Research Article

iMedPub Journals
http://www.imedpub.com/

Trauma & Acute Care

2017
Vol.2 No.1:33

Early Urethral Anastomosis of Traumatic Posterior Urethral Injuries: A Single Centre Experience

Liang Huang[1,2], Guilin Wang[1,2], Zhengyan Tang[*1,2], Zhao Wang[1,2], Junjie Chen[1,2], Quan Zhu[1,2] and Yong Lin[3]

[1]Department of Urology, Xiangya Hospital, Central South University, Changsha, Hunan 410008, P.R. China

[2]Hunan Engineering Laboratory for Diagnosis and Treatment Technology of Urogenital Diseases, Changsha, Hunan 410008, P.R. China

[3]Institute for Virology, University Hospital Essen, University of Duisburg-Essen, Hufelandstrasse 55, Essen 45147, Germany

[*]**Corresponding author:** Zhengyan Tang, Department of Urology, Xiangya Hospital, Central South University, China, Tel: +8613507318268; E-mail: xytangzy@sina.com

Received date: December 16, 2016; **Accepted date:** February 06, 2017; **Published date:** February 16, 2017

Citation: Huang L, Wang G, Tang Z, Wang Z, Chen J, et al. (2017) Early Urethral anastomosis of Traumatic Posterior Urethral Injuries: A single Centre Experience. Trauma Acute Care 2: 33.

Copyright: © 2017 Huang L. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Purpose: To evaluate the effect of early urethral anastomosis (EUA) for traumatic posterior urethral injuries (TPUI) patients.

Materials and methods: We retrospectively studied 73 patients in our hospital with traumatic posterior urethral injuries who underwent early urethral anastomosis or delayed urethroplasty (DU) between June 2011 and June 2015. Intraoperative and postoperative data on 26 patients who treated with EUA were compared to those on 47 patients underwent DU with one-year follow-up.

Results: The time between the injury and the operation was an average of 7.9 days and 155.7 days in EUA and DU respectively. There was significant difference between the two groups in operation time which 93.5 ± 12.6 min and 110.2 ± 13.2 min. No patient had repeat urethroplasty in EUA, while 5 (10.6%) with a re-urethroplasty in DU. Success rate after the first operation was 88.5% in EUA while 66.0% in DU (P<0.05), however, the results of final success rate after a one year follow-up showed that no statistical significance difference (100% and 95.7% respectively). Incontinence (11.5%) and erectile dysfunction (23.1%) in EUA were similar in DU (19.1% and 36.2%, respectively). Patients with EUA noted an average of 1.4 procedures compared with an average of 2.9 in DU (P<0.05).

Conclusions: EUA is an alternative maneuver for traumatic posterior urethral injuries, when the patient's conditions were stable and severe complications were treated appropriately. It could decrease the operative time, incidence of re-stricture, average number of procedures, medical costs and the difficult of therapy.

Keywords: Posterior urethral injuries, Pelvic fracture, Urethroplasty, Urethral stricture

Introduction

Traumatic posterior urethral injuries (TPUI) result from many reasons, whereas primarily associated with pelvic fractures in average of 5-10% cases [1]. The proper management of traumatic posterior urethral injuries is important to reduce associated morbidity such as urethral strictures, incontinence and erectile dysfunction. However, the treatment strategies remains controversial including the options of primary realignment (PR), early urethral anastomosis (EUA) and suprapubic cystostomy with delayed urethroplasty (SPC+DU) [2-7]. The object of this study was to compare the clinic outcomes of early urethral anastomosis with delayed urethroplasty for traumatic posterior urethral disruption.

Materials and Methods

Clinical data of patients with posterior urethral disruption defects who received early urethral anastomosis or delayed urethroplasty from June 2011 to June 2015 at our institution were reviewed retrospectively. Patients were excluded from our study if their follow-up data were not completed, lost to follow-up or the follow-up time were less than one year. All patients signed informed consent to publish their case details before being discharged. All written consents in this study were reviewed and approved by the Ethics Committee of Xiangya Hospital, Central South University.

