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Outcome of everted end-to-end urethroplasty in traumatic bulbar and membranous urethra.

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Abstract:

Introduction: Numerous options are available for the surgical management of urethral strictures. Everted End-to-end anastomosis is the utmost effective management for bulbar and membranous urethral strictures with a documented high success rate with low postoperative morbidity.

Methodology: This study was conducted at department of Urology, Lahore General hospital, Lahore from May 2012 till May 2014. Total 30 patients were included in the study. Procedure was done by a single surgical team and Uroflowmetry and subjective evaluation was done on 2nd week, 1st month and 4th month and 12th month post operatively.

Results: Mean age of patients was 24.43±12.39 years. Mean stricture length preoperatively was 1.83±0.63 cm. On follow up 50% of patients were in each grade whose subjective grading were 1 and 2 at 2 week post operatively. After 1-month post operatively 76.67% patients had Grade-1 and 6.67% patients had Grade-2. After 1 month follow up 63.34% patients presented with grade-1, 20% with Grade-2 and 6.67% presented with Grade-3. Only 80% of the patients at 4th month and 1-year post operatively presented with grade-1 subjective improvement. 10% of the patients had stricture recurrence at 1-month follow up and another 10% had recurrence at 4 months of follow up.

Conclusion: Everted End-to-end urethroplasty is treatment of choice for short traumatic bulbar and membranous urethral strictures with a high success rate.

Key Words: Urethral Strictures, Everted End-to-end Urethroplasty, Bulbar Urethra, Membranous Urethra

Introduction:

A urethral stricture can be defined as “the narrowing of the urethral lumen due to fibrosis affecting the urethral epithelium and the underlying corpus spongiosum and can occur anywhere in the urethra”. It can present with the obstructive voiding symptoms, urinary tract infections or the retention of urine. If left untreated, complications like para urethral abscess, necrotizing fasciitis, urethrocutaneous fistula, bilateral hydronephrosis and

renal failure might occur.¹ Urethral stricture may be the result of trauma, such as straddle injury and pelvic fractures, recurrent urinary tract infection, sexually transmitted diseases, congenital abnormalities of the urethra, iatrogenic and idiopathic. As a consequence of pelvic fracture posterior urethral injury occurs in up to 10% of cases.² Urethral stricture is one of the complicated surgical problem since the history and thus the treatment remains to evolve. Reports of treatment of urethral

strictures is found to have started 6 centuries before Christ as mentioned in Hindu texts.³ Blind internal urethrotome by Civiale and Otitis proposed “blind internal urethrotome”, had not gained popularity due to high rate of complications and poor results. Historically, the treatment consisted of urethral dilation with sounds. These days numerous methods to treat urethral stricture including dilatation, internal optical urethrotomy (IOU) with cold knife or laser, and open surgical procedures including simple and everted end to end anastomosis in addition to some kind of substitutional urethroplasty.⁴

For the bulbar urethral stricture, IOU is usually considered as the first line treatment. However, the long-term results of this procedure are reported to be 30-60%. For all other bulbar strictures, an end-to-end anastomotic urethroplasty provides the best outcomes. Few studies have concluded that bridging long defects might cause chordee and sexual dysfunction and thus, have advocated the use of buccal mucosal substitution urethroplasty for bulbar strictures over 2 cm in length.⁵

Open urethroplasty (scar excision surgery) with a long-term success rate around 90 to 95 percent is considered as “gold standard” against which efficacy of all other procedures is assessed. The overall success rate reported is 87.5%.^{6,7} However, Gupta et al⁸ showed that the success of this procedure is based on the natural elasticity of the urethra.

As no single technique is ideal for all types of stricture, controversy among urologist continues and currently reconstructive urologists advocating “open surgical treatment options” and not the “endoscopic management” for the majority of urethral strictures.^{9,10}

In United States during last decade; it is estimated that 5,000 males’ patients’ needs hospitalization annually.¹¹ A study from Pakistan¹² conducted at Sindh Institute of Urology and Transplantation (SIUT), showed that urethral stricture disease represents 3-4% of all urology diseases and 5760 patients visit annually for the dilatation, alternative treatment options and for the uroflowmetry. (Hussain, 2008) Despite such huge burden of urethral stricture disease, Bullock and Brandes¹³ concluded that among urologists 57.8% had not once performed an urethroplasty.

