Orandi flap for penile urethral stricture: Polishing the gold standard

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Abstract

Introduction: We describe the combined use of the Orandi flap and the scrotal skin advancement flap to reduce complications for pendulous urethral stricture in men >40 years old.
Methods: Over the last 40 months, 10 men underwent urethroplasty for pendulous stricture by the modified Orandi urethroplasty. In this, additionally, a midline hairless scrotal skin flap of the size of the ventral skin defect on the pendulous portion was raised based on the dartos fascia. This flap was mobilized so that it reached the pendulous portion without tension and covered the penile defect. The catheter was removed after 4 weeks. Patients were followed every 3 months using uroflowmetry and the American Urological Association (AUA) symptom score.
Results: The mean age was 55.5. Of the 10 patients, the etiology was post-catheterization in 5 and idiopathic in the remaining 5. Three men also had stricture extending into the bulbous urethra (repaired using buccal graft). The mean additional time needed for the flap coverage was 36.2 minutes (range: 30–45). The median follow-up was 12 months (range: 3–40). The mean postoperative symptom score was 5.2 and the mean flow rate was 20.1 mL/sec. In 2 men, the meatus got retracted to the distal penile part (probably due to downward traction by scrotal skin). No patient complained of disfigurement. Two men reported recurrence (1 each in bulbous and penile urethra). The limitations are small number of patients and the observational nature of this study.
Conclusions: The intermediate-term results show that the modified Orandi urethroplasty is an acceptable treatment option with acceptable cosmetic results.

Introduction

Treating a pendulous urethral stricture is difficult and not yet standardized. The options include substitution urethroplasty using grafts or flaps and staged procedures. The penile longitudinal skin island, known as the Orandi flap, is a time-tested and technically simple treatment for the reconstruction of pendulous urethral strictures.[1-4] This method is especially suitable if the penile skin is redundant, especially ventrally. However, sometimes, the penile skin becomes short after the flap has been harvested. This leads to tension on the ventral suture line and necessitates a dorsal release incision. Although this new raw area (on dorsal aspect) heals quickly, it creates a potential area for complications and is psychologically traumatizing to the patient. Moreover, tension on the suture line is a potential reason for fistula formation.[1] We propose an easy method to cover the ventral aspect so that tension-free closure of the wound can be performed. Over the last 40 months, we have used this method in men over 40, in which a single-stage repair was possible for the pendulous urethral stricture. We present our experience and report the initial results.

Methods

The database for men over 40 years old with either isolated pendulous urethral stricture or panurethral stricture suitable for single-stage repair was maintained prospectively (data were collected and entered into the database at the time of their clinical encounter). We received written informed consent from patients (with guarantees of confidentiality) and institutional ethical committee clearance.

We recorded patient demographics, duration of the problem, etiology of the stricture and history of previous interventions. All men underwent preoperative uroflowmetry (if voiding was possible), retrograde urethrogram (RGU), and voiding cystourethrogram (VCUG) if a suprapubic bladder catheter was in situ. The parameters noted were the length and location of the stricture.

All men underwent repair of pendulous stricture with the modified Orandi flap and simultaneous buccal mucosal graft urethroplasty for bulbous urethral stricture, if bulbous stricture was also present. All surgeries were performed under

epidural/spinal anesthesia. Buccal graft harvesting was performed under local anesthesia as previously described.[5] The urethral catheter was removed after 4 weeks. The patients were then followed after 3 months and then with 6 monthly assessments with the American Urological Association (AUA) symptom score and uroflowmetery. RGU was done if the patient complained of poor flow or if the uroflowmetery results showed a flow rate less than 15 mL/sec. The patients were questioned verbally about the overall cosmetic appearance, yet they did not complete a validated questionnaire for this parameter.

We excluded men with obliterate stricture and men in whom a 6-F ureteral catheter (over a guidewire) could not be passed into the bladder. Similarly, we excluded men with a woody hard urethral plate, with infection, who underwent a staged repair. Patients whose stricture etiology was lichen scelrosus were also excluded.

Technique

The initial steps of the surgery for the vertical penile (Orandi) flap have been previously described.[1] After the urethral tube was constructed, the remaining penile skin was assessed to see if skin closure could be performed without tension. If the skin was falling short (which is usually the case), then the size of the defect was measured. The size of the defect was calculated after applying mild traction on the penile skin; then an island of midline scrotal skin of the same size as the defect was marked (after stretching the scrotal skin). This scrotal skin flap was gently raised (based on dartos fascia) and brought over the penis and the edges were stitched to the penile skin using fine absorbable sutures (3/0 vicryl). The scrotal wound was then closed primarily (Fig. 1).

Results

The modified Orandi flap was used in 10 men who fulfilled the inclusion criteria over the last 40 months. The mean age was 55.5 (range: 45–65). In 7 men the stricture was confined to the pendulous urethra alone, while in the remaining 3 it was panurethral. The etiology was post-catheterization in 5 and idiopathic in 5. The mean duration of symptoms was 18.7 months (range: 6–36). Two men were on supra-pubic urinary diversion (SPC) for urinary retention. The mean preoperative AUA score (measured in 8 men; 2 were on SPC) was 25.4 (range: 20–30). The mean preoperative maximum urine flow rate (measured in 8) was 3.6 mL/sec (range: 2–5). Eight men had undergone previous urethral dilatations and 1 patient had undergone prior urethroplasty using buccal mucosa for a panurethral stricture.

