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A case series of standard surgical management of bulbo-membranous stricture

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ABSTRACT

Background: Urethral stricture is an acquired permanent narrowing of the urethra impeding the flow of urine during micturition. It is one of the oldest urological diseases, and its treatment remains a challenge for urologists. Urethral stricture disease affects about 300 per 100,000 men. Most common causes are trauma and infections in developing countries and idiopathic in developed countries. Treatment options for short bulbar urethral strictures include dilatation, direct visual internal urethrotomy and anastomotic urethroplasty. Excision and end to end anastomosis (anastomotic urethroplasty) for short bulbo-membranous urethral strictures and buccal mucosal graft gives excellent long term results with reduced recurrence rate.

Methods: Sixty-three patients who had undergone anastomotic urethroplasty from 2013 to 2016 at Government Medical College and Superspeciality Hospital, Nagpur, Maharashtra, India Department of Urology were included in the study. For strictures less than 2cm, excision of stricture and anastomosis done, while for stricture more than 2cm buccal mucosal grafting done over 16 F Foleys catheter. Postoperative follow up done up to 1 year.

Results: The total number of patients included is 63 and study conducted between January 2013 to December 2016. End to end urethroplasty was done in 41 patients and had mean duration of surgery of about 120 minutes, while buccal mucosal grafting was done in 22 patients. Age ranges from 14 to 78 years with highest incidence of stricture was seen after 5th decade of life, mainly due to iatrogenic causes of previous instrumentation and post TURP surgery. Strictures in younger adults are mainly as a result of trauma by fall astride injury and pelvic fractures and seen during 3rd and 4th decade of life. Most common length of stricture observed was 1-2cm in about 65.07% and mainly occurred due to post urethral procedures. Long strictures more than 2cm were mainly because of trauma in about 35%. Seven patients had recurrence in follow up, out of which 2 managed conservatively by repeated dilatation and 5 patients needed reoperation.

Conclusions: The present results suggest that in patients with strictures too long to be excised and re-anastomosed a tension-free buccal mucosal graft provides better results. However, in patients with short strictures, in whom a completely tension-free anastomosis can be achieved, direct end-to-end anastomosis remains good option.

Keywords: Bulbo-membranous urethra, Urethroplasty

INTRODUCTION

The urethra is traditionally divided into anterior and posterior parts. The anterior part is surrounded by the

corpus spongiosum. It includes the bulbar urethra, which is enclosed by the bulbospongiosus muscle and the penile urethra that runs from the distal margin of the bulbospongiosus to the fossa navicularis and external

meatus. The posterior urethra is the part between the bladder neck and the bulbar urethra and includes the bladder neck, the prostatic urethra, and the membranous urethra surrounded by the external urethral sphincter mechanism. Urethral stricture is an acquired permanent narrowing of the urethra impeding the flow of urine during micturition. It is one of the oldest urological diseases, and its treatment remains a challenge for urologists. 1,2

Urethral stricture disease affects about 300 per 100,000 men. Most common causes are trauma and infections in developing countries and idiopathic in developed countries. Treatment options for short bulbar urethral strictures include dilatation, direct visual internal urethrotomy and anastomotic urethroplasty.^{3,4}

Excision and end to end anastomosis (anastomotic urethroplasty) for long bulbo-membranous urethral strictures gives excellent long term results with reduced recurrence rate. 5,6

The aim of surgical reconstruction for urethral stricture is to provide an adequate calibre, compliant and stable urethra. This study was done to determine the etiology of bulbar urethral stricture, the perioperative and operative management as well as surgical outcome at a tertiary care high volume government centre in central India.

METHODS

Sixty-three patients who had undergone anastomotic urethroplasty from 2013 to 2016 at Government Medical college and Superspeciality Hospital, Nagpur, Maharashtra, India, Department of Urology were included in the study.

Preoperative evaluation

These involve complete history, physical examination, urine analysis, urine culture, serum electrolyte, urea and creatinine, abdominopelvic ultrasonography, micturating cystourethrogram and retrograde Urethrogram. Chest X-ray and electrocardiography were done in patients above 50 years or at risk of cardiovascular disease.

