A new option to prevent fistulas in anterior urethroplasty in patients with kippered urethra: the tunica vaginalis flap

Luciano A. Favorito 1, 2, Fernando Salles da Silva Filho 1, José Anacleto de Resende Junior 1, 3

1 Hospital Federal da Lagoa, Rio de Janeiro, RJ, Brasil; 2 Unidade de Pesquisa Urogenital, Universidade do Estado do Rio de Janeiro, UERJ, Rio de Janeiro, RJ, Brasil; 3 Departamento de Urologia, Universidade do Estado do Rio de Janeiro, UERJ, Rio de Janeiro, RJ, Brasil

ABSTRACT

The objective of this study is describing a technique with the use of a tunica vaginalis flap (TVF) to cover the suture line during anterior urethroplasty in patients with kippered urethra due to chronic indwelling catheterization (CIC). We studied 5 patients (mean age=50.2) with a neurogenic bladder that developed urethral erosion after a long period of CIC. Foley catheter was removed on the 14th postoperative day. One patient developed wound infection and urethrocutaneous fistula, which was conservatively managed and after 12 months of follow-up all the patients didn’t report difficulties in intermittent self-catheterization. In conclusion, a urethroplasty with TVF technique may be a viable method for repairing penile urethral erosions, but further studies are required with a bigger sample to confirm our results.

INTRODUCTION

The use of flaps is very important to protect the suture line and avoid fistulas in surgical corrections of penile urethral strictures. The tunica vaginalis flap (TVF) was used as an additional cover of suture line and fistula prevention in hypospadias and epispadias with an acceptable complication rate and good cosmetic results (1). The use of TVF as the dorsal component of a two-stage urethroplasty in anterior urethral strictures presented significant fibrosis and this kind of flap is not suitable in Bracka surgery (2).

Urethral strictures occur in about 5 to 20% of patients as a complication of chronic indwelling catheterization (CIC) (3). Penile urethral erosion (kippered urethra) is a rare complication of CIC, with some studies reporting it to occur more frequently in men with neurogenic bladder (3). There are techniques described for repairing the ventral urethral erosions but a standardized approach is not yet available (4, 5).

TVF was used in anterior urethral strictures corrections (6) but studies about surgical techniques for repairing the ventral erosions in patients with CIC are scarce in literature. Recently we published a video
with the use of TVF to prevent fistulae in a patient with kippered urethra (7). The objective of this paper is to describe a simple surgical technique to prevent urethral fistulae in patients with urethral erosions using a tunica vaginalis flap.

**SURGICAL TECHNIQUE**

This study was carried out in accordance with the ethical standards of the hospital’s institutional committee on human experimentation. We prospectively analyzed patients admitted to our facility with diagnosis of kippered urethra (Figure-1A) between January 2018 and February 2020.

In the operating room (OR), a single dose of cefazolin (2g) was given as a systemic prophylactic antibiotic against Gram-positive and Gram-negative bacteria. The external genitalia were shaved to remove hair from the surgical site. The patients were placed supine, disinfected and draped steriley. The surgical incision was delimited with a marking pen (Figure-1B) and the urethral plate was separated from the penile skin and dartos tissue by an incision at its limits with the adjacent tissue following dissection (Figure-1C). After mobilization of the urethral margins, urethral tubularization was performed in a 2-plane continuous suture of its margins with 4-0 PDS (Figure-1D). Lumenal diameter was calibrated with a 16Fr Foley catheter. The next step was the access of the testicle by a subcutaneous tunnel and confecion of a 5 to 6cm vascularized TVF (Figure-2A). This tissue was used to cover the urethral suture (Figure-2B and Figure-2C) and after the TVF fixation we reconstructed the glans and closed the penile skin. Patients were discharged on the 2nd postoperative day, and a Foley catheter was maintained for 14 days. The mean

