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Results of Urethroplasty by Segmental Resection and End-to-End Anastomosis at the Urology Department of Hôpital De LA Paix, Ziguinchor: A Study of 45 Cases

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Abstract

Introduction: Urethral stricture in men is an ancient condition and remains a frequent issue in urological practice. This pathology can have severe consequences on the upper urinary tract. Despite advances, its treatment continues to pose challenges, stimulating ongoing innovation and ingenuity among urologists, as evidenced by the multitude of available surgical techniques. The aim of our study was to evaluate the outcomes of urethroplasty by segmental resection and end-to-end anastomosis in the management of urethral strictures at the Urology Department of Hôpital de la Paix in Ziguinchor, Senegal. **Methods:** We conducted a retrospective and descriptive study from January 2017 to December 2021, spanning a 5-year period. The study included all male patients treated for urethral stricture using the technique of anastomotic urethroplasty. **Results:** We collected 45 cases. The mean age of the patients was 51.16 years (range: 15 - 85 years). Complete urinary retention was the most common reason for consultation, accounting for 60% of cases (n = 27). The majority of strictures were located in the bulbar urethra (60%, n = 27), with a mean length of 1.6 ± 0.9 cm (range: 0.5 cm - 4 cm). Infectious causes were predominant, representing 51.1% of cases (n = 23). A history of urethral instrumentation was reported in 37.7% of patients (n = 17). All patients underwent segmental urethral resection followed by end-to-end anastomosis. The mean duration of hospitalization was 5.2 ± 9 days. After a follow-up period of

21 ± 12 months [1 - 48 months], the average success rate was 73.3% (n: 33). The success rate for bulbar strictures was 85.7% (n = 24), and for strictures less than 2 cm in length, the success rate was 87% (n = 20). At 12 months of follow-up, long-term outcomes were more favorable for traumatic strictures (75%, n = 9) compared to infectious causes (50%, n = 8). Postoperative complications were predominantly infectious, with 11.1% wound suppuration and 8.9% urinary tract infections. No deaths were reported. **Conclusion:** Urethral stricture was predominantly caused by infection, highlighting the need for appropriate and optimal antibiotic therapy in urinary tract infections. The treatment of stricture remains a challenge for urologists.

Keywords

Urethral Stricture, Anastomotic Urethroplasty, Outcomes

1. Introduction

The management of male urethral stricture is part of the daily practice of urologists and represents one of the oldest known urological conditions. This frequent pathology can lead to severe consequences for the upper urinary tract. In developed countries, strictures are mainly of traumatic or iatrogenic origin, often resulting from endo-urethral procedures [1]. In contrast, in developing countries, infectious causes predominate, with a particularly high incidence reported in Senegal [2]. Urethral stricture is a debilitating condition, and despite significant progress, its management remains a challenge [3], continuing to stimulate the innovation and ingenuity of urologists. Anastomotic urethroplasty is among the most commonly used techniques in Senegal, although it has been rarely evaluated [4]. The aim of our study was to assess the outcomes of segmental urethral resection with end-to-end anastomosis at the Urology Department of Hôpital de la Paix in Ziguinchor, Senegal.

2. Patients and Methods

This descriptive study focused on male patients who underwent segmental resection and end-to-end anastomotic urethroplasty over a 5-year period (January 2017 to December 2021). We included all male patients treated for urethral stricture using this surgical technique. Patients who were lost to follow-up, those who underwent other urethroplasty techniques, incomplete records, and deceased patients were excluded. Data were collected from patient medical records, hospitalization logs, and operative protocol registries.

The variables studied were:

1. Epidemiological: age.

2. Clinical: presenting symptoms, stricture characteristics (location, length, etiology).

3. Para-clinical: renal function, urine culture and sensitivity.

4. Surgical: tissue quality, postoperative catheterization method, duration of drainage, length of hospital stays, and complications (early and late). Treatment outcomes were assessed using clinical and radiological criteria.

5. Success: absence or resolution of dysuria with a single dilation, no significant post-void residual volume (suprapubic ultrasound), and patent urethral lumen (retrograde urethrocystography or urethrocystoscopy).

