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Primary Urethral Realignment in Traumatic Urethral Rupture

Baher Ali Kamal, FRCS, Dr.Ch(Uro)*

Objective: To study the role of early realignment of the urethra in cases of complete rupture of the membranous urethra.

Methods: Fifteen patients were admitted to King Fahd Hospital of the University, Al-Khobar, Kingdom of Saudi Arabia, with complete rupture of the posterior urethra associated with fractured pelvis after road traffic accidents. Three of these patients were referred for further management with suprapubic catheters alone. The remaining twelve patients were explored, after resuscitation, shortly after the accident to establish the alignment of the urethra on a Foley's catheter as well as bladder drainage through a suprapubic catheter.

Results: Realignment of the urethra was successful in 9 patients and unsuccessful in the remaining 3 patients. In the realignment group, two patients were impotent and none was incontinent. Five patients did not need any further treatment (follow up 13-19 months) and 4 developed short segment urethral stricture that required visual urethrotomies at 4-12 month intervals. Long stricture (1.5 - 4 cm long) occurred in all 6 patients who had solely suprapubic catheterization, 3 of whom had urethroplasty while the other 3 were lost to follow up. Two patients of this group were impotent after the accident. Two of the three who had urethroplasty developed urethral stricture and had internal urethrotomies at 6 -12 months intervals.

Conclusion: Urethral realignment seems to have a place in the initial management of patients with complete rupture of the posterior urethra associated with pelvic fracture. It appears to reduce the incidence of post traumatic stricture with no increase in the risk of impotence or incontinence.

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Traumatic disruption of the posterior urethra remains one of the most difficult and controversial injuries to treat[1]. It occurs in approximately 10% of the patients with pelvic fracture[2]. The multiple injuries incurred by the typical patient with a pelvic fracture result in mortality rates $\geq$30%[2,3]. Morbidity from posterior urethral injury associated with pelvic trauma has changed little during the years and the resulting incontinence, impotence and urethral stricture remain a source of lifelong misery to most of these men. Turner-Warwick has described the problem

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* Assistant Professor and Consultant Urologist
Department of Urology
King Fahad Hospital of the University
King Faisal University
Al-Khobar 31952,
Kingdom of Saudi Arabia.

very aptly: "it is the urologist who will have to share the burden of ultimate disability with the patient when the thoracic, abdominal and even the orthopedic aspects are probably long forgotten"[4]. The initial management of proximal urethral disruption determines primarily the prevalence of the above mentioned complications[5].

The aim of this study is to determine the role of realignment of the urethra as an initial management for traumatic rupture of membranous urethra.

METHOD

A retrospective study was carried out on 15 male patients who presented to King Fahd Hospital of the University, Al-Khobar, Kingdom of Saudi Arabia between January 1985 and December 1998 with traumatic rupture of the posterior urethra associated with fracture of the pelvis. No attempts were made to catheterize the patients in the emergency room for fear of converting an incomplete urethral rupture to a complete one[6]. Blood at the meatus was the single most important clinical diagnostic sign for urethral injury[7]. The definitive diagnosis of urethral rupture was made by retrograde urethrogram. Complete posterior urethral rupture was diagnosed on the appearance of gross extravasation of contrast medium at the area of the membranous urethra with no contrast entering the prostatic urethra or bladder at all[8]. After complete stabilization of the general condition of the patients they were taken to the operating room for surgical exploration. All explored patients received broad spectrum antibiotics at induction of anaesthesia. Through a midline infraumbilical incision, the bladder was explored for possible injury. Two interlocking metal sounds were introduced gently, one through the bladder neck and the other through the external meatus. When they touched each other and a clink was heard the distal sound was guided into the bladder. A straight urethral catheter No. 10 Fr. was fixed to the sound and brought out through the urethra. A silicone Foley's catheter No.18 Fr. was sutured to the straight catheter and pulled gently into the bladder. The retropubic space was not explored and the retropubic haematoma was not disturbed. No vigorous manipulations were tried. A suprapubic catheter was left in the bladder for drainage. In two cases, urethral alignment was difficult due to presence of bony fragments at the rupture area or due to severe pelvic dislocation with subluxation of the sacro-iliac joint. One patient had accompanying rectal injury and only suprapubic diversion was done in addition to repair of rectal injury and defunctioning colostomy. Three patients had complete rupture of the prostatomembranous urethra and were treated initially in other hospitals in the area and subsequently referred to our hospital with only a suprapubic catheter. Urethral catheter was removed at 6 weeks in patients who had successful urethral realignment. If they voided freely per urethra the suprapubic catheter was removed the following day.

