first 3 months, every 3 months during year 1 and every 6 months during year 2. After year 2 most patients were followed annually.

Results: 139 patients were included in the study, 9 were excluded for inadequate follow up. Median age was 54 years (17–87). The etiology of stricture was iatrogenic in 35%, unknown in 32%, inflammatory in 17% and secondary to external trauma in 16%. Majority (61%) were bulbar or bulbo membranous in location. For a mean follow up of 8.9 ± 11 months, the overall recurrence rate was 37%, with mean time to recurrence of 4.5 months. Stricture length ($p = 0.0001$), etiology ($p = 0.001$) and site ($p = 0.017$) were significant factors of recurrence.

Conclusions: Strictures of penile urethra, following transurethral resection of prostate and length greater than 20 mm are significant causes of poor result for optical urethrotomy monotherapy. Patients with these predictors should preferably not be treated by OU.

1. Introduction

Male urethral stricture disease continues to be a common and often challenging urological condition. The management of urethral stricture has evolved over the past few decades, however, the three most commonly used procedures, i.e. dilation, optical urethrotomy and urethroplasty have changed very little over the past few decades. Excellent success rates have been reported for open surgical reconstruction, however, interest in minimally invasive techniques forces investigators to attempt endourological approaches.[1,2]

Optical urethrotomy is a widely accepted treatment in approximately 80% of patients' with urethral strictures.[3] Repeated dilatation and open urethroplasty are other treatment procedures for urethral strictures.[4] Optical urethrotomy (OU) has been performed either under general or spinal anesthesia.[5]There are few excellent reports on use of local anesthesia.[6] Generally optical urethrotomy is considered ideal for short segments (less than 2 cm).[4,5] However, some authors believe that length is not a limiting factor for urethrotomy of anterior urethral strictures[7,8]OU has many advantages including day care procedures, early mobilization, shorter period of indwelling catheter and good short term results. However, significant percentage of patients' recurs following OU. Most of these patients require either self dilatation, dilatation by urologist in clinic, repeat OU or open urethroplasty. The best long-term results for this disorder, which has a considerable tendency to recur, are achieved with open reconstructive methods whereas OU is curative approach only in cases of short-segment bulbar urethral strictures without spongiofibrosis. Predictors of success of OU as single procedure are not clearly defined in literature. Current work is attempted to define the patients who will benefit from OU monotherapy.

2. Materials and methods

Between January 2003 and December 2008, 148 patients underwent direct vision internal urethrotomy for symptomatic urethral strictures. The charts of all the patients were reviewed and 9 patients excluded from the study for lack of adequate follow up. 139 patients were included in the study. All patients with greater

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than 2 cm stricture were initially offered open urethroplasty as a first option, however, after explaining the pros and cons of both some of them opted for OU as a first step and if it recurs to consider urethroplasty. Preoperative assessment included retrograde and voiding urethro cystography, uroflowmetry and urine culture. All preoperative infections were treated with antibiotics. The length of the stricture was measured on the urethrogram film by the attending urologists and the radiologist.

Using general or major regional anesthesia and a 21F urethrotome, the urethrotomy was performed under vision with a cold-knife incision of the stricture at the 12 o'clock position according to the technique described by Sachse.[1] A 16–18 Ch. indwelling silicone catheter was left for 5–7 days.

All patients were evaluated postoperatively with uroflowmetry monthly for the first 3 months, every 3 months during year 1 and every 6 months during year 2. After year 2 most patients were followed annually. When the peak flow was less than 15 ml per second, an urethro-cystogram was performed to exclude recurrent stricture. Patients who had low maximum flow rate on uroflowmetry (Q max) less than 10 ml per second required dilatation or repeat direct vision internal urethrotomy or open urethroplasty at the discretion of the treating urologist.

3. Results

Complete follow up was available in 139 patients (92%). The mean age of the patients was 54 years (range 17–87). The mean length of the strictures was 1.75 cm and it ranged between 0.5 and 4.5 cm. Idiopathic strictures (32%) were the most common observation followed by inflammation and transurethral manipulation in 17% each, and traumatic in 16% of patients.

