

Ventral Bulbar Augmentation

A New Technical Modification of Oral Mucosa Graft Urethroplasty for Stricture of the Proximal Bulbar Urethra

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Purpose: Complication rates with ventral onlay technique of oral mucosa graft urethroplasty have been attributed to the poor ventral support for the graft. We herein describe a new technique which overcomes these problems and also discuss the short-term follow-up.

Materials and Methods: In a prospective study conducted between January 2006 and June 2008, 13 patients with proximal stricture of the bulbar urethra underwent ventral bulbar augmentation. In this technique, the graft was sutured only to the bulbar urethra and the rest of spongiosal tissue was closed superficially. Longitudinal incisions were given in the partial depth of the bulb, adjacent to the suture line and were sutured together over the first suture line.

Results: The mean follow-up period was 16.4 months (range, 6 to 30 months). Two of the patients developed re-stricture; one at the proximal anastomosis of the graft with native urethra and one at the distal anastomosis. Remaining 11 patients have satisfactory postoperative uroflow rates and are doing well. The success rate at the last follow-up was 84.6%.

Conclusion: This technique exploits the local bulbar anatomy by successfully moving the lateral bulbar tissue medially, below the ventrally placed mucosal graft. This results in a thicker ventral bulbar platform which provides enhanced support to the graft.

Keywords: urethral stricture, treatment outcome, oral mucosa

*Urol J. 2010;7:115-119.
www.uj.unrc.ir*

INTRODUCTION

Ventral onlay is one of the successful techniques of oral mucosa graft urethroplasty, especially for strictures in the bulbar urethra.⁽¹⁾ Despite its popularity, ventral onlay is plagued by complications like fistula, sacculation, and pseudodiverticulum formation, which in turn may cause post-void dribbling and ejaculatory failure. Sequestration of the semen and residual urine inside the pseudodiverticulum may further compromise state of the adjacent urethra and lead to recurrent

stricture disease.⁽²⁾

Ventral bulbar augmentation (VBA) is a new technical modification which brings the lateral spongiosal tissue ventro-medially. This modification decreases the complication rates of ventral onlay and enhances the success rates by augmenting the thickness of that portion of the bulb, which forms the base for the ventral graft. Initially, VBA was performed on a few patients as a pilot project.⁽³⁾ Since the results were encouraging, a prospective study was undertaken

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*Received February 2009
Accepted October 2010*

to assess the impact of VBA in larger number of patients suffering from stricture of the proximal bulbar urethra.

MATERIALS AND METHODS

In this prospective study conducted between January 2006 and June 2008, 13 patients with stricture of the proximal bulbar urethra underwent VBA urethroplasty. An inclusion criterion was stricture length more than 2 cm. Thus, patients having short stricture (< 2cm) were excluded.

Nine patients did not know the cause of their stricture, in 2 of the patients it was due to the urethral catheterization and in the remaining 2, it was due to trauma. The mean duration of the disease was 27 months (range, 3 months to 4 years). Four patients had co-morbid conditions at the time of admission, 1 patient was positive for hepatitis B surface antigen (not having active liver disease), 2 patients had diabetes mellitus (controlled on medication), and 1 was hypertensive (controlled on medication).

The site of stricture was the proximal bulbar urethra in all the 13 patients. Seven patients had undergone at least one prior procedure; 3 of these had undergone optical internal urethrotomy once, 2 of them had undergone urethral dilatation a couple of times, 1 patient had undergone both urethral dilatation and optical internal urethrotomy and 1 patient was admitted with suprapubic catheter (SPC) in situ, since he had gone into acute urinary retention and could not be catheterized per urethra. Remaining 6 patients presented to the outdoor patient department with chief complaint of decreased urinary stream and frequency.

Routine laboratory and specific radiological investigations like retrograde urethrography and voiding cystourethrography were performed. Uroflowmetry study with post-void residual urine measurement was done in those patients who were not catheterized at the time of admission and could void with a reasonable flow (patients on catheter or those with poor flow were excluded).

Mean stricture length was 3.1 cm (range, 2.1 to

4.9 cm). The duration of operation was slightly longer with VBA compared to ventral onlay technique performed in the bulbar urethra (approximately, 15 to 20 minutes longer); the mean operative time was 195 minutes (range, 160 to 200 minutes). This could be due to the initial learning curve with the first few operations, since we did not divide the patients into subgroups due to small sample size. Intra-operative blood loss was negligible and none of the patients required postoperative blood transfusion. One patient suffered from brief hypotension during the surgery, but was adequately resuscitated and did not have any postoperative sequel. Postoperative complications were documented during the hospital stay and when the patient came for follow-up at regular time interval.