The posterior urethral disruption could be determined by the history of trauma, blood at the urinary meatus, and voiding cystic urethrography or retrograde urethrography. Immediately urinary diversion by suprapubic cystostomy which be done transcutaneously under ultrasound guidance or openly through a suprapubic incision above the symphysis pubis in the midline 2 fingerbreadths, is the first step in patients who suspected urethral injury. The life-threatening complications such as shock, unstable pelvic fracture, serious organ injuries, or hemodynamic instability and general conditions of patients were evaluated simultaneously, after these severe complications were

addressed appropriately and the patient's conditions were stable a tension free end-to-end urethral anastomosis from mucosa to mucosa via the perineum were done subsequently.

An inverted Y-shaped midline perineal incision was made with the patients was placed in a lithotomy position. The subcutaneous tissue and bulbospongiosus muscle were dissected to expose the bulbous and membranous urethra. After excising the hematoma and necrotic tissue surrounding the urethra completely, the proximal and distal necrotic urethral segments were excised and the urethral ends were spatulated ventrally and dorsally respectively. Tension free mucosa to mucosa anastomosis of two ends was commenced using 4/0 or 5/0 polyglycolic acid absorbable suture with eight stitches over a size of 18 silicone catheter. The urinary catheter was removed at one month after surgery, the suprapubic cystostomy catheter followed if auto-urination was satisfactory.

Delayed urethroplasty was made from 3 months to 6 months after the patients underwent primary urethral realignment or simple suprapubic cystostomy. The operation method and the postoperative treatment were similar to EUA described above. The difference between them is to ensure the urethral strictured segment and scar tissue were excised completely to avoid the recurrence of urethral scar stricture postoperative, that is also the most critical point. However, some ancillary maneuvers such as mobilization of the distal anterior urethra, separating of the intercavernous septum, inferior pubectomy or supracrural rerouting would be done if the strictured segment is too long to achieve tension-free end-to-end urethroplasty.

The patients were followed up as every three months for one year. The operating time, the number of patients who underwent ancillary maneuvers, urethral dilation (UD) or direct vision internal urethrotomy (DVIU) after procedures, re-urethroplasty, average procedures, success rates, incontinence and erectile dysfunction were selected as monitored parameters. Successful operation was defined as a maximum flow rate (Qmax) not less than 10 ml/s, no significant evidence of urethral stricture on the voiding cystourethrography or retrograde urethrography, a good history of voiding that not require UD or DVIU within one year of surgery. SPSS 22.0 software was applied for statistical analysis with t test and Chi-square test, $P<0.05$ was considered a statistically significant difference.

Results

The demographic characteristics of all enrolled patients were listed in Table 1. A total of 73 patients with posterior urethral injuries aged from 15 to 63 years were included in our study. Among these, twenty-six patients (mean 34.9 years) were initially managed with early urethral anastomosis and forty-seven patients (mean 36.7 years) were treated with delayed urethroplasty in our hospital. The time between the injury and the operation was an average of 7.9 days and 155.7 days in two groups respectively. The primary reason of traumatic posterior urethral disruption was traffic accidents, occurring in 22 (84.6%) patients in EUA and 38 (80.9%) patients in DU group. Besides, others courses such as crush injury, falling injury, straddle injury and iatrogenic injury were showed in Table 1.

Table 1: Demographic data of all enrolled patients ($\bar{x} \pm s$, n (%)).