6. Failure: persistent dysuria or urinary retention after catheter removal requiring additional procedures (e.g., internal urethrotomy, repeated dilations), and persistent urethral stenosis (confirmed by imaging or endoscopy).

3. Results

A total of 58 medical records of patients treated with segmental resection and end-to-end anastomosis urethroplasty were reviewed, of which 45 were included in the study. Of the 13 excluded cases, we noted lost to follow-up (8 cases); incomplete data (2 cases); those who died from unknown causes (2 cases); and one case of two urethroplasty techniques being combined in the same operation.

The patients had a mean age of 51.2 ± 19 years (range: 15 - 85 years), with the 60–70-year age group being the most represented. The most common reason for consultation was acute urinary retention (AUR), which accounted for 60% (n = 27) of cases, followed by dysuria in 35.5% (n = 16) and urinary tract infections in 28.8% (n = 13). The mean consultation delay was 5.2 ± 2.6 months (range: 1 - 13 months).

Imaging studies and surgical exploration showed that the bulbar urethra was affected in 60% of cases, followed by both membranous and penile urethra in 20% each. Stricture length ranged from 1 to 2 cm in 51.1% of cases, and from 2 to 3 cm in 26.7%. Infectious etiology (acute urethritis) was predominant in 51.1% (n = 23), followed by trauma in 28.9% (n = 12) and iatrogenic causes in 15.6% (n = 7).

Surgical exploration revealed fibrosis in 71% of cases (n: 32), the cause of which was infectious in 20 cases, meaning that fibrosis was associated with infection in 62.5% of cases. All patients underwent segmental resection with end-to-end anastomosis. A transurethral catheter was placed postoperatively in 84.4% (n = 32), with a mean duration of 20.5 ± 7 days (range: 15 - 45 days). The mean hospital stay was 5.2 ± 9 days (range: 1 - 64 days).

The overall postoperative complication rate was 31.1%. Surgical site infection was the most frequent (11.1%), followed by urinary tract infection (8.9%) (Table 1). The success rate for bulbar urethral strictures was 85.7% (n = 24) (Table 2). Success rates at 3 months were 75% (<1 cm) and 87% (1 cm - 1.9 cm), while at 6 months they were 63.6% (2 cm - 2.9 cm) and 33.3% (≥4 cm) at 12 months. After 24 months of follow-up, the success rate for infectious etiologies dropped from 78.3% (n = 18) to 30% (n = 3), for iatrogenic etiologies from 85.7% (n = 6) to 33.2% (n = 1), while for post-traumatic causes it declined only from 83.3% (n = 10) to 75% (n = 9) after 12 months. For catheterization of 20 to 29 days, the success rate was 91.6% (n = 11) at 3 months, falling to 60% (n = 3) at 24 months (Table 3).

Table 1. classification of immediate postoperative complications according Clavien-Dindo.

Type of complication	Grade	treatment	Number of cases
Minor complications	Grade I	Analgésics	5
		Antipyrétics	3
		Antiemetics	1
		Local care	2
	Grade II	Antibiotics	6
	Grade III a	local anesthesia	2
Major Complications	Grade IV b	Intensive care	1

Table 2. Outcomes by follow-up duration and stricture location.

Follow-up over time	Stricture Location		
	Penile	Bulbar	Membranous
Immediate			
Patients (total)	9	28	9
Success n (%)	6 (66.6)	24 (85.7)	7 (77.7)
3 months			
Patients (total)	9	28	9
Success n (%)	5 (55.5)	23 (82.1)	8 (89)
6 months			
Patients (total)	9	22	9
Success n (%)	5 (55.5)	14 (63.6)	7 (77.7)
12 months			
Patients (total)	7	20	9
Success n (%)	3 (42.8)	13 (65)	7 (77.7)
24 months			
Patients (total)	5	10	7
Success n (%	2 (40)	3 (30)	5 (71.4)
36 months			
Patients (total)	5	6	4
Success n (%)	2 (40)	3 (50)	3 (75)
48 months			
Patients (total)	1	1	4
Success n (%)	1 (100)	1 (100)	3 (75)

Table 3. Success rate based on the duration of urinary drainage.