RESULTS

The fifteen patients included in this study were divided into 2 groups. The first group was 9 patients where urethral realignment was successfully carried out. The second group (6 patients) consisted of those who had only suprapubic diversion. Their age ranged from 20 to 47 years with a mean of 35.3 years. All patients were potent and continent before the accident. All patients who had realignment of the urethra had normal urethral micturition after removal of the catheter. They were followed up 14 to 36 months with a mean of 34 months. Five of them (56%) kept voiding freely during follow up with normal flow rates. The other 4 patients (44%) noticed gradual diminution of the force of micturition and urethrograms showed short

segment urethral stricture at the injury site. The strictures formed were less than 1 cm in length and were successfully managed by internal urethrotomy at 4-12 month intervals. All the nine patients were continent. Two patients (22%) complained of potency problems.

On the other hand, all the patients who had suprapubic diversion alone (Johansson's technique), had complete stricture of the urethra. The strictures were 1.5 - 4 cm long as measured by combined retrograde and micturating urethrograms. Two patients from this group were impotent after the accident (33%). All the 6 patients were discharged from the hospital after healing of the fractured pelvis at 6-12 weeks with suprapubic catheter. Three of them were lost to follow up because of travelling to their home countries. The other three patients subsequently had urethroplasty 5 -7 months after the accident. Perineal urethroplasty was done for one patient while combined transpubic and perineal urethroplasty was performed on the other two. Two of the three patients operated upon were already impotent before surgery and the third was potent before and after surgery.

One patient developed post urethroplasty stricture at the site of anastomosis and was subsequently managed by internal urethrotomy.

DISCUSSION

Fracture of the bony pelvis with associated rupture of the posterior urethra is a serious injury. Road traffic accidents that cause these injuries are usually very severe and are fatal in about 30% of the cases[2,3]. The initial management of proximal urethral disruption determines primarily, the ultimate outcome of these serious injuries[5]. The management of posterior urethral injuries is still controversial[5,6,8-11]. Historically, these injuries were treated by an early realignment and stenting of the urethra. The bladder was then drained through a suprapubic catheter and a retropubic drain was established. A more aggressive way of management recommended immediate surgical exploration with evacuation of the retropubic haematoma and suture repair of the ruptured urethral ends with or without traction sutures from the prostate to the perineum[12,13]. Johansson[14] in 1953 advocated initial management by suprapubic catheterization only, avoiding urethral instrumentation, and management of the resulting strictures by urethroplasty 3-4 months later. His thesis was based on the postulation that urethral manipulations increased the risks of impotence and incontinence. He also stated that the hematoma formed would undergo re-absorption and allow the prostate to settle down to its position with 1-2 cm stricture. This technique was popularized by Morehouse and associates[15] and was universally adopted in North America and kept so for one and a half decades[5 7,16]. In the late 1980s, however, voices calling once more for early realignment of the urethra were heard[8-10,17], with data to show that this technique did not change the incidence of impotence. They also demonstrated that with early alignment of the ruptured urethra some patients did not develop stricture at all and that stricture, if formed, would be short and easily managed by internal urethrotomy or dilatation without the need for open surgery.