Most commonly, the stricture was in the bulbous urethra 37%, of bulbo-membranous junction 24%, in penobulbar 16%, in penile 14% and membranous urethra was involved in the remaining 9% of patients. Kaplan–Meier curves for studying recurrence over time were generated. The estimated stricture-free rate at 9 months was 66% after internal urethrotomy. The median follow up after optical urethrotomy was 9 months (range 6–71). The median duration between optical urethrotomy and recurrence was 4.5 months and recurrence rate was 34%.

For the purpose of further analysis Kaplan–Meier recurrence curve and Cox regression analysis done to see the association with recurrence (see Fig. 1). The relationship of co-orbidity with recurrence rate indicated that 37% of patients were hypertensive ($p = 0.58$), 22% were diabetic ($p = 0.26$), 12% were having ischemic heart disease ($p = 0.18$) and none of them reached statistical significance. Analysis to determine the significance of etiological factors with recurrence rate indicated traumatic stricture ($p = 0.12$), post instrumentation strictures ($p = 0.76$), post catheterization strictures ($p = 0.40$) and inflammatory stricture ($p = 0.74$) were not associated with significantly higher recurrence rates. Stricture length more than 2 cm ($p = 0.0001$), post transurethral resection of prostate stricture ($p = 0.039$), idiopathic stricture ($p = 0.001$) and penile stricture ($p = 0.017$) were associated with recurrence. Correlation of previous treatments with recurrence rate indicated that; optical urethrotomy ($p = 0.000$), dilatation ($p = 0.000$) and self intermittent catheterization ($p = 0.001$) found to have significantly higher recurrence rate.

4. Discussion

Although the success of urethrotomy at 5 years is less than that of urethroplasty 50% compared to 83% in 1 study.[9] The ease and safety of urethrotomy make it the procedure of first choice for the treatment of male urethral strictures.[10] Despite initial enthusiasm

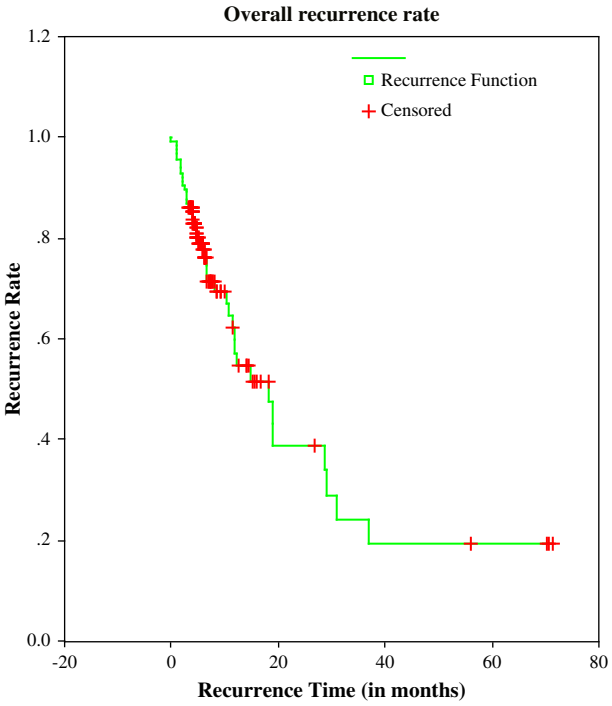

Fig. 1. Recurrence curve over time using Kaplan–Meier curve.

for the new technology, laser urethrotomy appears to offer no advantage over conventional internal urethrotomy.[11,12]

