



Compare Outcomes Of Single Stage Vs Two Stage Urethroplasty For Panurethral Strictures Including Pre-Operative And Post-Operative Course

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Article History	Abstract
Received: 09 November 2022 Revised: 07 December 2022 Accepted: 29 December 2022	<p>Aim: The aim of the present study was to compare outcomes of single stage vs two stage urethroplasty for panurethral strictures including pre-operative and post-operative course.</p> <p>Methods: The Observational study was conducted at Dr. D.Y. Patil Medical College and Research Centre, Pimpri for the period of 2 years. The study was conducted in 40 patients randomly dividing into two groups, 20 patients underwent single stage urethroplasty and 20 underwent two staged urethroplasty with or without buccal mucosal graft urethroplasty based on size of urethral plate.</p> <p>Results: In the present study, majority of the patients belonged to 41-50 years age group followed by 31-40 years age group and it was found that age groups were not statistically significant. Majority of the patients had Balanitis xerotica obliterans (LS) etiology followed by Post instrumentation/catheter and the results were not statistically significant. Majority of the patients had 13-15 cms length of stricture. In the present study, 12 and 16 were narrow external urethral meatus in single and two stage respectively. In the two stage, Johanson's urethroplasty</p>

<p>CC License CC-BY-NC-SA 4.0</p>	<p><i>procedure was done and in single stage, Kulkarni's full length dorsal onlay BMG urethroplasty procedure was done. In single and two stage, Urethrocutaneous Fistula and Epididymo-orchitis complications were noted. In single stage, success was noted in 16 patients and in two stage, success was noted in 17 patients.</i></p> <p>Conclusion: <i>The single stage repair in patients with LS had good results with less re-stricture rates. The use of BMG as a substitution in single stage repair had re-stricture rates compared to flaps substitution. The two-stage repair should be limited to complex urethral strictures, failed urethroplasty and obliterated urethral stricture urethral caliber is less than 6F.</i></p> <p>Keywords: <i>single stage urethroplasty, two stage urethroplasty, panurethral strictures</i></p>
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1. INTRODUCTION

Urethral strictures occur due to the development of circumferential scar tissue in the epithelium and underlying corpus spongiosum of the urethra. This scar tissue leads to a gradual reduction in the diameter of the urethral lumen. This phenomenon leads to the manifestation of lower urinary tract symptoms, primarily characterised by a decrease in the flow rate of urine.¹ If left untreated, strictures have the potential to result in significant problems, including recurrent urinary tract infections, urine retention, and eventual impairment of renal function. Panurethral stricture illness encompasses the segment of the urethra extending from the meatus to the bulbar urethra. There has been an observed increase in the prevalence of panurethral stricture in Indian and Asian countries, with the primary cause being lichen sclerosus (LS).² The condition known as genital lichen sclerosus (LS) frequently results in the development of significant and widespread anterior urethral strictures. Panurethral stricture illness is frequently attributed to the utilisation of urethral equipment and catheterization.³ The management of Pan urethral strictures poses a significant difficulty in the field of reconstructive urology due to the limited availability of tissue for effectively addressing extensive areas of narrowing. Moreover, these strictures are commonly linked to heightened rates of problems in the postoperative period.⁴ The management of urethral strictures in surgical practise is contingent upon several factors, including the underlying cause, specific anatomical location, extent of the stricture, and the degree of fibrosis affecting adjacent tissues.⁵⁻⁷ The management of strictures affecting the bulbar urethra is well-established and typically involves excision and end-to-end anastomosis or a brief patch onlay substitute urethroplasty.⁴ The present surgical interventions utilised exhibit favourable outcomes and encompass various approaches, such as single- or multiple-stage reconstructions, employing flaps, grafts, or a combination thereof. In rare instances, when deemed necessary, a perineal urethrostomy may be considered as a viable option for patients who prefer to avoid more extensive procedures. In the past, the preferred approach for treating panurethral strictures was the utilisation of a two-stage urethroplasty. The Johanson's two-stage procedure, initially introduced in 1953, involved the incorporation of buried epithelium, initially sourced from local skin. Over time, this technique evolved to utilize autologous grafts based on the Denis-Browne principle.⁸

