

Outcome of buccal mucosa urethroplasty in the management of urethral strictures

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Summary

Objective: The objective of the study is to report the outcome of buccal mucosal

urethroplasty.

Materials and methods: The follow up data of 15 patients undergoing single stage urethroplasty from September 2010 to September 2015 were retrospectively reviewed. They received buccal mucosa graft for urethroplasty. The patients were followed for complications and outcome.

Results: Mean age was 53.7 ± 13.6 . The stricture length ranged from 3 to 6 cm (mean 4.4 ± 0.8). The success rate for buccal mucosa urethroplasty (BMU) was 67.7% at 12th month.

Three patients presenting with voiding difficulty in the 3rd month and one in the next 12 months, had urethral restenosis. One patient had fistula formation at 6th month postoperatively. Five patients underwent retreatment procedures such as internal urethrotomy, urethroplasty and/or internal urethrotomy. Conclusions: The buccal mucosa is easy to obtain and handle, therefore BMU can be safely and effectively managed outside high volume institutions.

KEY WORDS: Urethral stricture; Buccal mucosa; Urethroplasty.

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INTRODUCTION

Anterior urethral stricture is a pathological fibrous tissue development involving the corpus spongiosum. The most common etiology of anterior urethral stricture is trauma, mostly straddle injury. Several factors such as etiology of stricture, site, length and density of the fibrous tissue should be taken into consideration for appropriate management (1).

A long segment of urethral stricture is the indication for surgical correction. Strictures longer than 2 cm that are not suitable for anastomotic repair therefore, require substitution urethroplasty, where a graft is used. Whilst substitution urethroplasty is an established and accepted treatment there is currently no clear consensus on the best graft material (2).

Pedicled and free grafts have been used including split and full-thickness skin grafts (genital and extra-genital), bladder mucosa, colonic mucosa, tunica vaginalis, tissue-engineered grafts, and intra-oral mucosa (buccal or lingual) (3, 4).

Long-term results of scrotal and extra-genital skin are disappointing as non-hirsute full-thickness skin grafts

are associated with stricture recurrence (5). Among the mucosal grafts, the buccal mucosa has proved to be a versatile and successful urethral substitute. The use of buccal mucosa graft (BMG) for urethral reconstruction was first reported, in 1894 (6). It is relatively easy to obtain and manipulate, is a wet epithelium, and has an excellent immunity. It is less prone to stricture recurrence especially in the presence of lichen sclerosus. Today the buccal mucosa is the preferred donor site for urethral stricture repair (7). However, its harvesting may be associated with donor site morbidities, such as perioral numbness, difficulty in opening the mouth and less commonly, dry mouth, and long term complications such as scarring (8).

The thick buccal mucosa epithelium with dense submucosa and extensive capillary network assures rapid neovascularisation and early access of nutrients from the wound bed (4, 9, 10).

Herein we report our experience with dorsal BMU for the primary repair of anterior urethral strictures.

MATERIALS AND METHODS

After ethics committee approval, we reviewed data of 24 patients with anterior urethral stricture undergoing buccal mucosal urethroplasty (BMU) between September 2010-September 2015. After excluding 5 patients, who had follow-up less than 6-months, and 3 patients lost to follow-up, 15 patients, were finally analyzed. Patients with short stricture (< 2.5 cm), strictures with caliber >6 mm, complex strictures (strictures associated with abscess, fistula), posterior urethral strictures, history of oral surgery, visible oral mucosal changes, restricted mouth opening, and previous failed urethroplasty were excluded from the study.

The retrospective data of patients undergoing BMU were collected. Patient characteristics and baseline data were recorded. All patients underwent uroflowmetry (UFM), urine culture/sensitivity, urethrography, and cystourethroscopy. The oral mucosal characteristics were assessed in all patients during the initial workup. Single stage dorsolateral onlay graft urethroplasty was applied in all patients. After intubation under general anesthesia, initially perineal dissection was done. Following midline perineal incision, bulbospongiosus muscle was dissect-

ed. The urethra was mobilized from cavernosa only on one side beyond midline to preserve the vascular supply. The urethra was opened longitudinally on lateral side. The stricture length was measured. Graft was harvested 2 cm longer than the measured stricture length, as there is approximate 10% contraction over time, and width of 15-25 mm was taken to provide a lumen of at least 24 Fr after tubularization.

