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Role of Dorsalonlay full thickness vaginalgraft urethroplasty in the management of stricture urethra in females

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Abstract
Introduction: *Female urethral stricture is an under diagnosed cause of bladder outlet obstruction in females. The possible aetiology may be idiopathic, infection, difficult catheterisation with subsequent fibrosis, prior urethral surgery or trauma. We present our technique and results of dorsal onlay full thickness vaginal graft urethroplasty for stricture urethra in females.*
Materials and Methods: *A prospective study was performed on 14 female patients with stricture urethra who underwent dorsal onlay vaginal graft urethroplasty from February 2013 to February 2015. All thepatients had previously undergone multiple dilatations. The preoperative evaluation included detailed voiding history, local examination, uroflowmetry, calibration with 10 Fr Foley's catheter and micturating cystourethrogram (MCUG).*
Results: *Mean age of presentation was 46.5 years. Mean Qmax improved from 6.9 to 24.2 ml/s and mean residual volume decreased from 161 to 17.3 ml. Mean operative time was 81.4 min and mean hospital stay was 3.8 days. Mean duration of follow-up was 18 months (6 months to 2 years). None of the patient was incontinent.*
Conclusion: *Dorsal onlay vaginal graft urethroplasty could be considered as an effective way to treat female urethral strictures.*
Keywords: *Dorsal onlay, female urethral stricture, vaginal graft*

I. Introduction

Female urethral stricture usually is an underdiagnosed cause of bladder outlet obstruction. It occurs in 2.7% to 8% of females presenting with lower urinary tract symptoms and surgical treatment is still debatable.[1] Because of its rare incidence, strict diagnostic criteria has not been documented. However, Defreitas *et al*. stated that a detrusor pressure (Pdet) of 25 cm of water and maximum urinary flow rate (Qmax) of less than 12 ml/s is consistent with obstruction.[2] The most common aetiology for female urethral stricture may be infection, repeated instrumentation, trauma, previous surgeries for stone disease or incontinence, radiation for pelvic malignancy, and idiopathic. As similar to the male urethral stricture disease, results of repeated urethral dilatation and internal urethrotomy are not good in females as subsequent fibrosis occurs due to bleeding and extravasation.[3] Surgery is the definitive treatment in such cases in the form of meatoplasty for distal urethral strictures and grafts or flaps for midand proximalurethral strictures. Several methods of female urethroplasty have been reported in various small series.We present our experience of management of female urethral stricture with dorsal onlay full thickness vaginal graft in 14 patients at a single centre.

II.Methodology

A prospective study was performed on 14 female patients withstricture urethra from February 2013 to February 2015. Informed consent was taken from all the patients for surgery and consent for inclusion into the study. The diagnostic criteria are, maximum urinary flow rate (Qmax) of less than 10 ml/s, inability to calibrate urethra with 10 Fr catheter, and narrowing of urethraon micturating cystourethrogram (MCUG). All patients had preoperative evaluation including detailed history, physical examination, uroflowmetry, residual volume, and micturating cystourethrogram. Calibration was not attempted with 16 or 18 Fr catheter as it could dilate some soft strictures and make interpretation of MCUG difficult. Almost all patients presented with poor flow and incomplete sense of voiding, one of them had recurrent urinary tract infections asmain presenting complaint. All the patients had previously undergone multiple dilatations. The aetiology was idiopathic in 12 cases, one had undergone multiple transurethral resections for a bladder tumor, and one patients underwent cystolithotripsy for bladder stone. None of the patients had preoperative incontinence or prolapse. All patients had normal urine examination and serum creatinine preoperatively. Patients were advised to keep betadine vaginal pessaries 48hrsprior to surgery to prepare vagina for harvesting the graft.