The Johanson staged urethroplasty was more morbid and did not show consistent result, so the use of flaps or grafts have become essential in patients with longer and complex strictures. There are various tissues used as substitution for urethroplasty such as penile skin, posterior auricular skin, bladder mucosa and buccal mucosa. In 1995-96 Barbagli et al described a new dorsal onlay graft urethroplasty, the buccal mucosal graft was sutured and quilted over the corpora cavernosa, and the urethra was sutured over the graft and this technique was widely accepted. The success rate was 92-95% for a period of 19 to 36 months.⁹⁻¹¹

Then Kulkarni et al adopted this technique of dorsal onlay buccal mucosa graft for panurethral strictures, he performed dorsal meatotomy with graft insertion from meatus till proximal bulb by penile invagination through a single incision in perineum and this was adopted worldwide for single stage repair of panurethral strictures.² The aim of the present study was to compare outcomes of single stage vs two stage urethroplasty for panurethral strictures including pre-operative and post-operative course.

2. MATERIALS AND METHODS

The Observational study was conducted at Dr. D.Y. Patil Medical College and Research Centre, Pimpri for the period of 2 years. The study was conducted in 40 patients randomly dividing into two groups, 20 patients underwent single stage urethroplasty and 20 underwent two staged urethroplasty with or without buccal mucosal graft urethroplasty based on size of urethral plate. The institute ethics committee clearance was obtained before start of study. All subjects were subjected through a physical examination of genitalia and perineum and symptoms were assessed using the IPSS.

Pre operatively stricture were evaluated with

- Ultrasonography,
- Uroflowmetry,
- Postvoid residual volume (PVR),
- Retrograde urethrography and micturating cystography,
- The patients with urethral stricture were taken up for cystourethroscopy.
- Plan of post-operative follow up
- Foley catheter was removed after 3 weeks.

Symptom assessment

- Uroflowmetry with PVR assessment was done at 1, 3 and 6 months after catheter removal.
- A retrograde urethrogram was done at 3 months.
- Failure is defined as inability of patient to void or need of any ancillary procedures like VIU or dilatation.
- Informed written consent was obtained from patients.

INCLUSION CRITERIA:

1. Long segment occlusive and near occlusive panurethral strictures.

EXCLUSION CRITERIA:

1. Patients unfit for surgery.
2. Malignant urethral lesions.
3. Strictures of size less than 5 cm.
4. Oral cavity premalignant/malignant lesions.
5. Failed urethroplasty.
6. Urethro-cutaneous fistula.

STATISTICAL ANALYSIS:

The captured findings were entered into a Microsoft Excel spreadsheet and subsequently underwent statistical analysis using the SPSS software. The chi-square test was employed to assess the statistical significance level. A significance level of less than 0.05 was used to determine statistical significance.

3. RESULTS

Table 1: Age Group

Age Group (years)	No. of Patients		
	Single Stage	Two stage	Total
20 – 30	1	2	3
31 – 40	6	3	9
41 – 50	5	6	11
51 - 60	3	4	7
61 - 70	5	5	10
Chi-square value	1.568		
p- value	0.8147 (non-significant)		

In the present study, majority of the patients belonged to 41-50 years age group followed by 31-40 years age group and it was found that age groups were not statistically significant.

Table 2: Etiology of Stricture

Etiology of Stricture	No. of Cases		
	Single Stage	Two stage	Total
Balanitis xerotica obliterans (LS)	10	14	24
Post instrumentation/catheter	6	3	9
Others	4	3	7
Chi-square value	1.810		
p- value	0.819 (non-significant)		

Majority of the patients had Balanitis xerotica obliterans (LS) etiology followed by Post instrumentation/catheter and the results were not statistically significant.

Table 3: Length of the Stricture

Length of Stricture	No. of Patients	
	Single stage	Two stage
10-12 cms	5	4
13-15 cms	13	15
>16 cm	2	6
Chi-square value	1.72	
p- value	0.677 (non-significant)	

Majority of the patients had 13-15 cms length of stricture.

