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Original article

# Urethroplasty for male urethral strictures: Experience from a national teaching hospital in Senegal



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## KEYWORDS

Male urethral stricture disease;  
Urethroplasty;  
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## Abstract

**Objectives:** To report our experience with urethroplasties due to male urethral stricture disease and to identify factors affecting the results.

**Patients and Methods:** Between January 2007 and December 2010, 75 urethroplasties performed due to male urethral stricture were prospectively collected.

**Results:** The mean age of patients was 52.6 years (median: 56 years) for urethroplasties by substitution and 47.3 years (median: 47.5 years) for anastomotic urethroplasties. The most common localization of urethral stricture was the bulbar urethra (63.3%). The length of the stricture averaged  $1.95 \pm 0.72$  cm (median 2 cm) in anastomotic urethroplasties and  $4.40 \pm 1.54$  cm (median 4 cm) in urethroplasties by substitution. The success rate was 69.8% (37/53) for anastomotic urethroplasties, 23.1% (3/13) for urethroplasties using Quarty's technique, 25% (1/4) for Blandy's urethroplasties. The success rate was 81% (17/21) in patients operated on by experienced surgeons, and 53.7% (29/54) in those operated on by young surgeons ( $p = 0.02$ ). The success of urethroplasty was more frequent for urethral strictures between 1 and 5 cm (46/69) than in those greater than 5 cm (0/6) ( $p < 0.05$ ), when the diagnosis of stricture was done within the phase of dysuria (11/13) than when it was done during the phase of progressive complications of the urethral stricture (35/62) ( $p < 0.05$ ).

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*Conclusions:* In our hands, the results of anastomotic urethroplasty were better, while those of substituting urethroplasties were disappointing. These results are explained by the complexity of the strictures and the limited experience in urethral reconstruction of most surgeons.

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## Introduction

A urethral stricture (US) is an acquired permanent narrowing of the urethra impeding the flow of urine during micturition. It is one of the oldest urological diseases, and its treatment remains a challenge for urologists. Urethral dilatation, one of the oldest US treatments, can sometimes produce good results, which are usually transient [1]. However, besides its inefficiency, dilatation is often regarded by patients as psychologically traumatic and disempowering. At its advent, endoscopic internal urethrotomy (EIU) raised great hopes because it is a simple, fast, and minimally invasive treatment. However, these hopes were soon thwarted as EIU proved not to be more effective than urethral dilatation [2]. In patients with a short, incomplete US [3] and without dense spongiofibrosis, a unique, initial EIU is assumed to be effective and efficient, especially when the stricture is located at the bulbar urethra. However, in post-traumatic strictures, EIU has a high risk of failure, and urethroplasty should thus be considered as first-line treatment [4]. The repetition of minimally invasive therapies rarely gives good results and exposes the patient to complications such as stricture lengthening, extension of spongiofibrosis, wrong track, urogenital infection and massive urethral bleeding. These complications make US more complex. This repetition also exposes the patient to the risks of repeated anesthesia, in addition to its high cost. These treatments should be considered palliative rather than curative. Thus, the treatment of choice in US is now urethroplasty, with high success rates [5,6].

In Senegal, US becomes common [7] and often diagnosed at the complications stage [8]. There, in a retrospective study, the results of Quartey urethroplasty (penile fasciocutaneous flap) were evaluated [9], but the results obtained with other types of urethroplasties are unknown.

The objective of this study was to report our experience with urethroplasties for male urethral stricture disease and to identify factors affecting the results.

## Patients and methods

We conducted a prospective, monocentric study, over a four-year period (between January 2007 and December 2010) on urethroplasties performed due to male US at the Department of Urology-Andrology of the Aristide Le-Dantec Hospital (Dakar). The variables studied were; age of patients, circumstances of discovery, stricture location, stricture length, US etiologies, previous urethral procedures, surgeon's experience in urethral reconstructive surgery, type of urethroplasty and results obtained. During the four-year study, 79 patients underwent a urethroplasty, and 75 of them were recruited in this study.

