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EXPERIENCE AND CHALLENGES IN THE MANAGEMENT OF PELVIC FRACTURE URETHRAL DISTRACTION DEFECT (PFUDD) BY EXCISION AND END TO END URETHROPLASTY

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ABSTRACT: PURPOSE: To identify and study various factors and complications that crop up in post-operative period and pose a challenge to the treating urologist in providing a satisfactory outcome to patients. **MATERIAL AND METHODS:** 240 patients who underwent urethroplasty were included in this study. Patients were followed up postoperatively at 6 week and 6 month. The retrospective arm was used as experience and existing complications were taken as challenge for improvising urethroplasty skills in management of urethral stricture secondary to PFUDD. **RESULTS:** majority of the patients were of reproductive age group, with bulb membranous junction as the most common location. Of all about 60% had TILE A grade of pelvic fractures, 27% had TILE B and 13% with TILE C. at 6 week follow up post urethroplasty none of the patient had recurrence of the stricture, 15 (6.25%) had erectile dysfunction and 5 (2.08%) patients presented with the complications of the urinary incontinence. At 6 month follow up after urethroplasty 15(6.25%) patients developed recurrence of stricture 5 out of 15 who presented with erectile dysfunction showed improvement

KEYWORDS: Posterior urethral stricture; end to end urethroplasty; PFUDD.

INTRODUCTION: The success rates of urethroplasty varied widely from 77% to 95% in various series, which was due to various definitions of surgical success.^{1, 2, 3} Restricture after anastomotic urethroplasty occurs in about 15% of cases.⁴ 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.⁵

In a review of 60 cases of anastomotic urethroplasty for PFUDD, Corriere describes both early and late complications. Surgical complications included rectal injuries (3%), repeat strictures that required dilation or visual internal urethrotomy (32%), and repeat strictures that required reoperation (5%). By 1 year after surgery, all patients had a patent urethra (100%). At 1 year, 43 (72%) patients voided normally, 5(8.3%) were areflexic and performed self-catheterization, 5 (8.3%) had urge incontinence, and 5(8.3%) had mild stress incontinence requiring no treatment.

Moderate stress incontinence responded to imipramine in one case and collagen injection in one. The risk of incontinence due to sphincter weakness following anastomotic urethroplasty is very low as continence depends on the intact bladder neck.⁶ Open bladder neck seen cystoscopy and/or cystography before urethroplasty may herald postoperative incontinence.⁷ At present; the preferred option is to manage the PFUDD and bladder neck problem sequentially. Bladder neck reconstruction provides good postoperative continence rates, although some patients may require a sling procedure or implantation of an artificial urinary sphincter.⁸

Of the patients who were potent preoperatively only 52% remained potent postoperatively.

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Of the 29 (48%) patients who were impotent preoperatively and immediately postoperatively⁹ regained potency at 1 year. However, at 1 year, the quality of erections of the 40 potent men was normal in only 22 (37%) and fair to poor in 18 (30%).⁹ Anger et al. reported 54% of patients with PFUDD had erectile dysfunction of some degree, including severe dysfunction in 31%.¹⁰

They found that the risk of erectile dysfunction was much higher in patients with PFUDD as compared with patients with pelvic fracture alone. It appears that while most men with erectile dysfunction have it consequent to the pelvic fracture itself, a number of men suffer erectile dysfunction consequent to urethroplasty, although the incidence varies from 2% to as high as 52%.

It should also be noted that though a few patients reported improvement of sexual function following urethroplasty and a substantial number developed erectile dysfunction progressively several months after the urethral reconstruction. Thus men with PFUDD injuries represent a target population for early penile rehabilitation programs.

Gupta et al. have reported a large retrospective series comparing outcomes in fresh cases and in redo cases. The success rate in both the groups were similar (excellent or acceptable result in 95%), but the redo cases required a longer operative time due to the more frequent need for the transpubic approach and the need for meticulous dissection and additional maneuvers to achieve successful urethroplasty. Similar conclusions were drawn by Singla et al. in their series of pediatric anastomotic urethroplasties.¹¹

Culty and Boccon-Gibod in a series of 51 patients, reported a satisfactory outcome of 95% in primary cases compared with 60% in patients with previous failed urethroplasty. Singh et al. concluded that previous intervention in the form of railroading and urethroplasty affected the outcome of redo urethroplasty but previous core through internal urethrotomy did not affect the outcome significantly.¹² Lumen et al. also concluded that the failures and complications were higher after reconstruction following failed urethroplasty.¹³

These studies indicate that in cases of failed anastomotic urethroplasty, redo anastomotic urethroplasty is the treatment of choice giving the best and most durable results in terms of urethral patency. However, these redo cases require greater expertise and often need an elaborated perineal approach with a greater need for pubectomy than primary anastomotic urethroplasty. The patency results in redo cases, although very good, are marginally inferior to primary anastomotic urethroplasty in most series thereby emphasizing the need to do as good an urethroplasty as possible in the first attempt itself.