Uroflowmetry (UF) has become a common method to evaluate urethral stricture disease which provides objective data regarding patient voiding, and these values can be followed longitudinally, then monitored to measure the need for and the outcomes of interventions. In a systematic review, Meeks et al concluded that UF was the most common method to assess the stricture disease progression, as it was used in 60% of the included citations. However, the use of UF in urethral stricture

disease post operatively has not been adequately studied.¹⁴⁻¹⁶

Many studies have been conducted internationally and nationally for the comparison different techniques of stricture management and to see their success rates but there are very few studies from the developing countries and therefore the challenge continues to treat urethral stricture disease properly. The aim of this study was to assess the efficacy of the procedure in terms of uroflowmetry and subjective improvement in symptoms.

Methodology:

Current study was conducted at department of Urology Lahore General Hospital for the period of two years from May 2012 to May, 2014. Total 30 patients were included in the study. Informed consent and demographics of the patient was obtained in writing before the procedure. Procedure was done by a single surgical team and patients were followed up for 12 months. Foley was removed and Uroflowmetry was done on 2nd week, 1st month, 4th month and 12th month post operatively. Urethral evaluation was conducted with retrograde or flexible cystoscopy at 4th month and one-year post operatively.

Inclusion Criteria:

- 1) Male patients having traumatic blind stricture at bulbar and membranous urethra.
- 2) Patients having stricture length 0.5 cm up to 2.5 cm.

Exclusion Criteria:

- 1) Patients having history of neurological deficit.
- 2) Patients with history of urethroplasty more than one time and those with urethrorectal fistula.

The criteria used to assess the success of the Urinary stream:

Uroflowmetry Evaluation:

- A. Grade 1-Good (Peak flow rate is more than 15 ml/sec)
- B. Grade-2-Fair (Peak flow rate is between 10-15-ml/sec)
- C. Grade-3-Poor (Peak flow rate is lesser than 10/ml/sec)

Subjective Evaluation:

- A. Grade 1-Good (Patient voids as before the injury)
- B. Grade-2-Fair (Patient void with some difficulty, stream is thin and intermittent)
- C. Grade-3-Poor (Voiding is so affected that patient is unable to pass urine in a stream)

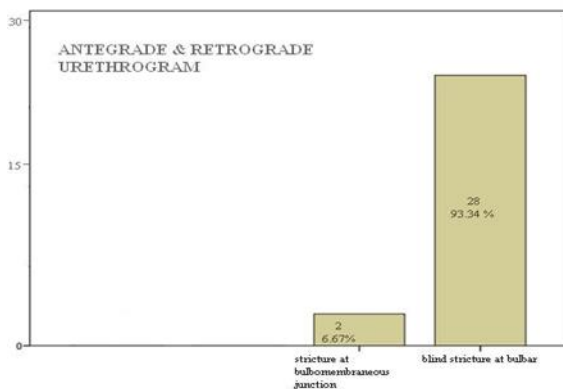
Everted End-To-End Urethroplasty.

All patient underwent surgery after all pre-operative preparations. Endoscopically urethra visualized up to stricture with flexible scope distally as well as proximally through the suprapubic opening. The level of stricture was identified. With skin incision made at perineum the perineal muscles cut in mid-line and urethra was exposed. Then urethra was detached from the perineal body. Complete excision of fibrosed segment was made mandatory until healthy pliable tissue reached. Foley was passed per urethra, and then guided into proximal

urethra. End-to-end anastomosis was carried out. A tension free anastomosis was done with 6-8 sutures of 4/0 vicryl over Foley catheter. Placement of sutures was done in a symmetrical fashion to evert the edges, initially at 9, 12 and 3 O'clock position. They were clearly demarcated so that no jumbling occurs, then rest of the sutures is applied at 4, 6 and 8 O'clock position. Drain was placed. Supra-pubic catheter was retained. The patient was shifted ward after recovery from anesthesia. Continue i/v antibiotics and painkillers for 24 hours and the drain was removed after 24 hours. If no subjective complaint of fever and pain, i/v antibiotic and pain killers were changed into oral and the patient was discharged after 48 hours. Patients were with restricted mobilization for 3-4 days post operatively.