Follow-up	Duration of urinary drainage (days)			
	< 20	[20-30[	[30-40[	+40

Continued

		Immediate		
Patients (total)	22	12	10	1
Success n (%)	19 (86.3)	11 (91.6)	6 (60)	1 (100)
		3 months		
Patients (total)	22	12	10	1
Success n (%)	18 (81.8)	11 (91.6)	7 (70)	1 (100)
		6 months		
Patients (total)	17	11	10	1
Success n (%)	13 (76.4)	8 (72.7)	5 (50)	1 (100)
		12 months		
Patients (total)	16	10	8	1
Success n (%)	12 (75)	8 (80)	3 (37.5)	1 (100)
		24 months		
Patients (total)	9	5	6	1
Success n (%)	6 (66.6)	3 (60)	1 (16.6)	1 (100)
		36 months		
Patients (total)	8	2	5	1
Success n (%)	6 (75)	2 (100)	1 (20)	1 (100)
		48 months		
Patients (total)	1	2	2	1
Success n (%)	3 (75)	2 (100)	1 (50)	1 (100)

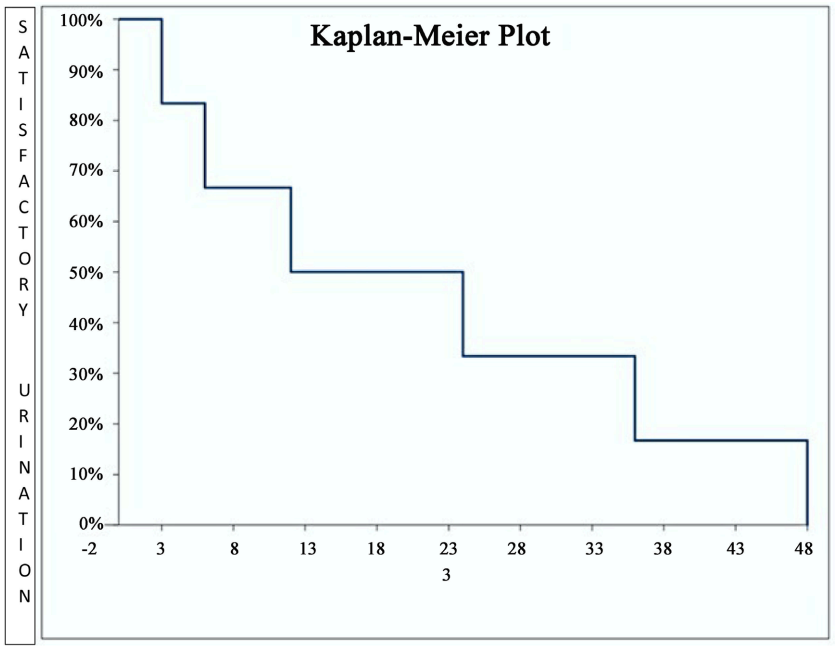

Figure 1. Kaplan-Meier actuarial curve of functional outcomes based on regression.

Late complications included two cases of ejaculatory disorders, one case of erectile dysfunction, and one of penile shortening. After a mean follow-up of 21 ± 12.6 months (range: 1 to 48 months) (**Figure 1**), at 6 months, 76.9% (n: 30) of patients had achieved good results, and this rate fell to 26.6% after 36 months. Retreatment consisted of internal endoscopic urethrotomy in 9 cases and periodic dilation every 6 months due to financial constraints.

4. Discussion

Anastomotic urethroplasty is the most frequently performed surgical technique for urethral strictures. Studies by Fall B. *et al.* [4] and Ndoye M. *et al.* [5] in Senegal support this finding, with 53 out of 75 and 67 out of 91 urethroplasties, respectively. The predominance of this technique is explained by its suitability for most urethral strictures, its technical simplicity, and its better functional outcomes compared to techniques using pedicled flaps or grafts.

Adults were the most affected group. Fall *et al.* [2] reported a mean age of 53.5 years (range: 23 - 87), and Raber M. *et al.* [6] reported a mean of 42 years (range: 18 - 69). Our study found an average consultation delay of 5.2 ± 2.7 months (range: 1 - 13), attributable to symptom neglect, limited socioeconomic resources, scarcity of urologists, and distance from specialized centers.

