

Brief Communication

A new technique for the obliterative urethral strictures

Xianguo Chen, Kexiao Wang, Yuanping Ye, Zongyao Hao, Jun Zhou, Song Fan, Haoqiang Shi, Chaozhao Liang

Department of Urology, First Affiliated Hospital of Anhui Medical University, Hefei, Anhui 230022, PR China

Received September 25, 2013; Accepted October 10, 2013; Epub November 15, 2013; Published December 1, 2013

Abstract: There have been a troublesome problem to treat with obliterative urethral strictures, the challenge is how to reduce wound of surgery and improve therapeutic success rates. In this study, we reported single-hospital institution case-series including 97 patients with obliterative urethral strictures were enrolled with “three lines lie within one imaginary plane (TLLWOIP)” to treat with patients with the obliterative urethral strictures. Perioperative variables and success rates were evaluated. Urinary flow rate, residual urine (RU) volume and quality-of-life score (QoLs) of patients were analyzed. In the obliterative urethral strictures, postoperative maximum urinary flow rate was 24.36 ± 10.69 ml, and postoperative RU volume and QoLs outcomes were significantly lower than preoperative outcomes with TLLWOIP. A total of success rate was 62.9% with TLLWOIP. Our results suggested that it was ideal candidates for initial treatment with TLLWOIP for the obliterative urethral strictures.

Keywords: Obliterative urethral strictures, TLLWOIP

Introduction

The obliterative urethral stricture is the common clinical problems in urology. Several factors contributed to the obliterative urethral stricture, including trauma, iatrogenic injury, infection, sexually transmitted diseases, specifically, straddle trauma—is regarded as the common cause for the obliterative urethral stricture [1, 2]. The obliterative urethral strictures have brought great harm to the patients with progressive symptoms: urinary tract infection, acute urinary retention, hydronephrosis and kidney failure [3].

Currently, the available clinic therapeutical measures of the obliterative urethral strictures are dilatation, open urethroplasty and direct vision internal urethrotomy (DVIU). Dilatation can sometimes be helpful for a short stricture [4]. However, the periodic dilation is associated with the repeated trauma and inflammation exacerbates the formation of scar tissues. Thus, dilatation is not considered to be cost effective or beneficial for the obliterative urethral stricture for the initial treatment [3]. Open urethroplasty can be accomplished with a one-

stage for the most distal reconstructions [5]. However, open urethroplasty involves the complicated procedure to operation, and creates severity injury for the patients, it may be necessary to perform a substitution procedure if the stricture is long [6]. Clearly, DVIU is readily available and minimally invasive for the obliterative urethral strictures. However, the lower success rates of DVIU limited the application to DVIU for the obliterative urethral strictures. The challenge is how to improve therapeutic success rates. Therefore, a rational therapy for the obliterative urethral strictures remain to be resolved.

Herein, we describe the experience of “three lines lie within one imaginary plane (TLLWOIP)” to treat with patients with the obliterative urethral strictures. Then, we analyze the outcome of a follow-up.

Materials and methods

Materials and methods

This study was approved by the institutional Ethics Review Board before the preparation. 97 patients with the obliterative urethral strictures

A new technique for the obliterative urethral strictures

Table 1. Baseline characteristics of patients with the obliterative urethral stricture

	Location	Length (cm)			Numbers	
	Posterior	≤1	1-1.5	1.5-2	single	multiple
OUS	97	49	34	14	88	9

Note: The baseline characteristics of patients with the obliterative urethral stricture are shown, OUS: the obliterative urethral stricture.