On occasion a patient with a failed urethroplasty or rarely even in a primary PFUDD the gap between the bulbar urethra and the prostatic apex may be so long that an anastomotic urethroplasty may not be feasible. In these cases there is no option but to perform a substitution urethroplasty using a perineoscrotal fasciocutaneous flap.¹⁴ The authors prefer to do this in a staged manner creating a perineal urethrostomy first and then 6 months later, if the urethroplasty remains stable, performing the second stage to complete the reconstruction of the urethra.

These procedures are associated with a high complication rate, which includes recurrent stricture, diverticulum formation, and formation of calculi.¹⁴ There are anecdotal reports of the successful use of innovative techniques for reconstruction of the posterior urethra, such as using a pedicled appendix graft¹⁵ or a microvascular free flap, such as the radial forearm free flap.¹⁶

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MATERIAL AND METHODS: Cases of posterior urethral stricture operated by end to end urethroplasty were included in this study from our institute over a period of 13 years between July 1999 and September 2012.

The study was conducted in 240 patients who underwent urethroplasty. Patients were followed up postoperatively at 6 week and 6 month. The retrospective arm was used as experience and existing complications were taken as challenge for improvising urethroplasty skills in management of urethral stricture secondary to PFUDD Various complications that occurred were noted and the time of their appearance was also noted, interventions done were recorded with their outcomes.

RESULTS: In our study total 240 patients were analyzed majority of the patients (66.25%) were of reproductive age group, with bulbomembranous junction (68%) as the most common location. Of all about 60% had TILE A grade of pelvic fractures, 27% had TILE B and 13% with TILE C. at 6 week follow up post urethroplasty none of the patient had recurrence of the stricture, 15(6.25%) had erectile dysfunction and 5(2.08%) patients presented with the complications of the urinary incontinence. At 6 month follow up after urethroplasty 15(6.25%) patients developed recurrence of stricture 5 out of 15 who presented with erectile dysfunction showed improvement.

CONCLUSION: The short term outcome following urethroplasty is fairly good. The past experience thus suggests that if the cause of PFUDD are managed by supra-pubic catheterization initially followed by urethroplasty after 3 months by excision of the strictured segment and end to end anastomosis, then the short term outcome turns out to be good. All 5 patients who presented with urinary incontinence remained incontinent at 6 month follow up. Among the other complications wound infection was present in 7(2.9%) and 3 developed urethrocutaneous fistula.

DISCUSSION: Urethral stricture is very troublesome disease. it is very challenging to the treating urologist. Posterior pelvic fracture urethral distraction defect (PFUDD) is a challenging urologic problem that may result in complications, such as urinary incontinence and inability to void due to recurrent stricture leading to a lifelong disabling condition. As the understanding of the disease process has improved with better imaging in the form of magnetic resonance imaging (MRI) and Doppler ultrasound and with better surgical techniques, the success rate of posterior anastomotic urethroplasty have improved worldwide. Our study suggests that traumatic strictures are mostly shorter in length.

We compared stricture by two methods. With intraoperative length, it revealed the sonography detected correct length of stricture in 90.6% of cases as compared to that of conventional radiography. Out of 240 patients with traumatic urethral stricture, 186 patients were found to have associated fractures in bony pelvis In our study we found that most patients who suffered TILE grade A pelvic injury had a poor outcome thus suggesting that stability and the degree of pelvic fracture had definite influence on the outcome that we expect.

Urethroplasty is commonly performed worldwide by re constructive urologist and such a large scale often faced with numerous complications, yet "complication based analysis" still persists as gray area.

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Post-operative short term follow up results were encouraging for post traumatic stricture but the long term results were not so good. Infection and restenosis were the most frequent complications encountered, whereas impotence, incontinence, urethro-cutaneous fistula, wound dehiscence and ejaculatory disturbances were also seen. Post urethroplasty evaluation at 6 months showed 85.96% success rate which reduced to 75.67% at 2 years.

Erectile function is a predictor of overall patient satisfaction after repair of urethral strictures. Previous studies have focused primarily on stricture recurrence and incontinence. However erectile function is usually discussed as only a small part of broader reports of the operative outcome. Some reports have suggested that age of patient, sexual function before surgery, elapsed time after surgery and stricture length and severity are likely to have direct influence long-term erectile function after treatment.

As incidence of complete impotence is reported to be 5% at age 40 and 15% at 70, we first considered whether age is confounding variable.

