INTRODUCTION
Posterior urethral stricture is an obliterative process in the posterior urethra which results from fibrosis due to distraction in that area caused by trauma. Traumatic strictures are becoming increasingly important and common due to increase in civil violence and injury following road traffic accidents. The inflammatory reaction following trauma is limited to injured area of urethra and so the fibrosis that is responsible for stricture formation is localized, short stricture and formed within a short period from injury.

In addition to appropriate initial management for urinary retention and associated injuries, careful selection of the operative technique and the experience of the urologist in urethral reconstructive surgery are crucially important for successful repair of post-traumatic urethral stricture. The decision as to which operative technique should be used is determined by various factors, including stricture length and location, situation of fractured pubic bone segments and the general health and age of the patient.

Treatment options are urinary diversion, dilatation of the urethra, endoscopic urethrotomy, and open surgical repair. Open surgical techniques include two main approaches: resection of the stricture with end-to-end anastomosis and substitution techniques by grafts or flaps, namely substitution urethroplasty. The latter technique is often used for long strictures in which resection and anastomosis are not possible. Nearly all post-traumatic posterior urethral strictures in adults can be corrected by one-stage transperineal end-to-end anastomotic urethroplasty.

Immediate approximation of urethra by transversal approach or delayed end-to-end urethroplasty were main options exercised in our setup. Immediate approximation resulted in dense fibrosis, loss of erectile function and occasionally incontinence. Due to this, the aim of the present study was to evaluate the outcome of delayed (three months after trauma) end-to-end

ABSTRACT
Objective: To determine the outcome of delayed end-to-end anastomotic urethroplasty in blind post-traumatic stricture of posterior urethra at our setup.

Study Design: Case series.

Place and Duration of Study: Department of Urology and Renal Transplantation, Quaid-e-Azam Medical College/ Bahawal Victoria Hospital, Bahawalpur, from January 2009 to June 2011.

Methodology: Adult patients with completely obliterated post-traumatic stricture of posterior urethra ≤ 2 cm were included in the study. Patients with post-prostatectomy (TUR-P, TVP) stricture, stricture more than 2 cm in size or patients of stricture with neurogenic bladder and patients with any perineal disease were excluded from the study. Retrograde urethrogram and voiding cysto-urethrogram was done in every patient to assess stricture length and location. Stricture excision and delayed end-to-end anastomosis of urethra with spatulation was performed in every patient. Minimum follow-up period was 6 months and maximum 18 months.

Results: There were 26 cases with road traffic accident (indirect) and 14 had history of fall/direct trauma to perineum or urethra. Majority of the patients (57.5%) were between 16 to 30 years of age. Twelve (30.0%) patients developed complications postoperatively. Early complications of wound infection occurred in 01 (2.5%) patient. Late complications were seen in 11 (27.5%) patients i.e. stricture recurrence in 7 (17.5%), erectile dysfunction in 2 (5.0%), urethrocutaneous fistula and urinary incontinence in one patient (2.5%) each. Success rate was 70.0% initially and 87.5% overall.

Conclusion: Delayed end-to-end anastomotic urethroplasty is an effective procedure for traumatic posterior urethral strictures with success rate of about 87.5%.

Key words: Post-traumatic stricture. Posterior urethra. End-to-end urethroplasty. Blind stricture.
anastomotic urethroplasty in post-traumatic stricture of posterior urethra.

**METHODOLOGY**

This observational study was conducted at the Department of Urology and Renal Transplantation, Bahawal Victoria Hospital/Quaid-e-Azam Medical College, Bahawalpur, from January 2009 to June 2011. Patients of age 16 – 50 years with completely obliterated post-traumatic stricture (blind stricture) of posterior urethra on retrograde urethrogram and Micturating Cystourethrogram (MCUG) measuring ≤ 2 cm were included in the study. Patients with post-prostatectomy stricture, stricture > 2 cm in size or patients of stricture with neurogenic bladder or any perineal disease were excluded from the study. Also patients with pubic rami fracture butterfly segment which would obviously intervene the repair over, visible on X-ray pelvis, urinary bladder or rectal injury at the time of trauma were also excluded.

A total number of 40 patients who fulfilled the inclusion/exclusion criteria were selected. Detailed history and physical examination of every patient was done. The investigations done before the procedure were blood complete examination, Urine routine examination, serum creatinine level, X-ray chest, screening for hepatitis B and C and abdominal ultrasonography. Retrograde urethrogram and voiding cystourethrogram was done in every patient to assess stricture length, location and caliber.

