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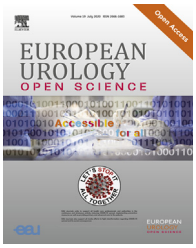

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Surgery-in-Motion: Brief Correspondence

Double-face Augmentation Urethroplasty for Bulbar Urethral Strictures: Technical Implications and Short-term Outcomes for a Dorsal Versus Ventral Approach

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Abstract

This study describes technical implications and compares short-term outcomes after a dorsal versus ventral approach for double-face augmentation urethroplasty (DFAU) for treating a near-obliterated bulbar urethral stricture (BUS). This was a retrospective evaluation of a prospectively collected database of patients with BUS (<2 cm) who underwent DFAU. The choice between the approaches depended on (1) landmark identification (the relation between the bulbospongiosus muscle and the distal end of the stricture) and (2) corpus spongiosum width. In DFAU, inlay augmentation was at the level of the narrowed urethral plate (<6 Fr). Patient follow-up data (symptom score and uroflowmetry) were assessed every 3 mo for the first year, and every 6 mo thereafter. A successful outcome was defined as a normal urinary flow rate without obstructive voiding symptoms. Fifty-two patients underwent DFAU for BUS (dorsal approach, $n = 30$; ventral approach, $n = 22$). The maximum flow rate and symptom scores significantly improved in both groups. The overall success rates (86%) were similar. In conclusion, a dorsal approach for DFAU is versatile and can be considered in all circumstances. A ventral approach should be performed in patients with proximal BUS. The short-term outcomes were similar for both approaches.

Patient summary: We assessed whether double-face augmentation urethroplasty is a suitable option for treating near-obliterated bulbar urethral strictures using two free grafts for augmentation to improve the urinary flow. This operation can be performed using two methods and both techniques were safe with similar short-term outcomes.

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Nontraumatic near-obliterative bulbar urethral strictures (BUS) of <2 cm in length can be managed with nontransecting anastomotic bulbar urethroplasty or augmented anastomotic urethroplasty [1–3]. However, if the obliterative stricture segment is >2 cm and the urethral caliber is <6F, augmentation with a single graft may not be sufficient [4,5]. In these cases, double-face augmentation urethroplasty (DFAU) is indicated. DFAU can be performed using either a dorsal (dorsal onlay and ventral inlay) or ventral (ventral onlay and dorsal inlay) approach [4,5]. A buccal mucosal graft (BMG) or a free inner preputial graft (IPG) can be used for the urethral plate augmentation [6]. Reports in the literature regarding clear indications for a dorsal or ventral approach in DFAU are sparse. The aim of this study was to describe the technique and assess short-term functional outcomes for a dorsal versus ventral DFAU approach for near-obliterative BUS.

This was a retrospective evaluation of a prospectively collected database of patients with BUS (<2 cm) who underwent DFAU in our institute between January 2016 and May 2019. Reports for patients who were followed for a minimum of 6 mo were included. Prior approval was obtained from our institutional review board. All patients gave informed consent before surgery. Patient demographics and clinical data were retrieved from our hospital's online database system. The American Urological Association (AUA) symptom score, blood investigations, and radiological imaging (abdominal ultrasound, retrograde urethrogram, and maximum urinary flow rate [Q_{max}]) were evaluated before surgery.

DFAU was carried out using either a dorsal or ventral approach. All the perineal procedures were performed by a single surgeon (B.E.). The BMG was harvested by a separate team. An IPG was considered for patients with poor oral hygiene. A near-obliterated BUS was defined as a urethral caliber <6F on urethroscopy [7]. The choice between both approaches was intraoperative based on (1) landmark identification (the relation between the bulbospongiosus muscle, and the distal end of the urethral stricture) and (2) corpus spongiosum width. Inlay augmentation with free graft was done at the level of the narrow urethral plate (<6 mm), and overlapping of the distal and proximal edges of the grafts was avoided.

A dorsal approach for DFAU was considered in all circumstances, especially for cases in which the BUS extended distally to the bulbospongiosus muscle, for primary urethroplasty, and for strictures with dense spongiofibrosis (corpus spongiosum width <15 mm). In this approach, the urethra was mobilized on the left side [8]. Dorsal urethrotomy was performed at the level of the stricture. A free graft was harvested and fixed to the apex of the proximal urethral margin using interrupted sutures (sutured to the medial urethral margin and the underlying corpora cavernosa). Ventral inlay augmentation with a free graft was at the level of the narrowed urethral plate (<6 mm) and the urethra was closed over a 16F catheter.

A ventral approach for DFAU was considered for patients in whom the distal end of the BUS was proximal to the bulbospongiosus muscle (and extended into the proximal bulbar urethra) [6]. The ventral approach was also considered when the width of the corpus spongiosum (measured using calipers) was >15 mm [9]. Ventral sagittal urethrotomy was performed and the urethral stricture was opened until the normal urethral lumen was identified. Dorsal inlay augmentation with a free graft was at the level of the narrowed urethral plate (<6 mm). The urethral lumen was augmented ventrally with the free graft over a 16F urethral catheter. Spongioplasty was performed and the bulbospongiosum muscle and perineal surgical site were approximated in two layers.