Table 2. Changes in urinary flow rate, RU and QoLs in Preoperative and Postoperative with TLLWOIP

	Preoperative	Postoperative	P value
Max urinary flow rate (ml/S)		24.36±10.69	
RU (ml)	389.3±54.7	53.8±26.8*	<0.01
QoLs	5.82±0.41	3.18±0.85**	<0.05

Note: Changes in urinary flow rate, RU and QoLs in Preoperative and Postoperative with TLLWOIP. Data are shown as mean ± SD, preoperative vs postoperative *, $P < 0.01$; **, $P < 0.05$. TLLWOIP: three lines lie within one imaginary plane; QoLs: quality-of-life score; RU: Residual Urine.

were enrolled in the study. The investigation included the etiology, length of stricture, position, a single or multiple strictures, whether infection were present. The results were evaluated with the following parameters preoperatively and postoperatively: the urinary flow rate, RU and quality-of-life score (QoLs) were analyzed. The postoperative recurrence and the following therapy were followed-up. All of the patients were examined the urine routine in preoperative preparation in order to exam whether the infection or not, and pelvic plain and lateral radiograph were taken in all of the patients to exam the length, location, and angle of the obliterative urethral strictures.

Operation process

All of the patients were administered general anesthesia and under the lithotomy position. A cystostomy was performed for the obliterative urethral strictures, an 18-22 F urethra staff through posterior urethra was inserted into the proximal obliterative urethral strictures from the cystostomy channel. Then we punctured the obliterative urethral strictures from distal to proximal with puncture needle, and we successfully punctured the obliterative urethral strictures when encountered the feelings of metal impact in this procedure, and the guide-wire was placed into urethra through puncture needle. In order to maintain the three lines lie in the same plane: consist of urethra staff, urethral endoscope and the line that join umbilicus

with the middle point of pubis, called as TLLWOIP. Then, the scar was incised by cold-knife according to the physiological curve of urethra, if necessary, left forefinger inserted into rectum to introduce the direction of the cold-knife. It is necessary for substituting the cold knife for laser urethrotomy using Nd:YAG for the patients with long scar. After performing the procedures, an 18 or 20 Fr indwelling catheter was left for 2-6 weeks in all patients.

Results

A total of 97 patients underwent TLLWOIP diagnosed as the obliterative urethral strictures clinical data were analyzed at our center. The age of patients ranged from 18 to 72 years (mean age 43 years). The duration of disease was between 1 month to 23 years. The causes of 97 the obliterative urethral stricture were traumatic in 39 (40.2%), infection in 23 (23.7%), iatrogenic in 14 (14.4%), and unknown in 21 (21.6%) (Table 1). The infection that specially accompanied with traumatic played an important role in obliterative urethral stricture.

The length of the obliterative urethral strictures was ranged from 0.5 cm to 2 cm in posterior urethra. The obliterative urethral strictures less than 1 cm, 1-1.5 cm, 1.5-2 cm were 49, 34 and 14 cases, respectively. For number of strictures, the single and multiple strictures were 88 and 9 cases in the obliterative urethral stricture group (Table 1).

In the obliterative urethral strictures, postoperative maximum urinary flow rate was 24.36±10.69 ml with TLLWOIP, postoperative RU was (53.8±26.8) ml significantly lower than preoperative outcomes (389.3±54.7) ml, QoLs of postoperative outcomes was (3.18±0.85) markedly lower than preoperative outcomes (5.82±0.4) with TLLWOIP (Table 2). A total of success rate was 62.9% (61/97) at 12 months, postoperatively, of the 11 cases recurrent the obliterative urethral strictures with TLLWOIP, and 7 patients were successfully treated with urethral dilatation. The success rate for the length of the obliterative urethral strictures less than 1 cm, 1-1.5 cm, 1.5-2 cm were 83.7% (41/49), 52.9% (18/34) and 14.2% (2/14),

A new technique for the obliterative urethral strictures

Table 3. The success rates in the obliterative urethral stricture with TLLWOIP

	Length (cm)			Numbers	
	≤1	1-1.5	1.5-2	single	multiple
SR	83.7%	52.9%*	14.2%**	68.2%	11.1%***

Note: The success rates in the obliterative urethral stricture according to the length and numbers of the obliterative urethral stricture with TLLWOIP. *, $P < 0.01$, the length (1-1.5) vs the length (≤ 1); **, $P < 0.01$, the length (1-1.5) vs the length (1.5-2); ***, $P < 0.01$, the single vs the multiple. SR: success rates; TLLWOIP: three lines lie within one imaginary plane.

respectively. The success rate in the single and multiple obliterative urethral strictures was 68.2% (60/88) and 11.1% (1/9), respectively (Table 3). There were no intraoperative or post-operative complications with TLLWOIP.