After taking informed, written consent (explaining all the risks and complications of procedure), surgery was performed under general or spinal anaesthesia in all patients. After anaesthesia, patient was placed in exaggerated lithotomy position. Midline incision in the perineum was made. Incision was deepened to cut subcutaneous fat and bulbocavernous muscle in the midline to expose the bulbar urethra. A metallic bougie was passed per urethra upto the stricture to facilitate the dissection. A window was created between the urethra and deeper structure, and urethra was dissected away from the corpora cavernosa distally upto penoscrotal junction so as to approximate the strictured segment. Proximally dissection was carried upto the stricture and then more proximally approaching the normal part of urethra. Proximal urethra was approached with bougie from suprapubic cystostomy port, directed into urinary bladder neck and palpated perineally. With the help of suprapubic and urethral bougie stricture length was estimated. The affected urethral segment was extirpated, followed by end-to-end anastomosis in which normal ends were spatulated and four interrupted sutures of 4/0 polyglycolic acid (vicryl 4/0) were applied over 18 Fr Foley’s catheter. Hemostasis was secured and fascia and skin were closed in layers and dressing (T-bandage) was applied. All surgical procedures were performed by the same urologist without significant changes in standard technique.

Intravenous antibiotic prophylaxis by cephadrine and gentamicin were administered for 48 – 72 hours post-operatively and oral antibiotics were started thereafter. The patients were discharged on the 5th postoperative day, on average. Their catheters were removed 2 – 4 weeks later and antegrade voiding cystourethrography (VCUG) or retrograde urethrography was carried out. Follow-up was initially fortnightly and then at 3 months intervals. Follow-up period was 6 – 18 months for these particular patients under study.

**RESULTS**

Age ranged from 16 to 50 years with mean age of 36 years (Table I). Majority of the patients (87.5%) were between 16 – 40 years of age.

Majority of the patients (85.0%) presented with retention of urine after pelvic trauma and were relieved of retention by percutaneous or open suprapubic cystostomy. All patients had history of trauma (26 with road traffic accident and 14 had history of fall and other trauma to perineum or urethra). Twelve had associated pelvic fracture. The length of strictured part was less than 2 cm in all patients with an average length of about 1.2 cm. In all patients, stricture was excised and overlapping end-to-end anastomosis of urethra with good spatulation at healthy margins was performed. Operative time was between 90 – 120 minutes. Blood transfusion was required in 02 (5.0%) patients.

The postoperative complications are shown in Table II. There were early complications in one patient (2.5%) and late complications in 11 (27.5%) patients. In early complications, wound infection was found in 01 (2.5%) patient which was managed conservatively. While in late complications, 07 (17.5%) patients developed recurrent stricture at anastomotic site which was managed by single optical internal urethrotomy in 2 patients. Two patients underwent optical internal urethrotomy 2 – 3 intervals. Follow-up period was 6 – 18 months for these particular patients under study.

**Table I: Age at operation.**

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Number of patients</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>16 – 30</td>
<td>23</td>
<td>57.5</td>
</tr>
<tr>
<td>31 – 40</td>
<td>12</td>
<td>30.0</td>
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<tr>
<td>41 – 50</td>
<td>05</td>
<td>12.5</td>
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</tbody>
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**Table I: Postoperative complications.**

<table>
<thead>
<tr>
<th>Complications</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wound Infection</td>
<td>01</td>
<td>2.5</td>
</tr>
<tr>
<td>Late</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stricture recurrence</td>
<td>07</td>
<td>17.5</td>
</tr>
<tr>
<td>Urethrococutaneous fistula</td>
<td>01</td>
<td>2.5</td>
</tr>
<tr>
<td>Erectile dysfunction</td>
<td>02</td>
<td>5.0</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>01</td>
<td>2.5</td>
</tr>
<tr>
<td>Total number of patients</td>
<td>12</td>
<td>30.0</td>
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times. They were kept on clean intermittent self catheterization for few months. Three patients required frequent multiple internal urethrotomies and considered as complete failure. Urethrocuretaneous fistula developed in one (2.5%) patient which required repair; one (2.5%) patient developed urinary incontinence. Erectile dysfunction was found in 2 (5.0%) patients. Overall 12 (30.0%) patients developed complications post-operatively and initial success rate was 70.0%. Patients with erectile dysfunction improved with time and regained normal erection. Out of 7 patients who developed stricture, 4 patients were cured by OIU. One patient who developed wound infection was also cured with antibiotics. So, overall success rate was 87.5%.

**DISCUSSION**

Posterior urethral disruption is one of the most challenging urological injuries to manage following pelvic trauma. Posterior urethral injury as complication of pelvic fractures occurs upto 25%, resulting from blunt pelvic trauma mainly due to high-speed motor vehicle accidents and occupational injuries. For the evaluation of stricture, retrograde urethrography (RUG) and voiding cystourethrography (VCUG) dynamic contrast imaging is the best approach despite the advent of newer imaging methods. Both studies were done to assess the stricture length and location.