Figure 1 - The figure shows the initial step of the surgical procedure using the the tunica vaginalis flap (TVF) in anterior urethroplasty for a patient with urethral erosion after chronic indwelling catheterization (CIC): A) Preoperative aspect of the urethral erosion by CIC in a 46 years-old patient; B) Demarcation of the subcoronal incision and around urethral erosion; C) Dissection and separation of the the urethral plate (dashed line) from the penile skin and dartos; D) Urethral tubularization in a 2 planes continuous suture of its margins with 5-0 PDS (arrow).
Table 1 - The table shows demographic data of the 5 patients studied. We can observe the patients’ age (in years), the length of the urethral erosion (in centimeters), the comorbidities and the etiology that led to the use of a urethral catheter.

| Patient | Age (years) | Length of urethral erosion (cm) | Etiology                | Comorbidities                |
|---------|-------------|---------------------------------|-------------------------|------------------------------|
| 1       | 20          | 3.4                             | Neurogenic bladder      | Down syndrome                |
| 2       | 67          | 5.5                             | Neurogenic bladder      | BPH, diabetes mellitus       |
| 3       | 69          | 4.5                             | Neurogenic bladder      | BPH, diabetes mellitus       |
| 4       | 47          | 5.4                             | Neurogenic bladder      | Spinal cord injury           |
| 5       | 48          | 5.8                             | Neurogenic bladder      | Spinal cord injury           |
| Mean    | 50.2        | 4.92                            |                         |                              |

* BPH = Benign prostatic hyperplasia.
follow-up time was 12.25 months (range: 10-14 months). Uroflowmetry was not performed because the patients had no spontaneous urination. The final aspect 4 weeks after the catheter removal in one of the cases is demonstrated in Figure-2D.

RESULTS

We studied 5 patients with neurogenic bladder who developed urethral erosion after a long period of CIC (Table-1). The patient’s ages ranged from 20 to 69 years (mean age=50.2). The mean urethral defect length was 4.92cm ± (range: 3.4 to 5.8cm). The 5 patients had urethral erosions and difficulties in maintaining CIC.

Only 1 patient (20%) developed, after the surgery wound infection and urethra-cutaneous fistula, which was conservatively managed with the use of 2g of cephalexin for 10 days and with urethral catheterization for 14 days. The other 4 patients did not report difficulties in CIC after at least 10 months of follow-up. The procedure had no impact on sexual function, and the final aspect had no additional changes except for the scar, even in the patient with wound infection.

DISCUSSION

The use of indwelling urinary catheters could be associated with urethral erosion involving portions or complete erosion of the glans and penile shaft and in these cases the urethral reconstruction is necessary to restore the penile anatomy (8, 9). In our sample we observed only one immediate complication after the catheter removal in a patient that developed a wound infection and a small urethra-cutaneous fistula, which was conservatively managed with antibiotics and urethral catheterization for 14 days. The other 4 patients did not report difficulties in CIC after at least 10 months of follow-up. The procedure had no impact on sexual function, and the final aspect had no additional changes except for the scar, even in the patient with wound infection.

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TVF is useful for hypospadia correction (1) and we believe that the same results will be obtained with the use of this flap in urethral erosions. As far as we know, there are no reports about the use of this technique in cases of urethral erosion after CIC. This technique is easy to perform and in our initial cases we had good results in 80% of them, with minor complications in only one case, which was resolved with the use of a bladder catheter.

This study has important limitations that must be mentioned: single center study with small sample size and short follow-up, which makes the evaluation of long-term complications, such as urethral diverticulum, impossible.

Therefore, this initial study suggests that the use of a TVF may be a viable method to cover the urethral suture during reconstruction in patients with urethral erosions. Further studies with a larger number of patients carried out in several centers with long-term follow-up are required to validate the effectiveness of this technique.

CONFLICT OF INTEREST

None declared.

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**Correspondence address:**
Fernando Salles da Silva Filho, MD
Rua Vinicius de Moraes, 161/801
Rio de Janeiro, RJ, 22411-010, Brasil
Fax: +55 21 2521-3715
E-mail: fernandosallessf@gmail.com