CLINICAL CASE

Panurethral stricture treatment using a one-stage ventral onlay buccal mucosa graft

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KEYWORDS
Lichen sclerosus; urethral stricture; Urethroplasty; Buccal mucosa; Mexico.

Abstract  Panurethral strictures (PUSS) are a therapeutic challenge for the urologist. Despite the fact that different techniques for their management have been described, postoperative recurrence is frequent, especially in cases associated with lichen sclerosus et atrophicus (LSA). In the last 2 years we have treated 3 patients with LSA-associated PUSS through urethroplasty and the application of a one-stage ventral onlay buccal mucosa graft. The mean stricture length was 16 cm and there were no immediate complications. At fourteen months of postoperative follow-up, the success rate was 66.6%.

We concluded that it is possible to obtain buccal mucosa grafts up to 18 cm in length in a single incision with minimal morbidity at the donor site. These grafts can be used for treating extensive, complex, and multisegmented urethral strictures with good results.

PALABRAS CLAVE
Liquen escleroso; Estenosis uretral; Urethroplastía; Mucosa oral; México.

Tratamiento de la estenosis panuretral mediante el uso de un injerto único de mucosa oral

Resumen  Las estenosis panuretrales (EPU) representan un reto terapéutico para el urólogo. A pesar de que distintas técnicas han sido descritas para su manejo, la recurrencia postoperatoria es frecuente, especialmente en casos asociados a liquen escleroso y atrófico (LE). En los últimos 2 años hemos tratado 3 pacientes con EPU asociada a LE, mediante una uretroplastía con aplicación de injerto único de mucosa oral en la porción ventral de la uretra. La longitud media de estenosis fue de 16 cm. No hubo complicaciones inmediatas. Se completaron 14 meses de seguimiento postoperatorio con una tasa de éxito del 66.6%.

Concluimos que, es posible obtener injertos de mucosa oral de hasta 18 cm de longitud en una única incisión con mínima morbilidad para el sitio donador, los cuales pueden ser usados para el tratamiento de estenosis uretrales extensas, complejas y multisegmentadas con buenos resultados.

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Introduction

Panurethral strictures (PUs) are a therapeutic challenge for the urologist, given that there is no universal consensus on their management.¹ Their treatment becomes even more complicated due to their high recurrence rate, the complexity of their etiology, and the fact that the majority of patients have been previously multitreated. Thus, the selection of the reconstruction technique depends on the length of the stricture, the grade of spongiofibrosis, and the experience and preference of the surgeon.²

Palminteri et al. recently established that panurethral strictures are predominantly caused by lichen sclerosus et atrophicus (LSA) and chronic urethral catheterization.³ LSA is a chronic, progressive, and sclerotic and atrophic inflammatory process of unknown etiology that affects the prepuce, glans penis, and urethral meatus⁴ (fig. 1A). It was first described by Stuhmer in 1928,⁵ but it was Laymon who, in 1951, reported the extension of this pathology to the entire urethra.⁶ Kulkarni et al.⁷ indicated that the incidence of urethral involvement due to LEA is approximately 10.3%.

Substitution urethroplasty through the use of buccal mucosa grafts appears to be the most widely accepted treatment of PUs, given that the use of cutaneous grafts has demonstrated recurrence of close to 100%.⁸ The aim of this article was to describe our experience with the treatment of PUs secondary to LEA. We present 3 patients with urethral strictures of 15 cm in length or more, all treated through one-stage ventral onlay buccal mucosa graft.

Case presentations

Within the time frame of March 2011 and January 2013, 3 patients (mean age: 58 years) arrived at our service with LEA-associated PUs that were 15 cm in length or longer. Before arriving at our hospital all 3 patients had undergone failed endourethral procedures, resulting in cystostomy placement.

The patients were evaluated through combined antegrade and retrograde cystourethrography in order to determine the extension and length of the stenoses (fig. 1B).

