

## Dorsal Free Graft Versus Johanson's II Urethroplasty for Long Segment Anterior Urethral Stricture Management: A Comparative Study

\*Reza MS,<sup>1</sup> Mia GM,<sup>2</sup> Hussain MZ,<sup>3</sup> Islam MT<sup>4</sup>

### Abstract

**Objective:** To compare the results and complication rates of dorsal free graft and Johanson's II urethroplasty for long segment anterior urethral stricture management.

**Methods:** The surgical records of 100 patients of Dhaka medical college hospital, BSMMU and one private hospital who had long segment anterior urethral stricture repaired between 2005 and 2006 were evaluated and analyzed prospectively.

**Result:** The outcome was considered as success if the patient needed no further instrumentation, including dilatation or urethrotomy. Overall success rate for dorsal free graft urethroplasty were 96% in case of dorsal free graft and 68% in Johanson's II urethroplasty. Failure rate were 4% in dorsal free graft and 32 % in Johanson's II urethroplasty.

**Conclusion:** Repair of long segment anterior urethral stricture by dorsal free graft urethroplasty shows more success and less complication rate then Johanson's II urethroplasty.

[Shaheed Syed Nazrul Islam Med Col J 2019, Jan; 4 (1):70-76]

**Key Words:** Urethra, Long segment stricture, Dorsal free graft and Johanson's II, Comparative study

### Abbreviations and Acronyms

BMG = Buccal mucosal graft, BXO = Balanitis Xerotica Obliterance, Group A: dorsal free graft urethroplasty, Group B: Johanson's stage II urethroplasty, OIU= optical internal urethrotomy, RGU & MCU=Retrograde urethrogram and micturiting cystourethrogram, Sec. =Second.

### Introduction

An urethral stricture is defined as a scar of the subepithelial tissue of the corpus spongiosum, which constricts the urethral lumen.<sup>1</sup> It mainly arises from an insult; for example, infective, inflammatory or a local traumatic process leading to ischemic spongiofibrosis that is ischemia of spongy tissue of corpus spongiosum. This leads to loss of underlying vascular spongy tissue, and as it heals by

fibrosis, it causes scar formation resulting in a stricture. It restrict urine flow and causes various complications.<sup>2</sup> When it involves more than 2 cm long segment of urethra it is called long segment stricture. Anterior urethra comprises with penile and bulbar urethra. Urethral dilatation, urethrotomy or urethroplasty are used for urethral stricture management.<sup>3</sup> Since ages, the simplest form

1. \*Dr. Md Suhel Al Mujahid Reza, Assistant Professor of Urology, Sheikh Hasina Medical College, Tangail. suhelurobd@gmail.com. suhel\_reza@yahoo.com
2. Dr. Golam Mostofa Mia, Associate Professor, Department of Surgery, SHMC, Tangail.
3. Dr. Md. Zahid Hussain, Assistant Professor, Department of Urology, Government Shahid Sheikh Abu Naser Specialised Hospital, Khulna.
4. Dr. Md. Touhidul Islam, Associate Professor, Department of Physiology, SHMC, Tangail

\*For correspondence

of treatment advised for patients with an epithelial stricture (stricture limited to epithelium) without spongiofibrosis is urethral dilatation by metal bogies. The advantage of being fracturing of scar tissue of the stricture and enlargement of lumen temporarily, bringing relief to patients though it is not curative. Nowadays, optical internal urethrotomy (OIU) is also done which involves incising the stricture transurethrally using endoscopic equipment.<sup>4</sup>

Urethroplasty done by anastomotic or substitution technique. Anastomotic technique is curative for short segment (<2 cm) bulbar urethral stricture. Substitution technique is suitable for long segment anterior urethral stricture. Substitution may be done by graft or flap. Graft may be placed both dorsally or ventrally by onlay or inlay techniques over the strictured segment. Long segment anterior urethral stricture may be treated by single or staged procedure. Dorsal free graft is a single stage procedure and Johanson's is a staged procedure. In first stage of Johanson's procedure, a hypospadias is created by incising the stricture segment of urethra by longitudinal midline ventral incision and lay open by marsupialization of urethral mucosa to adjacent penile or perineal skin according to the site of stricture. Then after a specific interval when synechia developed, stage II procedure performed. A large number of operative techniques are available for urethral stricture management and the superiority of one technique over other is not clearly defined. So the urologist must be familiar with each and every technique, as each technique has its own merits and demerits.