No patient required blood transfusion. An extra mean time of 36.2 minutes (range: 30–45) was required for raising the scrotal flap, covering the penile defect, and closing the scrotal wound. The overall time for the urethroplasty procedure was between 130 and 180 minutes (mean time: 145).

The mean follow-up duration was 18.5 months (median follow-up duration was 12 months; range: 3–40). One patient developed re-stricture in the bulbous urethra after 9 months

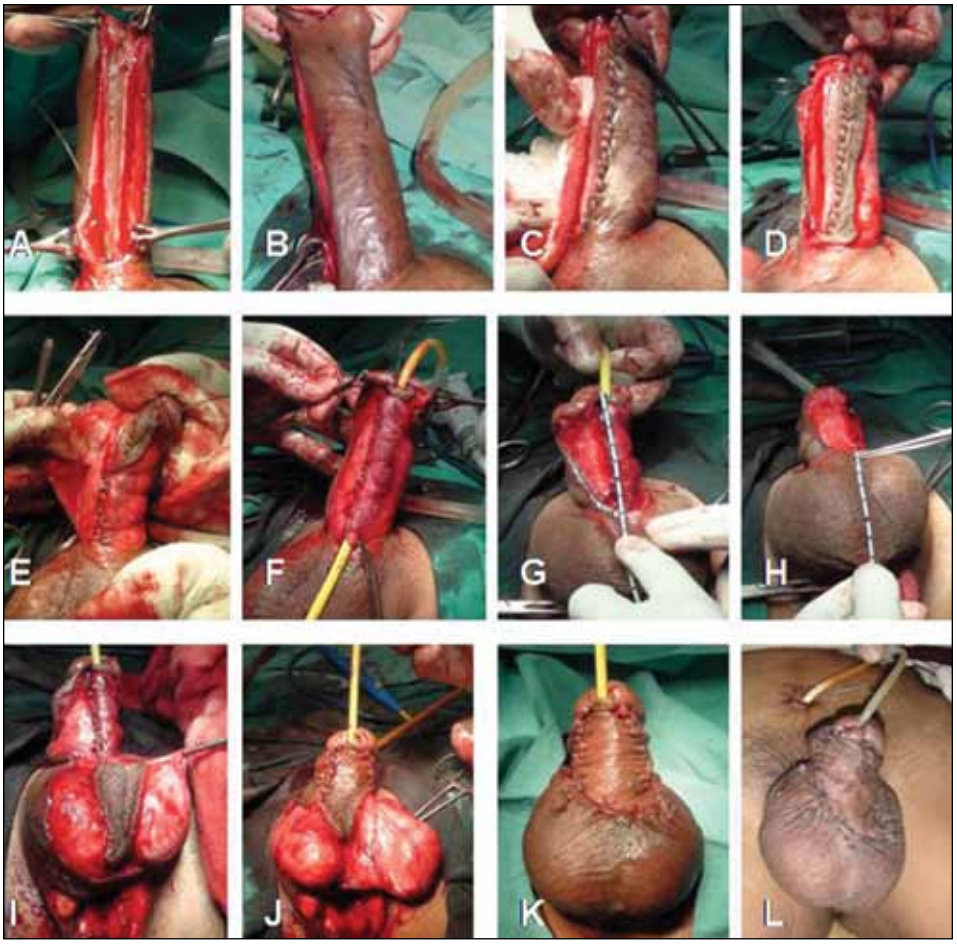

Fig. 1. A: The pendulous urethra has been opened ventrally. B: An appropriately sized penile flap has been marked. **C:** The medial edge of the flap has been stitched to edge of urethral plate. **D:** An appropriately sized flap has been created. E: The flap being stitched to the other edge of the urethral plate to create wider urethra. **F:** Completed the creation of urethra. **G:** Measurement of size of ventral defect (both transversely and vertically). **H:** Measurement of the scrotal skin flap size. **I:** Creation of scrotal island. **J:** Coverage of ventral penile defect with scrotal flap. **K:** Completed procedure. **L:** Photo after 3 months.

Fig. 2. Cosmetic appearance after surgery.

of follow-up, where the entire bulbous urethra got strictured again. Another patient had re-stricture in the pendulous part of the urethra (entire portion) after 6 months. In 2 patients, the urethral meatus became hypospadiac (retracted in the distal penile area) due to the pull exerted by the scrotal flap in the initial cases (Fig. 2, part F). No patient developed a urethral fistula. The cosmetic appearance was acceptable to patients (Fig. 1, part L, Fig. 2). The mean postoperative AUA symptom score was 5.2 (range: 3-6) and the mean flow rate was 20.1 mL/sec (range: 15-24) in the 8 successful patients.