For BMU, graft taking was started with the submucosal infiltration of xylocaine and adrenaline (1:100,000) under the marked buccal mucosal patch. Approximately, 0.5-1.0 cm mucosa from Stenson's duct were left to prevent duct injury. All defects were left open to prevent tension, pain, and distortion.

After graft harvest, fat removal was done till the graft appeared creamy white. Graft and urethral plate were stretched to avoid postoperative diverticula and postvoid dribbling; attached on cavernosal bodies and after that it was sutured to the urethral plate in dorsolateral onlay fashion.

Finally, the urethra was closed over 16 Fr silicone catheter with 4-0 vicryl. All patients were given intravenous antibiotics for 1 days, followed by oral for 5 days. The patient was allowed clear fluids or liquid diet on day 1 and then gradually soft and regular diet in the following days. In the postoperative period patients were asked to outpatient clinic for reporting the complications.

The patients were followed at 1, 3, 6 and 12 months after surgery. Voiding symptoms, questionnaires, and UFM were done in all as primary screening for stricture recurrence. Urethrography and cystourethroscopy were done as a secondary screening only if the patient developed obstructive symptoms or UFM showed $Q_{max} < 15$ ml after ruling out lower urinary tract infection.

The success of urethroplasty was considered as the primary outcome of the study. We defined success as the absence of any obstructive symptoms and no need of subsequent procedures, such as dilatation, cystourethroscopy, and internal urethrotomy.

Statistical evaluation

Data were entered in the MS Excel and analyzed in SPSS version 20 software (IBM Corp. IBM SPSS Statistics for Windows, Version 16.0). Continuous variables were presented as means \pm standard deviation. Proportions (percentages) were calculated for discrete variables.

RESULTS

Characteristics of patients and in follow up periods are depicted in Table 1. Mean age was 53.7 ± 13.6 . The stricture length ranged from 3 to 6 cm (mean 4.4 ± 0.8). The success rate for BMG was 67.7% at 12th month. Three patients presented with voiding difficulty in the 3rd month, one in the next 12 months, had urethral restenosis. One patient had fistula formation at 6th month post-operatively.

One patient was reoperated with internal urethrotomy and subsequent internal urethrotomy with urethroplasty, one with urethroplasty and subsequent urethral dilation, one with internal urethrotomy and subsequent urethral dilation, one with fistula closure. Early and immediate graft donor site complications were seen in all patients.

Pain, difficulty in chewing and numbness of donor site was the most common early complication, but these were mild and transient in all patients. Salivary flow changes were not seen in any patient.

Table 1.
Characteristics of patients undergoing buccal mucosal urethroplasty.

| Age | Etiology of stricture | Stricture length cm | Comorbidity | 3 rd month | 6 th month | 12 th month | Reoperation | Dilation |
|-----|--|---------------------|-------------|-----------------------|-----------------------|------------------------|----------------------|----------|
| 73 | Infection (Fournier) | 6.0 | DM+HT | stricture | normal | normal | - | + |
| 50 | Hypospadias repair | 4.0 | none | stricture | normal | stricture | Urethroplasty | - |
| 47 | Trauma | 4.0 | none | normal | normal | normal | - | - |
| 44 | Trauma | 5.0 | none | normal | normal | stricture | Urethroplasty | - |
| 39 | Trauma | 4.0 | none | normal | normal | normal | - | - |
| 64 | Instrumentation (TUR-P) | 4.0 | HT | normal | normal | stricture | Internal urethrotomy | + |
| 34 | Trauma | 4.0 | none | normal | normal | normal | - | - |
| 68 | Infection | 5.0 | none | normal | normal | normal | - | - |
| 38 | Hipospadias repair | 5.0 | HT | normal | fistula | fistula | Fistula closure | - |
| 63 | Infection (urethritis) | 5.0 | DM+HT | normal | normal | normal | - | - |
| 56 | Instrumentation (urinary catheter insertion) | 3.0 | DM+HT+CAD | normal | stricture | stricture | - | + |
| 75 | Lichen sclerosis | 4.0 | HT | normal | normal | normal | - | - |
| 62 | Instrumentation TURP | 5.0 | DM+HT | normal | normal | normal | - | - |
| 37 | Hypospadias repair | 3.0 | none | normal | normal | normal | - | - |
| 55 | Trauma | 5.0 | DM | stricture | stricture | stricture | Urethroplasty | + |