Preoperative assessment and determination of the etiology of the stricture have been described in a previous article [7]. The

stricture was due to sexually transmitted infection (urethritis) in 45 patients (60%), pelvic trauma in 15 patients (20%) and was of iatrogenic origin in one patient. For 14 patients (18.7%), the etiology of the stricture was not identified. All patients were circumcised.

The techniques used for urethroplasty were anastomotic urethroplasty [10] in 53 cases, Quartey's technique [11] (penile fasciocutaneous flap) in 13 cases, Blandy's technique [12] (scrotal fasciocutaneous flap) in 4 cases and Bengt-Johanson's technique [13] (two-stage urethroplasty) in one case. Pedicle skin flaps were tubularized in all cases. Michalowski's urethroplasty was also used in 4 cases. It consists of leaving in place a rear wall of urethral mucosa, wherein lips are attached to the corpora cavernosa or perineal ceiling. The progressive epithelialization of the urethra is expected from this wall of urethral mucosa, around a urinary catheter. After the procedure, a urethral catheter was placed for at least 21 days.

The surgeons were divided into two groups: one group of young surgeons with fewer than three years of experience, and a group of surgeons experienced in urological reconstructive surgery.

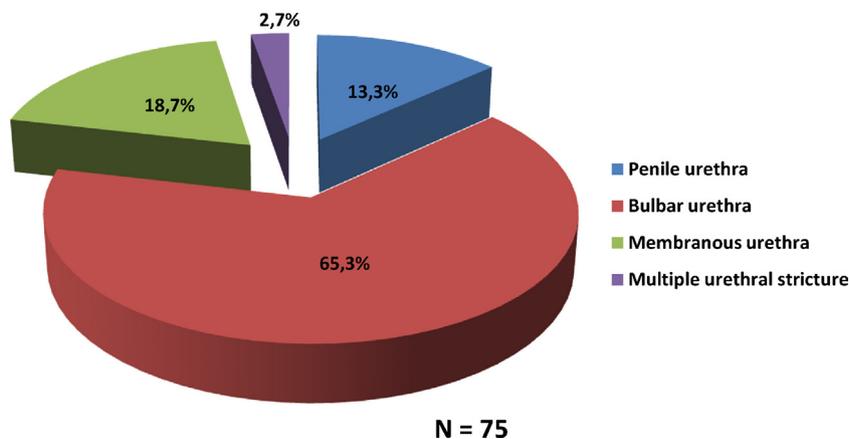
During the postoperative follow-up, patients were reviewed in consultation at three, six, nine and 12 months. From then on, the follow-up assessment was annual. During these consultations, a clinical examination was performed, and when the patient had dysuria or urinary retention, a retrograde urethrocytography and/or urethrocytostcopy were requested to determine a possible recurrence of the stricture.

The results of urethroplasty were considered a failure in the following situations:

- Immediate postoperative dehiscence of a suture of the urethra, necrosis of a skin flap, or urinary fistula through the surgical wound.
- Persistent dysuria, after removal of the urethral catheter, or urinary retention and proven urethral stricture by retrograde and voiding urethrocytography or by urethrocytostcopy (recurrence of the urethral stricture) [14].

The results were considered a success whereas removal of the urethral catheter accompanied by straight and vigorous voiding stream, and no dysuria. Also, when retrograde urethrocytography or urethrocytostcopy showed a urethra of normal caliber.

The duration of postoperative follow-up was on average  $15.5 \pm 13.7$  months (1–48 months), with a median of 12 months. It exceeded 12 months in 75% of patients.



**Figure 1** Distribution of patients according to the site of stricture.

Statistical analysis was performed using the ÉpiInfo™ v. 2000 software. The comparative analysis of the variables was performed with a Student's *t*-test, Chi<sup>2</sup> test or Fisher's exact test with a significance level set at 5%. The local ethics committee approved the study.