Chronic urinary retention was the main presenting complaint, followed by infectious complications and ejaculatory issues. Similar results have been reported in Sub-Saharan Africa, where complications such as retention and scrotal abscesses are common [3] [4]. Urethral stricture is a chronic condition caused by progressive urethral scarring, explaining late presentation with complications.

Our results show a gradual decrease in urethroplasty success rates over four years. Fall *et al.* [2] reported a decline from 93.6% to 26.1% after 3 years. This trend was similar for patients presenting with dysuria. Thus, in our study, early or late presentation was not a predictive factor for surgical outcome.

The bulbar urethra was the most commonly affected site, followed by penile and membranous urethra. The bulbar urethra may be injured in perineal trauma, and urethral segments near the meatus and bulbar urethra are rich in periurethral glands, leading to inflammatory reactions and sequelae. Similar findings were reported by Sikpa KH *et al.* [7] in Togo and Bah MB *et al.* [3] in Guinea, with 67.6% and 72% bulbar strictures, respectively.

Functionally, Fall B *et al.* [2] reported a 95.6% success rate for bulbar strictures; Bah MB *et al.* [3] reported 60% satisfactory micturition at 6 months, confirming the suitability of bulbar urethra for anastomotic urethroplasty due to its elasticity and blood supply, reducing ischemia and secondary fibrosis.

More than half of our patients had strictures shorter than 3 cm. Although Guralnick ML *et al.* [8] suggested limiting anastomotic repair to 1 cm to avoid penile shortening or curvature, Micheli E. *et al.* [9] achieved good results in 93% of cases with strictures up to 3 cm.

The leading cause in our series was infection, followed by trauma. Similar findings are common in Sub-Saharan Africa [10] [11], while in developed countries, iatrogenic causes predominate due to endoscopy [12] [13]. Infectious strictures often show worse outcomes due to significant spongiofibrosis, consistent with our findings and those of Fall B. *et al.* [2], who noted a drop in success rate from 92.6% to 66.7% after 2 years. In contrast, post-traumatic outcomes are better, as spongiofibrosis progresses from outside inward, allowing clearer identification of the stricture [14]. The results of Diarra A. *et al.* [15] are consistent with this, showing a good success rate on post-traumatic strictures, with 80% over a 12-month follow-up period

In our study, success rates were slightly higher among patients who had undergone prior interventions. However, findings in the literature are mixed. Some authors suggest urethrotomy failure does not compromise long-term outcomes of anastomotic repair [16] [17], while Gomez RG *et al.* [18] claim best outcomes occur in untreated patients.

Immediate postoperative complications were mainly wound infections. Sikpa KH *et al.* [7] reported similar findings (14.6%). This predominance may be attributed to suboptimal aseptic conditions and inadequate perioperative antibiotic coverage.

Late complications included sexual dysfunction. While we lacked baseline erectile function data, the literature is mixed regarding urethroplasty and sexual dysfunction. Mundy AR *et al.* [19] reported a 5% erectile dysfunction rate after anastomotic urethroplasty and 0.9% after substitution urethroplasty. Surgical technique should emphasize nerve preservation, distal dissection, and tension-free anastomosis to minimize these risks [20].

Anastomotic urethroplasty offers superior long-term outcomes compared to substitution techniques. After a mean 21-month follow-up in our study, outcomes remained favorable, although failures increased over time. Reported causes of failure include inadequate incision, ischemia, or tension at anastomosis [19] [21].

Difficulties and limitations: the retrospective nature of our study with loss to follow-up and data loss, the lack of baseline data on erectile function, limited access to care.

5. Conclusion

The results of our studies are encouraging in a context where the etiology of urethral stricture was dominated by infectious causes. The postoperative outcome is strongly impacted by infectious complications, hence the need to sterilize the urine before surgery and to administer appropriate antibiotic therapy after surgery. Despite the progress made, the treatment of urethral stricture remains a challenge for urologists.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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