Results:

Among 30 patients mean age of patients was 24.43 ± 12.39 years among which 22 patients were single and 8 were married. Minimum age of patient was 11 and maximum age of patient was 50 years. 2 patients were barber, 10 were doing private job and 5 patients were factory worker. All the patients were with suprapubic tube and none of them voided clamping the tube. There were 28 patients whose mode of trauma was direct and only 2 patients' mode of trauma was indirect due to pelvis fracture. There were 6(20%) patients who had undergone IOU prior to urethroplasty and 1(3.3%) patient had passage of urine at perineal level. The remaining 23(76.7%) patients had no other presenting complaint. Mean duration was 6.83 ± 4.25 months between trauma and urethroplasty with minimum duration of 1 month and maximum duration of 12 months. Antegrade and retrograde showed 28 (93.34%) patients with blind stricture at bulbar level and 2(6.67%) patients with stricture at bulbo membranous junction.



Per operative mean stricture size was 1.83 ± 0.63 cm with minimum and maximum stricture size observed in patients was 0.50 cm and 2.50 cm respectively. None of the patients had recurrence of strictures after 2 weeks post operatively. 3 patients (10%) had stricture recurrence at 1 month follow

up and another 3 patients (10%) had recurrence at 4 month of follow up who were subjected to Internal Optical Urethrotomy (IOU). Among the 6 patients (20%) stricture recurrence, 2 patients (6.67%) required single IOU, 3 patients (10%) required 2 times IOU with interval of 3 months and 1 patient (3.34%) had to undergo Johansen's Urethroplasty after repeated IOU. This repeated IOU with other intervention was considered as failure. There were 15 patients (50%) in each subjective grading of Grade-1 and Grade-2 at 2 week post operatively. After 1-month post operatively there were 23 patients (76.67%) who had Grade-1 subjective grading and 2 patients (6.67%) had Grade-2 and Grade-3 subjective grading each. 24 patients (80%) at 4th month and 1-year post operatively presented with grade-1 subjective improvement symptom.

Similarly, there were 22 patients (73.24%) whose Uroflowmetry grading was 1 and 8 patients (26.67%) Uroflowmetry grade was 2 after 2 weeks post operatively. After 1 month follow 19 patients (63.34%) presented with grade-1, 6 patients (20%) with Grade-2 and 2 patients (6.67%) presented with Grade-3. Only 24 patients (80%) at 4th month and 1-year post operatively presented with grade-1 Uroflowmetry.

Discussion:

Appropriate primary management, a good judgement for the selection of the operative technique and the experience of the urologist in urethral reconstructive surgery are of great value for successful outcome of post traumatic urethral stricture repair. The choice for the operative technique should be used is depended upon various factors, primarily stricture site and length, and the age and the general health of the patient. A wide array of techniques is used in reconstructive surgery for bulbar urethral stricture diseases, and revisions are constantly made on those techniques. End-to-end urethroplasty for bulbar urethral stricture has over 95% long term success rates with less complications.^{17,18}

In this study mean age of patients was 24.43 ± 12.39 years. Minimum age of patient was 11 years and maximum age of patient was 50 years. According to the results of Santucci et al¹⁸ who reviewed 70 urethroplasties performed on patients over age of 64 years (range 65 to 82) which included 30 anastomotic urethroplasties. The comparison of incidence of re-stricture was done with a group of similar patients below 65 years of age but there was no statistically difference in the outcomes. In contrast of another study 139 patients below 65 years of age (mean age 35, range 14 to 63) had a success rate of 89.9% similarly, 14 patients over 65 years of age (mean age 71, range 66 to 78) had a success rate of 100%. Thus, the results seem to advocate that age is not a factor affecting the outcome and that end-to-end anastomosis can be performed on patients of any age group with the urethral stricture disease.¹¹