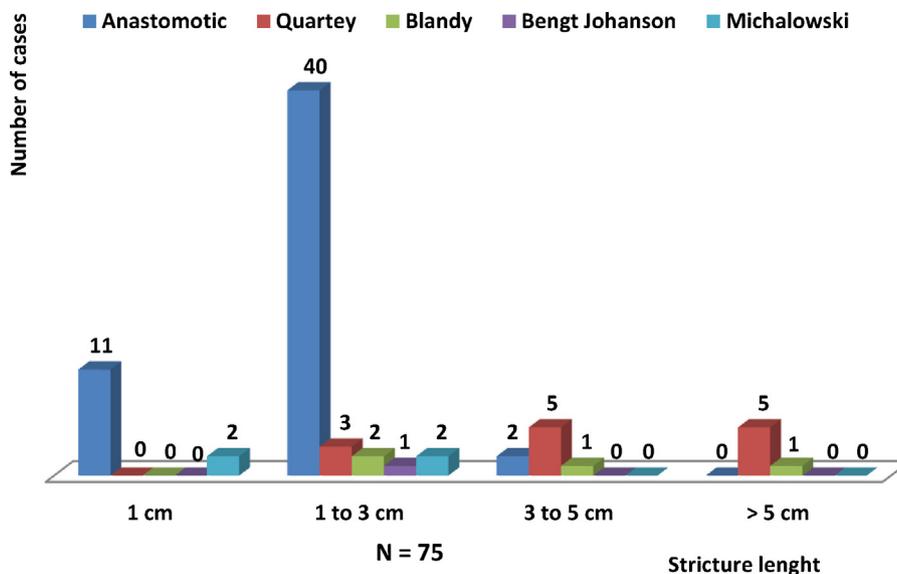
## Results

The mean age of patients was  $48.3 \pm 20$  years (8–87 years) with a median of 50 years. In substitution urethroplasties, the mean age of patients was 52.6 years (median: 56 years), while in anastomotic urethroplasties, it was of 47.3 years (median: 47.5 years). The most affected subgroups were those between 21 and 30 years and between 61 and 70 years.

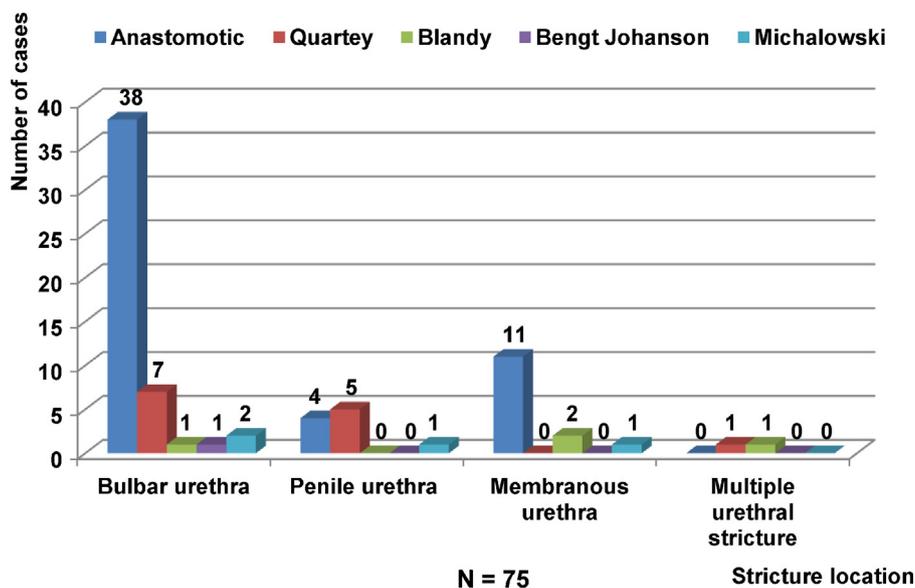
The presenting symptoms of the stricture were urinary retention (62.7%), dysuria (17.3%), Fournier's gangrene (10.7%) and dysuria associated with urethrocutaneous perineal fistulas (9.3%). The stricture was most frequently located in the bulbar urethra (63.3%) (Fig. 1). Length of the stricture averaged  $2.45 \pm 1.39$  cm (1–7 cm) with a median of 2 cm. A stricture length of 1 cm was found in 17.3% of cases, between 1 and 3 cm in 64% of cases, and

between 3 and 5 cm in 10.7% of cases. The stricture was longer than 5 cm in six patients (8%). The length of the stricture averaged  $1.95 \pm 0.72$  cm (median of 2 cm) in the anastomotic urethroplasties and  $4.40 \pm 1.54$  cm (median of 4 cm) in substitution urethroplasties.