Urethral stricture remains a difficult surgical problem for men since known medical history. For many centuries there was not much difference among the treatment of urethral stricture of any aetiology. Treatment consisted mainly of urethral calibrations and dilatations. In addition to being very bothersome and painful, these procedures did not cure the patient and were the source of serious complications such as infections, sepsis, bleeding, urethral perforation and urinoma. After the introduction of optical system by Hopkins in 1960 and later Sachse in 1970, optical internal urethrotomy has been widely practised. However, the results of different series raised doubt about the efficacy of this procedure and mentioned high recurrence rate approaching 80% in 5 years. Optical internal urethrotomy is only curative for short stricture (< 1 cm) that are not having significant spongiosisfibrosis especially with a thin channel of urethral lumen. Moreover, its role is very limited in the management of blind urethral stricture.

It was then in the second half of the twentieth century that urethroplasty, based on excision of the strictured area, and primary urethral anastomosis came into use again. Since then, new techniques such as skin, bladder urothelium, buccal mucosal free and pediced grafts and expandable metal urethral splints have been developed.

The decision about operative technique is determined by various factors, including stricture length and location. Early intervention may be complicated by bleeding, huge pelvic hematoma, concomitant injuries to other organs. Primary endoscopic re-alignment of urethra can obviate the need for further intervention, but suprapubic cystostomy, with delayed anastomotic perineal urethroplasty remains the gold standard with long-term success rates exceeding 90%.

The bulbar urethra is elastic and can be mobilized from its attachment within the bulbospongiosus allowing 2 – 4 cm of stretch to overcome a defect, but 1 cm of this length is also lost to spatulation for anastomosis to the similarly spatulated membrano-prostatic urethra. The key to successful anastomotic repair are adequate mobilization and tension-free spatulated anastomosis. The spatulation is important because if there is some contraction of the anastomosis after surgery, as would be expected, the caliber remains adequate. The main limitation of this procedure is the length of stricture. If tried to bridge longer gap, it may result in ventral curvature of the penis, and the anastomosis will be under tension with risk of failure. So the stricture segment should not be longer than 2 cm for end-to-end anastomosis urethroplasty. For longer defects in which resection and anastomosis are not possible, substitution techniques by grafts or flaps (substitution urethroplasty) are used. Despite the impressive advances in surgical treatment of urethral stricture since the second half of the past century, there is not yet a definite cure for all of these patients with long strictures. Perhaps in the present century with the progress made in the use of artificial tissue replacement and bioengineering with bovine collagen compounds combined with tissue and embryonic cell culture, the urethra can be reconstructed with better results.

The age at presentation in this study varied from 16 years to 50 years with mean age of 36 years. Most of the patients were between 16 – 30 years. The results in this study confirm that patient age is not a factor in the success of procedure and end-to-end anastomosis should not be withheld from patients on the basis of age as observed by Barbagli et al. Patients were admitted 8 – 12 weeks post-trauma with suprapubic cystostomy which was initially done for retention of urine after pelvic trauma.

Recently, the ideal stricture length for end-to-end anastomosis has become a contentious issue. Guralnick and Webster asserted, without validation from data, that this operation should be limited to stricture of 1.5 cm or less. Excision of a longer urethral segment risks penile shortening or chordee. In this study, the length of strictured part was less than 2 cm in all patients with an average length of about 1.2 cm. In all patients, stricture was excised and overlapping end-to-end anastomosis of urethra with good spatulation was performed. Esteban-María et al. and Gupta et al. reported wound infection in 4.0% and 3.6% while in this study, it was...
found in 01 (2.5%) patient. Incidence of recurrent stricture in this study was 17.5% while Dakum et al. reported its incidence 34.4%, Mundy et al. and Tijani et al. 12% and 22.5% respectively. Urethrocaneous fistula observed in different studies ranged from 02 – 15%, while in this study it was found in 2.5% patients. Dakum et al. and Esteban-Maria et al. observed urinary incontinence in 3.1% and 3.5% respectively while in this study this rate was 2.5%. Incidence of erectile dysfunction in different studies ranged from 5.6% to 7.1%. In this study, erectile dysfunction was found in 5.0%.

So, in the present study initial success rate was 70.0% and overall success rate was upto 87.5% which is very much comparable to many previous studies.

**CONCLUSION**
End-to-end anastomotic urethroplasty is an effective and durable approach to the post-traumatic posterior urethral stricture treatment. It is also the best available and gold standard procedure for traumatic posterior urethral strictures with an overall success rate of about 87.5%. Recurrent strictures are uncommon and most can be effectively managed with optical internal urethrotomy.

**REFERENCES**