The present study is designed to observe the outcome of the dorsal free graft urethroplasty by ventral sagittal urethrotomy approach using penile skin graft and Johanson' II urethroplasty by neighboring penile skin flap

for long segments stricture of the penile or bulbar urethra.

## Methods

In this prospective multicentre study on patients of Dhaka medical college hospital, BSMMU and one private hospital in Dhaka, one hundred cases of long segment anterior urethral stricture were evaluated over a period of one year from May 2005 to May 2006. These patients were divided in group A and group B according to serial number. Odd number are kept in group A, treated by dorsal free graft urethroplasty and even numbered patient were kept in group B and treated by Johanson's stage II urethroplasty. All the patients were aged between 15 to 65 years. In all cases, stricture lengths were > 2 cm long. All the patients were presented with severe obstructive urinary symptoms. Preoperatively patients were assessed by history, physical examination and relative investigations. External genitalia were examined and urethra palpated in all the patients. Uroflowmetry, retrograde urethrogram and micturiting cystourethrogram (RGU &MCU) were done in each cases pre and post operatively. These investigations were used as a major yardstick for diagnosis of disease and success of treatment offered to the patient. Culture and sensitivity of urine sample was done in patients of urinary tract infections (UTI). The upper urinary tract was assessed by ultrasound and in some cases by intravenous urography (IVU). The strictures were approached through ventral sagittal urethrotomy incision. Patients were asked to follow-up on regular basis.

## Results

In this present study, a series of 100 cases of urethral stricture were evaluated. Age range in this series was from 15 to 65 years. Highest number of cases detected in group A was 16 (32%) and age range was 31-40. In group B, it

was 18 (36%), and age range also 31 to 40 years. Age of both groups were compared and found not significant ( $P = 0.86$ ).

Highest causes of stricture in this series was Inflammatory, were found in 19(38%) cases of group A and 16 (32%) of group B. Other causes are, in group A are iatrogenic 12 (24%), post traumatic 8 (16%), unknown 6 (12%), BXO 5 (10%) and in group B, iatrogenic 10 (20%), post traumatic 10 (20%), BXO 8 (16%), unknown 6 (12%). Statistically it was not significant ( $P= 0.852$ ) for both groups.

Length of strictures of both groups ranged from 2-10 cm. Among them highest number of cases, 28(56%) cases detected in group A and 26(52%) cases in group B had 5-7 cm long strictures. 2-4 cm long stricture was found in 12(24%) cases in group A and 14(28%) cases found in group B. 8-10 cm

long stricture was found in 10 (20%) cases in group A and B respectively. Statistically it was also not significant for both groups ( $P=0.852$ ).

Location of strictures were defined radiologically by RGU & MCU. Highest number of strictures found in group A 27 (54%) and 23(46%) patients in group B were located at bulbar urethra. Others are in penile urethra 9(18%) in group A and 15(30%) in group B, penile and bulbar 8(16%) in group A 6(12%) in group B, penile with meatal stenosis in 6(12%) in both group A and B. Statistically it was not significant ( $P= 0.551$ ) for both groups.

After procedure, in group A, out of 50 patients, complications detected in 2(4%) cases. On the other hand, in group B, out of 50 patients, complication detected more or less in 17 (34%) cases.

Table I: Postoperative complications

Name of complications	Group A(n=50)			Group B (n=50)			p
	No. of complications	No. of patients developed complications	Overall complication rate (%)	No. of complications	No. of patients developed complications	Overall Complication rate (%)	
Wound infection	1	2	4	6	17	34	<0.001
Urethrocutaneous fistula	1			3			
Recurrent stricture	0			6			
Recurrent stricture	1			5			
Post void dribbling	0			17			

Over all postoperative complications observed in 2 (4 %) cases of group A, whereas 17 (34%) cases of group B .So the success rate of group A was 96% and in group B was 66%, which was much lower than the success rate of group A. Hence the difference between two groups was statistically significant ( $P < 0.001$ ).