Procedure

Two surgical teams worked simultaneously with separate instruments for graft harvest and the perineal exposure. The oral mucosa graft was harvested under local anesthesia from the inner cheek as per our technique.^(4,6) The technique of VBA was performed on all the 13 patients by a single surgeon (DD) under regional anesthesia (spinal or epidural). A midline perineal incision was used for the bulbar urethra dissection. The graft was sutured only to the mucosal edges of the stricture defect as in ventral onlay (Figure 1). A continuous 4-0 monofilament polyglecaprone-25 suture was then applied taking thin bites through the superficial portion of the bulb and closing the bulbar urethra. The inverted raw edges formed a vascularized bed for the buccal mucosal graft.

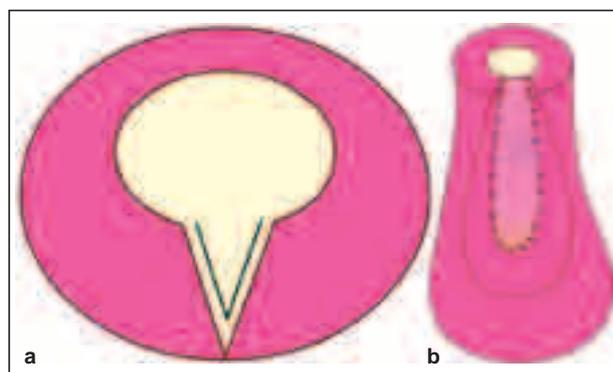


Figure 1. Transverse section and front view of the bulbar urethra, respectively, demonstrating that the graft is sutured only to the mucosa.

Approximately, 5 mm on either side of this suture line, longitudinal incisions were given in partial depth of the bulb and the medial edges were sutured together over the first suture line (Figure 2). The lateral edges of incision were then sutured as a third layer (Figure 3). Fibro-fascial adhesions which adhere to the lateral aspect of the bulb and the undersurface of the perineal membrane were separated by blunt dissection, which permitted medial advancement of the bulbar tissue (Figure 4). Closure of the perineal incision was done in the conventional manner over a per-urethral catheter (PUC). We

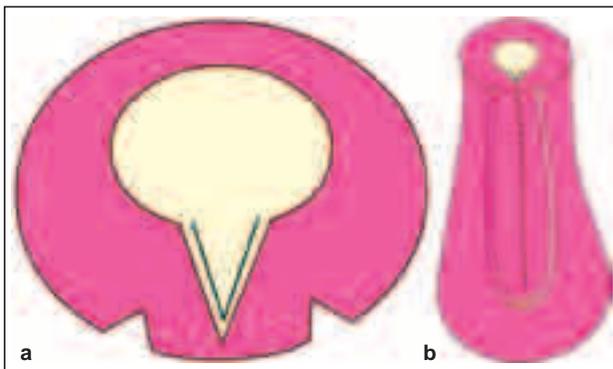


Figure 2. Transverse and front view demonstrating parallel incisions adjacent to the midline.

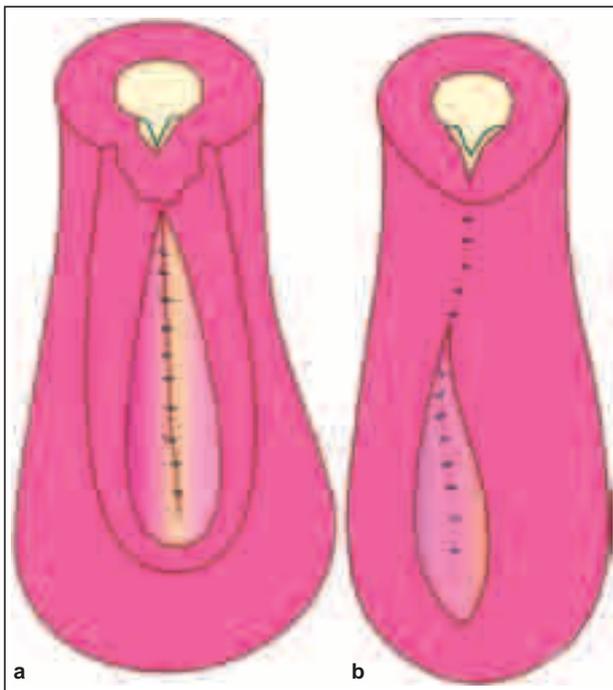


Figure 3. Front view demonstrating the closure in 2 layers over the previous closure.