Discussion

Treating a pendulous urethral stricture is difficult. The principle of repair is that the repair should not compromise penile length or cause penile chordee, and certainly should not negatively affect penile appearance.[6] The results of a graft urethroplasty are generally poor,[7-9] although some authors report good results.[10,11] Similarly, a staged procedure has many problems and has been associated with high revision rates.[12] The Orandi flap urethroplasty is considered an easy and reliable method to treat a pendulous urethral stricture.[1] It is also considered the gold standard, albeit *faut de mieux*.[8] However, it is important to get the right width of the flap (which is not easy) and that is why the procedure carries a significant complication rate.[8] A flap width up to 25 mm can easily be taken without compromising penile skin closure.[13] However, in our experience this was sometimes not true. Primary closure of a large skin defect is usually done under significant tension over the suture line. Moreover, there is a risk of fistula formation as the suture lines overlap each other in the conventional method.[6] Therefore, to overcome tension over the suture line, a dorsal release incision has been introduced. However, it mutilates the penis further and may cause significant apprehension to patients.

With our technique of ventral coverage, there is no tension on the penile skin and no risk of fistula formation. The modification itself is very simple and does not require much skill. The midline scrotal skin is relatively hairless and can easily be brought up to the tip of the penis. Gil-Vernet and colleagues described the biaxial epilated scrotal flap for reconstructing the urethral strictures, including those of the pendulous urethra.[14] They have shown that the vascular supply to this flap is fairly good and reliable and that the midline scrotal skin can be easily brought to the pendulous urethral portion.

Certain problems peculiar to the Orandi flap have been described.[3] First, it has been said that men dislike the scarring of penile skin incisions and, to a lesser extent, the irregularity of the skin caused by raising and rotating the dartos fascia as a pedicle for the flap.[3,13] Second, men dislike the torsion of the penis as a consequence of the pedicle, which tends to lie round on one side of the penis, when it is based on one of the dorsolateral vascular bundles.[3,13] This is magnified by the deficiency of the dartos fascia on the other side because of the way the flap is raised. Third, when a circumferential tubed reconstruction is performed with a flap, there is "bow-stringing" of the neourethra away from the corpora cavernosa, giving the appearance of ventral webbing of the penis.[3,13] With our modification the deficiency created due to the absence of dartos fascia on one side gets covered by the scrotal flap. Procedures to reduce penile torsion have already been described. One disadvantage of our modification could be the cosmetic appearance due to the use of scrotal skin. However, in our experience the cosmetic appearance is acceptable to the patient (Fig. 1, part L, Fig. 2). However, in view of the possibility of a hypospadiac urethral meatus and penile rotation, we offer this procedure only to men over 40 years old after explaining these complications. The colour of the scrotal skin matches the penile skill well. Also we have found that the ventral cosmetic appearance was not as important as the scar (due to release incision) over the dorsal aspect. There is concern that some men may grow hair later on the ventral surface of the penis. However, in our experi-

ence no patient developed hair on the penis and, moreover, if anyone gets hair then these hairs can be de-epilated any time if the patient desires. However, an important limitation of this study with regards to cosmesis is that we have not used any validated questionnaire to assess cosmetic satisfaction.

A similar type of scrotal flap has already been described before for penile coverage, especially after a bilaterally pedicled island penile skin procedure.[15,16] However, the use of scrotal skin cover for penile defect after Orandi flap has not been described. Care has to be taken while mobilizing the scrotal flap. The flap should reach the tip of the penis easily without tension. If there is tension on the flap, then the flap has a tendency to pull the meatus back (seen in our initial 2 cases). Another method to prevent fistula formation is the interposition of tunica vaginalis flap between the urethral and penile skin suture lines. However, this needs mobilization of the testis. Moreover, because of the additional tissue it may be difficult to close the skin suture further increasing the tension on the suture line.

Many urethral reconstructive urologists prefer to use the transverse penile flap.[17,18] This flap has many advantages with excellent cosmetic appearance. The major critique of the transverse flap is that the dissection is more difficult.[18] Another method for repair of penile stricture is the use of longitudinal ventral penile skin flap, as described by Turner-Warwick.[19] However, this method was described to be more useful in bulbar urethral reconstruction, where the flap is retrogradely inverted through a scrotal tunnel.[19] With our modification, the advantage of simplicity of Orandi flap is combined with a simple scrotal advancement flap to optimize the management of the penile stricture. We experienced only 2 failures, with 1 failure each in the bulbous and the penile urethra. One reason for the low failure rate in the pendulous area could be that we have been able to harvest a broad flap for reconstructing the urethra. With our modification, as we did not consider primary penile skin closure, we could rotate a generous-sized flap.

The drawbacks of our study are the small number of patients and inadequate follow-up. The small sample size was because of the strict patient selection criteria – all patients were over 40 and their penile skin was short for primary closure. Another limitation is penile skin flaps are not recommended in men with strictures due to lichen sclerosus. The long-term results of our modified Orandi flap technique are likely to remain the same as previously described results.[3]

Conclusions

Our data suggest that combined with the scrotal advancement skin flap, the Orandi flap is a good option for the treatment of pendulous urethral stricture in middle-aged/elderly men where the penile skin falls short for primary closure.

Competing interests: The authors declare no competing financial or personal interests.

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