

Delayed Anastomotic Posterior Urethroplasty : Longterm Results

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ABSTRACT:

BACKGROUND:

There is still controversy regarding the treatment of post-traumatic posterior urethral distraction injuries. Initial suprapubic cystostomy and delayed perineal urethral reconstruction has been considered the reference standard.

OBJECTIVE:

We review our experience with delayed perineal urethral reconstruction, with a focus on the long-term outcome and complications.

PATIENTS AND METHODS:

Between March 2007 and April 2012, 56 patients with posterior urethral distraction injury due to pelvic trauma underwent reconstruction with delayed perineal approach. Motor car accident were the main mode of trauma occurring in 34 patients (60.71%) followed by blunt pelvic trauma in 15 patients (26.78%) and fall from height in 5 patients (8.92%). Bullet injury in 2 patients (3.57%). The definitive repair was delayed after a time interval ranging from 2 to 9 months (mean 2.83 ± 1.14) after initial management. Mean patient age was 30.16 ± 15.31 (range 6 to 65) years. In all cases, the area of fibrosis was aggressively excised, the corpus spongiosum was mobilized, and a tension-free, spatulated end-to-end anastomosis was achieved by splitting the corporeal bodies. The preoperative evaluation consisted of combined antegrade and retrograde cystourethrograms. A detailed sexual history was obtained in all patients.

RESULTS:

After a mean follow-up of 29.78 ± 15.79 months (range 9 to 60 months), 50 patients (89.28%) had a successful outcome (with or without additional urethrotomy). 6 patients (10.71%) was considered a surgical failure, endoscopy was unsuccessful. The patients is scheduled for another trial of surgical repair.

CONCLUSION:

Our results support the belief that delayed perineal reconstruction with extensive excision of fibrosis and a tension-free, spatulated end-to-end anastomosis is a successful treatment for posterior urethral distraction defects, with acceptable morbidity.

KEY WORDS: urethral stricture, posterior urethral injuries, urethroplasty.

INTRODUCTION:

Posterior urethral distraction injuries are usually secondary to pelvic trauma and are reported to occur in approximately 10% of these patients^(1,2). Injury to the membranous urethra may be associated with injury to the prostate, especially in children, which may endanger the proximal sphincteric mechanism⁽³⁾.

The treatment of posterior urethral distraction injuries is controversial and a technically difficult issue in Urology^(2,4).

The end result of complete prostatomembranous disruption is complete obliteration of the membranous urethra, which is converted to a

fibrous tract⁽⁵⁾. The only reliable line of treatment in such cases is bulboprostatic anastomosis by the perineal or the transpubic route, the success rate is more than 90%⁽⁶⁾. However, incomplete rupture of the membranous urethra may be ended by simple urethral stricture which could be corrected by visual urethrotomy.

Complete distraction is reported to occur in 73% of traumatic urethral injuries^(2,5) and the suggested surgical treatment modalities include (a) immediate primary simple realignment over a stenting catheter, (b) immediate primary suture repair, and (c) initial suprapubic cystostomy alone, with delayed elective urethroplasty for the resulting stricture⁽⁷⁻¹⁸⁾.

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Many urologists believe delayed urethral reconstruction is the safest method. In the 1970s Turner-Warwick popularized a delayed 1-stage perineal approach comprising urethral mobilization followed by bulboprostatic anastomosis to bridge defects of up to 2.5 cm⁽¹⁹⁾. This procedure became the standard repair for short strictures while substitution urethroplasty or transpubic urethroplasty continued to be used for longer defects or complex posterior urethral defects, respectively. In the 1980s Webster, G. D described an elaborated 1-stage anastomotic repair through the perineum alone involving the progressive use of up to 4 steps to achieve a tension-free anastomosis in even the longest distraction defects⁽²⁰⁾.

In this report, we review our experience with treatment of posterior urethral distraction injuries, which consists of immediate suprapubic cystostomy and delayed perineal urethral reconstruction(end-to-end anastomosis) in Najaf teaching hospital , and report the longterm outcome and complications.

PATIENTS AND METHODS:

From March 2007 to April 2012, 56 patients posterior urethral traumatic disruptions underwent a delayed ,one stage bulboprostatic anastomotic urethroplasty at Najaf Teaching Hospital.

Motor car accident were the main mode of

trauma occurring in 34 patients(60.71%)followed by blunt pelvic trauma in 15 patients(26.78%) and fall from height in 5 patients(8.92%).Bullet injury in 2 patients(3.57%).