Table 4: Meatal Status

External urethral meatus			
Narrow		Normal	
Single stage	Two stage	Single stage	Two stage
12	16	8	4

In the present study, 12 and 16 were narrow external urethral meatus in single and two stage respectively.

Table 5: Operative procedure

Classification	Procedure	No. of patients
Two stages	Johanson's urethroplasty	20
Single stage	McAninch Penile circumferential fasciocutaneous flap urethroplasty	1
	Kulkarni's full length dorsal onlay BMG urethroplasty	16
	Orandis flap	3

In the two stage, Johanson's urethroplasty procedure was done and in single stage, Kulkarni's full length dorsal onlay BMG urethroplasty procedure was done.

Table 6: Complications

Classification	Complications	No. of patients
Single stage	Urethrocutaneous Fistula	3
	Epididymo-orchitis	3
	Stricture	4
Two stage	Urethrocutaneous Fistula with meatal stenosis	1
	Epididymo-orchitis	2
	Wound dehiscence	2
	Perineal urethrostomy stenosis	1

In single and two stage, Urethrocutaneous Fistula and Epididymo-orchitis complications were noted.

Table 7: Comparison of urethral stricture single stage repair and two stage repair

Variables	Single stage repair	Two stage repair
Success	16	17
Failure	4	3
Total	20	20
Chi-square test	0.173	
p- value	0.677 (non-significant)	

In single stage, success was noted in 16 patients and in two stages, success was noted in 17 patients.

4. DISCUSSION

The surgical procedure utilised to address a penile urethral stricture is primarily contingent upon the underlying cause of the stricture. There is a significant disparity in the aetiology of penile stricture between industrialised and developing countries. Lichen sclerosus (LS) and failed hypospadias repair (FHR) have emerged as the primary aetiologies of penile urethral strictures in developed nations. Concurrently, there has been a decline in the prevalence of post-infectious strictures, but strictures resulting from instrumentation and catheterization have shown an upward trend.⁵⁻⁷ Contrarily, among emerging nations, the prevalence of recurrent gonococcal urethritis continues to be a significant factor contributing to strictures. However, there is also an observable pattern of declining urethritis cases and a simultaneous rise in strictures caused by instrumentation and catheter usage in these regions.¹²⁻¹⁴

Most of the patients were in age group of 41-50 (27.5%), followed by those between 61 to 70 years (25%), 31 to 40 years (22.5%), 51 to 60 years (17.5%), 20-30 years (7.5%). The mean age of the patients in single stage urethroplasty group was 50.15 years (range 33-70 years) and in two stage urethroplasty group was 50.85 years (range 28-70 years). Kulkarni et al² in a study of 117 patients underwent single stage urethroplasty mean age was 47.8 years. In a study by Mohamed Selim et al¹⁵ in 123 patients who underwent two stage urethroplasty mean age was 38 years. The most common etiology of panurethral stricture in our study was lichen sclerosus in both single stage 10 (50%) and two stage 14 (70%) urethroplasty, then instrumental/iatrogenic/catheter related was 6(30%) in single stage and 3(15%) in two stage and trauma and infection in single stage was 4(20%) and 3(15%) in two stage. In a study by Kulkarni et al¹⁶ single stage repair for pan urethral stricture out of 117 patients 82 (70%) was due lichen sclerosus, catheter induced was 14(11.9%), idiopathic in 12 (10%), instrumentation 6(5.3%), failed hypospadias and trauma 3(2.6%). The stricture length was assessed by radiologically, length of grafts used and length of urethral plate most of patients were between range 13 to 15 cm in both single 13 (65%) and two stage 15 (75%) groups. The shortest length of stricture was 10 and longest 18 cm. The mean stricture length in a study by Deepak Dubey et al⁵⁶ of 39 patients in single stage study was 7.2cm (range 4-17 cm) and two stage mean length was 8.2 cm (range 6-19 cm). In a study by Mohamed Selim et al¹⁵ in 123 patients who underwent two staged urethroplasty mean stricture length was 8.3cm (4-13cm)