We had to convert from TLLWOIP to the open operation in 7 obliterative urethral strictures, including 3 cases resulted from posterior urethral angulation due to pelvic fracture and dislocation, 2 cases with multi-strictures and 2 cases with severe infection, the other patients no additional procedure were required.

Discussion

The therapy of the obliterative urethral strictures remains to be a controversial clinical problem. There were many methods to deal with the obliterative urethral strictures, for examples, urethral dilation, DVIU and urethroplasty [7, 8]. In this study, we had a good experience on performing TLLWOIP to cut the obliterative urethral strictures to recover the continuity of urethra. This method advantage over DVIU was that it can avoid blind urethrotomy and form the false passage of urethra. Our experience clearly suggested that the technique of TLLWOIP was better choice for the obliterative urethral strictures.

The definite diagnosis was very important in preoperative, including familiar with the length, the location, the history of operation, the infection of urethral strictures [9-12]. The urine bacterial should be routinely examined with the patients with obliterative urethral strictures due to they had the long-term history of urinary retention or suprapubic cystostomy. Pelvic plain and lateral radiograph should be taken in all of the patients, and it was also necessary to perform urethra confluence with urethral staffs

for the urethrography, and on behalf of getting the messages of the length of obliterative urethral strictures, angulation or displacement of urethra, bone compressed urethra. Patients with obliterative urethral strictures were performed open operation mainly from pelvic fracture induced the angulation or displacement of posterior urethra, and bone compressed urethra. These results suggested that it was important for the preoperative urethrography to the diagnosis and treatment of obliterative urethral strictures.

The most difficult and the key point in the surgery of obliterative urethral strictures with TLLWOIP, was to restore the continuity of the urethra, and avoid the formation of false tract. For the false tract, a urethral endoscope was placed into posterior urethra through the neck of bladder, and we determined the correct position of urethra according to the musculus sphincter of bladder neck and seminal colliculus. We considered the operating region more clear and less form the false tract with TLLWOIP.

Currently, an increasing evidences had observed that success rate of DVIU was greatly varied from 20% to 60% after single-stage DVIU for urethral strictures [13, 14], and lower success rate for obliterative urethral strictures. But the total success rate was 62.9% with TLLWOIP for obliterative urethral strictures in our research. It was clear that success rate of obliterative urethral strictures was dependent upon stricture position, cause and length and whether the single and multiple strictures. Ours data suggested that the success rates rapidly decrease as the length of the stricture increases, and the success rates of the multiple strictures were marked lower the single strictures. We found that the most failure cases were due to posterior urethral angulation resulted from the pelvic fracture and dislocation, and the bone chip compression urethra. A number of studies showed that it was most likely to occur urethral strictures recurrence within 3-12 months [15]. Risk factors for stricture recurrence remain highly to be controversial, and there were a number of factors to affect stricture recurrence: cause, position, length, numbers of strictures and whether perioperative urinary infection present [14, 16]. Our study suggested that the length (1.5-2 cm) of stric-

A new technique for the obliterative urethral strictures

ture significantly decreased the success rates of the obliterative urethral strictures.

It was clear that frequent and regular urethra dilation could effectively reduce stricture recurrence rates within one year. In our research, there were 11 cases that recurrent obliterative urethral strictures with TLLWOIP performed regular urethral dilatation. The long term follow-ups showed that these patients got a satisfied outcome after TLLWOIP, and they could also have a relative unobstructed urinate after frequent and regular urethra dilation.