Currently the ideal stricture length for end-to-end anastomosis is a topic for debate and discussion. Guralnick and Webster¹⁹ concluded that the end-to-end urethroplasty should be limited to stricture of 1 cm or less, as excision of a 1 cm urethral segment with opposing 1 cm proximal and distal spatulations results in a 2 cm urethral shortening, which may be accommodated by the elasticity of the bulbar urethra without chordee. On the other hand, Morey and Kizer²⁰ reported on a selected cohort of 22 patients (excluding those with hypospadias or pelvic trauma) with proximal bulbar urethral strictures longer than 2.5 cm treated with an extended anastomotic approach, suggesting that urethral reconstruction is proportional to the length and elasticity of the distal urethral segment.^{19,20} In our study mean stricture length was 1.83 ± 0.63 cm. In a study it was also documented with a success rate of 91% with no erectile complaints in comparisons with the shorter strictures, suggesting that in selected strictures ≤ 2.5 cm can be successfully managed using this procedure. According to the results of Barbagli²¹ the interpretation of the success rate of urethroplasty according to stricture length was controversial. Excision of the stricture and primary anastomosis is theoretically the simplest open surgical approach, giving cure rates close to 100% in appropriately selected patients. The indications must be clear, and patients must be strictly selected to comply with these criteria; the stricture should be less than 3 cm in length at the bulbous urethra.

UTI is reported in 2–4% of patients after urethroplasty. It may include simple UTI or febrile UTI (complicated by epididymitis, pyelonephritis or sepsis). It was emphasized that the importance of removing Foley catheters as early as possible to decrease these rates and tend to keep patients on antibiotics during the entire catheterization period. In this study there were 80% of the patients with everted end to end urethroplasty without any other intervention, did not suffered from any infection post operatively and 6 patients (20%) who had recurrence of strictures postoperatively and had gone IOU had also no sort of infection postoperatively, so this study concludes no infection postoperatively.²²

Undoubtedly end to end urethroplasty is a treatment followed with the highest success rate provided, it is used in the correct indication and thus in a short stricture. Several reports confirm a success rate of about 95%. According to the results of this study, the subjective grading 80% success rate was achieved and in terms of uroflowmetry the success rate was same that was 80%. Although success rate was about 15% less as reported by other studies, this difference was due to the recurrence of stricture in the patients in current study as result IOU was done for these patients. Among the 6 patients (20%) stricture recurrence, 2 patients (6.67%) required single

IOU, 3 patients (10%) required 2 times IOU with interval of 3 months and 1 patient (3.34%) had to undergo perineal urethroplasty after repeated IOU. Therefore, the stricture that was manageable with IOU was considered as success after the urethroplasty but the repeated IOU with other intervention was considered as failure and it was only 3.34%. Considering the success rate with stricture recurrence managed by IOU was 96.76%. Most of the stricture recurrence after end-to-end urethroplasty can be successfully corrected by 1 or 2 sessions of endoscopic urethrotomy. The results of these endoscopic urethrotomy are durable in most cases treated, and most authors accept these cases as successful urethroplasty.²³⁻²⁵ Therefore, the overall result of current study is 96.76% which is comparable to published data.

Conclusion:

Everted End-to-end urethroplasty carries 100% cure results with minimum complication rate provided it is used for the management of short stricture of bulbar and membranous part of the urethra.

References:

1. Jordan, G. H., Schlossberg S. M. & Devine, C. J. Surgery of The Penis and Urethra. In Walsh Campbell's Urology. 8th Ed. Philadelphia, Pa: Saunders Elsevier. 2007. 3886-3995.
2. Santosh K Singh, Devendra S Pawar, Atul K Khandelwal, Jagmohan. Transperineal bulboprostatic anastomotic repair of pelvic fracture urethral distraction defect and role of ancillary maneuver: A retrospective study in 172 patients. Urology Annals; 2010; 2 (2) 53-57.
3. H. L. Attwater H. The History of Urethral Stricture. British Journal of Urology, 1943: 15, 39-51.
4. Spirnak JP, Smith EM, Elder JS. 1993. Posterior urethral obliteration treated by endoscopic reconstitution, internal urethrotomy and temporary self-dilation. J Urol. 1993;149(4):766-8.
5. Deepak Dubey, K. Muruganandham. 2008. What is the treatment of choice for bulbar urethral strictures which are not an indication for visual internal urethrotomy? Indian J Urol 2008.24(3); 427-28.
6. IA Mungadi, NH Mbibu. 2010. Current concepts in the management of anterior urethral strictures. Nigerian Journal of Surgical Research, 2006; 8(3-4) 103-10.
7. Subhani G. M, Akmal M, Mehmood K., Iqbal Z, Jafari A. A, Hussain M. 2010. Outcome of Anastomotic Urethroplasty For Stricture Urethra. Annals of Punjab Medical College. 2010; 4 (1) 17-20.
8. Gupta NP, Mishra S, Dogra PN, Hemal AK, Seth A, Kumar R. Outcome of End-To-End Urethroplasty: Single-Center Experience. Urol Int. 2009;82(2):179-82.
9. Andrew C. Peterson, George D. Webster. Management of Urethral Stricture Disease: Developing Options for