The patient is placed in dorsal litho to my position and operative field including the vagina is cleaned and draped with strict aseptic measures. The anus is adequately covered and sealed from the operative area. Cystoscopy is done with 6 Fr paediatric cystoscope to see the stricture area and assess its length from bladder neck. Normal saline mixed with 1% adrenaline is injected in periurethral tissues, an inverted U-shaped incision

is given and urethra is dissected dorsally and laterally from 3 to 9'0' clock position by sharp dissection with scissors (Fig. 1). Stay sutures are taken at urethral angles to help in dissection. Dissection is done with care so as not to damage the vestibular bulbs and the clitoral body by staying close to the fibrous tissue of the urethra. An

18 Fr Foley is inserted upto the stricture segment and urethra is dissected proximally above the stricture in retropubic space. A full-thickness urethrotomy is then made over the stricture site at 12' 0 clock position with scissors (Fig. 2). Urethra is now again calibrated with an 18 Fr Foley catheter to ascertain that there is no proximal stenosis beyond the incised stricture site. Saline is injected in submucosal plane in the vaginal wall and full-thickness vaginal graft of 1cm wide is harvested and defattened (Fig. 3). A 18 Fr silastic catheter is placed in urethra over which vaginal graft has to be sutured to urethrotomy site. The vaginal graft is then sutured on the dorsal surface of urethra as onlay graft with 4-0 vicryl sutures in interrupted fashion and excess graft is tailored to achieve a normal meatus like appearance (Fig. 4-6). Foley's catheter was removed 14 days after surgery and MCUG done at 3 weeks after surgery. All patients were advised once weekly self-calibration upto 3 months. Postoperative follow-up included every 3 monthly assessment of voiding and storage lower urinary tract symptoms, uroflowmetry and post void residual urine.

III. Results

Site of stricture was in mid urethra in all 14 patients. Mean age of patients was 46.5 years (39-56 years). Mean preoperative and postoperative Qmax were 6.9 ml/s and 24.2 ml/s respectively and mean preoperative and postoperative post void residual urine were 161 ml and17.3 ml respectively. Mean stricture length was 1.3 cm (0.8cm-2cm),mean operative time was 81.4 minutes andmean hospital stay was 3.8 days (3-5 days). Mean duration of follow-up was 18 months (6months- 2yrs). None of the patients had evidence of any vaginal bleeding or graft necrosis. Patients did not report any significant postoperative pain or discharge suggestive of wound infection and were advised to return to their normal daily activities after 4 to 5 days. The criteria of successful reconstruction was a postoperative Qmax greater than 15 ml/sec with minimal post void residue(<30 ml) and normal appearing voiding cystourethrogram. Once weekly self-calibration is advised for initial 3 months.At follow-up 3 weeks after surgery, micturating cystourethrogram showed a normal urethra.

At 1 year of follow-up, all patients had Qmax >20 ml/sec without any significant residual urine or voiding and storage lower urinary tract symptoms. At mean follow-up of 18 months, all patients voided well with good flow without recurrence of stricture. None of the patients reported incontinence during follow-up.

IV. Discussion

Female urethral stricture is usually an underdiagnosed condition.[1] It was treated in past with repeated urethral dilatations and internal urethrotomy. As in males, urethral stricture disease in females can cause voiding and storage lower urinary tract symptoms, recurrent urinary tract infections, and even renal impairment. These symptoms are usually of long duration and severe which cause significant impairment in quality of life. Stricture is usually distal to external urethral sphincter and can occur in any part of urethra, although it seems to occur most commonly in mid and distal urethra and less in proximal urethra.[3]Often these females are referred by physicians and surgeons as there is no means by which they can be relieved medically. These patients may be evaluated by detailed voiding history including symptoms of stress and urge incontinence and recurrent urinary tract infections. Local examination should be done along with uroflowmetry and measurement of residual volume. Calibration may be done gently with 10 Fr catheter for diagnosis as larger catheter could dilate some soft stricture and micturating cystourethrogram would not show narrowing of stricture site and proximal urethral dilatation.Surgical treatment of female urethral stricture disease has not been adequately addressed in literature and few small series describing various techniques of female urethroplasty are available.Smith, *et al.* reported their experience with dilatation and intermittent catheterisation in seven female urethra stricture patients with seemingly good results, as amongst patients declared cure, none required more than four dilatations.[3] However, he stated that for patients who are not compliant or cannot self catheterise, this procedure is inadequate and urethroplasty could be a better option.The dorsal approach for vaginal graft has the same advantages as described in that of male stricture urethra of strong mechanical support and vascular bed provided by clitoral cavernosal tissue, decreasing the risk of formation of diverticulum. It is a more physiological reconstruction that directs the urinary stream away from vagina and spares the ventral aspect of urethra for further anti-incontinence surgery.[4]Montorsi *et al.* described vestibular flap urethroplasty in 17 patients.[5] Under optical magnification, an inverted Y-shaped incision was made around the meatus and the distal part of the urethra was dissected from its perimeatal tissue from the 9 o'clock to the 3 o'clock position. The urethra was then incised "dorsally" (close to the vagina) and a vestibular flap was developed superior to the urethra.

