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BUCCAL MUCOSA URETHROPLASTY FOR BULBAR URETHRAL STRICTURES

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Objectives: Urethroplasty with the buccal mucosa graft is an excellent option for the treatment of urethral stricture disease. The authors report their 10-year experience with buccal mucosa graft urethroplasty by the dorsal and ventral approach.

Patients and Methods: From June 1994 to May 2003, 67 patients with bulbar urethral stricture underwent buccal mucosa urethroplasty. A free graft of buccal mucosa was used as an onlay; ten patients were operated by the ventral approach and the remaining 57 by the dorsal approach. After the bulbar urethra is exposed, we perform a dorsal endoscopic cold knife urethrotomy until the urethra is fully opened. After measurement of the defect, the graft is harvested from the lower lip and sutured to the urethra and to the corpora cavernosa. A transurethral grooved catheter and suprapubic drainage are left for 7 and 14 days, respectively.

Results: The median follow-up was 58 months (range 12 – 110). Recurrence of the stricture occurred in 4% (3/67) of the patients with a recurrence rate of 2/10 (20%) and 1/57 (2%) for the ventral and dorsal onlay patients, respectively. The overall complication rate was 9/67 (13%).

Conclusions: Buccal mucosa urethroplasty provides a high long-term success rate for the treatment of bulbar urethral strictures. The dorsal onlay may be superior to the ventral onlay approach.

Key Words: urethral strictures, buccal mucosa, urethroplasty

INTRODUCTION

The treatment of urethral stricture disease in the adult is often challenging. After the initial reports of high success rates of cold knife urethrotomy, a long-term stricture recurrence rate was reported[1]. For most urethral strictures, urethroplasty is today the best option to achieve definitive cure.

Two important topics have recently changed urethral surgery: the use of the buccal mucosa for urethroplasty[2], and the dorsal onlay approach, according to Barbagli[3].

One-stage urethroplasty can be considered the best option for the treatment of primary strictures. We report our 10-year experience with bulbar urethral strictures treated with buccal mucosa graft urethroplasty, mostly by the dorsal approach.

PATIENTS AND METHODS

In a multi-institutional study carried out between June 1994 and April 2004, seventy-two patients with urethral strictures were treated with one-stage buccal mucosa graft urethroplasty; 67 of them had a bulbar stricture. Only these 67 patients were included in this study. Sixty-five patients (97%) had a stricture recurrence after previous urethrotomy (1-7 procedures, median 3); ten patients (15%) had already undergone unsuccessful urethroplasty.

The procedure was performed with a ventral onlay in 10 patients and with a dorsal onlay in 57 patients. Preoperative evaluation included uroflow, retrograde and voiding urethrocystogram, as well as Stamey test for urinary infection. The mean age was 44 years (range: 14 – 69 years). The median length of the stricture was 3.5 cm (range: 2 – 16 cm).

The aetiology of the stricture was infective in 28 (42%), iatrogenic in 22 (32%), unknown in 12 (18%) and traumatic in 5 (7%) patients.

Nine patients had panurethral stricture disease with a median length of the stricture of 11 cm (range 9 – 16 cm) requiring a combined urethroplasty. A pedicled penile skin flap and buccal mucosa free graft were used.

Technique:

Epidural anaesthesia is used. The patient is placed in the lithotomy position. A perineal midline incision is performed. The bulbocavernosus muscle is divided, obtaining good access to the bulbar urethra. A Brantley-Scott perineal retractor is used. The urethra is isolated from the surrounding tissues and the corpora cavernosa. For the dorsal approach, ventral dissection should be avoided to decrease the risk of damage to the bulbar arteries. The stricture can be better located by gently inserting an 18 Fr. Foley catheter, until it can be further introduced without forcing. With a 20 Fr. urethrotome a full thickness endoscopic section of the stricture is done at 12 o'clock. The dorsal urethrotomy is prolonged with scissors until healthy, wide caliber urethral tissue is encountered. Usually the incision must include 5 mm of healthy urethra cranially and distally to the ends of the stricture. The length of the urethral defect is measured.