Operative management

Standard perineal anastomotic urethroplasty was employed.

Instruments and suture material

General surgical set, Haygrove sound, curved metal probes, Electrocautery, Vicryl suture material 3-0 to 5-0.

Surgical technique

Spinal or epidural or general anaesthesia depending the patients general condition and anaesthetic preference is

employed. The patient is placed in the extended Lithotomy position. The patient is cleaned and draped.

Perineal approach

A vertical midline perineal incision extending about 2cm proximal to the anus is made. The subcutaneous tissue and Colle's fascia are cut along the line of the incision, exposing the bulbospongiosus muscle. The bulbospongiosus muscle is split down the middle. The urethra is mobilized from the corpora. The stricture is localized using Haregroove (antegrade) and a 16-Fr Foleys catheter (retrograde). The bulbar urethral is laid open in the area of the stricture. The stricture is resected into the healthy corpus spongiosum, when blood begins to drip from the urethralstumps.

For strictures less than 2cm length: The adequately mobilized urethral stumps are spatulated (1cm) at 6 and 12 o'clock. This ensures a wide anastomosis and sufficient urethral calibre. The mobilized urethral stump should be without tension. A single-layer suture that catches all layers of the wall is done. We do interrupted anastomosis at 12, 2, 10, 8, 4 and 6 o'clock positions. The dorsal anastomosis is performed first, a 16F silicon catheter is passed, and then the ventral anastomosis is completed taking care not to catch the silicon catheter.

For stricture more than 2cm length: Buccal mucosal graft put in between for anastomosis of bulbar urethra. The buccal mucosa harvested from lower lip of size about 5x4 cm fashioned into a wide tubule. Single layer end to end anastomosis was done with vicryl 3-0.

The bulbospongiosus muscle is reconstructed over the urethra. The submuscular space is drained with Romsons suction drain and the perineal incision closed in layers. Pressure dressing is applied. A size 16F suprapubic Foleys is left in the suprapubic cystostomy for urinary diversion.

Post-operative management

Intravenous analgesic and antibiotics were given for first 48 hours, later on shifting to oral antibiotics and analgesics. Patient is mobilized second day post-operative and discharged four to seven days after surgery. Sutures removed on 14th postoperative day. Urethral catheter was removed on 28th postoperative day. Subsequently the suprapubic cystostomy catheter is removed within 48 hours if the voiding was normal. The tract of the suprapubic cystostomy was left to heal on its own and usually takes about 2-4 days.

RESULTS

Total 63 patients were included in the study which was conducted from January 2013 to December 2016 with a follow up period of 12 months.

Table 1: Procedure done and mean duration of surgery.

Procedure	No. of patients	Mean duration of surgery
End to end urethroplasty	41	120 (90-140) min
Buccal mucosal graft	22	145 (100-200) min

End to end urethroplasty was done in 41 patients and had mean duration of surgery of about 120 minutes, usually less than buccal mucosal grafting which takes about 145 minutes. It was mainly because of extra time taken during taking graft and fashioning it into tubular structure for grafting.

Table 2: Age group.

Age	No. of cases	Percentage
<10	0	0
11-20	5	7.94%
21-30	10	15.87%
31-40	17	26.98%
41-50	10	15.87%
>50	21	33.34%
Total	63	100%

Age ranges from 14 to 78 years. Highest incidence of stricture was seen after 5th decade of life, mainly due to iatrogenic causes of previous instrumentation and post TURP surgery. Strictures in younger adults are mainly as a result of trauma by fall astride injury and pelvic fractures and seen during 3rd and 4th decade of life.

Table 3: Presentation of patient.

Presentation	No. of patients	Percentage
Ac. Urinary retention with SPC done	45	71.42%
Straining during micturition with incomplete emptying	18	28.57%
Recurrent UTI	10	15.87%
Dribbling of urine/ overflow incontinence	5	07.93%

Table 4. Etiology.

Etiology	No. of patients	Percentage
Traumatic	25	39.68%
Infective	6	9.52%
Idiopathic	1	1.58%
Iatrogenic	30	47.61%
Malignant	1	1.58%

Most of patients came with acute retention of urine and failure to be catheterized, hence SPC done. It was seen in about 71.42% of patients. Rest of patients presented with

straining during micturition in 28.57%, recurrent UTI in 15.87% and overflow incontinence in 7.93%.

