



African Journal of Urology

Official journal of the Pan African Urological Surgeons' Association
web page of the journal

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Review

Management of anterior urethral strictures with buccal mucosa: Our pioneering experience



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Received 21 January 2016; accepted 25 January 2016

Available online 2 March 2016

KEYWORDS

Anterior urethral strictures;
Urethroplasty;
Buccal mucosa graft

Abstract

Urethral stricture management is a challenging surgery. Multiplicity of techniques means that none of them is ideal. No single technique is appropriate for all situations and the successful surgeon should have a store of operations to choose from according to each specific case. This review aims to provide an update on the different uses of buccal mucosal graft as a reconstructive and replacement tool for anterior urethral strictures management.

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Historical background

Buccal mucosa graft (BMG) was first use as a urethral reconstructing tool by Humby in 1941. He used a lower lip graft for a patient with multiple hypospadias repair presented with penoscrotal fistula [1]. This was followed by a long period of inactivity.

In 1978, we started using buccal mucosal grafts for management of crippled hypospadias. Preliminary results were not encouraging. The first published series were by Burger et al., in 1992, who described the use of buccal mucosal graft in six patients; three of them with prior failed hypospadias repair and shortage of genital

skin [2]. Again the results were unsatisfactory till 1995, when Duckett et al. successfully used buccal mucosa for urethral reconstruction after hypospadias, epispadias and urethral strictures [3].

In 1993, El-Kassaby et al. published the first series for anterior urethral stricture repair using buccal mucosal grafts. 20 patients underwent 1-stage correction of an anterior urethral stricture using a buccal mucosa patch graft. This technique was used for short strictures (1–2 cm) that usually required a 2–4 cm repair. Results were successful in 18 patients, while 2 redo surgery for recurrent stricture [4].

Anatomic and histologic considerations

The oral mucosa is the mucous membrane lining the inner aspect of the mouth. It has two major layers, namely the epithelium and the underlying connective tissue (termed lamina propria). Another

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Peer review under responsibility of Pan African Urological Surgeons' Association.

<http://dx.doi.org/10.1016/j.afju.2016.01.003>

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submucosa layer can be found just beneath the lamina propria and is not easily discriminated from it [5]. Oral mucosa could be further subdivided into three categories (based on function and histology); Masticatory, Lining and Specialized mucosa.

Masticatory mucosa is formed of keratinized stratified squamous epithelium, found on the dorsum of the tongue, hard palate and attached gingiva. Its structure allows it to resist the abrasion of rough food particles.

Lining mucosa is formed of nonkeratinized stratified squamous epithelium, found almost everywhere else in the oral cavity, including buccal, labial and alveolar mucosa [5,6].

- Buccal mucosa refers to the membrane lining of the inner surface of the cheeks from the line of contact of the opposing lips anteriorly to the line of the pterygomandibular raphe (lateral to retromolar trigone) posteriorly. The medial boundary is the line of attachment of the buccal mucosa to the upper and lower alveolar ridges superiorly and inferiorly. It consists of stratified squamous epithelium (oral epithelium) and an underlying connective tissue (lamina propria) [7].
- Labial mucosa refers to the inside lining of the lips.
- Alveolar mucosa refers to the mucosa between the gums and the buccal/labial mucosa.

Specialized mucosa found specifically in the regions of the taste buds on lingual papillae on the dorsal surface of the tongue that contains nerve endings for general sensory reception and taste perception [5,6].

Anterior urethral strictures

The anterior urethral stricture equals narrowing of the anterior urethra. The pathology is explained mainly by fibrosis and scarring of the urethral epithelium together with the spongy erectile tissue of corpus spongiosum [8].

Etiology of anterior urethral strictures

Too many causes participate in this process. Infection, trauma and lichen sclerosis are considered as the most common etiologies. However, most causes of urethral strictures remain unknown, but they are probably due to a remote unrecognized perineal trauma or recurrent attacks of urethral mild infections (as *Neisseria gonorrhea* or *Chlamydia*) [9].

The pathological process includes injury to the urethral epithelium or the underlying corpus spongiosum leading to healing by a scar which ends by an anterior urethral stricture. Trauma, usually straddle, either presents as acute retention and urethral bleeding, or more often goes unrecognized and presents later with obstructive voiding complaints. Iatrogenic trauma to the urethra could be the cause, as catheterization and endoscopic procedures, but it decreases with fine manipulation of the urethra [10].

Lichen sclerosus et atrophicus is another common chronic inflammatory condition that affects the anterior urethra as well as the foreskin and glans. It is considered as a frequent cause of phimosis, meatal stenosis and long anterior strictures.

Use of skin in reconstruction of the urethra frequently results in re-stricturing due to recurrent lichen sclerosis or to Koebner phenomenon which is recurrence of the skin condition in diseased skin [11].

Lichen sclerosis characterized with uncertain etiology, varied presentation, and multiple treatments. In early stages, a short course of steroids, topical or systemic, can control the disease and prevent progression. Surgical treatment by circumcision can be curative if the disease is treated early when still localized. Progression to long segment stricture or panurethral stricture will necessitate more sophisticated management [12].

Presentation of urethral stricture patients

These patients usually present with lower urinary tract obstructive symptoms or recurrent urinary tract infections such as prostatitis or epididymitis. Some patients also present with urinary retention. But with detailed history, most of these patients are found to have tolerated notable voiding obstructive symptoms for a long period of time before progressing to complete obstruction [10].

Evaluation of anterior urethral strictures

To start treatment, the nature of the stricture including stricture anatomy should be accurately determined. The location and length of the stricture is determined using radiography [13], urethroscopy, flexible cystoscopy [14] and ultrasonography [15]. The depth and density of the scar in the spongy tissue is more difficult to estimate but it could be measured by ultrasonography or magnetic resonance imaging. Morey and McAninch found that ultrasonography accurately defines the extent of spongiositis in bulbar urethra [15]. It usually exceeds the appearance of the stricture length measured in the contrast studies. It is very beneficial for reconstructive urologists to attend the urethrography or doing it by themselves.

Even by the use of all of these tools, the final and most accurate evaluation of stricture will be available during surgery assisted by antegrade or retrograde endoscopy.

Management of anterior urethral strictures

It has been said that there is no tissue better than the urethra to replace the urethra. This is true for short stricture in the bulbar urethra amenable for excision and primary anastomosis. But this is however not possible to achieve with longer strictures to avoid the risks of excessive mobilization and penile curvature. That's why urologists should be familiar with the use of many surgical techniques to deal with any condition of the urethra during surgery.

Among these techniques, penile grafts have been used to reconstruct the urethra in those strictures. To improve the survival and vascularity, the use of local flaps has also been advocated. Flaps however are technically demanding, and are not suitable in cases of Lichen Sclerosus.

In pursuit for the best graft material, bladder mucosa and buccal mucosal grafts have been used. The use of the latter has many advantages [4,16].

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