The definitive repair was delayed after a time interval ranging from 2 to 9 months (mean 2.83±1.14) after initial management . Mean patient age was 30.16±15.31 (range 6 to 65) years.

PREOPERATIVE EVALUATION

The acute treatment of patients presenting at our institution in most instances was placement of a suprapubic cystostomy tube with no attempt at immediate realignment.

Preoperative investigations included urine culture,simultaneous retrograde urethrography (RUG) and voiding cystourethrography(figure1).For each patient, the patency of the anterior urethra was documented by urethroscopy. The estimated radiographic preoperative length of the distraction defect was 2.75±0.86 (range 2-5) cm.A detailed sexual history about the quality of erections, before and after the trauma,they were asked about their sexual desire and nocturnal penile erections, and patients with a consistent inability to attain and/or maintain a penile erection sufficient to permit satisfactory sexual intercourse were considered to have ED. 11 patients(19.64%) with previous attempts of repair.Table 1 summarizes the preoperative patients characteristics.



Figure 1: Retrograde cystourethrogram.

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Table 1: All preoperative patient characteristic.

Age	Mean patient age was 30.16±15.31 (range 6 to 65) years.
Mode of trauma	motor car accidents in 34 patients(60.71%) Blunt trauma in 15 patients(26.28%) FFH in 5 patients(8.92%) Bullet injury in 2 patients(3.57%)
Suprapubic cystostomy	open method in 26 patients(46.42%) Percutaneous in 30 patients(53.57%)
Potency	13 patients(23.21%) had ED
Previous repair	11 patients by direct anastomotic repair(19.64%)
Length of fibrous tract	Range:2-5cm(mean2.75±0.86)

URETHRALRECONSTRUCTION TECHNIQUE

Patients were placed in an exaggerated lithotomy position, with the legs on adjustable leg supports. Perineal exposure of the bulbar and posterior urethra was achieved through an inverted Y-incision perineal incision (figure 2). The bulbospongiosus muscles were incised in the midline and the bulbar urethra was circumferentially mobilized proximally up to the strictured segment (figure 3). This segment was dissected in continuity with the mobilized urethra until the proximal end which led to the apex of the prostate where it was transected. The apex of prostate was incised over the tip of a Van Buren sound passed antegrade through the preexisting suprapubic tract and its tip palpated at the site of the stricture. The bulbar urethra was then trimmed back into healthy appearing tissue. The fibrotic tissue was excised completely from the

obliterated urethra to expose the normal posterior urethra and healthy tissue for anastomosis. To decrease the tension on the anastomosis, the corpora cavernosa were separated (figure 4). Stiches taken at fresh end prostatic apex (figure 5). Both the distal and proximal ends of the urethra were spatulated, and a total of 10 sutures of 3-0 or 4-0 monofilament polyglyconate (knots tied on the outer surface of anastomosis) were used to perform a direct mucosa-to-mucosa, end-to-end anastomosis over a 16 F silicon Foley urethral catheter (figure 6-7). Urethral lengthening procedures (Urethral mobilization, Crural separation) was done in all 56 patients (100%). The anastomotic site is anchored to the corpora cavernosa with two to three chromic catgut sutures. Drains alongside the anastomosis are placed before the closure of the bulbospongiosus muscle. Dressing was applied.

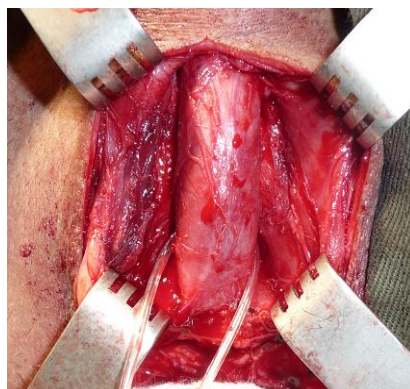


Figure 2: Perineal exposure of the bulbar urethra.

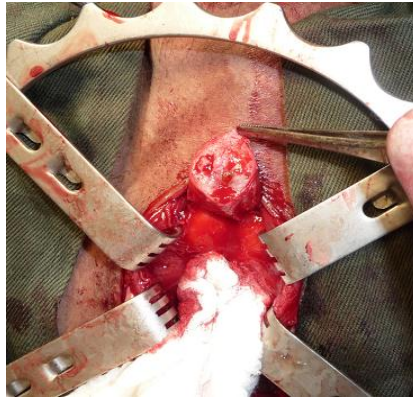


Figure 3: Bulbar urethra transected at the point of obliteration.

