Temporary Vesicostomy-Assisted Urethroplasty for Recurrent Obliterated Posterior Urethral Stricture

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Background: We report the outcomes of temporary vesicostomy- assisted anastomotic urethroplasty in patients with recurrent obliterated posterior urethral stricture.

Methods: A review of the medical records identified 12 men (mean age 35.8 years) who had undergone anastomotic urethroplasty for recurrent obliterated posterior stricture. Preoperative evaluation of the urethral defect included a simultaneous retrograde urethrogram and cystogram. The mean estimated preoperative radiographic length of the urethral disruption was 4.25 cm. All patients underwent 1-stage bulboprostatic anastomotic repair which was assisted by an intraoperative temporary vesicostomy.

Results: The initial objective success rate was 83%. The mean follow-up was 22 months. Voiding cystourethrography performed postoperatively demonstrated a wide, patent anastomosis in all but two cases. Urethroscopy performed 1 month after surgery revealed a patent anastomosis with normal urethral mucosa in all but two patients. The mean peak flow rate at the last follow-up visit was 16.3 ml/s. Two patients developed an anastomotic stricture 6 weeks after surgery that was successfully treated by direct visual internal urethrotomy. Finally, all patients had a patent urethra after salvage treatment postoperatively.

Conclusion: An open 1-stage temporary vesicostomy- assisted urethroplasty for recurrent obliterated posterior urethral stricture provides satisfactory outcomes and minimal morbidities.

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Key words: obliterated urethral stricture, urethra, urethral stricture, urethroplasty, vesicostomy

Obliterated posterior urethral stricture or posterior urethral distraction defect most commonly occurs as a consequence of pelvic fracture and may occur in up to 10% of cases.[1] Delayed excision of scar tissue and primary bulboprostatic anastomosis is considered the reference standard procedure among all treatment options for post-traumatic posterior urethral stricture. As a primary treatment modality, this technique is successful in approximately 90% of patients.[2,3] Other less invasive options for open urethroplasty, such as endoscopic realignment with interlocking urethrotomy, lead to a lower long- term success rate.[4] The length of the urethral stricture is one of the critical points for successful urethroplasty

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either by the open surgery or endoscopic treatment. Open substitution urethroplasty has been suggested for complicated or long urethral strictures. However, the optimal treatment for patients who have undergone unsuccessful primary treatment of a posterior urethral stricture is controversial. Therefore, we report our successful experience using vesicostomy-assisted anastomotic repair in patients with recurrent obliterated posterior urethral strictures after failure of previous treatment.

METHODS

From January 2007 to July 2010, 12 consecutive men underwent definite surgical therapy for obliterated posterior urethral strictures at our institution. The patients were between 19 and 70 years old (mean 35.8 years old). All urethral injuries had a traumatic etiology of either a traffic accident or a fall. The mean urethral distraction defect diagnosed by radiological evaluation was 4.25 cm (range 3.0 to 6.0 cm). The real length of the urethral disruption might be determined by subtracting the prostatic urethral length from 4.25 cm. All 12 patients were treated for failed previous surgical interventions. The previous failed treatments included open urethroplasty in 8 patients and endoscopic realignment in 4 patients. Preoperative evaluation consisted of simultaneous retrograde urethrography and cystography (Fig. 1). All 12 patients were managed preoperatively with suprapubic urinary diversion for at least 3 months. We did not make any repeat attempt at endoscopic realignment with catheter-assisted interlocking urethrotomies for these patients. All surgical repairs were approached through a midline longitudinal perineal incision with the patients in the exaggerated lithotomy position. All operative procedures were performed by the same surgeon (T.M.W.). Every patient underwent a one-stage perineal excision of the stricture and a primary bulboprostatic anastomotic repair as described by Webster et al.[5] We utilized a stepwise approach for urethral mobilization, including complete mobilization and division of the bulbar urethra, separation of the corporal bodies, excision of scar tissue, and, in select cases, a partial infrapubectomy to achieve an epithelium-to-epithelium, tension-free anastomosis. All patients required extensive urethral mobilization and separation of the corporal bodies. A partial infrapubectomy was performed in only one patient. In order to easily identify the proximal end of the urethra, we routinely created a vesicostomy before reconstructive surgery. The temporary vesicostomy via the previous cystostomy wound was restored to a cystotomy after the end of surgery. The anastomosis was carried out with 8 interrupted absorbable sutures.