Each patient was placed under general anesthesia for the surgery, with nasal intubation and continuous epidural blockade. With the patient in the extended lithotomy position the “inverted Y” penile, scrotal, and perineal incision was made in order to expose the entire length of the urethra. The urethra was then incised longitudinally on its ventral surface from the urethral meatus to the posterior portion of the affected urethra (fig. 1C) and the length of the stricture was measured. The buccal mucosa graft was obtained by injecting a solution of 1:200,000 diluted epinephrine into the submucosa to prevent bleeding and to facilitate graft extirpation. Being careful not to affect the parotid duct openings, the graft, measuring 1.5 cm wide, was retrieved from the lower lip area in an extended manner, from one side to the other. It was extracted in a single piece (figs. 2A and 2B) and the buccal incision was closed with a 4-0 Vicryl® suture. All the fatty tissue was removed from the graft and it was placed in a solution of 1 g of amikacin plus 250 cc of isotonic saline solution. A 16 Fr Silastic® Foley catheter was inserted in the bladder and the graft was placed on top of it, with its epithelial surface directed toward the urethral opening. The edges of the graft were attached to the urethral mucosa with a 5-0 Vicryl® running suture (fig. 2C). And finally, the corpus spongiosum of the urethra was sutured over the graft with a 4-0 Vicryl® running suture (fig. 3A). The surgical wound was frequently irrigated with the amikacin solution and the wound was closed in the customary way leaving no drainage (fig. 3B).

The 3 patients were released on the third postoperative day with the cystostomy catheter open and the transurethral catheter closed. The latter was removed 3 weeks later and a voiding cystourethrogram was performed (fig. 3C). The cystostomy was removed once it was demonstrated that there was no extravasation of contrast medium and the patient could urinate spontaneously.

The patients were regularly evaluated through uroflowmetry and a validated questionnaire for postoperative urethroplasty patients.⁹ At the same time, the postoperative complications were evaluated and grouped together according to the Clavien-Dindo classification.¹⁰-¹¹ The need to carry out some other procedure in order to reestablish spontaneous micturition was considered treatment failure.

Figure 1  Patient one. A) Common appearance of genital lichen sclerosus et atrophicus. B) Preoperative combined antegrade and retrograde urethrocystogram. C) Complete dissection of the affected urethra.
Results

The mean length of the stenoses was 16 cm (18 cm for patient one and 15 cm for patients 2 and 3). The mean follow-up period for the patients was 14 months (12 to 18 months), with a success rate of 66.6%. Patients one and 2 had a low-grade urinary infection in the first postoperative month (Grade II Clavien-Dindo classification). Patient 3 had no complications. Patient 2 was considered to have failed treatment because at the sixth postoperative month he developed such significant obstructive symptoms that he required urethral dilations. His last evaluation was carried out by telephone. He stated that he was not satisfied with the result of the surgery because of the urethral dilations. Nevertheless, in the evaluation he felt that his urinary symptoms did not have much impact on his quality of life because he could now urinate spontaneously, which he could not do before the operation. No complications at the donor site were reported (fig. 3D).

Discussion

The use of buccal mucosa grafts for the treatment of urethral stricture was first described in 1890 by the Russian surgeon Kirill Sapezko, but it was not until 1941 that Humby reintroduced its use for this purpose. Nevertheless, it took nearly one hundred years for the use of buccal mucosa to become generalized. Buccal mucosa gained in popularity due to the following characteristics: it has a strong, thick, and humid epithelium with a very vascularized lamina propria; it is available and is extremely infection-resistant, as well as having a low morbidity at the donor site, and there is very little postoperative stricture recurrence with its use.

PUS treatment with a buccal mucosa graft has given way to controversies with respect to the advantages and disadvantages of its use in one or 2-stage surgery. The placement of these grafts on the dorsal or ventral surface of the urethra is also a matter of debate. In 1996, Barbagli et al. pointed out the benefits of graft application on the posterior surface of the urethra: a minimum of bleeding, a more stable base in the tunica albuginea of the corpus cavernosum, which offers better vascularization, thus reducing the risk for graft contraction and the formation of urethral diverticula. On the other hand, when the graft is applied on the ventral surface of the urethra, there is less urethral mobilization and easy graft application.

However, according to Barbagli et al., both techniques appeared to have similar results in a case series of 50 patients in which the ventral, dorsal, or lateral placement of the graft each had a success rate of 83%-85%. Recently in Mexico, Esteban-Maria and Pérez-Becerra et al. reported the benefits of the buccal mucosa graft in complex urethral strictures with good results.