However this procedure could not be used in cases of vaginal fibrosis. Tanello *et al*. reported the use of a pedicle flap from the labia minora for the repair of female urethral strictures in two patients.[6] Berglund *et al.* presented the technique of ventral onlay buccal mucosal graft urethroplasty for recurrent urethral stricture

disease 30 months of follow-up.[7] After surgery one of the two patients developed a recurrence of LUTS because of meatal stenosis. Swender *et al*. used the technique of anterior vaginal mucosal flap in eight patients with complete cure in seven patients after a single procedure who previously underwent multiple dilatations.[8] Simonato *et al*. presented a series of six patients who underwent vaginal inlay flap urethroplasty inspired by Orandi technique with good results.[9]

To summarise the advantages, the procedure that we have described is simpler and does not require tissue tunnelling or flap rotation. It provides a more physiological voiding with urinary stream directed away

from vagina and spares ventral urethra for further anti-incontinence procedures. We did not observe incontinence in any patient during follow-up. Whole of the procedure can be completed in spinal anaesthesia. This procedure of dorsal onlay vaginal graft seems to be an effective way to treat female urethral stricture. It may be done in cases of proximal and mid urethral stricture.

V.Tables And Figures

Table: 1

Pt. no	Age (yrs)	Etiology	Previous treatment	Symptoms	Pre op incontinence or prolapse	Pre op Qmax (ml/s)	Pre op PVR (ml)
1	46	Idiopathic	Dilatation	Poor flow, incomplete voiding	Absent	7.5	175
2	42	Idiopathic	Dilatation	Poor flow, incomplete voiding	Absent	9	120
3	39	Idiopathic	Dilatation	Poor flow, incomplete voiding	Absent	8.9	140
4	45	Cystolithotripsy	Dilatation	Poor flow, incomplete voiding	Absent	5.5	250
5	49	Idiopathic	Dilatation	Poor flow, incomplete voiding	Absent	4.8	200
6	40	Idiopathic	Dilatation	Poor flow, incomplete voiding	Absent	9	185
7	50	Idiopathic	Dilatation	Poor flow, incomplete voiding	Absent	8.2	130
8	56	Transurethral resection of bladder tutor	Dilatation	Poor flow, incomplete voiding	Absent	6.4	150
9	48	Idiopathic	Dilatation	Poor flow, incomplete voiding	Absent	5.5	140
10	51	Idiopathic	Dilatation	Recurrent UTI	Absent	4.2	110
11	44	Idiopathic	Dilatation	Poor flow, incomplete voiding	Absent	8.8	130
12	53	Idiopathic	Dilatation	Poor flow, incomplete voiding	Absent	4.5	200
13	48	Idiopathic	Dilatation	Poor flow, incomplete voiding	Absent	6	190
14	40	Idiopathic	Dilatation	Poor flow, incomplete voiding	Absent	7.8	135

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Figure: 1 Inverted U incision above the external urethral meatus.

Figure: 2 A full thickness urethrotomy is made at 12'O'clock position after sharp dissection in periurethral plane.