There was significant difference in hospital stay in group A and group B patients. Group B stayed longer period in hospital then group A (p value<0.001).

Table II: Mean hospital stays

Group of patient	Mean $\pm$ SD(days)	Range(days)	P
Group A(n=50)	9.00 $\pm$ 2.43	8-20	
Group B(n=50)	11.80 $\pm$ 4.41	8-21	<0.001

There was significant urine flow difference in group A and group B patients. Taking good and average urine flow rate as success and poor urine flow rate as failure, group A had 96% success rate whereas group B had 84% initial success rate. The difference of urine flow rate between two groups was significant (P <0.046).

Table III: Results of urine flow rate after removal of catheter (after 21 days of operation)

Group of patient	Results in number of patients						P value
	Success		Average flow: 10-15 ml/s		Failure		
	Good flow : >15 ml/s		Poor flow:<10 ml/s				
	No.	%	No.	%	No.	%	0.046
Group A (n.=50)	48	96	0	0	2	4	
Group B (n.=50)	22	44	20	40	8	16	

In case of RGU & MCU, success rate in group A 96% and in group 84%. Failure rate in group A is 4% and group is 16%.Success and failure rate between two groups are also significant (P<0.001).

Table IV: Results of RGU & MCU after removal of catheter (after 21 days of operation)

Group	Before Operation			After Operation			P
	Good	Average	Poor	Good	Average	Poor	
Group A	0	0	50	48	0	2	<.001
Group B	0	0	50	27	15	8	<.001

Before operation 100% patient of both Group A and Group B had poor flow rate. During follow up of next 12 months significant change of urine flow rate between group A and group B.

Table V: Results of urine flow rate before operation and during follow up at 3 months, 6 months and 1 year after operation

Before Operation				After Operation					
Group of patients	Good: >15 ml/s	Average: 10-15 ml/s	Poor: <10 ml/s		Group of patients	Good: >15 ml/s	Average: 10-15 ml/s	Poor: <10 ml/s	P
Group A(n=50)	0	0	50	1 <sup>st</sup> visit	Group A (n=50)	48	0	2	0.002
					Group B (n=50)	22	15	13	
Group B(n=50)	0	0	50	2 <sup>nd</sup> visit	Group A (n=48)	42	4	2	0.002
					Group B (n=48)	17	18	13	
				3 <sup>rd</sup> visit	Group A (n=48)	42	4	2	0.001
					Group B (n=48)	15	18	15	

**Interpretation of flow rate (voided volume > 300 ml)**

Significant difference also detected in group A and group B in RGU &MCU done after 1 year of procedure.

Table VI: Results of both procedures according to RGU &amp; MCU after 1 year

Group of patients	Results of number of patients						P value
	Good		Average		Poor		
	No	%	No	%	No	%	
Group A(n=48)	46	95.83	1	2.08	1	2.08	<.05
Group B(n=48)	20	41.66	13	27.08	15	31.25	

**Discussion**

The incidence of urethral stricture is increasing due to more road traffic accidents, urethral instrumentation for diagnostic and therapeutic purposes and urethral inflammatory diseases.<sup>3</sup> In this present study full thickness penile skin is used either by ventral inlay graft technique (Asopa method<sup>5</sup> or by using adjacent healthy penile or scrotal skin as a local flap by using principles of buried intact epithelial strip (Johanson's technique).<sup>6</sup> Separately these two techniques are used in many centers around the world for long durations for long segment anterior urethral stricture management, but no

comparative study between these two techniques had yet done.

Age range of this series was 15-65 years in both groups .Mean age was 37.15 years in group A and 38.24 years in group B.

In the present series maximum number of strictures were found in bulbar urethra, and most common cause is inflammatory in nature. These results are contradictory to other centers report. It may be due to delayed treatment of gonococcal infection in our country. Length of the strictures ranged from 2 to 10 cm in the present study. Majority of

the patients had with 5-7cm long strictures. Maximum length was 8-10 cm in both group A and B. In the series of Asopa, et al, (2001)<sup>5</sup> length of the strictures ranged from 2-10 cm (mean 6 cm).