Kulkarni et al. were the first to describe single-stage panurethral reconstruction through the use of a buccal mucosa graft placed on the dorsal surface of the urethra, with a success rate of 91% in a preliminary case series of 36 patients with LSA-associated PUS. In another case series of 117 patients with PUS (mean stricture length of 14 cm), this same group recently reported a success rate of 83.7% and a mean 59-month follow-up. Dubey et al., using the technique developed by Kulkarni in 25 patients, reported a success rate of 88%. Nevertheless, in another group of 14 patients with severely damaged and multiple-strictured segments, these same authors chose 2 or more-stage reconstruction, concluding that even though this type of approach may be successful, it entails technical difficulties and multiple revisions.

Figure 2  A) Graft retrieval in a single piece. B) Buccal mucosa graft larger than 15 cm. C) Graft placement over a 16 Fr Silastic® catheter.
And finally, Kumar et al. 22 also using the technique described by Kukarni, treated 40 patients of whom 20 of them had PUS associated with LEA (mean stricture of 14.5 cm) and 20 with PUS of inflammatory or idiopathic origin (mean stricture of 14 cm), reporting a postoperative stricture recurrence of 35% in the LEA group, as well as a higher complication incidence.

In a study of 32 patients with urethral stricture treated with buccal mucosa grafts on the ventral portion of the urethra, Fichtner et al. 14 reported a complication rate of 25% at a more than 5-year follow-up (a mean of 6.9 years). All the complications presented within the first year, which is promising for the patients that are asymptomatic after a year of follow-up. The complications of the patients reported on in this work were fewer, with minimum morbidity for the donor site and good tolerance of the procedure. And so it can be inferred that the buccal mucosa grafts placed by expert hands, whether at the ventral or dorsal portion of the urethra, have the same success rate as that recently described by Patterson and Chapple in a review of the literature. 13

Peterson et al. 23 warned that heroic measures are not always justified in patients with extensive urethral strictures, especially those associated with LSA. Those authors observed that some patients did not accept a second procedure and in a follow-up of 44 patients treated with perineal urethrostomy, no complications were found. In addition, the patients were satisfied with the procedure. Therefore, they recommend this treatment in older patients that are already accustomed to urinating in a seated position. In contrast, we feel that the technique used in the present work is tolerated and reproducible, and offers patients the opportunity of reestablishing normal micturition without the need for urinary diversion methods or multiple procedures that are usually difficult and distressful for the patient. 21

According to our review of the literature, no other studies utilized a validated questionnaire for postoperative urethroplasty patients. We promote the use of this instrument and do not regard flowmetry as a good follow-up method of these patients because the symptoms and satisfaction levels of our patients are not correlated with $Q_{\text{max}}$ values. A flow of lower caliber than normal is apparently inherent in the procedure due to the fact that the length of the repaired urethra is considerably long and urine flow resistance is dependent on length; consequently, patients with well-repaired strictures will have a less-than-normal flow. 21

Even though our sample was small, it should be pointed out that it included patients with complex strictures whose lengths were greater than those generally reported on in the literature. Moreover, even though graft placement on the dorsal surface appears to be the preferred treatment for panurethral strictures, 18,20,22 the ventral access was the more efficient and easier approach for us, especially in LSA-associated strictures in which the urethra tends to be fixed to the adjacent tissues.

**Conclusions**

Extensive and multisegmented urethral strictures can be successfully treated in a single stage through the use of a ventral onlay buccal mucosa graft. In this article we demonstrated that it is possible to obtain a graft of up to 18 cm in length with a single incision and no morbidity in the oral cavity.

For the best results it is necessary to be very meticulous in the extraction and application of the graft; it is important that the graft be sutured to the urethral mucosa with 5-0 or 6-0 suture and that the entire graft be covered with the corpus spongiosum. It is also important to irrigate the wound and the graft with a solution containing an antibiotic. We also encourage the use of a latex-free Foley catheter for no less than 3 weeks.

Until more refined techniques or new substitution materials come out, we conclude that buccal mucosa has been proven to be the best graft available today for treating any type of urethral stricture.

**Conflict of interest**

The authors declare that there is no conflict of interest.

**Financial disclosure**

No financial support was received in relation to this article.

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