Out of the 20 patients in single stage urethroplasty 16 (80%) were considered successful and 4 (20%) were considered as failure and all of them had BMG as substitution. Out of 4 failures in single stage urethroplasty, one had meatal stenosis, two had re-stricture at the junction of the graft placed and one had stricture at proximal end of the graft. The stricture recurrence was managed by visual internal urethrotomy followed by multiple dilatations at 24 months follow up. Of the 20 patients who underwent two stage Johanson's urethroplasty 17 (85%) were considered successful and 3 (15%) were considered as failure. Out of 3 patients one had metal stenosis with urethrocutaneous fistula formation in mid penile urethra and other two had wound dehiscence during early postoperative period. The meatal stenosis with fistula patient required meatotomy with catheterization and other two cases required redo urethroplasty at 24 months follow up.

Dubey et al.¹⁷ conducted a comparative analysis between single-stage repair and two-stage repair approaches for the treatment of LS strictures. Out of the total cohort of 39 individuals, a subgroup of 14 patients had pronounced scarring of the urethral plate together with the presence of several segments of stricture. These patients subsequently underwent a series of graded urethroplasty procedures. Out of the total sample size of 14 patients, it was found that 4 individuals (28%) necessitated a revision of the initial stage urethrostomy procedure. Additionally, 2 patients (14%) experienced constriction of the glans cleft, while 1 patient (7%) suffered from complete graft loss. Furthermore, among the 3 patients (21%) who proceeded to the second stage, it was seen that they experienced a recurrence of strictures. Among the cohort of 25 patients who underwent single stage repair, a total of three individuals (12%) experienced the occurrence of recurrent stricture. A study conducted by McAninch and Morey¹⁸ involved a total of 66 patients who had penile circular fasciocutaneous skin flap urethroplasty. The average length of the stricture was found to be 9.08 cm, while the success rate at

the 41-month follow-up was determined to be 79%. The implementation of an extra method resulted in a notable increase in success rates, reaching a level of 95%. In contrast to tubularized grafts, onlay repairs have demonstrated a higher degree of long-lasting success. In their study, Nathan Y Hoy et al.¹⁹ examined 154 patients who underwent a comparison between the use of BMG and prepuccial skin in a single-stage operation and a two-staged method. The results indicated that the success rates were similar between the two approaches, with 86.8% (46/53) for the two-staged techniques and 87% (88/101) for the single-stage treatment. The utilization of preputial skin in single stage surgery resulted in the highest complication rate.

In a study conducted by Mohamed Selim et al.¹⁵, a total of 123 patients who underwent a two-staged urethroplasty were examined. The first stage of the procedure was found to be complicated by graft contracture in 11 patients, accounting for 8.9% of the sample. In the second stage of the study, wound dehiscence was observed in 2 out of 105 patients (1.9%), re-stricture occurred in 11 patients (10.5%), fistula was present in 6 patients (5.7%), and meatal stenosis was found in 3 patients (2.9%). The total success rate of the study was found to be 79.1%, with 83 out of 105 instances demonstrating successful outcomes. The mean follow-up period for the participants was 34.7 months, with a range of 10 to 58 months. The researchers reached the conclusion that the utilisation of buccal mucosal graft in phased urethroplasty is a viable and effective surgical alternative for individuals afflicted with lengthy anterior urethral strictures, particularly those with lichen sclerosus and those who have experienced unsuccessful prior surgical interventions. The post-operative complications in single stage were urethrocutaneous fistula 3 (15%) at 4 weeks, epididymo-orchitis 3(15%) were managed conservatively with catheterization and antibiotics. In two stage repair epididymo-orchitis 2 (10%) were managed with antibiotics and perineal urethrostomy stenosis 1(5%) which was seen after first stage managed by repeated dilatation.

5. CONCLUSION

The management of pan-urethral stricture disease by single-stage vs two stage procedure both had similar re-stricture rates. The single stage repair in patients with LS had good results with less re-stricture rates. The use of BMG as a substitution in single stage repair had re-stricture rates compared to flaps substitution. There is need for further studies to know benefits of grafts vs flaps in single stage repair. The two-stage repair should be limited to complex urethral strictures, failed urethroplasty and obliterated urethral stricture urethral caliber is less than 6F.

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