The stricture length was measured on standard urethrogram, however, for short bulbar strictures ultrasound is more accurate in measuring stricture length than conventional radiographic RUG and is therefore helpful in determining whether to excise or graft. Few studies have compared the efficacy of dilation and internal urethrotomy. In a retrospective study of 199 men with strictures treated at the Mayo Clinic between 1976 and 1990, 101 (67%) underwent dilation and 39 (26%) underwent direct vision internal urethrotomy.[13,14] The strictures were primarily iatrogenic (47%), less than 2 cm long (96%), single (99%) and in the bulbar urethra (57%). At a median follow up of 3.5 years the probability of not requiring retreatment within 3 years was 65% for dilation and 68% for urethrotomy, indicating that these procedures were equally efficacious as initial treatment of bulbar strictures.[15] In our study the recurrence rate was less in shorter stricture less than 2 cm and higher in penile stricture; similar results were reported by Steenkamp.[14] The recurrence rate after internal urethrotomy or dilation is lower for single, short (less than 1–2 cm.) bulbar strictures and the risk of recurrence is higher for penile strictures and those with periurethral scarring. Previous studies have shown that nearly one-half to two-thirds of strictures recur within the first year after treatment,[12,14–16] with a median interval to recurrence of 4 months.[17] In our study the median time to recurrence was 4.5 months after urethrotomy. However, strictures can recur up to 8 years after urethrotomy and, thus, follow up to 10 years is recommended.[18]

Several solutions for stricture recurrence have been suggested, including endoscopic resection of callus or injection of steroids, such as triamcinolone acetonide.[19] Clean intermittent self-catheterization can prevent stricture recurrence, provided it is continued for more than 12 months.[17,20–22] Recurrent strictures may be managed with urethral stenting but this is expensive.[23,24] There is controversy as to whether repeated urethrotomy is worthwhile.[25–27] Our study shows that the results are disappointing in those patients who had repeated internal urethrotomy, dilatation and are on self intermittent catheterization. Similar results were also reported by

Table 1
Predictors of recurrence for Optical urethrotomy.

Factors	Recurrence/total in the group (*n*)	*P*-value	95%confidence interval
Length			
>2 cm	20/34	0.0001	(6.83–12.83)
<2 cm	27/105		
Etiology			
Road traffic accident	22/139	0.12	(3.21–37.56)
Post TURP	23/139	0.039	(5.52–12.79)
Idiopathic	45/139	0.001	(24.06–53.94)
Instrumentation	19/139	0.76	(8.14–11.95)
Post-catheterization	6/139	0.40	(7.06–32.03)
Inflammatory	24/139	0.74	(10.90–24.87)
Site			
Penile stricture	8/20	0.017	(5.81–10.58)
Bulbar	36/51		
Peno-bulbar	6/22		
Bulbo-membranous	12/33		
Membranous	4/13		

other investigators,[14] It is noted that dilation and internal urethrotomy are equally effective as initial treatment for male urethral strictures, and are useful in a select group (approximately 70% of all patients) who are stricture-free at 3 months, and of whom 50 to 60% will remain stricture-free up to 48 months.[14] The percentage narrowing of the lumen at the stricture site on retrograde urethrography is described as another predictor of success by Mandhani et al.[28] Combination treatment with OU and clean intermittent self-catheterization is another viable option.[29] There is good patients' tolerance for this procedure and it is an option in the elderly patient group who may not be fit or willing to undergo reconstructive surgery or urethroplasty. However, Husman and Rathbun[30] noted that reviewed the results of direct vision urethrotomy for short (less than 1 cm) penile urethral strictures following hypospadias surgery, the addition of clean intermittent catheterization to direct vision urethrotomy does not improve the likelihood of success (Table 1).

5. Conclusions

Optical urethrotomy for initial and short stricture have favorable success but disappointing results for previously treated stricture. Predictors of recurrence include location (penile), size (>20 mm), Etiology (post TURP and Idiopathic), Recurrent following previous OU and Dilatation. We concluded that patients with greater 20 mm strictures, that occur following TURP or whose etiology is not known and are present in the penile urethra should be treated primarily with OU. However, the level of evidence of current work varies from 3 to 4. One important consideration in predicting success of OU is extent of spongiofibrosis. This aspect is not specifically looked at in the current work due to incomplete data. This is one of the limitations of our work.

Conflict of interest
None declared.

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Ethical approval
None declared.

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