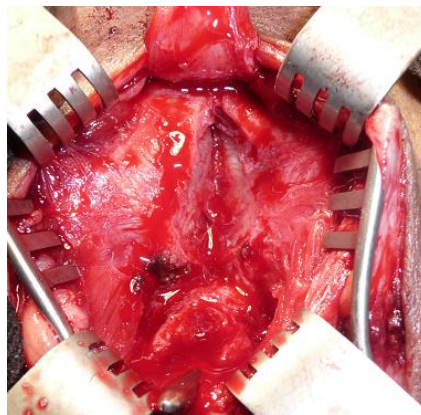


Figure 4: Intercrural space developed note the antegrade sound merging from prostatic urethra.

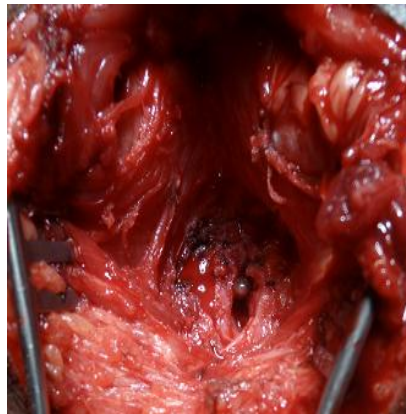


Figure 5: Stiches taken at fresh end prostatic apex.

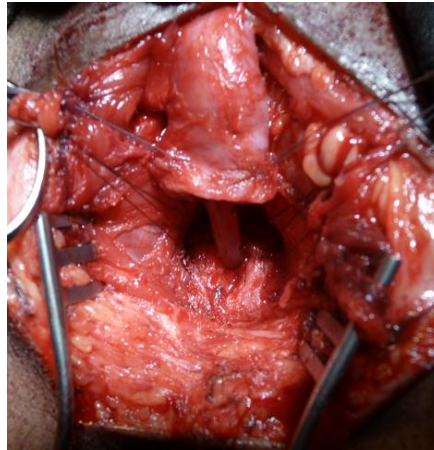


Figure 6: Anastomosis performed catheter introduced under vision and circumferential stitches in place.

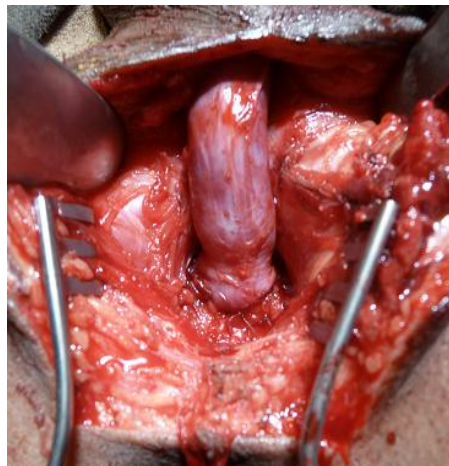


Figure 7: Complete anastomosis at the end of the procedure.

POSTOPERATIVE MANAGEMENT

Antispasmodics and antibiotics are given routinely. We use a parenteral third generation cephalosporin and metronidazole for 5 days and continue antibiotic coverage by oral quinolone. 9 patients (16.07%) required blood transfusion. Perineal drains removed 24-48 hours after surgery. Hospital stay ranged from 5-8 days (mean 5.87 ± 0.91). Duration of urethral catheter 4 weeks, the suprapubic tube is removed 3 days after successful voiding.

FOLLOW-UP

A total of 56 perineal anastomotic repairs were performed and have been followed for a mean of 29.78 ± 15.79 months (range 9 to 60). The follow-up consisted of periodic visits every 3 months during the first postoperative year and annually thereafter. History was taken concerning

subjective details on quality of urinary stream, urinary tract infections, ejaculation, and erection, and a careful clinical examination was done. Estimation of postvoiding residual urines by suprapubic ultrasonography. Furthermore urine analysis, additional radiologic (ie, urethrography) and endoscopic (ie, urethroscopy) evaluations were considered necessary when stricture recurrence was suspected.