The mental nerve is blocked. Then the lower lip is exposed with 2 sutures and a free graft of buccal mucosa is obtained, 2 cm wide and 1 cm longer than the measured length. The submucosa is infiltrated with a saline solution with norepinephrine at a 1/100,000 concentration. This maneuver allows harvesting of a graft as thin as possible, to prevent scarring and retraction of the lip. The graft is held and stretched on a silicone board with pins. All submucosa fibro-vascular and fatty tissue is carefully and completely removed. The graft is sutured to the open urethra with two series of interrupted vicryl 4/0 sutures. The same stitches are used to stretch and suture the urethra to the corpora cavernosa. With this procedure close contact between the urethra and the crura is obtained.

A Penrose drainage is left for 24 hours. Perineal compressive dressing is applied for 5 days. A grooved 16 Fr. silicon catheter is left postoperatively for one week. The patient must stay in bed for three days during which inosculation takes place. A suprapubic tube is maintained up to the second week, when a control antegrade urethrocystogram is obtained.

RESULTS

The median operative time was 135 minutes. No patient required blood transfusion. Median follow-up is now 58 months (range 12 - 110 months). The overall complication rate was 9/67 (13%). Early complications occurred in four patients (6%) including prolonged periurethral leakage at voiding cystourethrogram in two – it healed with conservative treatment by suprapubic drainage (4 and 6 weeks) -, and bleeding from the lower lip in one patient requiring local compressive dressing for 48 hours. Surgical revision was performed 20 days after urethroplasty for the correction of urethral torsion due to wrong fixation to the corpora in one patient. Late complications occurred in 5 patients (7%), including recurrent urinary tract infection requiring antibiotic therapy in 4 cases, and moderate lower lip sensitivity loss, 2 cm in extension, in one case. Follow-up criteria included uroflow at 6 and 12 months, then yearly, and urethrocystogram at 12 months and then only if the peak flow was below 15 ml/sec. The urethral stricture recurred in 2 of 10 patients (10%) treated with ventral graft, and in one of 57 patients (2%) treated with dorsal onlay ($P = 0.01$, two-tail Z test). Buccal mucosa urethroplasty was successful in 64/67 strictures (96%).

The urethrocystogram shows a good urethral caliber in all patients, occasionally with a non-obstructing abnormality of the ventral urethra at the site of the previous stricture.

DISCUSSION

The use of buccal mucosa for adult urethral stricture repair was first described by El-Kassaby et al. in 1993 and Baskin and Duckett in 1994[4,5].

Buccal mucosa is an optimal substitute for the urethra. The buccal mucosa graft is easily harvested and the bed heals quickly, with no sutures being required. The graft can be obtained from the inner cheek or from the lower lip. At these sites, the epithelium is thick and rich in elastin. The lamina propia of the buccal mucosa is very thin[5]. These features facilitate the inosculation of the graft with new vessels

from the hosting bed, so that the new blood supply is adequate for graft survival.

The dorsal approach with fixation of both the graft and the urethra to the corpora cavernosa can stretch the urethra open. Even in case of graft necrosis, the urethra is held open by the suture and new urethral mucosa can grow along the surface of the corpora, decreasing the likelihood of stricture recurrence.

Several reports are available in the literature regarding the use of buccal mucosa for adult urethral stricture disease. El Kassaby et al. first achieved a 90% success rate in 20 patients with anterior urethral strictures treated with buccal mucosa graft urethroplasty[4].

However, the question remains: Which is the best procedure for buccal mucosa graft urethral reconstruction, the ventral or the dorsal approach?