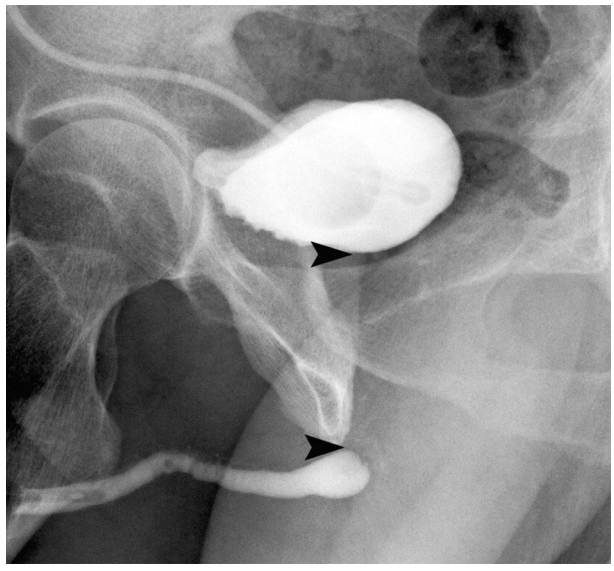

Fig. 1 A combined urethrography and cystography study demonstrates a 5-cm radiographic distraction defect (arrow head).

A Fr 16 silicon catheter for a urethral stent and another Fr 18 silicon catheter for suprapubic drainage were maintained postoperatively for 21 to 28 days. At removal of the urethral catheter, a voiding cystourethrography or retrograde urethrography was routinely performed to confirm the integrity of the repair and patency of the urethra (Fig. 2). The suprapubic catheter was removed 3 days later if the patient could void smoothly. Patients were followed up postoperatively for 1 month with uroflowmetry and ultrasound determination of the post-voiding residual urine. Cystourethroscopy was performed in all cases 1 month after urethroplasty. Surgical success was defined as subjectively satisfactory catheter-free urination, a peak urine flow rate of ≧ 15.0 ml/s, and a normal patent urethral image on radiological study or urethroscopy. Patients who met the above criteria after requiring 1 urethrotomy following open urethroplasty were also defined as having a satisfactory outcome.

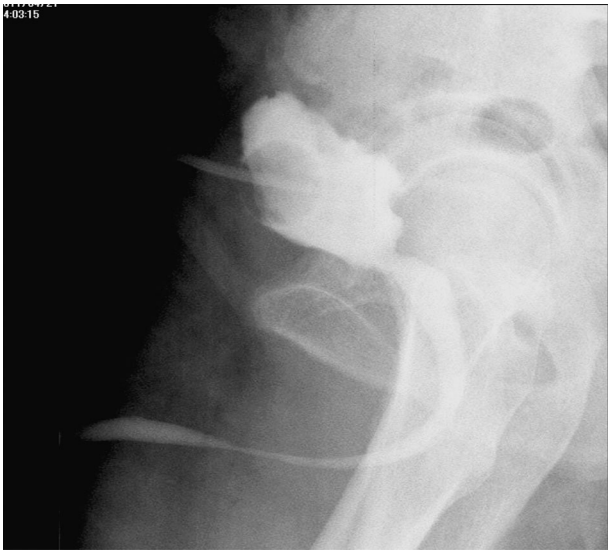

Fig. 2 A voiding cystourethrogram obtained 4 weeks after transperineal repair reveals a patent anastomosis without extravasation.