The urethroplasty techniques used according to stricture location and length are reported in Figs. 2 and 3. The results of urethroplasty were considered successful in 61.3% of cases, and were considered a failure in 38.7% of cases. The success rate by site was of 61.2%, 80%, 57.1% and 0%, respectively for the bulbar urethra, penile urethra, membranous urethra and multiple urethral strictures. It was 69.8% (37/53) for anastomotic urethroplasty, 23.1% (3/13) for Quartey's technique, 25% (1/4) for Blandy's technique, and 100% for Bengt-Johansson and Michalowski techniques. The success rate was 81% (17/21) in patients operated on by experienced surgeons in urological reconstructive surgery and 53.7% (29/54) in those operated on by younger surgeons ( $p = 0.02$ ). It was 67.5% (25/37) among patients without previous surgery of the urethra and 55.3% (21/38) in patients who had previously undergone at least one surgery of the urethra ( $p = 0.19$ ). The success rate of urethroplasty was 92.3% for 1 cm-long strictures and 64.6% for those in which the length was



**Figure 2** Types of urethroplasty according to stricture length.



**Figure 3** Types of urethroplasty according to stricture location.

between 1 and 3 cm. When the length of the stricture was between 3 and 5 cm, it was 37.5% and zero for strictures longer than 5 cm. The success of urethroplasty was significantly more frequent for US between 1 and 5 cm (46/69) than for US longer than 5 cm (0/6) ( $p < 0.05$ ) and it was more frequent when the strictures diagnosis was done in the phase of dysuria (11/13), compared to those done in the phase of progressive complications (35/62) ( $p < 0.05$ ). The result of the urethroplasty did not depend significantly on the location of the stricture ( $p = 0.19$ ) or on its etiology ( $p = 0.66$ ). Complications were observed in 22 patients (29.3%) together with; surgical site infection (20 cases), hematoma (one case) and urethrorectal fistula (one case). For 15 out of the 20 patients with a surgical site infection, the outcome of urethroplasty was a failure.

## Discussion

The success rate of anastomotic urethroplasty was of 69.8%. Compared to other types of urethroplasty, this technique gave the best results. However, the comparison of different surgical techniques is difficult because the choice of technique and success of the urethroplasty strongly depend on the complexity of the urethral stricture. Our overall success rate was modest compared to those reported by some authors [15–19]. Several factors may explain these differences. First, in our study, the definition of success was strict. Indeed, there is no consensus definition of success for urethroplasty [14], and the appreciation of the results varies across studies. Some authors have considered the appeal after urethroplasty to a single EIU or urethral dilatation to maintain the urethra permeable as a satisfactory or acceptable result [20], while in this study and in several others [16] such cases were considered failures. Anastomotic urethroplasty is an effective technique, especially recommended for strictures of the bulbar and the membranous urethra. According to Barbagli et al. [16], it is a simple procedure that requires no specific surgical expertise, unlike other urethroplasties with flaps. This explains the good results obtained by this procedure despite the limited experience of most surgeons.

