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Dorsal Onlay Graft Urethroplasty Using Penile Skin or Buccal Mucosa for Repair of Bulbar Urethral Stricture: Results of a Prospective Single Center Study

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Abstract

Objective: To compare the outcomes of dorsal onlay graft urethroplasty using penile skin (PS) or buccal mucosa (BM) free grafts in the repair of adult bulbourethral strictures.

Methods: From January 1998 to March 2003, 30 patients with bulbar urethral strictures underwent urethral reconstruction with PS (17) or with BM free graft (13). Follow-up was done at 6, 12 and 18 months postoperatively, and every year subsequently. Success was defined as normalization of IPSS and a stable Q_{max} value >20 ml/s. Any further instrumentation for stricture recurrence was considered a failure.

Results: Mean follow-up was 51 months (20–74). The overall success rate was 80% (85% in the BM and 76% in the PS group). Improvement of uroflowmetry, IPSS and QoL did not show a significant difference between the two groups. A significant improvement of the orgasmic function domain of the IIEF was found in patients treated with a PS graft. Post-operative complications were lip hypoesthesia (30%), retraction of the ventral skin of the penis (7%), post-voiding dribbling (8% with BM graft, and 7%, with PS graft). Six patients, 2 with BM (15%) and 4 with PS graft patch (24%) required further treatment due to stricture recurrence.

Conclusion: Results of PS or BM graft are comparable at 18 month follow-up, although orgasmic function is significantly improved in patients receiving a PS graft. Nevertheless, with extended follow-up, the use of PS seems to be associated with a higher failure rate.

Keywords: Urethral stenosis; Buccal mucosa; Grafting tissue; Grafting skin

1. Introduction

Complex strictures of the bulbar urethra that cannot be treated by means of an end-to-end anastomotic repair may be treated with a substitution urethroplasty. The issue of which material is best has generated considerable debate in the past [1–3]. Initially, the use of full-thickness free grafts of penile skin had been reported as successful. In time, this technique has been further refined and long term good results have been achieved [4]. Graft take was reasonable but shrinking and the lack of mechanical support of a fixed bed reduced neo-vascularization and consequently the caliber of the urethra [5–7]. Moreover, the use of extragenital skin and split thickness free grafts was associated with poor results due to significant retraction from scarring [4]. The use of dartos pedicled flaps has many advantages in terms of increased survival thanks to its own vascularization. Penile or preputial flaps were more successful than scrotal flaps [1], but were limited by the weakness of the flap at the site of the

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patch, causing the development of pseudo-diverticula, post voiding dribbling, infection and irritative symptoms [5–8]. In 1996, Barbagli et al. introduced a modified bulbar urethroplasty where the strictourethrotomy was made on the dorsal urethral surface rather than on the ventral with the graft dorsally sutured to the corpora cavernosa [9]. Subsequently many authors described the use of buccal mucosa placed in dorsal onlay fashion [14–22].

The aim of the study was to prospectively evaluate the outcome of a Barbagli dorsal patch urethroplasty performed with either penile skin or buccal mucosa in order to identify the best substitution material in terms of functional results and to evaluate sexual function after both procedures.

2. Materials and methods

From January 1998 to March 2003, 30 patients aged between 18 and 69 years old (mean age 42 years) with bulbar urethral strictures underwent urethral reconstruction with either penile skin (17 patients) or with buccal mucosa graft (13 patients). The etiology of strictures was unknown in 18 cases and secondary to catheterization/instrumentation in 12 cases. All patients were previously treated with at least one internal urethrotomy. Mean stricture length was 3.5 cm (2.5–5.5 cm). Preoperative assessment consisted of scoring subjective symptoms by means of International Prostate Symptom Score (IPSS), and International Index of Erectile Function (IIEF) questionnaires, urinalysis, uroflowmetry, retrograde and voiding cystourethrography, and urinary tract ultrasound. The surgical technique used was the one previously described by Barbagli et al. [9]. The urethra is completely mobilized from the corpora cavernosa, rotated 180 degrees, and the strictured tract is opened along its dorsal surface. Penile skin was harvested either from the prepuce or from the ventral aspect of the penile shaft while buccal mucosa was harvested at the lower lip. The choice of the graft tissue was made according to the choice of the patient and to his anatomical characteristics. The graft was fenestrated and there sutured to the opened urethra. The left mucosal margin of the opened urethra is sutured to the left side of the patch graft. The urethra is then rotated back to its original position and the right urethral margin is sutured to the right side of the patch graft. At completion, the graft area is entirely covered by the urethral plate and a 16 Ch Foley catheter is put in place. In the last two cases we employed buccal mucosa from the inner cheek in the area just below Stensen's duct.