On the other hand, suprapubic diversion only (Johansson's technique) resulted in long strictures (1-4 cm long) in 96-100% of published experience with this technique[5,6,11,13,16,18]. On the contrary, in studies where this injury was managed by early realignment of the urethra, the cumulative incidences of stricture in 320 cases was 54% (range from 14 - 75%) [5,6,8-10,18-23]. This incidence was found even in studies recommending Johansson's technique as the way of management[6]. The incidence of stricture for urethral realignment and Johansson's technique in the present study was 44% and 100%, respectively. Furthermore, none of our patients managed

by realignment of the urethra required urethroplasty for the management of their strictures, an experience earlier reported by Hershore et al[8] and Gelhard et al[10]. Urethrosplasty for post traumatic urethral stricture is a difficult operation and needs a highly specialized urologist in tertiary care centers with frequent flow of cases to gain considerable experience in managing such cases. Urethroplasty, perineal or transpubic, however affects the external sphincter and continence is maintained mostly by the internal sphincter mechanism[9]. If operation on the prostate or bladder neck is required later, the risk if incontinence is very high[7]. Certainly, a few surgeons from leading tertiary care centers report excellent personal success rates of 86%[24,25] to 96%[26] using one stage delayed urethrosplasty with no need for postoperative urethral dilatation or urethrotomy. The experience of others suggests that such results are not universally attainable with open repair. Thus, Husman et al[13] reported that 53% of 40 men treated perineally required subsequent visual urethrotomy and/or multiple dilatations within 36 months of follow up. The quality of stricture formed after realignment is very important. With good antibiotic coverage and the use of silicon catheters, urethral stricture, if formed, is in most cases short (less than 1/2 cm) which is easily managed by repeated dilations or visual urethrotomies[16]. During exploration and realignment of the urethra the retropubic space should not be explored for fear of introduction of infection particularly to the hematoma with the possiblity of pelvic abscess formation. Vigorous urethral manipulations should also be avoided for fear of injury to the neurovascular supply to the penis with subsequent risk of impotence. It is futile to suggest that the large pelvic hematoma, usually encountered in this injury would simply liquefy and resolve without organization of at least a portion of it into dense pelvic floor fibrosis with considerable distraction of the urethral ends and formation of a fairly long stricture if the urethral ends are not brought opposite to each other[5]. On the other hand, primary repair of the urethra is a difficult and dangerous procedure requiring evacuation of the retropubic hematoma and entry into the space of Retzius[7]. The amount of bleeding from the urethral arteries, plexus of Santorini, and the fractured bony ends can be massive and sometimes haemostasis in this area is very difficult or even impossible. Visualization of the area of the urethral ends is poor and the tamponade effect of the hematoma is lost if it is evacuated.

In recent years, as the understanding of the physiology and anatomy of the cavernous nerves has improved as have the surgical techniques, the possibility of iatrogenic injury and the rate of impotence has dropped markedly following realignment[8-10]. In the present study there were 2 out of 9 patients who complained of potency problems in the group who had realignment but it was not possible to identify the rate of impotence arising from the original trauma. On the other hand 2 out of 6 patients were impotent from the group with only suprapubic cystostomy as a result of the pelvic trauma. The reported incidence of potency problems from the fractured pelvis and urethral rupture is as high as 50%[11]. The actual contribution of realignment to potency disorders is uncertain since the operation is done early enough before the sexual condition of the patient could be assessed following the trauma[23]. Most of the reports with high incidence of impotence in early realignment do not state the technique used for realignment and whether exploration of the retropubic space was performed or not with or without suture repair of the urethral ends and whether antegrade and retrograde flexible cystoscopes were used in the realignment[6,7,11]. Johansson's technique, on the other hand, required urethroplasty at a later date with the possibility of injury to the nerves of potency. Furthermore, extensive dissection at the apex of the prostate may jeopardize the blood supply of the penis when it is done using the transpubic approach with excision of a wedge of bone and the dense fibrous tissue in that area. This was the case in the series published by Zinke and Furlow[27].

CONCLUSION

There seems to be grounds for realignment of the urethra to be performed, where possible, during the initial management of traumatic rupture of the membranous urethra. It should be done in a very gentle way so as not to cause any damage to the neurovascular supply of the penis but if any difficulties are encountered, suprapubic diversion only should be carried out. The procedure should be done under antibiotic cover and with the use of silicon catheters for at least 6 weeks.