Meneghini et al.[6] reported a success rate of 80% in 16/20 patients treated with ventral buccal mucosa urethroplasty for bulbar urethral strictures. The ventral onlay for buccal mucosa urethroplasty was also successful in the treatment of 47/53 patients (88%) with bulbar urethral strictures (median length 3.6 cm) in a multi-institutional study with a median follow-up of 25 months[7]. However, sacculation of the graft occurred in 4 cases (7.5%). Likewise, ventral buccal mucosa graft urethroplasty was performed in 60 patients with bulbar urethral strictures (49 with recurrent strictures) by Elliott et al.[8]. The graft length was 4.8 cm. Nine patients required a combined technique with distal penile fasciocutaneous flap for associated penile urethral stricture. At a median follow up of 47 months (minimum 12 months), 54 patients (90%) had no evidence of recurrent stricture.

Randomized studies comparing the dorsal and ventral approaches for buccal mucosa graft urethroplasty have not been published so far.

Andrich et al.[9] treated 71 patients with bulbar urethral strictures with buccal mucosa patch urethroplasty. The approach was dorsal in 42 cases and ventral in 29 cases. An overall five-year successful outcome was seen in 65 of their cases (92%), while the five-year recurrence rate was 5% and 14% for the dorsal and ventral procedure, respectively (P = 0.08).

In our study, comparison of the dorsal and ventral approaches cannot be properly done, since the latter group is too small. Nevertheless, a statistically significant lower recurrence rate was observed with dorsal graft urethroplasty compared to the ventral procedure (2% vs. 20%, P= 0.01).

The use of buccal mucosa has recently been extended to the treatment of penile urethral strictures. Heinke et al.[10] treated 38 patients with recurrent strictures of the bulbar (n= 30) and proximal penile urethra (n = 8) with the buccal mucosa ventral onlay graft. At 23 months, the overall success rate was 80%.

In another study, 23 patients with anterior urethral strictures underwent one-stage urethroplasty with a buccal mucosa ventral onlay graft[11]. The stricture site was bulbar in 18 cases and penile in 5 cases. The mean graft length was 4.9 cm. At 50 months, 20/23 patients (87%) had no evidence of recurrence.

An extensive experience with buccal mucosa urethroplasty has also been published by Andrich and Mundy. The procedure was performed in 128 patients with anterior urethral strictures[12]. The stricture was in the bulbar urethra in 77 cases and in the penile urethra in 41 cases. Thirty-three patients with penile urethral strictures, however, required two-stage urethroplasty. According to the type of reconstruction, the success rate was 89% for patch urethroplasty and 55% for tube urethroplasty at a minimum follow-up of 24 months.

Palminteri et al.[13] have proposed two-stage buccal mucosa urethroplasty for complex bulbar urethral strictures. After first-stage perineal urethrostomy with urethral plate preservation, a second-stage buccal mucosa graft is placed ventrally and urethral closure is achieved. At 18 months the reported success rate was 23/24 (93%), though surgical revision was performed between stages one and two in 6 cases.

New materials for urethral reconstruction are still searched for. Experimental and clinical studies are presently carried out to investigate the use of inert or cell seeded collagen matrix for urethral substitution[14,15].

In conclusion, buccal mucosa graft urethroplasty has been widely accepted for the treatment of bulbar urethral strictures. Prospective randomized data as to whether the dorsal or

ventral approach is best for urethral reconstruction are not available. The first reports on buccal mucosa urethroplasty in the treatment of penile urethral strictures are encouraging. For complex strictures, especially of the penile urethra, a two-stage procedure may be required.