	EUA	DU
No. of patients	26	47
Mean age (years)	34.9 ± 12.1	36.7 ± 12.4
Time between the injury and operation (days)	7.9 ± 1.6	155.7 ± 26.5
Causes of posterior urethral disruptions		
Traffic accidents	22 (84.6)	38 (80.9)
Crush injury	1 (3.8)	2 (4.3)
Falling injury	3 (11.5)	2 (4.3)
Straddle injury	1 (3.8)	0 (0)
Iatrogenic injury	0 (0)	5 (10.6)

The median time of procedure was 93.5 ± 12.6 min in EUA and 110.2 ± 13.2 min in DU, which was statistically significant. The operations were successfully accomplished in all patients except 1 (3.8%) in EUA and 4 (8.5%) in DU using ancillary maneuvers (P=0.79), that all the 5 patients underwent separating the fascia between the corpus cavernosums but still 1 patient required inferior pubectomy and 1 patient required supracrural rerouting to ensure tension-free suture in the latter group. The number of patients who underwent UD or DVIU after the first surgery was observed with 3 (11.5%) in EUA and 16 (34.0%) in DU (P=0.04). No patient in the early repair group had repeat urethroplasty, while 5 (10.6%) with a re-urethroplasty in the delayed repair group (2 of the 5 patients underwent three times of urethroplasty) (P=0.09). Patients with early urethral anastomosis noted an average of 1.4 procedures per patient compared with an average of 2.9 in the delayed urethroplasty group (P=0.00) (Table 2).

Table 2: Surgical data and complications of all the patients ($\bar{x} \pm s$, n (%)).

	EUA	DU	P
Operative time (min)	93.5 ± 12.6	110.2 ±13.2	0.00
Ancillary maneuvers	1 (3.8)	4 (8.5)	0.79
UD or DVIU	3 (11.5)	16 (34.0)	0.04
Re-urethroplasties	0 (0)	5 (10.6)	0.09
Average procedures	1.4 ± 1.3	2.9 ± 2.8	0.00
Success rate after first operation	23 (88.5)	31 (66.0)	0.04
Overall success rate	26 (100)	45 (95.7)	0.75
Incontinence	3 (11.5)	9 (19.1)	0.61
Erectile dysfunction	6 (23.1)	17(36.2)	0.38

Success rate was observed with 88.5% (23 in 26) in EUA after the first surgery, while 66.0% (31 in 47) in DU (P=0.04). However,

there is no statistical significance difference in overall success rate between two groups after a one year follow-up (100% *vs.* 95.7%) (P=0.75) (Figure 1). Incontinence occurred in 3 (11.5%) of the EUA group and 9 (19.1%) of the DU group, erectile dysfunction occurred in 6 (23.1%) and 17 (36.2%) respectively, while the results demonstrate that no significance difference between the two groups (P=0.61, P=0.38) (Table 2).

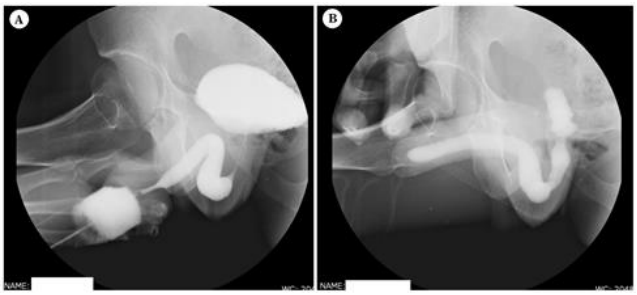

Figure 1: [A] Voiding cystic urethrography and retrograde urethrography showed the stricture at the membranous urethra preoperative. [B] Retrograde urethrography demonstrated that the urethral continuity was satisfactory 3 months after EUA.

Discussions

Due to the special anatomical relationship of the posterior urethra, posterior urethral injuries are highly correlated with the fracture of pelvic ring that occurs at the bulbo-membranous junction in majority of patients1. Pelvic fracture is always concomitant with other serious complications such as shock, excessive bleeding or liver injury, hence the shock resuscitation, life-threatening injuries should be treated in the first instance. Timely and appropriately management of traumatic posterior urethral injuries at the early stage could reduce the incidence of postoperative complications, however, the treatment protocols including primary realignment by open or endoscopic measures, early anastomotic anastomosis and suprapubic cystostomy with delayed urethroplasty were till matter of controversy.