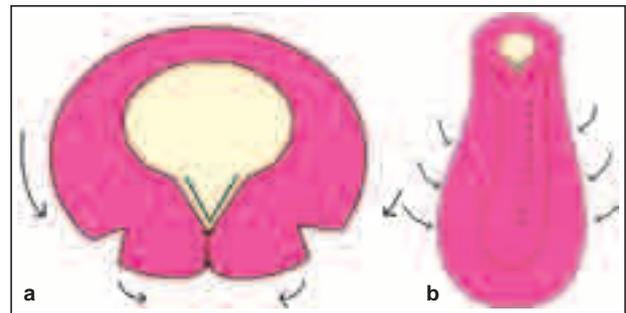


Figure 4. Cross-section view and front view demonstrating the concept of medial transposition of the ventral tissue by closure in 2 layers.

do not insert a drain or SPC on routine basis. In the postoperative phase, the patients were put on anti-erection drugs, such as diazepam. Patients were discharged within a week with PUC and SPC (if inserted) in situ and called after 2 weeks in the outdoor patient department, where further investigations were ordered. Pericatheter study was done, if no extravasation was visible, PUC was removed and the patient was given a voiding trial. If the flow was satisfactory, SPC was removed after a couple of days. Uroflow study with post-void residual urine measurement was done and repeated at regular intervals during the follow-up period. If the patient complained of poor flow or the flow was less than 14 mL/s, then additional investigations like retrograde urethrography or cystoscopy were advised.

Statistical Analysis

The data were entered in the MS-Excel computer program and all the analyses were carried out using SPSS (Statistical Package for the Social Science, version 15.0, SPSS Inc, Chicago, Illinois, USA) software. The mean and standard deviations were calculated for continuous variables such as age and different lengths variables, and proportions (percentages) were calculated for discrete variables. Chi-square test was used to compare dichotomous/categorical variables. Paired *t* test was used to detect significance from baseline value to follow-up time in case of continuous variables and unpaired *t* test was used to detect the difference between two continuous variables. A *P* value less than .05 was considered statistically significant.

RESULTS

The mean age of the patients was 34.7 years (range, 23 to 54 years). The mean follow-up period was 16.4 months (range, 6 to 30 months). In the immediate postoperative period, all the patients were symptom free. None of the patients developed a graft pseudodiverticulum, stenosis, fistula, or sacculation. Of 13 patients, 2 developed resticture after 5 months and 7 months of their surgery, respectively. In 1, the stricture was at the proximal anastomosis of the graft with native urethra and in the other at the distal anastomosis. Both the patients had initial encouraging postoperative uroflowmetry, but unfortunately, that deteriorated within 6 months of follow-up. Both of them were subjected to one episode of optical internal urethrotomy and now the stricture has stabilized and they are doing well at a follow-up of 8 months and 14 months each. Remaining 11 patients have satisfactory postoperative uroflow rates and are doing well.

Age, etiology, duration of disease, previous procedures, and co-morbid conditions had no statistical impact on the success rate, probably due to the small sample size. Similarly, duration of the operation, stricture length, and graft length had no statistical impact on the success.

Patients were considered successful if they did not undergo any postoperative intervention and their uroflow rates were > 14 mL/s. Therefore, the success rate at the last follow-up was 84.6%.

DISCUSSION

Spongioplasty after ventral onlay has been described earlier in the literature.⁽⁷⁻⁹⁾ The technique of VBA exploits local bulbar anatomy and successfully moves the lateral bulbar tissue ventromedially below the ventrally placed mucosal graft (Figure 4). This modification is carried out by performing an epithelium-to-urothelium anastomosis in which the spongiosum is avoided (Figure 1); the adventitia of the corpus spongiosum is available for closure over the graft and allows the percolating blood of the spongiosum to provide vascularity to the graft. This step also adds a backing of support, which prevents any outpouching or sacculation. It has

led to a high success rate in the long term.⁽⁷⁻¹⁰⁾

Morey and colleagues⁽⁷⁾ operated on patients who had complex refractory strictures of the bulbar urethra and achieved 92% success rate. Elliott and coworkers⁽⁸⁾ assessed their long-term results in 60 patients; of these, 49 had undergone previous attempt at repair. Bulbar stricture repair was successful in 54 patients (90%). Kellner and associates⁽⁹⁾ performed ventral onlay urethroplasty and spongioplasty on 18 patients and stated that 87% success rate was durable over the long term. Hence, our success rate, albeit a little lower, is similar to that described in the literature.

The only drawback of VBA is that it is difficult to perform in a fibrosed bulbar urethra since fine dissection is difficult to perform due to dense adhesions. Perforation of the bulb may occur which can cause bleeding. This obscures the local anatomy resulting in poor quality of spongioplasty and increases the operative time, ultimately leading to poor results. In these subjects, we prefer conventional ventral onlay.

CONCLUSION

Ventral bulbar augmentation is a good option for patients having stricture of the proximal bulbar urethra. Patient selection is an important criterion before attempting this technique. Further studies are required with a larger number of patients and a longer follow-up to validate the findings of this study.

CONFLICT OF INTEREST

None declared.

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