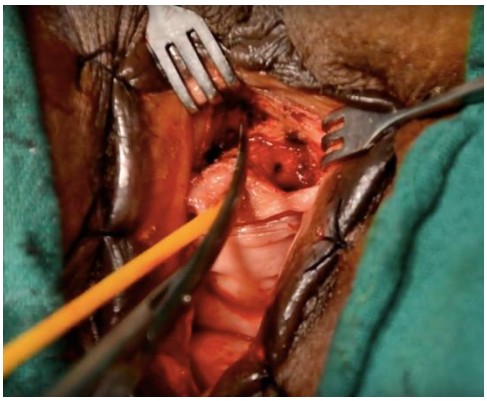
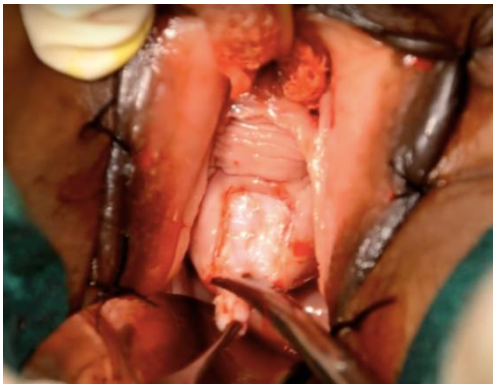
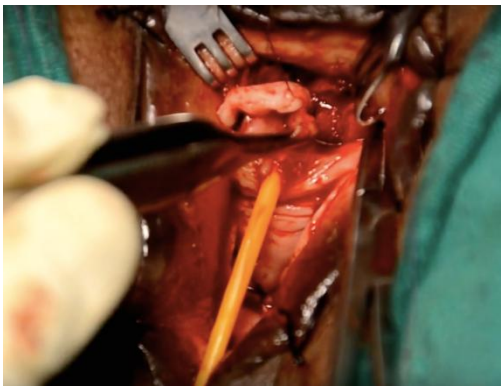
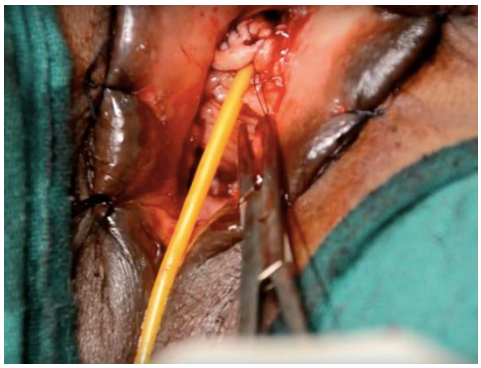


Figure: 3 Full thickness vaginal mucosal graft harvested from anterior vaginal wall.

Figure: 4 Apical suture between graft and urethra.







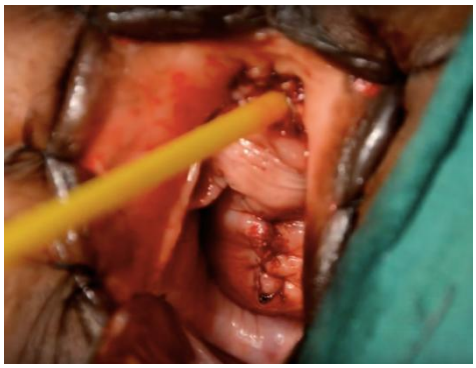


Figure: 5 Graft sutured in dorsal onlay fashion.

Figure: 6 Graft donor site closed primarily.

Table: 2

Pt. no	Stricture site	Stricture length (cms)	Operative time (min)	Hospital stay (days)	Qmax (ml/s)		PVR (ml)	
					Pre op	Post op	Pre op	Post op
1	Mid urethra	1	85	4	7.5	24.2	175	16
2	Mid urethra	1.2	90	4	9	25.6	120	15

Table: 2

Pt. no	Stricture site	Stricture length (cms)	Operative time (min)	Hospital stay (days)	Qmax (ml/s)		PVR (ml)	
					Pre op	Post op	Pre op	Post op
3	Mid urethra	1.5	85	3	8.9	25.3	140	17
4	Mid urethra	0.8	70	5	5.5	27.9	250	15
5	Mid urethra	2	85	3	4.8	20.8	200	21
6	Mid urethra	1.8	90	3	9	24.1	185	14
7	Mid urethra	2	75	3	8.2	22.7	130	18
8	Mid urethra	1.6	70	3	6.4	21.9	150	15
9	Mid urethra	1.5	85	5	5.5	21.4	140	20
10	Mid urethra	1	85	5	4.2	27.7	110	16
11	Mid urethra	1	75	4	8.8	26.3	130	18
12	Mid urethra	2	90	3	4.5	20.1	200	20
13	Mid urethra	1.8	80	5	6	24.9	190	19
14	Mid urethra	1.5	75	4	7.8	25.3	135	18

Table: 3

	Pre op	Post op
Mean Qmax (ml/s)	6.9	24.2
Mean PVR (ml)	161	17.3

VI. Conclusion

Dorsal onlay vaginal graft urethroplasty for stricture urethra in females is a simple and effective technique which can avoid repeated painful dilatations and multiple urethrotomies. Further studies with more patients and long follow-up are required to ensure the success of this procedure.

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