The method of primary realignment is to pull down the proximal urethra approximate to the distal injured end by catheter through open suprapubic incision, endoscopic or radiologic technology [2,8]. Although PR has several reported benefits that appears to decrease the incidence of stricture formation and facilitates its delayed repair compared to suprapubic cystostomy [9,10]. It has a high rate of subsequent urethral strictures requiring further repair in the first year after injuries even if the PR is satisfactory [11]. Leddy et al. [12] reported the mean time to failure after PR was only 79 days with a high rate of 78.9%. In fact, according to our previous experience, this method could not guarantee the two injury ends anastomose anatomically and enables the catheter balloon has sustained oppression on the bladder neck, resulting in increased incidence of stricture and incontinence.

A more popular maneuver is that suprapubic cystostomy at the time of injury and delayed anastomotic urethroplasty through the perineal approach 3 to 6 months later which has a high rate of long-term success of 90-98% [13,14], therefore, SPC +DU is considered to be the gold standard treatment for patients with traumatic posterior urethral disruption in some literatures [15]. On the other hand, the patients have a low quality of life (QoL) because of the long-term use of the suprapubic drainage tube, which resulting in serious psychological and social disorder problems. Additionally, the fresh posterior injury urethral ends don't suture together with a suprapubic catheter placed alone, that will lead to complex urethral stenosis and increased difficulty and complexity of delayed surgery [5].

Some ancillary maneuvers including mobilization of the distal anterior urethra, separating of the intercavernous septum, inferior pubectomy or supracrural rerouting would be done constantly to achieve tension-free urethroplasty, and most patients underwent more than two times of repairs [1,5]. Reports showed the average times of procedures per patient that compared to PR was 3.1 *vs.* 1.6 [16], the medical costs also increased accompany multiple surgeries.

There are few studies reported the early urethral anastomosis, as a result of most urologists considered that EUA will aggravate the pelvic fracture and increase the risk of massive bleeding which mainly applied for penetrating injuries, injuries associated with bladder neck or rectal rupture that required open surgeries immediately [17]. However, Mundy [7] recommended delayed primary repair could be done at 7 to 10 days after the injury, because their general conditions were stable, the hematoma has begun to absorb but the fibrosis has not yet formed at this period. Qu et al. [5] reported their experiences of immediate or delayed repair of pelvic fracture urethral disruption in children, showing that the rate of reoperation was less and the stenotic segment was easier to treat in the delayed repair group. Another study reported by Odoemene et al. [6] also revealed that onestage anastomotic urethroplasty could decrease incidence of postoperative complications such as restricture, impotence and urinary incontinence, but they had no control group.

Obviously, the operative time in EUA group was shorter than in SPC+DU group in our study, which benefited from the fresh injury urethral ends and surrounding perineal region without any fibrosis scar, and the urethra was good flexibility that made the tension-free anastomosis much easier. The rate of restricture was also lower in EUA group, UD or DVIU would perform when the patient had poor micturition or the recurrent symptomatic stricture determined by urethrography, while failed an urethroplasty was created. No patient required re-urethroplasties in EUA group but 10.6% of patients in SPC+DU group underwent two or three times of urethroplasties, there was no significant difference but we believed that the small number of enrolled patients result in the statistical bias. From our experiences, the EUA has a less average times of procedures and higher success rate after the first operation compared to SPC+DU (1.4 *vs.* 2.9, 88.5% *vs*. 66.0%, respectively), but in the long term, both procedures have a satisfactory result of overall success rate. Decreased the time of catheterization and the frequency of procedures will significantly improve their QoL and reduce the overall medical costs in their treatment cycle.

© Under License of Creative Commons Attribution 3.0 License

Besides, EUA appears to decrease the incidence of incontinence and erectile dysfunction for patients, while there were no difference between the two groups in our results which similar to published reports [6,9] suggesting that the majority causes of urinary incontinence and impotence after TPUI lies in injury itself but not the different management strategies.