DM: Diabetes Mellitus; HT: Hypertension; CAD: Coronary artery disease.

DISCUSSION

Severe and longer urethral strictures require substitution urethroplasty. Miscellaneous tissues have been used in the past however, in the last decade, buccal mucosa gained popularity as the best substitute material for urethral reconstruction (11).

Buccal mucosa is a convenient donor site for augmentation urethroplasty because of its thick epithelium, high content of elastic fibers and rich vascularity due to plexiform lamina propria, and good graft uptake (12). It is easy to obtain, readily available, compatible with wet environment, and buttress the local immune status with its increased amount of IgA, resistant to infection and has better healing features as demonstrated by rapid healing of aphthous ulcers. A systematic review and meta-analysis of urethral reconstruction with buccal mucosa or penile skin graft (PSG) revealed a success rate of 85.9% with buccal mucosa and 81.8% with PSG (13).

A 90% success rate has been reported when using buccal mucosa dorsal onlay free grafts for the management of bulbar urethral strictures. Whereas a 87% success rate when using buccal mucosa urethroplasty to treat 24 pendulous strictures. Our series is a 5-year retrospective review, of 24 consecutive patients who underwent buccal mucosa urethroplasty. It is not within the scope of this paper to discuss, in detail, the surgery involved as it is well described in previous studies, but rather to report the outcome following its use.

In addition, the nuances such as dorsal versus ventral onlay, one versus two-stage techniques, and the choice of surgery/graft depending on whether the stricture is bulbar pendulous or meatal, are not mentioned in this paper. The overall medium to long-term success rate in our small series is 67.7% at 12th month (when stricture recurrence after stage 1 is considered failure).

This lower success rate may be explained with high number of strictures due to trauma and previous hypospadias repair. In the present series, pain, difficulty in chewing and numbness of donor site were the most common early complication. No long-term complications, such as sensory nerve deficit, or damage to Stenson's duct occurred. In parallel to this observation, several authors have reported no important oral complications in their respective studies (14-17). However, in a retrospective review of 49 male patients it was found that 15 (26%) had residual perioral numbness after 6 months, with 5 (9%) having persistent restriction in mouth opening.

Considering the serious complications, mouth tightness due to oral scar development rates ranged from 9% to 32% in some series with a single serious hematoma case on the graft removal site in the buccal mucosa (18-20). In association with follow-up duration, it is known that all urethral grafts tend to shrink over time. One can claim that, a longer follow-up period is likely to produce poorer results. In this present study the mean follow-up period of 12 months may be the limitation of the study.

The other limitation of the study is its retrospective nature. Nevertheless, in the presence of different stricture etiologies and various parameters such as location, length and surgical techniques, a large prospective ran-

domised trial comparing graft materials and/or techniques would be extremely difficult to design. Therefore, despite the relatively small number of patients of our study, the present results seem to contribute modestly to the fact that BMU is a suitable method in substitution urethroplasty.

CONCLUSIONS

Reconstruction of a urethral stricture, not treatable with end-to-end anastomosis, impose a difficult surgical problem. Although the sample size is small, our study suggest that anterior urethral strictures up to 6 cm in length may be effectively managed with BMU.

The buccal mucosa is easy to obtain and handle, therefore BMU can be safely and effectively managed outside high volume institutions. Furthermore, the rate of complications, from both a urological and oropharyngeal perspective is low.

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