Most common cause of strictures in present set up was found to be iatrogenic due to various per urethral procedures like TURP, catheterization, cystoscopy, prostatectomy etc. in about 47.61%, followed by traumatic in young patients about 39.68%. Single case of malignant stricture was found in one old man (Table 4).

Table 5: Length of stricture.

Length	No. of patients	Percentage
<1 cm	0	0%
1-2 cm	41	65.07%
2-4 cm	17	26.98%
>4 cm	5	7.93%

Most common length of stricture observed was 1-2cm in about 65.07% and mainly occurred due to post urethral procedures. Long strictures more than 2cm were mainly because of trauma. It comprises about 35%.

Table 6: Follow up period.

Follow up	No. of patients	Percentage
Wound infection	2	3.17%
Recurrence	7	11.12%
Erectile dysfunction	2	3.17%
Incontinence	1	1.58%

Seven patients had recurrence in follow up period, out of which 2 managed conservatively by repeated dilatation and rest 5 patients needed reoperation where additional mobilization of urethra done by pubic bone shaving and taking out a wedge of inferior pubic arch to straighten the course of bulbar urethra. One patient needed buccal mucosal graft. Two patients had erectile dysfunction mainly as a result of old age and managed conservatively. One patient had incontinence, also managed conservatively.

DISCUSSION

The etiology of urethral stricture has evolved over the years. In time past it was mainly associated with longstanding infectious disease (gonococcal urethritis) or trauma.⁷ In the developed world, the aetiology of urethral stricture is mainly iatrogenic, such as transurethral resection, urethral catheterization, cystoscopy, prostatectomy, brachytherapy, hypospadias surgery and idiopathic.^{8,9} However in resource poor countries, we still see the pattern of infection and trauma.

In present study high percentage of iatrogenic strictures was mainly because of increased use of TURP in our surrounding area and our hospital being only Government tertiary referral centre for follow up of complicated cases.

Also, due to increased public awareness and hygiene the infective strictures are reduced significantly.

Table 7: Etiology.

Etiology	Present study	Michele E et al ¹³	Ofoha CG et al ¹
Traumatic	39.68%	22%	42.3%
Infective	9.52%	7%	50%
Idiopathic	1.58%	49%	-
Iatrogenic	47.61%	23%	7.7%
Malignant	1.58%		

Table 8: Length of stricture.

Length	present study (%)	Berger AP et al ¹²	Ofoha CG et al ¹
<1cm	0%		23.07%
1-2cm	65.07%	56.20% (<2cm)	65.38%
2-4cm	26.98%	43.79% (>2cm)	11.53%
>4cm	7.93%		

In the management of bulbar urethral stricture, many variables, such as length, severity, and location of stricture, can influence surgical outcome. The surgical technique should be selected mainly according to stricture length, but the stricture aetiology and density of the spongiofibrosis tissue should also be taken into account.¹¹

What constitutes an ideal urethral length for anastomotic urethroplasty is still debatable. Good results have been achieved by different investigators with length that range from 1cm to 5cm. A10,11 Berger AP et al conclude that defects ranging from 0.5 to 16cm can be repaired by perineal surgical approach ranging from end to end urethroplasty for strictures less than 2cm and dorsal onlay urethroplasty, ventral buccal mucosal flaps and ventral faciocutaneous flaps for longer defects more than 2cm. overall defects up to 5cm may be successfully excised and primarily reconstructed in select young men with proximal bulbar strictures. Page 12.

Table 9: Operative procedure.

Operative procedure	Present study	Berger AP et al ¹²	Michele E et al ¹³	Ofoha CG et al ¹
End to end urethroplasty	65.07%	56%	100%	100%
Buccal mucosal flap	34.93%	5%	-	-
Dorsal onlay urethroplasty	-	26%	-	-
Ventral faciocutaneous flap	-	13%	-	-

Table 10: Results of procedure on follow up.