Conclusions

Therefore, our preliminary findings suggest that early urethral anastomosis via perineal approach is an alternative maneuver for traumatic posterior urethral injuries, when the patient's conditions were stable and severe complications were addressed appropriately. It could decrease the operative time, incidence of re-stricture, average number of procedures, medical costs and the difficult of therapy. Larger number of patients and longer follow-up period of case-control studies are required in multicenters to confirm the results of EUA.

Acknowledgements

This study was supported by grants from the National Nature Science Foundation of China (Grant No. 81570627) and the key program of the Science and Technology Department of Hunan Province (Project No. 2015JC3132).

Conflicts of Interest

The author has declared no conflicts of interest.

References

1. Velarde-Ramos L, Gómez-Illanes R, Campos-Juanatey F, Portillo-Martín JA (2016) Traumatic lesions of the posterior urethra. Actas Urol Esp 40: 539-548.
2. Lee MS, Kim SH, Kim BS, Choi GM, Huh JS (2016) The Efficacy of Primary Interventional Urethral Realignment for the Treatment of Traumatic Urethral Injuries. J Vasc Interv Radiol 27: 226-231.
3. Haidari M, Azargoon A, Mahmoudvand H, Almasi V, Pournia Y, et al. (2014) Complications of primary realignment of posterior urethral disruption after pelvic trauma. Trauma Mon 19: e13523.
4. Koraitim MM, Kamel MI (2015) Perineal repair of pelvic fracture urethral injury: in pursuit of a successful outcome. BJU Int 116: 265-270.
5. Qu Y, Zhang W, Sun N, Huang C, Tian J, et al. (2014) Immediate or delayed repair of pelvic fracture urethral disruption defects in young boys: twenty years of comparative experience. Chin Med J (Engl) 127: 3418-3422.
6. Odoemene CA, Okere P (2013) One-stage Anastomotic Urethroplasty for Traumatic Urethral Strictures. January 2004-January 2013. Niger J Surg 21: 124-129.
7. Mundy AR (1991) The role of delayed primary repair in the acute management of pelvic fracture injuries of the urethra. Br J Urol 68: 273-276.
8. Warner JN, Santucci RA (2015) The management of the acute setting of pelvic fracture urethral injury (realignment vs. suprapubic cystostomy alone). Arab J Urol 13: 7-12.
9. Koraitim MM (2012) Effect of early realignment on length and delayed repair of postpelvic fracture urethral injury. Urology 79: 912-915.
10. Barrett K, Braga LH, Farrokhyar F, Davies TO (2014) Primary realignment vs. suprapubic cystostomy for the management of pelvic fracture-associated urethral injuries: a systematic review and meta-analysis. Urology 83: 924-929.
11. Leddy L, Voelzke B, Wessells H (2013) Primary realignment of pelvic fracture urethral injuries. Urol Clin North Am 40: 393-401.
12. Leddy LS, Vanni AJ, Wessells H, Voelzke BB (2012) Outcomes of endoscopic realignment of pelvic fracture associated urethral injuries at a level 1 trauma center. J Urol 188: 174-178.
13. Gómez RG, Mundy T, Dubey D, El-Kassaby AW, Firdaoessaleh, et al. (2014) SIU/ICUD Consultation on Urethral Strictures: Pelvic fracture urethral injuries. Urology 83: S48-58.
14. Osman NI, Mangera A, Inman RD, Chapple CR (2015) Delayed repair of pelvic fracture urethral injuries: Preoperative decision-making. Arab J Urol 13: 217-220.
15. Rios E, Martinez-Pineiro L (2016) Words of Wisdom. Re: Primary Endoscopic Realignment of Urethral Disruption Injuries-A Double-Edged Sword? Eur Urol 69: 536-537.
16. Mouraviev VB, Coburn M, Santucci RA (2005) The treatment of posterior urethral disruption associated with pelvic fractures: comparative experience of early realignment versus delayed urethroplasty. J Urol 173: 873-876.
17. Mundy AR, Andrich DE (2011) Urethral trauma. Part II: Types of injury and their management. BJU Int 108: 630-650.