RESULTS

The patients were followed up for a mean 22 months (range 6 to 42). Postoperative urethrography demonstrated a patent anastomosis in all but two patients (Table). The initial success rate of the transperineal urethroplasty was 83% (10/12 patients). The mean peak flow rate was 16.3 ml/s in patients who were able to void postoperatively. A cystourethroscopy was also performed on all patients 1 month after surgery and demonstrated an intact and patent anastomosis with no strictures in all but two patients. Two of the patients developed a short, soft anastomotic stricture 2 weeks after removal of the urethral catheter and were successfully treated with an internal urethrotomy and urethral dilation. Three patients received a one-time urethral dilation by metal sounds during the routine postoperative cystourethroscopy. Consequently, all patients could urinate satisfactorily at the final follow-up. Therefore,

Table Clinical Data of Patients

Patient No.	Age	Urethral distraction defect		Primary treatment	*Post-operative urethral patency	Adjuvant treatment	Follow-up at last procedure	
		Injury severity*	Radiographic distraction length (cm)†				Duration (months)	PFR (ml/sec)
1	31	Type III	4	Urethrotomy	Yes	None	44	12.5
2	27	Type II	4.5	Urethroplasty	Yes	None	42	16.5
3	42	Type III	4	Urethroplasty	Yes	None	38	15.5
4	22	Type III	3	Urethrotomy	Yes	None	32	13.5
5	30	Type III	4.5	Urethrotomy	Yes	None	24	20.5
6	19	Type II	3.5	Urethroplasty	Yes	None	19	21.1
7	34	Type III	3	Urethroplasty	Yes	None	14	14
8	60	Type III	4.5	Urethroplasty	No	DVIU	14	17.4
9	70	Type III	6	Urethroplasty	No	DVIU	12	15.4
10	25	Type II	3	Urethroplasty	Yes	None	10	12.7
11	40	Type III	5	Urethrotomy	Yes	None	8	18
12	30	Type III	6	Urethroplasty	Yes	None	6	18.5

Abbreviations: DVIU: direct visual internal urethrotomy; PFR: peak flow rate; *: Injury severity according to Colapinto V and McCallum RM classification[5]; †: Estimated real distraction length was determined by subtracting the length of the prostatic urethra from radiographic distraction length.

the final urethral patency rate was 100%. No significant postoperative complications were noted except for one scrotal abscess. Two patients reported urgent urinary incontinence requiring medication after the surgery. Follow-up data on erectile function was not available for this report.

DISCUSSION

In general, the severity of a pelvic injury determines the extent of the initial urethral destruction and hence the length of the ultimate defect. With more severe trauma, actual tearing of the urethra can occur. In the majority of cases, however, complete division of the urethra occurs due to tearing of the bulbomembranous junction. The resulting "urethral stricture" is technically not a true stricture but rather a "urethral distraction defect," as there is no urethral lumen between the proximal and distal urethral ends.[6] According to the published literature, primary catheter realignment of the distracted defect of the posterior urethra using endoscopic techniques has continued to gain popularity. These techniques are minimally invasive and highly successful in the short term, but 45% to 60% of these patients develop recurrent strictures during follow-up.[4,7,8] Some of the recurrent strictures may be effectively managed with repeat direct visual internal urethrotomies (DVIU) and urethral dilation. However, several studies have documented the poor long-term results of DVIU.[4,9,10] We believe that endoscopic urethrotomy is only indicated in short urethral strictures associated with minimal spongiofibrosis.

Successful treatment of urethral strictures requires an accurate assessment of the anatomy of the stricture. A radiographic approach using simultaneous antegrade and retrograde urethrography combined with selective ultrasonography enables an accurate delineation of the stricture length and accompanying spongiofibrosis. The goal of treatment is a widely patent, continent urethra accomplished with minimal morbidity, the fewest number of procedures, and minimal urethral instrumentation. Although, the average length of urethral disruption on radiological study in our patients was 4.25 cm, the real length of urethral disruption should be determined by subtracting the length of the prostatic urethra from the radiographic length. However, the real length of an unhealthy urethra will be longer than the estimated length if the length of urethra affected by post-traumatic fibrotic changes is included.

Published reports concerning urethroplasty for traumatic posterior strictures have included patients with urethral disruption lengths varying from 1 to 10 cm.[2,3,11] In the past, we usually first tried endoscopic realignment for posterior urethral disruption. Repeat open urethroplasty is not uncommon in our institution. However, we confronted a high rate of recurrent strictures. Furthermore, we encountered more complicated posterior urethral strictures in patients who transferred from local hospitals. As a result, we abandoned endoscopic realignment and adopted a modified method using a temporary vesicostomy instead of a simple cystostomy to assist the urethroplasty.