The success rate was 23.7% with the technique of Quartey and 25% with the technique of Blandy. These rates were lower than those

reported by Falandry [21], who obtained good results in 87.2% of cases. In Nigeria, Aghadji and Odoemene [19] reported a success rate of 68.1% after Quartey's urethroplasty, while Tijanii et al. [22] reported 40% success at 30 months. Our success rate in substitution urethroplasties were also low compared with those reported in some European studies [17,18]. We believe that the failures observed here were due to incorrect technical implementation (false roads, inadequate excision of scar tissue, poorly vascularized pedicle) because of the limited experience of most surgeons in the study. Indeed, the success rate of urethroplasties performed by experienced surgeons (81%) was comparable to those reported in the literature [17,19]. In an earlier study from the same center on 30 cases of Quartey's urethroplasty, all were performed by experienced surgeons, and the results were considered good in 73.5% of cases [9]. In flap urethroplasty, the learning curve constitutes a significant bias in terms of success [16]. The result of the urethroplasty is strongly determined by the surgeon's expertise. Because this expertise is impossible to acquire for all urologists, some authors believe that this type of urethroplasty should be reserved for surgeons who have benefited from at least three years of learning in urological reconstructive surgery [23]. In addition, all our patients had had flap-tubes, and it has been reported that the results are better when flaps are used as patches [24]. This trend to use the flap-tube instead of patch enlargement is related to the severity and extent of sclero-inflammatory lesions of the urethra and of the spongiofibrosis, which, in our patients, often impeded the preservation of a urethral wall. Furthermore, according to Barbagli et al. [25], in penile US with a rigid urethra and an extensive spongiofibrosis, penile pedicle flap-tubes are more appropriate due to the poor vascularization of this part of the urethra. The urethra is then completely resected and replaced by a fasciocutaneous flap-tube.

The discovery of the urethral stricture occurred after a Fournier's gangrene in eight cases (10.7%), and after urethrocutaneous perineal fistulas in seven cases (9.3%). In these patients, the initial treatment included a sometimes-repeated debridement [8], and when a urethroplasty had to be performed with a penile or scrotal flap, the tissue available was often poorly vascularized scar tissue. The extensive spongiofibrosis and scarcity or unavailability of quality penile or

scrotal skin (used as a flap) render urethral strictures very complex [18] and for this reason, the results of substituting urethroplasties are often disappointing. Although long since fallen into disuse, the use of a scrotal flap was sometimes the only possible alternative, which explains their use in this study. The low success rate obtained with these scrotal flaps confirmed their poor quality [26].

No oral mucosa flap was used despite their frequent use and good results reported in the literature [17]. After transfer, the survival of free flaps is initially obtained by imbibition, and in a second phase, by neoangiogenesis. Cleanliness and vascularization of the free flap's implantation site are critical to the flap's survival. However, in our patients because of the late consultation and/or the discovery of the stricture occurred after the complications arose, the spongiofibrosis was very intense and the implantation site was often poorly vascularized. All these jeopardized the survival of a potential free flap and explain our preference for pedicle flaps. In addition, we have no experience with this technique in our center.

Two-stage urethroplasty was only used in one patient. According to Aghaji and Odoemene [19], the execution of this type of urethroplasty in patients with low socioeconomic status exposes them to Fournier's gangrene. This explains our strong preference for one-stage urethroplasty even if, in some of our patients, two-stage urethroplasty was indicated (multiple urethral stricture, massive spongiofibrosis or several previous urethroplasties).

In this study, there was no significant difference in the success rate of urethroplasty considering whether the urethra had previously been manipulated. The impact of prior urethral manipulation on the outcome of urethroplasty is a controversial subject. According to several authors, prior urethral manipulation is not a bad prognostic factor for urethroplasty [15,16]. Conversely, other studies have shown that urethroplasty success rates were significantly lower in patients who had already undergone more than one endoscopic urethrotomy [18] and/or urethroplasty [17,27]. These lower success rates would be associated with spongiofibrosis extension, lengthening of the stricture and deterioration of the blood supply to the urethra [24].

## Conclusion

In the present study, anastomotic urethroplasty showed better results than other techniques. The results of substitution urethroplasties were often disappointing because of the complexity of the strictures, the limited experience in urethral reconstruction of most surgeons, and the adverse conditions in which this surgery was performed. The improvement of these results requires assigning substitution urethroplasties to experienced surgeons, using fasciocutaneous flaps as patches and improving working conditions.

## Conflict of interest

The authors declare that they have no conflict of interest.

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