The urethral catheter was removed after 3 wk. AUA symptom score, complications, and Q_{max} were assessed every 3 mo during the first year after surgery, and every 6 mo thereafter. Complications were assessed according to the Clavien-Dindo classification [10]. A successful outcome was defined as a normal urinary flow rate without any obstructive voiding symptoms. Results for continuous variables are presented as the mean ± standard deviation. Data for categorical variables are presented as the frequency and percentage. A χ^2 test was used to compare preoperative and postoperative data. Outcomes for the dorsal and ventral approaches were compared using Student's *t* test. Statistical significance was set at $p < 0.05$.

Table 1 – Demographics and stricture characteristics for the dorsal and ventral groups for double-face augmentation urethroplasty

Parameter[a]	Dorsal group (*n* = 30)	Ventral group (*n* = 22)	*p* value
Age (yr)	46 ± 4.1	52 ± 5.5	0.68
Stricture etiology, *n* (%)			0.555
Post-instrumentation	13 (43.3)	12 (54.5)	
Inflammatory	11 (36.7)	5 (22.7)	
Idiopathic	6 (20)	5 (22.7)	
Previous interventions, *n* (%)			0.959
Single OIU	7 (23.3)	5 (22.7)	
Multiple OIUs/dilatations	23 (76.75)	17 (77.3)	
Stricture length (cm)	5.8 ± 0.6	5.1 ± 0.7	0.977
Type of graft, *n* (%)			0.913
Buccal mucosal graft	27 (90)	20 (90.9)	
Inner preputial graft	3 (10)	2 (9.1)	

OIU = optical internal urethrotomy.
[a] Results for continuous variables are presented as mean ± standard deviation.

Table 2 – Perioperative parameters and outcomes for the dorsal and ventral groups for double-face augmentation urethroplasty

Parameter[a]	Dorsal group ($n=30$)	Ventral group ($n=22$)	p value
Operative time (min)	83 ± 12	75 ± 9.6	0.016
Hospital stay (d)	3.9 ± 0.6	3.7 ± 0.8	0.332
Catheter duration (d)	23.6 ± 3	24.5 ± 4	0.361
Perioperative complications, n (%)[b]			
Surgical site infection (grade 2)	0	1 (4.5)	0.238
Donor site (oral cavity) bleeding (grade 3a)	1 (3.3)	2 (9.1)	0.379
Epididymo-orchitis (grade 2)	1 (4.5)	0	0.238
Postvoid dribbling (grade 1)	6 (20)	4 (18.2)	0.869
Follow-up (22 mo)	**($n=26$)**	**($n=19$)**	
Failures (grade 3b), n (%)	4 (13.3)	3 (13.6)	0.975
AUA symptom score			
Preoperative	24 ± 4	26 ± 4	0.075
Postoperative (6 mo)	8 ± 3	7 ± 1.6	0.453
	$p<0.001$	$p<0.001$	
Uroflowmetry			
Preoperative (ml/s)	6 ± 2	5 ± 2	0.530
Postoperative at 6 mo (ml/s)	25 ± 4	29 ± 5	0.174
	$p<0.001$	$p<0.001$	

AUA = American Urological Association.
[a] Results for continuous variables are presented as mean ± standard deviation.
[b] Clavien-Dindo grades.

Fifty-two patients underwent DFAU for BUS (dorsal approach, $n=30$; ventral approach, $n=22$). The demographics and stricture characteristics were similar in both groups (Table 1). Perioperative parameters, complications, and outcomes for the two groups are shown in Table 2.

Our study highlights the technical considerations for a dorsal or ventral approach for DFAU. The most important landmark is the distal end of the bulbospongiosus muscle in relation to the distal end of the BUS. The distal bulbar urethra has deficient spongy tissue and inadequate bulbuspongiosus muscle. Hence, ventral urethrotomy in this region would result in a risk of urethral diverticulum [1]. A ventral approach is safe only for strictures involving the proximal two-thirds of the bulbar urethra [1,5]. For these strictures, the width of the corpus spongiosum is important (width >15 mm is normally safe for a ventral approach [9]). However, a dorsal DFAU approach is safe and can be considered for all BUS cases [1]. Following ventral or dorsal urethrotomy, the decision on inlay augmentation is crucial. A stricturectomy with inlay augmentation can be considered if the width of the urethral plate is <6 mm and the stricture length is <2 cm (with focal spongiofibrosis). However, if the urethral plate width is <6 mm and the stricture length is >2 cm, then a stricturotomy with inlay augmentation is considered. Overlapping of the distal and proximal edges of the grafts (inlay and onlay) should be avoided to prevent anastomotic rings. The limitations of our study include the retrospective analysis of a small cohort with short-term follow-up.

In conclusion, the choice between ventral and dorsal approaches should be made intraoperatively according to the position of the stricture in relation to the bulbospongiosus muscle, the corpus spongiosum width, and the degree of spongiofibrosis. A dorsal DFAU approach is versatile and can be considered in all circumstances. The ventral approach, although technically easy, should be performed selectively in patients with proximal BUS. Short-term outcomes were comparable for both approaches.

Author contributions: Bhavatej Enganti had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Enganti, Bendigeri.
Acquisition of data: Enganti, Pandya.
Analysis and interpretation of data: Enganti, Bendigeri, Pandya.
Drafting of the manuscript: Enganti, Ragoori.
Critical revision of the manuscript for important intellectual content: Chiruvella, Reddy, Ghouse.
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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.euros.2021.01.008.

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