REFERENCES

1. Glass RE, Flynn JT, King JB, et al. Urethral injury and fractured pelvis. Br J Urol 1978;50:578-8 1.
2. Flint LM, Brown A, Richardson JD, et al. Definite control of bleeding from severe pelvic fracture. Ann Surg 1979;189:709-11.
3. Turnkey DD, Champan MW, Lim RC Jr, et al. Management of pelvis fractures in blunt trauma injury. J Trauma 1974;14:912-6.
4. Turner-Warwick R. A personal view of immediate management of pelvic fracture with urethral injury. Urol Clin North Am 1977; 4: 81-92.
5. Webster GO, Mathes GL, Selli C. Prostatomembranous urethral injuries: A review of the literature and a rational approach to their management. J Urol 1983;130:898-902.
6. Coffield KS, Weens WL. Experience with management of posterior urethral injury associated with pelvic fracture. J Urol 1977;117: 722-4.
7. Mc Aninch JW. Traumatic injury to the urethra. J Trauma 1981;21:291-7.
8. Hershorn S, Thijssen A, Radomski SB. The value of immediate or early catheterisation of the traumatised posterior urethra. J Urol 1992;148:1428-31.
9. Grasswellar PO, Farrow GA, Robson CJ, et al. Traumatic rupture of the supramembranous urethra. J Urol 1977;118:770-1.
10. Gilhard MK, Heyman AM, Weintraub P. A technique for immediate realignment and catheterisation of the disturbed prostatomembranous urethra. J Urol 1989;142:52-5.
11. Dhabuwala CB, Hamid S, Katsikas DM, et al. Impotence following delayed repair of prostatomembranous urethral disruption. J Urol 1990;144:677-9.
12. Peters PC, Bright TC. Management of trauma to the urinary tract. Adv Surg 1976;10:197-9.
13. Husman DA,Wilson WT, Boone TB, et al. Prostatomembranous urethral disruption: Management by suprapubic cystostomy and delayed urethroplasty. J Urol 1990;144:76-9.
14. Johansson B. Reconstruction of male urethral strictures. Acta Chir Scand Suppl 1953;176:23-5.
15. Morehouse DD, Belitsky P, Mackinson K. Rupture of the posterior urethra. J Urol 1972;107:255-8.
16. Morehouse DD, Mackinson KJ. Management of prostatomembranous urethral discruption, 13 years experience. J Urol 1980;123:173-4.
17. Devine CJ,Jr, Jordan GH, Devine PC. Primary realignment of the disturbed prostatomembranous urethra. Urol Clin North Am 1989;16:291-5.
18. Jackson DH, Wiliam JL. Urethral injury: a retrospective study. Br J Urol 1974;46:665.

19. De Weerd JM. Immediate realignment of posterior urethral injury. Urol Clin North Am 1977;4:75-83.
20. Gibson GR. Urological management and complications of fracture pelvis and ruptured urethra. J Urol 1974;111:353-6.
21. Cass AS, Godec CJ. Urethral injury due to external trauma. Urology 1978;11:607-9.
22. Patterson DE, Barrett DM, Myers RPP, et al. Primary realignment of posterior urethral injuries. J Urol 1983;129:513-5.
23. Fowler JW, Watson G, Smith MF, et al. Diagnosis and treatment of posterior urethral injury. Br J Urol 1986;58:167-9.
24. Mc Aninch JW. Pubectomy in repair of membranous urethral stricture. Urol Clin North Am 1989;16:297-302.
25. Morehouse DD. Management of posterior urethral rupture, a personal view. Br J Urol 1988;61:375-8.
26. Turner-Warwick R. Prevention of complications resulting from pelvic fracture, urethral injuries and from their surgical management. Urol Clin North Am 1989;16:335-67.
27. Zincke H, Furlow WL. Long term results with transpubic urethroplasty. J Urol 1985;133:605-7.