- Surgical Intervention. *BJU International*. 2009; 94, 971-976.
10. Doumanian, L.R. Evaluation and Treatment of Urethral Stricture Disease. *Curr Bladder Dysfunct Rep*. 2010, 5: 198-204.
 11. Santucci RA, McAninch JW, Mario LA, Rajpurkar A, Chopra AK et al. Urethroplasty in patients older than 65 years: indications, results, outcomes and suggested treatment modifications. *J Urol*. 2004 Jul;172(1):201-3.
 12. Hussain M. Urethral Stricture Disease: An Old Disease with Newer Treatments. *J Pak Med Assoc*. 2008 May;58(5):227-8.
 13. Bullock TL, Brandes SB. Adult anterior urethral strictures: a national practice patterns survey of board-certified urologists in the United States. *J Urol*. 2007;177(2):685-90.
 14. Shoukry I, Susset J. G, Elhilali M.M. & Dutartre D. Role of Uroflowmetry In the Assessment Of Lower Urinary Tract Obstruction In Adult Males. *Br J Urol* 1975; 47: 559-566.
 15. Bloom DA, Foster WD, McLeod DG, Mittemeyer BT, Stutzman RE. Cost-Effective Uroflowmetry In Men. *J Urol*. 1985 Mar;133(3):421-4.
 16. Herbison AE, Fraundorfer MR, Walton JK. Association between symptomatology and uroflowmetry in benign prostatic hypertrophy. *Br J Urol*. 1988 Nov;62(5):427-30.
 17. Berger AP, Deibl M, Bartsch G, Steiner H, Varkarakis J et al. A comparison of one-stage procedures for post-traumatic urethral stricture repair. *BJU Int*. 2005;95(9):1299-302.
 18. Santucci RA, Mario LA, McAninch JW. Anastomotic urethroplasty for bulbar urethral stricture: analysis of 168 patients. *Urol*. 2002 Apr;167(4):1715-9.
 19. Guralnick ML, Webster GD. The Augmented Anastomotic Urethroplasty: indications and outcome in 29 Patients. *J Urol*. 2001 May;165(5):1496-501.
 20. Morey AF, Kizer WS. Proximal bulbar urethroplasty via extended anastomotic approach—what are the limits? *J Urol*. 2006 Jun;175(6):2145-9; discussion 2149.
 21. Barbagli G, De Angelis M, Romano G, Lazzeri M. Long-term followup of bulbar end-to-end anastomosis: a retrospective analysis of 153 patients in a single center experience. *J Urol*. 2007 Dec;178(6):2470-3. Epub 2007 Oct 15.
 22. Al-Qudah HS, Santucci RA. Al-Qudah, H. S. & Santucci, R. A. 2005. Extended complications of urethroplasty. *Int Braz J Urol*. 2005 Jul-Aug;31(4):315-23; discussion 324-5.
 23. Martínez-Piñeiro JA, Cárcamo P, García Matres MJ, Martínez-Piñeiro L, Iglesias JR Excision and anastomotic repair for urethral stricture disease: Experience With 150 Cases. *Eur Urol*. 1997;32(4):433-41.
 24. Aghaji AE, Odoemene CA. One-Stage Urethroplasty For Strictures: Nigerian Experience. *Int J Urol*. 2001 Jul;8(7):380-5.
 25. Manikandan R, Dorairajan LN, Kumar S. Current concepts in the management of pelvic fracture urethral distraction defects. *Indian J Urol* 2011.27(3); 385–391.