In summary, the fact that the surgical treatment of obliterative urethral strictures were continually changing, and the choice of a procedure depended on a number of different factors. We suggested that it was ideal candidates for initial treatment with obliterative urethral strictures for TLLWOIP tended to have a single, short (<1 cm), without urine infection, posterior urethra stricture. Patients who were poor prognosis included those with pelvic fracture lead to be the posterior urethral angulation, and the bone chip compression urethra. It was a critical role in preventing stricture recurrence to perform urethra dilation after TLLWOIP.

Disclosure of conflict of interest

None.

Address correspondence to: Dr. Chaozhao Liang, Department of Urology, First Affiliated Hospital of Anhui Medical University, Hefei, Anhui 230022, PR China. Tel: +86-0551-62923440; E-mail: liang_chaozhao@126.com

References

- [1] Santucci RA, Joyce GF, Wise M. Male urethral stricture disease. *J Urol* 2007; 177: 1667-1674.
- [2] Lumen N, Hoebeke P, Willemsen P, De Troyer B, Pieters R, Oosterlinck W. Etiology of urethral stricture disease in the 21st century. *J Urol* 2009; 182: 983-987.
- [3] Waxman SW, Morey AF. Management of urethral strictures. *Lancet* 2006; 367: 1379-1380.
- [4] Tonkin JB, Jordan GH. Management of distal anterior urethral strictures. *Nat Rev Urol* 2009; 6: 533-538.
- [5] Mangera A, Chapple C. Management of anterior urethral stricture: an evidence-based approach. *Curr Opin Urol* 2010; 20: 453-458.
- [6] Xie H, Xu YM, Xu XL, Sa YL, Wu DL, Zhang XC. Evaluation of erectile function after urethral reconstruction: a prospective study. *Asian J Androl* 2009; 11: 209-214.
- [7] Mangera A, Chapple C. Management of anterior urethral stricture: an evidence-based approach. *Curr Opin Urol* 2010; 20: 453-458.
- [8] Lumen N, Hoebeke P, Troyer BD, Ysebaert B, Oosterlinck W. Perineal anastomotic urethroplasty for posttraumatic urethral stricture with or without previous urethral manipulations: a review of 61 cases with long-term followup. *J Urol* 2009; 181: 1196-1200.
- [9] Zimmerman WB, Santucci RA. A simplified and unified approach to anterior urethroplasty. *Nat Rev Urol* 2010; 7: 386-391.
- [10] Meeks JJ, Erickson BA, Granieri MA, Gonzalez CM. Stricture recurrence after urethroplasty: a systematic review. *J Urol* 2009; 182: 1266-1270.
- [11] Fenton AS, Morey AF, Aviles R, Garcia CR. Anterior urethral strictures: etiology and characteristics. *Urology* 2005; 65: 1055-1058.
- [12] Kashefi C, Messer K, Barden R, Sexton C, Parsons JK. Incidence and prevention of iatrogenic urethral injuries. *J Urol* 2008; 179: 2254-2257; discussion 2257-2258.
- [13] Greenwell TJ, Castle C, Andrich DE, MacDonald JT, Nicol DL, Mundy AR. Repeat urethrotomy and dilation for the treatment of urethral stricture are neither clinically effective nor cost-effective. *J Urol* 2004; 172: 275-277.
- [14] Naude AM, Heyns CF. What is the place of internal urethrotomy in the treatment of urethral stricture disease? *Nat Clin Pract Urol* 2005; 2: 538-545.
- [15] Pansadoro V, Emiliozzi P. Internal urethrotomy in the management of anterior urethral strictures: long-term followup. *J Urol* 1996; 156: 73-75.
- [16] Albers P, Fichtner J, Bruhl P, Muller SC. Long-term results of internal urethrotomy. *J Urol* 1996; 156: 1611-1614.