Foreskin or ventral shaft skin provided a graft of sufficient size with a length varying from 2.5 to 6 cm (mean 4.3). Buccal mucosa graft length ranged from 2.5 to 5 cm. (mean 3.2) and width from 2 to 3 cm. (mean 2.5).

The catheter is removed 3 weeks after surgery when a voiding cystourethrography is performed.

Follow-up consisted of administration of IPSS, IIEF questionnaires, uroflowmetry and urinalysis at 6, 12 and 18 months, and every year subsequently. Cystourethrography was done in cases of obstructive symptoms or abnormal stream. Success was defined by the absence of obstructive symptoms at IPSS and a stable maximum urinary flow value >20 ml/s. Patients with obstructive symptoms associated with urinary flow <20 ml and evidence of a recurring stricture leading to the need for further instrumentation (including dilation or urethrotomy), were considered failures. Diagnosis of recurrence was performed in all patients by means of uroflowmetry, IPSS questionnaire, retrograde and antegrade cystourethrogram and flexible endoscopy. Statistical analysis was based on the Student's *t*-test for unpaired data. The analysis of surgical results was performed using Kaplan-Meier curves and log rank test.

3. Results

All patients were assessed at a shortest follow-up of 20 months; maximum was 74 months and average 51 months. The overall success rate was 80% (24 patients out of 30): 11 patients with buccal mucosa (group 1) (85%) and 13 patients with penile skin graft patch (group 2) (76%). The difference between the two groups was not statistically significant as demonstrated in the Kaplan-Meier curve and log rank test (Fig. 1). Preoperative patients characteristics as defined by questionnaires were similar in both groups of patients: maximum urinary flow was 7.5 and 4.7 ml/s and IPSS was 18.7 and 16.3 in group 1 and group 2 respectively; quality of life was poor in either group (5 and 5.1). At the 18 month follow-up a general improvement was observed in the IPSS and QoL questionnaires: maximum flow rate improved (>20 ml/s) and IPSS fell to 2.6 and 4 respectively in group 1 and group 2; quality of life improved to 0.4 and 1 respectively (Table 1). Table 2 shows the changes observed in the erectile and orgasmic function domains of the IIEF. While the erectile function domain did not change significantly, a statistically significant improvement of orgasmic

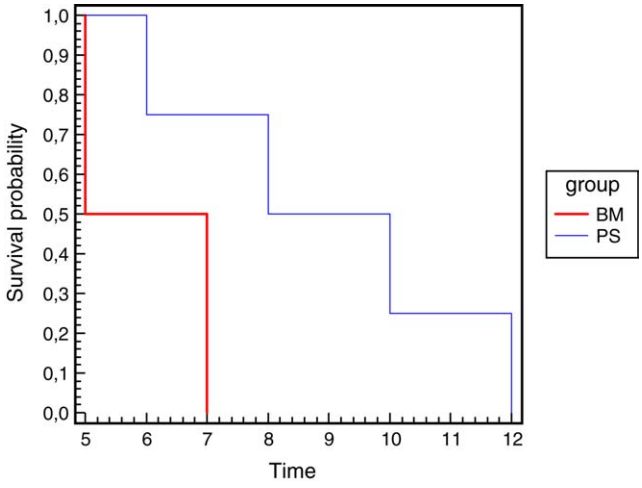

Fig. 1. Kaplan-Meier curves regarding stricture free probability as a function of time in buccal mucosa and in penile skin group (log rank test: chi-square 2.17; $p = 0.14$).