Traditionally, there are two approaches for performing open urethroplasty. The advantages of urethral repair via the perineum are the simplicity of the anastomosis and the lower degree of operative morbidity compared with the transpubic approach. It has been suggested that urethral anastomosis should be attempted first through the perineum in every patient, with the transpubic approach reserved for the more complicated cases.[2,12,13] In this series of patients, we performed an elaborated 1-stage bulboprostatic anastomosis through the perineum as described by Webster et al.[5,6] The unique features of our technique is creation of a vesicostomy to help easily identify the bladder neck using either a metal dilator or cystoscope. Of note, this maneuver allows digital localization of the bladder neck and reassures the surgeon of an adequate dissection direction deep into the perineum. We suggest that no penile skin flaps or buccal mucosal grafts are required for long posterior urethral strictures with lengths around 3 cm. Primary end-to-end anastomosis of the posterior urethra is a suitable procedure without as many morbidities as a time-consuming substitution urethroplasty using flaps or grafts. Although two of our patients required subsequent internal urethrotomies after their urethroplasties, they could urinate smoothly at the last follow-up. Inadequate excision of scar tissue and problems in the early learning curve for the surgical techniques comprised the major causes of restricture. Actually, recurrent strictures after transperineal urethroplasty are narrow mucosal rings without dense fibrosis, and the chances of success of treatment are quite high.[11] However, the number of cases is too

small to enable us to draw any definite conclusions.

The extensive fibrosis associated with many endoscopic urethrotomies may hamper the recruitment of sufficient normal urethra for good epithelization of the mucosa.[10] Many of these patients are still treated by repeated dilations or even chronic self-dilation. However, the long-term results have been poor, and these procedures should not be considered curative. From our experience, postoperative urethral dilation should only play a rescue role for short strictures after an anastomotic urethroplasty. In our limited experience with the same surgeon, excision of the stricture and primary bulboprostatic anastomosis could be successfully performed for recurrent posterior urethral strictures using the perineal route. Using a progressive stepwise approach to aggressively mobilize the corpus spongiosum and develop the intracrural space, we found that a sufficient normal urethral length could be recruited for a tension-free anastomosis in all our patients. Furthermore, we avoided unnecessary endoscopic manipulation before the anastomotic urethroplasty. Earlier reports indicated that previous failed interlocking urethrotomies and urethroplasties significantly decreased the success of subsequent open repair.[14,15]

In conclusion, we recommended the creation of a temporary vesicostomy to assist 1-stage anastomotic repair for recurrent and obliterated posterior urethral strictures. In our limited experience, this modified approach was successful in most recurrent cases, with only minimal morbidities.

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以暫時性膀胱造廔作爲輔助的尿道重建手術來治療復發性完全阻塞的後尿道狹窄

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背 景： 針對復發性完全阻塞後尿道狹窄的病患，我們以暫時性膀胱造廔作爲輔助的尿道重建手術來治療並報告其結果。

方 法： 採取回溯性病例分析，自 2007 年 1 月至 2010 年 7 月共有 12 例復發性完全阻塞後尿道狹窄的男性病患，接受暫時性膀胱造廔作爲輔助的尿道重建手術。術前以逆行性尿道攝影及膀胱攝影評估，平均手術前由 X 光片顯示出可能尿道分離的長度爲 4.25 公分。

結 果： 初期的手術成功率爲 83%，平均追蹤時間爲 22 個月，手術後平均最高尿流速爲 16.3 ml/s。其中有 10 位病患手術後以解尿性的膀胱尿道攝影以及尿道內視鏡證明有通暢的尿道吻合處。但另外有 2 位病患在術後 6 個星期產生吻合處狹窄，而接受經由尿道切開術治療。最後，所有病患術後皆可正常排尿。

結 論： 以暫時性膀胱造廔作爲輔助的尿道重建手術，來治療復發性完全阻塞的後尿道狹窄，可以得到滿意的排尿結果以及極小的術後併發症。

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關鍵詞： 阻塞性尿道狹窄，尿道，尿道狹窄，尿道重建手術，膀胱造廔

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