RESULTS:

Mean operative time for the perineal procedure was 2.94 ± 0.84 hours (range 2-4.5). 40 patients (71.42%) are voiding efficiently with good flow, no appreciable residual urine or UTI. These patients did not need any additional endoscopic interventions. 10 patients (17.85%) experienced deterioration of their voiding performance within the first 6 months. RUG

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revealed a short urethral constriction. Endoscopy confirmed the presence of narrowing of the urethra at site of anastomosis. These strictures were readily incised with the cold knife. Out of the 10 previous patients, 7 (12.50%) were successfully treated by 1 session of optical urethrotomy. The other 3 (5.35%) patients need an additional endoscopic session 10 months

postoperative to achieve a perfect flow. Thus, by 12 months postoperative onward, 50 patients (89.28%) had a successful outcome (with or without additional urethrotomy). 6 (10.71%) patients was considered a surgical failure. Endoscopy was unsuccessful. The patients is scheduled for another trial of surgical repair. Results are summarized in Table 2.

Table 2: Results.

	Success alone	Success surgery plus 1 VIU	Success surgery plus 2 VIU	Overall success	Failure	Total NO.
Number of patients(%)	40(71.42%)	7(12.50%)	3(5.35%)	50(89.28%)	6(10.71%)	56(100%)

POSTOPERATIVE URINARY INCONTINENCE

Urinary incontinence did not develop in any patients as a direct result of the anastomotic surgery. Two patients complained of bothersome postvoid urinary dribbling. This had resolved by the end of the first postoperative year.

ERECTILE FUNCTION

All stated that they were sexually active before being injured, and 13 (23.21%) of the 56 underlined that significant ED developed after the initial trauma and before urethroplasty. When we consider that the remaining 43 were potent preoperatively, 3 (6.97%) of those 43 stated that they had lost their potency after urethral reconstruction. Only 1 patient reported that he regained his potency postoperatively.

DISCUSSION:

Surgical repair of post-traumatic posterior urethral strictures remains one of the most challenging problems in Urology. There is no universal agreement on the definition of a successful surgical outcome. Roehbon and Mc Connell defined the criteria of operative success or failure by dividing treated patients into 3 groups⁽²¹⁾:

1-the excellent group required no treatment at follow up and had no urinary tract infection or obstructive symptoms.

2-the good /fair group required 1 or more dilation (including visual urethrotomy) but not regularly and voided normally.

3-the failure group required periodic dilation or revision surgery.

According to previous criteria, our results summarized as follows

- the excellent group : 40 out of 56 patients (71.42%)

- the good /fair group 10 out of 56 patients (17.85%)

- the failure group 6 out of 56 patients (10.71%)

Our results could be summarized into primary success rate of (71.42%) and overall success rate of 50(89.28%). The latter group of patients included those requiring urethrotomy to achieve a stricture free outcome.

Optimal timing (immediate versus delayed) and surgical approach (endoscopic versus open) of post-traumatic posterior urethral distraction injuries remain controversial. Some advocate immediate urethral realignment instead of a stenting catheter^(17,22) others recommend suprapubic cystotomy alone at the time of injury with delayed repair of the ensuing distraction defect⁽⁴⁾. The major advantage of delayed urethral reconstruction is that it can be done under controlled conditions when the patient has recovered from the major associated injuries^(2,11).

Conventional urethroplasty comprises serial progressive steps such as mobilization of bulbar urethra, division of triangular ligament, crural separation, inferior pubectomy and supracrural rerouting of the urethra. approximately 2 cm length is bridged in each step⁽²³⁾.

Complete excision of scar tissue is essential before urethral anastomosis to achieve a successful result. Actually, an increasing emphasis has been given to this issue by many authors^(13,14,24, 25). This requires meticulous and complete resection until healthy appearing tissue is reached. It is fundamentally important to appreciate that incomplete excision of scar tissue will necessarily result in anastomosis of the anterior urethra into a fibrosed prostatic apex which is the best predictor of failure. Resection

of the obliterative stricture with spatulated anastomosis from a normal bulbar urethra to a healthy prostatic urethra is considered by most authors the ideal repair in children and adults. Spatulation of the urethral ends ensures an end-to-end anastomosis of wide caliber. We spatulate the proximal end anteriorly on the prostate, since anterior prostatic urethra is thinner. Mobilization of the corpus spongiosum is another critical operative detail that decreases the tension on the end-to-end anastomosis. Splitting of the corporeal bodies also reduces the urethral curve and shortens the actual distance between the urethral ends. In our study, all patients underwent distal urethral mobilization together with development of the intercrural space.