In recent reports, the incidence of impotence after urethral reconstruction using various flaps or grafts ranged from 0% to 3%^{8,19}. We did not expect any change in erectile function in those who underwent the end-to-end anastomosis, as Koraitim²⁰ suggest that impotence is usually related to the original trauma and rarely (2%) to urethroplasty itself. Furthermore, no patient reported a decline in erectile function after end-to-end anastomosis in a study by Barbagli et al.²¹

As most operations were conducted by the same surgeon, we believe that the bias from the urologist was minimized, and therefore that the anastomosis procedure negatively affected the patients' erectile function. In addition, erectile function was significantly decreased in patients whose length of urethral stricture ranged from 2 to 5 cm after the procedure. It should be explained by the fact that the anastomosis procedure was often chosen for those patients.

In our study we found that 15 patients i.e. 6.25% had erectile dysfunction at 6 weeks. Out of the 15 patients who presented with erectile dysfunction, 13 patients had TILE grade C pelvic injuries. Five out of the 15 patients who presented with erectile dysfunction at 6 weeks showed an improvement in erectile function on evaluation at 6 months. Two among these belonged to Tile A Category, 2 belonged to Tile C category and one patient had no associated pelvic fractures. These findings do suggest that less severe the injuries more are the chances of improvement in sexual function.

Most cases of posterior urethral injury should be managed acutely with suprapubic drainage and then definitively treated after 3–6 months of recovery. This allows any hematoma to resolve, with descent of the prostate and shortening of the defect. Acute surgical intervention is indicated in the uncommon situation where there is an associated rectal injury. Concomitant bladder or bladder neck injury offer other indications for acute intervention but leave optional how to deal with the urethra (leave it alone for later repair or acutely realign).

In our study we found that 7 patients i.e. 2.91% patients developed wound infection. Adding more about 3 patients i.e. 1.25% developed urethrocutaneous fistula in short term follow-up after urethroplasty.

Perineal complications are similarly rare. Restricture, wound infections, hematomas, skin anesthesia / paresthesia, and other local infections do sometimes occur. In a study by Fichtner J et al²² they reported overall complication rate was 25% (8 of 32).

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CONCLUSION: The short term outcome following urethroplasty is fairly good. The past experience thus suggests that if the cases of PFUDD are managed by SPC initially followed 3 months by urethroplasty performing excision of the strictured segment and end to end anastomosis, then the short term outcome turns out to be good.

This study leaves behind a major challenge in the management of PFUDD i.e. of erectile dysfunction and restricture. Although our experience from the various studies dictates that erectile dysfunction in most of the cases resolves spontaneously from 6 months to 1 year, the darker area is the persistence of this complication amongst the few because erectile dysfunction is the overall predictor of satisfaction amongst the patients of PFUDD.

Although restricture is present only in few patients in the short term follow up after urethroplasty, and majority of these can be managed by dilatations, the few requiring redo-urethroplasty adds to the morbidity of the patients of PFUDD and pose a challenge to the treating urologists.

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TILE GRADE	FRACTURE TYPE	FRACTURES INCLUDED	FRACTURE MANAGEMENT
A	Stable, Minimally displaced.	Avulsion # pelvis, Iliac wing #, Isolated pubic rami #, Undisplaced acetabular #.	Conservative.
B	Rotationally unstable, Vertically stable.	Open book #, Ipsilateral pubic rami # with posterior complex injury, Bucket handle #.	Conservative, occasionally require traction.
C	Rotationally unstable, Vertically unstable.	Unilateral pelvic #, Bilateral pelvic # [anterior & posterior], Acetabular # with unilateral or bilateral pelvic #.	Always require traction and/or fixation.
TILE classification			

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PATIENT SATISFACTION: While evaluating the outcome in patients who had undergone urethroplasty the patients were categorised into three categories namely good, fair and poor. Seventy seven percent patients faired good on patient satisfaction scale; 12% patients faired fair on patient satisfaction scale; 11 % patients faired poor on patient satisfaction scale.

COMPLICATION: While evaluating the patients in the post-operative period attention was focussed mainly five complications namely; wound infection, urethrocutaneous fistula, stricture recurrence, erectile dysfunction, and urinary incontinence. Out of the 240 patients under study, 15(6.25%) patients presented with erectile dysfunction, none of the patients presented with recurrence of

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stricture, seven (2.91%) patients presented with wound infection at the surgical site, five (2.08%) patients presented with urinary incontinence, and 3 (1.25%) patients presented with urethrocutaneous fistula at 6 weeks follow up.

Pelvic Fractures Grades: The target population under study were cases with traumatic urethral strictures. Out of the 240 patients, 186 (77.50%) patients had associated pelvic fractures. These pelvic fractures were classified into TILE grade A; B & C. 59.67% (111 patients) of the patients had TILE A grade of pelvic fracture, 26.88% (50 patients) of the patients had TILE B grade of pelvic fractures and 13.44% (25 patients) of the patients had TILE C grade of pelvic fractures.

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