In group A, 2(4%) patient developed complications in the form of wound infection and temporary urethrocutaneous fistula during post operative period. Success rate was 96%. Iselin and Webster (1999)<sup>7</sup> showed 97% success rate of dorsal free graft urethroplasty for bulbar urethral stricture. In a series of Asopa, et al, (2001),<sup>5</sup> done by dorsal free graft urethroplasty by ventral sagittal urethrotomy approach temporary urethrocutaneous fistula developed in 1(8.3%) patient and recurrent stricture in 1(8.3%) patient. The present study is comparable with others.<sup>5,7</sup>

Total number of complications in group B done by stage II Johanson's urethroplasty was 16(32), hence the success rate was 68%. Same procedure done by Culp and associates (1957) complication rate was 7.8%,<sup>8</sup> Kaufman and associates 42.75%,<sup>9</sup> Bogas and Lasky 16%,<sup>10</sup> Colapinto Farnandes and Draper 18.4%<sup>11</sup> Whitehead and Morales 60%,<sup>12</sup> Johanson himself 86%.<sup>6</sup>

Operation time ranged from 90-150 min. for both groups, mean operation time for group A was  $115.2 \pm 19.5$  and for group B  $115.20 \pm 7.5$  ( $P=1.00$ ) which is statistically not significant.

In the present study, mean postoperative hospital stay in dorsal free graft urethroplasty (group A) was  $9.00 \pm 2.43$  days whereas in Johanson's II urethroplasty (group B) was  $11.80 \pm 4.41$ . The difference of hospital stay between two groups was significant ( $P<0.001$ ).

After 21 days of operation, uroflowmetry and RGU & MCU done in both group A and B. In

group A good flow rate was detected in 48(96%) patients. In group B it was in 42(84%) cases. After one year of operation, in group A, results of uroflowmetry remain unchanged but in group B success rate persists in 33(68.75%) cases. RGU shows normal caliber urethra in 48(96%) patients after 21 days of operation which persist more or less after one year. In group B it was initially 42(84%), declined to 34(68%). This difference in the outcome is statistically significant ( $P<0.001$ ). There was no mortality in any group; however morbidity was higher in group B than group A due to higher post operative complications.

### Conclusions

Considering the success and failure rate, post operative complications, hospital stay, cosmetic results, urine flow rate and radiographic view of the reconstructed urethral caliber during follow up visit of both groups; dorsal free graft substitution urethroplasty is better than Johanson's II urethroplasty for the treatment of long segment anterior urethral strictures.

### References

1. Mundy AR, Andrich DE. Urethral strictures. *BJU Int.* 2011; 107:6-26.
2. McAninch JW. Disorders of the penis and male urethra, in Smith's general urology. Edited by Tanagho EA, McAninch JW. 5th international edition, McGraw-Hill Co, Philadelphia, 2000; pp.670-672.
3. Andrich DE, Mundy AR. Urethral Stricture and their surgical management. *Br J Urol* 2000; 86: 571-580.
4. Steenkamp JW, Kock MLS. Epidemiology of urethral stricture at Tygerberg Hospital. *South African Medical Journal.* 1994; 84(5):267-8.
5. Asopa HS, Garg M, Singhal GG, et al. Dorsal free graft urethroplasty for urethral stricture by ventral sagittal

- urethrotomy approach. J Urol 2001; 58: 657-659.
6. Donald J, Jaffar, George R, et al. Johanson urethroplasty for repair of urethral strictures. J Urol 1956; 75: 805–810.
  7. Iselin CE, Webster GD. Dorsal onlay graft urethroplasty for repair of bulbar urethral stricture. J Urol 1999; 161: 815-818.
  8. Culp DA, Flocks RH, Kronawetter H, et al. Experiences with the Johansen-Denis Browne technique of urethroplasty. J Urol 1957; 77:446.
  9. Kaufman J J, Pearman RO , Goodwin WE. Complications of the Johanson operation in the repair of urethral strictures. J Urol 1962; 87: 883
  10. Bogas M and Lasky N . Experience with a two stage urethroplasty for urethral stricture. J Urol 1969; 102:444.
  11. Colapinto V. Two stage urethroplasty for stricture, results and technical considerations. Brit. J Urol 1969; 41:494.
  12. Whitehead ED, Morales P. Complications of urethroplasty for stricture. J Urol 1972; 107:412.