The success rates of anastomotic urethroplasty in children and adults is in the range of 80-98%^(2,4,8,11,12,15,18,27,28,29). Restricture after anastomotic urethroplasty occurs in about 15% of cases.⁽²⁶⁾ But most of these can be successfully corrected by 1 or 2 sessions of endoscopic internal urethrotomy. The results of these endoscopic urethrotomy are durable in most cases treated, and most authors accept these cases as successful urethroplasty. In about 10-11% of children, anastomotic urethroplasty fails. In these cases redo-urethroplasty still has a very high success rate of more than 95%.^(18,27) Reconstruction of pediatric post-traumatic posterior urethral distraction injuries represents a significant surgical challenge because of the smaller pelvic confines, smaller caliber of the urethra, the less developed and therefore less elastic nature of the preadolescent corpus spongiosum, and the increased tissue fragility. Resection with end-to-end anastomosis is the usual procedure in the face of a short segment stricture. Most posttraumatic posterior urethral strictures in children can be managed through the perineal route^(27,28).

Urinary incontinence as a direct result of anastomotic surgery has not been encountered in this series which is consistent with results reported in a number of clinical series^(13,14,25).

After posterior urethroplasty patients maintain urinary continence by the bladder neck mechanism alone without a functioning distal urethral sphincter mechanism. Even if it had survived the original accident and ensuing fibrosis, the distal mechanism would be completely extirpated or bypassed during the subsequent surgical excision and urethral anastomosis. This has been proved by

urodynamic studies after perineal and transpubic urethroplasty^(30,31). However, associated bladder neck incompetence, which is usually secondary to missed or neglected bladder neck injury from the original trauma, will result in incontinence⁽³²⁾. In these cases bladder neck repair may be performed synchronously with perineo-abdominal urethroplasty, or deferred until the resumption of urethral voiding after perineal urethroplasty when incontinence can be documented^(33,34).

Postoperative ED was reported to be 18.9% after delayed urethral reconstruction⁽⁸⁾. In another report by Koraitim⁽¹⁶⁾, ED was classified as resulting from either the original pelvic fracture (15%) or the urethral reconstruction itself (2.5%). In our series, a detailed sexual history was obtained from 56 patients, and the postoperative loss of potency was noted in 3 of them (6.97%). Only 1 patient regained his erectile capacity postoperatively. ED was stated to develop after the initial trauma in 13 patients (23.2%).

Further more, no major complication or morbidity was encountered in any of our patients, no significant incontinence, no penile chordae, deformity or urinary fistula developed in our patients throughout our study period.

CONCLUSION:

In adults patients, as in pediatric, our results support the belief that delayed perineal reconstruction with extensive excision of fibrosis and a tension-free, spatulated end-to-end anastomosis is a successful treatment for posterior urethral distraction defects, with acceptable morbidity.

REFERENCES:

1. Koraitim MM, Marzouk ME, Atta MA, *et al*: Risk factors and mechanisms of urethral injury in pelvic fractures. *Br J Urol* 1996;77:876-80.
2. Koraitim MM: Pelvic fracture urethral injuries: the unresolved controversy. *J Urol* 1999;161: 1433-41.
3. Al-Rifaie MA, Gaafar S, Abdel-Rahman M. Management of posterior urethral strictures secondary to pelvic fractures in children. *J Urol*; 1990;145:353.
4. Webster GD, Mathes GL, and Selli C: Prostatomembranous urethral injuries: a review of the literature and a rational approach to their management. *J Urol* 1983;130:898-902.