REFERENCES

1. Pansadoro V, Emiliozzi P. Internal urethrotomy in the management of anterior urethral strictures: long-term follow-up. *J Urol* 1996, 156:73.
2. Bürger RA, Müller SC, El-Damanhoury H *et al.* The buccal mucosal graft for urethral reconstruction: a preliminary report. *J Urol* 1992, 147:662.
3. Barbagli G, Selli C, di Cello V *et al.* A one-stage dorsal free-graft urethroplasty for bulbar urethral strictures. *Br J Urol* 1996, 78:929.
4. El-Kasaby AW, Fath-Alla M, Noweir AM *et al.* The use of buccal mucosa patch graft in the management of anterior urethral strictures. *J Urol* 1993, 149:276.
5. Baskin L, Duckett JW. Mucosal grafts in hypospadias and stricture management. *AUA Update Series* 1994, 13:269.
6. Meneghini A, Cacciola A, Cavarretta L *et al.* Bulbar urethral stricture repair with buccal mucosa graft urethroplasty. *Eur Urol* 2001, 39:264.
7. Kane CJ, Tarman GJ, Summerton DJ *et al.* Multiinstitutional experience with buccal mucosa onlay urethroplasty for bulbar urethral reconstruction. *J Urol* 2002, 167:1314.
8. Elliott SP, Metro MJ, McAninch JW. Long-term follow up of the ventrally placed buccal mucosa onlay graft in bulbar urethral reconstruction. *J Urol* 2003, 169:1754.
9. Andrich DE, Leach CJ, Mundy AR. The Barbagli procedure gives the best results for patch urethroplasty of the bulbar urethra. *BJU Int* 2001, 88:385.
10. Heinke T, Gerharz DW, Bonfig R, Riedmiller H. Ventral onlay urethroplasty using buccal mucosa for complete stricture repair. *Urology* 2003, 61:1004.
11. Kellner DS, Fracchia JA, Armenakas NA. Ventral onlay buccal mucosal grafts for anterior urethral strictures: long-term follow up. *J Urol* 2004, 171:726.
12. Andrich DE, Mundy AR. Substitution urethroplasty with buccal mucosal-free grafts. *J Urol* 2001, 165:1131.
13. Palminteri M, Lazzeri M, Guazzoni G, Turini D, Barbagli G. New 2-stage buccal mucosal graft urethroplasty. *J Urol* 2002, 167:130.
14. De Filippo RE, Yoo JJ, Atala A. Urethral replacement using cell seeded tubularized collagen matrices. *J Urol* 2002, 168:1789.
15. El-Kassaby AW, Retik AB, Yoo JJ, Atala A. Urethral stricture repair with an off-the-shelf collagen matrix. *J Urol* 2003, 169:170.

RESUME

L'utilisation de muqueuse buccale dans le traitement des sténoses de l'urètre bulbaire

Objectifs: L'urètroplastie par greffe de muqueuse buccale est une excellente option pour le traitement des sténoses urétrales. Les auteurs rapportent 10 ans d'expérience dans l'approche dorsale et ventrale de la greffe de muqueuse buccale dans l'urètroplastie. **Patients et Méthodes:** De juin 1994 à mai 2003, 67 patients présentant une sténose de l'urètre bulbaire ont subi une urètroplastie utilisant la muqueuse buccale. Un onlay est réalisé par un greffon de muqueuse buccale libre; dix patients ont été opérés par l'approche ventrale et les 57 restants par l'approche dorsale. Après exposition de l'urètre bulbaire, nous réalisons une urètrotomie interne endoscopique dorsale jusqu'à ce que l'urètre soit complètement ouvert. Après mesure du défècte, le greffon est prélevé au niveau de la lèvre inférieure et est suturé à l'urètre et aux corps caverneux. Un drainage transurètral et suspubien est gardé respectivement 7 et 14 jours. **Résultats**: La médiane du suivi était de 58 mois (de 12 à 110). Une récidive de la sténose est constatée dans 4% (3/67) des patients avec un taux respectif de récidives de 2/10 (20%) et 1/57 (2%) patients pour l'onlay ventral et dorsal. Le taux de complications total était de 9/67 patients (13%). **Conclusions:** L'utilisation de muqueuse buccale dans le traitement des sténoses de l'urètre bulbaire donne à long terme un taux de succès élevé. L'onlay dorsal parait donner de meilleurs résultats que l'approche ventrale.

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