Treatment of urethral meatus stenosis due to *Balanitis xerotic obliterans*: Long-term results using the meatoplasty of Malone

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**Abstract**

**Objective:** To present our experience in the treatment of severe stenosis of the external urinary meatus in male children and adults with balanitis xerotic obliterans.

**Materials and methods:** A total of 21 patients were operated on in a 5-year period, using the meatoplasty technique of Malone. Mean patient age was 41.7 years (range 7–75). Mean postoperative follow-up was 40.8 months (range 6–54). The surgical procedure consisted in making a small ventral incision of the urethral meatus with an extensive dorsal meatotomy, correcting the esthetic defect of the gland with an inverted V-shaped relieving incision. The postoperative evaluation was performed in every patient by written questionnaire informing about the functional and cosmetic results of the surgical technique.

**Results:** No post-surgical complications or recurrences of the urethral stenosis were recorded. A total of 18 patients (85.7%) replied to the post-surgical questionnaire. All were very satisfied with the functional result. Fifteen (83.3%) were also very satisfied with the cosmetic results of the technique.

**Conclusion:** The meatoplasty of Malone is a good alternative for the treatment of urethral meatal stenosis. It is an easy and rapid-to-perform technique. It avoids creating a hypospadiac meatus and achieves good postoperative results.

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Introduction

Balanitis xerotica obliterans (BXO) is a chronic skin disease of unknown etiology that often goes unnoticed because of, among other things, an incomplete medical examination. This disease does not develop in circumcised men; it is associated with trauma, instrumentation, genital piercing, genital abnormalities (e.g. hypospadias), and may be associated with the development of a squamous cell carcinoma. It can also occur in children, although the data about its incidence in this group of patients are not fully defined. The BXO may affect the urethra in 30% of the cases, causing from a focal stenosis of the urethral meatus to extensive urethral strictures involving the entire navicular fossa. The main symptoms of the disease are pain, local penile discomfort, itching, painful erections, and urinary retention. The surgical treatment of the disease has high rates of recurrence. Add to this that patients report having a decreased quality of life due to the many reoperations and postoperative relapses.

A useful surgical alternative is the meatoplasty technique of Malone, which is used for the treatment of urethral meatal stenosis. This technique is relatively new, as it was described in the year 2004. It has been successfully performed in our hospital in 21 patients, and functional and esthetic results achieved with this technique have been prospectively evaluated and described in this work.

Materials and methods

The surgical technique was performed in patients with severe meatal stenosis with no major extension to the navicular fossa. From October 2004 to April 2009, 21 patients were operated on using the meatoplasty technique described by Malone. The mean age of these patients was 41.7 years (7–75 years). Five of these cases (23.8%) were children aged between 7 and 12 years. All these cases in pediatric age had the particularity of having suffered meatal stenosis relapses after having undergone surgery using conventional techniques.

Other 7 adults also had a history of a total of 12 previous surgeries (9 meatotomies and three dilations of the urethral meatus). Only 9 patients, all adults, were operated for the first time without a history of previous surgical treatments. In 12 men, the existence of characteristic histological findings of BXO was confirmed. A 39-year-old patient was diagnosed with chronic renal failure due to bilateral hydronephrosis secondary to severe stenosis of the urethral meatus caused by BXO. All the patients were admitted for surgical treatment. The bladder catheter was removed 24 h after surgery and the patients were discharged once good bladder emptying was checked by means of ultrasound.

The patients were followed for a median time of 3.4 years (6–54 months). In this follow-up, they were interviewed personally and at least one physical exam, which consisted of the neomeatus assessment to rule out recurrence of stenosis at this level, was performed. In addition, all the patients were sent a questionnaire that assessed the patient’s postoperative voiding, the postsurgical esthetic result and sexual life.

Surgical technique

A contraindication for the performance of the technique described by Malone was the existence of severe balanitis xerotica extending to the navicular fossa or fibrosis of the corpus spongiosum at the glans, as such cases must be operated with a technique that forms a neourethra. The surgical procedure is performed using a tourniquet at the base of the penis, allowing for good hemostasis and proper surgeon’s view.

Two breaking points with Vicryl® 4x0 suture are placed on both sides of the narrow meatus. Then, a small ventral meatal incision is performed without creating a hypospadic urethra. This incision is aimed at slightly widening the urethral meatus allowing for the introduction of anatomic forceps in order to, this way, assess the extension of the BXO to the navicular fossa (Fig. 1). If there is extensive invasion of the distal urethra, a urethroplasty with oral mucosal flap is suggested. In those cases with focal stenosis or localized BXO at the urethral meatus, we continue according to the meatoplasty technique of Malone. This technique involves a deep dorsal meatotomy that, in its incision, reaches the glans (Fig. 2).
A typical urethral meatus stenosis due to BXO.

Figure 1: Typical urethral meatus stenosis due to BXO. (B) A meatal ventral incision for the evaluation of an invasion due to BXO of the navicular fossa.

Figure 2: (A) and (B) Steps for a deep dorsal meatotomy that reaches the glans.

Figure 3: (A) Suture of the urethral mucosa to the epithelium of the glans using monofilament thread 6x0. (B) Inverted-V incision of the glans.