Study	No of patients	Recurrence rate	Success rate
Present study	63	7 (11.12%)	88.88%
Berger AP et al ¹²	153	32 (20.91%)	79.08%
Michele E et al ¹³	74	3 (4.05%)	95.95%
Ofoha CG et al ¹	26	2 (7.69%)	92.30%
Barbagli et al ⁶	153	14 (9.1%)	91.9%
Eltahawy et al ¹⁴	260	3 (1.15%)	98.8%
Suh JG et al ¹⁵	33	4 (12.13%)	87.87%

End to end urethroplasty was most commonly applied procedure in various studies due to its simplicity, ease to perform and shorter duration of surgery in comparison to other procedures. In present study we used end to end urethroplasty in 65.07% of patients mainly those of short stricture segment, while for longer stricture buccal mucosal graft was used in 34.93%. Michele E et al and Ofoha CG et al used only end to end urethroplasty for strictures up to 5cm length. On the other hand Berger AP et al used urethroplasty in 56%, buccal mucosal graft in 5%, dorsal onlay urethroplasty in 26% and ventral faciocutaneous flap in 13% depending on length of stricture, spongiofibrosis, tension free length after mobilization etc. 12

Endoscopic urethrotomy is now widely practised; it is easy to use and has a low rate of complications. This has resulted in a continuing debate about how best to treat urethral strictures, especially as urologists tend to choose the simplest and least invasive solution, however the results may largely vary in long term follow up.

So, we concentrated present study on open standard surgical approach and compared them with previously published studies.

In present index study we used end to end urethroplasty for short strictures and buccal mucosal grafts for long strictures. The recurrence was seen in 7 patients (11.2%) in follow up period of 12 months. It is comparable to various previous studies (Table 10).

In a study conducted by Berger AP et al with 153 patients, 86 patients treated with end-to-end anastomosis 23 (27%) had a recurrent stricture at a mean follow-up of 38 (1-96) months, compared with three of 20 (15%) in the fasciocutaneous flap group at 6 (3-8) months. ¹² In the dorsal onlay group two of 40 (5%) men developed restricture after a follow-up of 15 (6-24) months, whereas in the buccal mucosa group four of seven required surgical revision for stricture recurrence at 11 (6-14) months.

In study of Michele E et al out of 74 patients studied, 93% were cured; three had recurrent stenosis and were reoperated by urethrotomy after 3 months, with a good flow rate thereafter (>15 mL/s). 13

In Ofoha CG et al, twenty-six patients with bulbar urethral stricture, who had excision and end to end anastomosis, had a success rate of 92.3% with a mean follow up 30.1 months, range 10 to 48 months.¹

Barbagli et al reviewed 153 patients, who underwent bulbar end to end anastomosis. In his series, stricture length range (1cm-5cm) and follow up was for a period of 68 months. He reported a success rate of 90.8%.⁶

Eltahawy et al in a series involving 260 patients who underwent excision with primary anastomosis with mean follow up of 50.2 months, stricture length range 0.5 to 4.5cm (mean 1.9), only three patients had recurrent stricture. His success rate was 98.8%.¹⁴

Suh JG et al reviewed 33 patients who underwent bulbar end-to-end anastomosis; the mean excised stricture length was 1.5cm (range, 0.8 to 2.3cm). Twenty-nine patients (87.9%) were symptom-free and required no further procedure after a mean follow up 42.6 months. 15

Table 11: Postoperative complications.

Complications	Present study	Ofoha CG et al ¹	Berger AP et al ¹²
Wound infection	3.17%	7.69%	-
Erectile dysfunction	3.17%	3.84%	11.12%
Incontinence	1.58%	0%	3.92%

Postoperative complications included wound infection of about 3.17% in present study which is slightly low as compared to other studies. Erectile dysfunction was comparable to other studies previously conducted. Incontinence was 1.58% comparable to previous studies and over all complications rate in post-operative period was low.

CONCLUSION

The present results suggest that in patients with strictures too long to be excised and re-anastomosed a tension-free buccal mucosal graft provides better results. However, in patients with short strictures, in whom a completely tension-free anastomosis can be achieved, direct end-to-end anastomosis remains good option.

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