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Surgery in Motion

Surgical Techniques in Substitution Urethroplasty Using Buccal Mucosa for the Treatment of Anterior Urethral Strictures

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Abstract

Objectives: Since the resurgence in the use of buccal mucosa (BM) in substitution urethroplasty in the late 1980s and early 1990s, there has been controversy as to which surgical technique is the most appropriate for its application.
Methods: The authors performed an updated literature review. Several centres have published widely on this topic, and the points considered include the use BM in dorsal onlay grafts, ventral onlay grafts, and tubularised grafts and the role of two-stage procedures.
Results: In experienced hands, the outcomes of both dorsal onlay grafts and ventral onlay grafts in bulbar urethroplasty are similar. The dorsal onlay technique is, however, possibly less dependent on surgical expertise and therefore more suitable for surgeons new to the practice of urethroplasty. The complications associated with ventral onlay techniques can be minimised by meticulous surgical technique, but in series with longer follow-up, complications still tend to be more prevalent. In penile urethroplasty, two-stage dorsal onlay of BM (after complete excision of the scarred urethra) still provides the best results, although in certain circumstances a one-stage dorsal onlay procedure is possible. In general, ventral onlay of BM and tube graft procedures in the management of penile strictures are associated with much higher rates of recurrence and should therefore be avoided.
Conclusions: In experienced hands the results of the ventral and dorsal onlay of BM for bulbar urethroplasty are equivalent. Two-stage procedures are preferable in the penile urethra, except under certain circumstances when a one-stage dorsal onlay is feasible.

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1. Introduction

Anastomotic repair of the urethra has a higher success rate than any other type of repair. When substitution procedures are necessary, historically various tissues have been used including genital (penile and scrotal) skin, extragenital skin, bladder mucosa, and buccal mucosa. These tissues have been used as either pedicled flaps with their own blood supply or as free tissue grafts. The use of colonic mucosa has also been reported, but this is not validated as yet and seems to involve a significantly greater degree of morbidity for graft harvest than any of the other methods mentioned.

The most common graft materials in use today are buccal mucosa (BM), preputial skin (when available), and penile and preputial skin flaps with their own blood supply. The most appropriate use of these materials has long been the subject of controversy, especially in terms of which type of tissue and whether as a graft or flap and at which site along the urethra.

The use of BM in urethral surgery was first described by Humby in 1941 [1] but not reported again until the late 1980s. Since then, it has proved to be a versatile graft material well suited to repair of the urethra [2–5] because it is a wet epithelium, which is easily harvested and amenable to surgical manipulation, has a privileged immunity rendering it less prone to infection, and is more resistant to stricture recurrence than skin particularly in the presence of lichen sclerosus (LS), previously known as balanitis xerotica obliterans (BXO). BM also has a dense submucosa with a dense capillary network that facilitates the early imbibition of nutrients from the wound bed as well as early inosculation of neovasculature [2–6]. The graft is harvested either from the inner aspect of one or both cheeks, from the lower lip, or in cases where extensive substitution is necessary, from all three sites. Several papers have looked at the morbidity associated with harvesting the BM graft, and all conclude that morbidity is lower with inner cheek harvest than lower lip, because these patients tend to have a lesser degree of discomfort and a lower rate of paraesthesia (secondary to mental or lingual nerve injury) postoperatively [7,8].

Recent controversy has surrounded whether to insert this tissue in a ventral or dorsal position, and a previous review suggested that the two techniques might be more similar in terms of outcome than previously thought [9]. With this in mind this updated review was conducted to evaluate this further.

2. Methods

A Medline search was performed. Articles from 1985 onwards were included with the search using the above key words. Articles not discussing the specific technique of substitution urethroplasty were discounted. Due to the nature of the surgery, it is usually performed in specialist centres. These centres tend to have larger series and, hence, the majority of papers tend to come from only a few sources.

3. Results

3.1. *Bulbar urethra*

Most of the literature relates to bulbar urethroplasty. Traditionally, urethroplasty is performed as an ventral onlay, with the corpus spongiosum either excised and reconstructed using a BM patch applied to a dorsal native urethral roof strip or incised in the midline over the stricture to perform a ventral stricturotomy [10,11], with the free graft applied to augment the urethra. Ideally, the corpus spongiosum is then closed over the graft to provide a well-vascularised bed, and the bulbocavernosus muscle and soft tissues are then closed to complete the procedure.

The concept of dorsal onlay grafts for substitution bulbar urethroplasty, mobilising the urethra intact, and performing the stricturotomy dorsally, was introduced by Barbagli et al in 1996 [12–14], and since has found widespread support. This has been suggested to produce the following benefits: less bleeding from the thinner dorsal spongiosum, application of the graft to the tunica albuginea of the corpora cavernosa providing a more stable base to allow better fixation of the graft, facilitating the acquisition of a richer blood supply, and reducing contracture during healing. Also, theoretically there should be less risk of sacculation of the graft under pressure of voiding and, hence, a lower incidence of diverticulum formation. In some cases, the degree of spongiofibrosis is such that a lengthy segment of urethra has to be removed and, hence, incision and augmentation of the onlay with corpus spongiosum is not possible. In these cases, the strictured urethra needs to be excised and a modified onlay procedure can be performed (eg, augmented roof-strip procedure [6,14] or one-stage circumferential mucosal replacement graft [15]). Alternatively, a tubularised graft can be placed, but this should be avoided because of the higher failure rate [6,16]. In these cases two-stage surgery is more appropriate with the formation of a temporary perineal urethrostomy prior to the second stage.

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