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5. Al-Rifaie MA. Transpubic approach for surgical repair of post-traumatic membranous urethral structures over four years. Read at the XIX International Congress of the Societe' Internationale d'Urology. San Francisco, California, 1982: 5–10.
6. Turner-Warwick R. Pelvic fracture urethral injuries. In: Whit. eld HN, Hendry WF, eds. Textbook of genitourinary surgery, vol. 2. New York: Churchill Livingstone; 1985:865-71.
7. Webster GD, Koefoot RB, and Sihelnik SA: Urethroplasty management in 100 cases of urethral stricture: a rationale for procedure selection. J Urol 1985;134:892–98,.
8. Koraitim MM: Pelvic fracture urethral injuries: evaluation of various methods of management. J Urol 1996;156:1288– 91.
9. Elliot DS, and Barrett DM: Long-term follow-up and evaluation of primary realignment of posterior urethral disruptions. J Urol 1997;157:814–16.
10. Koch MO: Primary realignment of prostatomembranous urethral disruptions. Semin Urol 1995;13:38–44.
11. Griebing TL, and Kreder KJ: Urethral reconstruction after pelvic fracture with urethral disruption: the gold standard. Semin Urol 1995;13:45–55.
12. Hampel N: Posterior urethral disruptions associated with pelvic fracture: the place for delayed repair. Semin Urol 1995;13:34–37.
13. Morey AF, and McAninch JW: Reconstruction of posterior urethral disruption injuries: outcome analysis in 82 patients. J Urol 1997;157:506–10.
14. Webster GD, and Ramon J: Repair of pelvic fracture posterior urethral defects using an elaborated approach: experience with 74 cases. J Urol 1991;145:744–48.
15. Husmann DA, Wilson WT, Boone TB, *et al*: Prostatomembranous urethral disruptions: management by suprapubic cystostomy and delayed urethroplasty. J Urol 1990;144:76-78.
16. Koraitim MM: The lessons of 145 posttraumatic posterior urethral strictures treated in 17 years. J Urol 1995;153:63–66.
17. Herschorn S, Thijssen A, and Radomski SB: The value of immediate or early catheterization of the traumatized posterior urethra. J Urol 1992;148:1428–31.
18. Podesta ML, Medel R, Castera R, *et al*: Immediate management of posterior urethral disruptions due to pelvic fracture: therapeutic alternatives. J Urol 1997;157:1444–48.
19. Turner-Warwick, R.: A personal view of the management of traumatic posterior urethral strictures. Urol Clin North Am, 1977;4:111.
20. Webster, G. D.: Repair of the difficult posterior urethral stricture. World J Urol, 1987;5:30.
21. Roehborn,CG,and Mc Connell,J.D. Analsis of factors contributing to success or failure of 1- stage urethroplasty for urethral stricture disease .J urology 151,869.1994.
22. Follis, H. W., Kock, M. O. and McDougal, W. S.: Immediate management of prostatomembranous urethral disruptions. J Urol, 1992;147:1259.
23. Mundy AR .transperienal bulboprostatic anastomotic urethroplasty WJ URO 1998;16:164.
24. Corriere, J. N., Jr.: 1-stage delayed bulboprostatic anastomotic repair of posterior urethral rupture: 60 patients with 1-year followup. J Urol, 2001;165:404.
25. Turner-Warwick, R.: Prevention of complications resulting from pelvic fracture urethral injuries—and from their surgical management. Urol Clin North Am, 1989;16:335.
26. Cooperberg MR, McAninch JW, Alsikafi NF, Elliott SP. Urethral reconstruction for traumatic posterior urethral disruption: outcomes of a 25-year experience. J Urol 2007;178:2006-10.
27. Singla M, Jha MS, Muruganandam K, Srivastava A, Ansari MS, Mandhani A, *et al*. Posttraumatic posterior urethral strictures in children--management and intermediate-term follow-up in tertiary care center. Urology2008;72:540-43.
Hafez AT, El-Assmy A, Sarhan O, El-Hefnawy AS, Ghoneim MA. Perineal anastomotic urethroplasty for managing post-traumatic urethral strictures in children: the long-term outcome. BJU Int2005;95:403-6.
28. Orabi S, Badawy H, Saad A, Youssef M, Hanno A. Post-traumatic posterior urethral stricture in children: how to achieve a successful repair. J Pediatr Urol 2008;4:290-4.

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29. Koraitim, M. and Sabry, A. A.: Mechanism of continence after transpubic urethroplasty. *Urology*, 1986;27:187.
30. Koraitim, M. M., Atta, M. A., Fattah, G. A. and Ismail, H. R.: Mechanism of continence after repair of post-traumatic posterior urethral strictures. *Urology*, 2003;61:287.
31. McAninch, J. W.: Traumatic injuries to the urethra. *J Trauma*, 1981;21:291.
32. Koraitim, M. M.: Posttraumatic posterior urethral strictures in children: a 20-year experience. *J Urol*, 1997;157:641.
33. Iselin, C. E. and Webster, G. D.: The significance of the open bladder neck associated with pelvic fracture urethral distraction defects. *J Urol*, 1999;162:347.