The urethral mucosa is sutured to the epithelium of the glans by means of a suture with separate Monocryl® 6x0 suture. The fact of combining the ventral incision with the dorsal meatotomy allows for a good opening of the urethral meatus, but the esthetic result obtained so far in terms of the glans due to the sutures made is poor. However, this aspect can be modified by making an inverted-V incision at the level of the glans and above the urethral meatus (Fig. 3). In this incision, the apex of the V will be very close to the most proximal point of the dorsal meatotomy. Then, the edges of this incision are deepened. This way, the inner leaves of these edges can be sutured together with continuous sutures using Monocryl® 6x0, and so the ceiling of the distal neourethra is constituted thereby correcting the defect in the previous suture (Fig. 4). The outer leaves of the edges of the inverted-V incision will be closed with separated sutures using the same type of suture (Fig. 5). The final result of this technique is to obtain a broad and orthotopic meatus at the level of the glans (Fig. 6).

Results

In this series, no immediate intraoperative or postoperative complications occurred. After the urethral catheter removal, all the patients achieved a satisfactory spontaneous voiding, without post-void residual. In no case was there recurrence of the stenosis at the level of the urethral meatus, nor did urethral fistulas occur.

The postoperative follow-up questionnaire of our patients was answered by 18 of them. All the patients
Figure 4  (A) and (B) Steps to suture the inner leaves of the inverted-V incision using monofilament thread 6x0.

Figure 5  (A) and (B) Steps to suture the outer leaves of the inverted-V incision using similar absorbable thread.

Figure 6  (A) Postoperative immediate result after the bladder catheter being placed. (B) Final score after 8 weeks.

reported having a good quality of postoperative urination. A total of 15 out of 18 patients (83.3%) admitted that they were pleased with the esthetic results after surgery. In neither case has the quality of sexual life been altered in the postoperative period. Similarly, in 15 patients (83.3%), the existence of a discontinuous urine stream was never reported. One patient (5.5%) reported occasionally bifida stream. Two cases (11%) reported frequently discontinuous stream. The postoperative examination showed no recurrence of the process in any patient.

Discussion

The surgical treatment of the BXO regarding the urethra is associated with high rates of recurrence. In the world literature, various surgical techniques that help to treat different types of urethral strictures have been published.\textsuperscript{3-5,8,9} In these series, it was found that the use of a buccal mucosal flap to replace the urethral faulty narrow area remains the technique with best long-term postoperative results.\textsuperscript{3,5,9} In return we find, beyond the disease in question significantly affecting the patients, few publications that discuss the treatment of localized narrowing at the level of the urethral meatus.\textsuperscript{3,6}

Functional as well as esthetic aspects must be considered when the surgical treatment for a stenosis of the urethral meatus arises. The technique to be implemented for such cases should ensure appropriate urethral unblocking, the orthotopic location of the urethral meatus at the level of the glans, and allow for micturition without difficulty. The invasive techniques that try to solve such meatal stenosis are the dilation of the meatus, the simple ventral meatotomy, and a
number of different variants of distal urethroplasties. These techniques generally, and especially in cases of severe urethral or meatal stricture with ventral location, fail to meet the above-mentioned criteria and have a high rate of recurrence. This concept was checked in our series, in which 57% of the patients treated had previously received meatal dilations or even conventional meatotomies, without any long-term success. Added to this is the fact that some patients with meatal stenosis recurrence and urethral meatus of ventral location tend to have a hypospadic urethra altering not only the voiding function, but also the postoperative esthetic results. In addition, unfortunately, there are very few publications worldwide, with a long-term monitoring of other newer alternative surgical techniques for the treatment of urethral strictures with meatal involvement. One solution to this therapeutic dilemma is the meatoplasty technique published by Malone in 2004, which combines a ventral and dorsal meatotomy, thus, allowing to obtain a wide urethral meatus. At the same time, the inverted-V suture at the level of the glans allows for the meatal orthotopic location, avoiding the creation of a hypospadic meatus, which also allows to ensure good postoperative esthetic results after surgery. Interestingly enough, although some patients had a BXO extended to a great part of the glans, both in our series and in the one originally presented by Malone, there was no recurrence of the urethral meatus stenosis with this meatoplasty technique. This finding is of importance beyond the short observation time of our patients, since the underlying disease in many cases, years later, generates a new stenosis in patients previously operated. Venn and Mundy published, in this regard, a series with 12 patients undergoing urethroplasty utilizing foreskin; they had relapsed leading to reoperation in all cases after a follow-up of 5 years. In another recent international study, Kulkarni et al. found in just 15 men (7% of the total study population) an 80% success rate after meatotomy.

The results of our series, first described in Spanish, suggest that the meatoplasty of Malone meets the ideal criteria for the treatment of the urethral meatus stenoses, even for those caused by BXO. This surgical procedure is in our hands effective and lacking recurrence, with a relatively short period of follow-up. Our experience reflects that the meatoplasty of Malone obtains good functional and esthetic results. However, it takes more patients and longer postoperative follow-up to properly define the importance that this innovative procedure will have in the future in the surgical treatment of urethral stricture.

Conflict of interest

The authors declare that they have no conflict of interest.

References