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ORIGINAL ARTICLE

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Lessons learnt from Snodgrass tip urethroplasty: a study of 75 cases

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Abstract *Introduction and objectives*: Snodgrass tubularized incised plate urethroplasty and 2 modifications were evaluated in 75 hypospadiacs (distal and midpenile). *Patients and methods*: The initial 25 patients (group A), underwent Snodgrass tubularized incised plate urethroplasty. In the next 25 patients (group B), the urethral plate defining incision and Snodgrass urethrotomy were not extended distally to the glans tip and the neourethra was reconstructed (distal to proximal) over a spacer. In the last 25 patients (group C), dorsal free skin grafting of the raw area (following Snodgrass urethrotomy) was done. *Results*: In group A, all patients developed meatal stenosis and required intermittent dilatation for 3 months. In groups B and C meatal stenosis did not occur. *Conclusions*: Restriction or elimination of the raw area in the region of the neomeatus as in groups B and C effectively prevents meatal stenosis following Snodgrass repair.

Keywords Urethroplasty · Meatal stenosis · Stricture · Skin graft

Introduction

Following Snodgrass urethrotomy, the key step in Snodgrass tubularized incised plate (TIP) urethroplasty [1], the raw area may undergo uneventful re-epithelialization [2, 3] or it may contract resulting in meatal stenosis or less commonly strictures [4]. Creation of a wide and oval neomeatus [5], eversion of the neomeatus [6], limiting Snodgrass urethrotomy distally [7] and post-operative bouginage of the neourethra [4] have been described to prevent meatal stenosis following Snodgrass repair. Skin [8] and buccal mucosal grafts [9] have been described to prevent strictures, but their utility has been questioned by others [2]. This study describes our experience with Snodgrass TIP urethroplasty and two modifications with special emphasis on evaluation of meatal stenosis and strictures.

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Material and methods

A total of 75 hypospadiacs (glanular 13, subcoronal 40, and midpenile 22) aged 2–12 years (average age 3 years) were evaluated in this study. Those with chordee, proximal hypospadias or previous urethroplasty were not included. The patients were assessed for meatal stenosis, strictures, fistula, flap necrosis and cosmetic appearance.

Initial 25 patients, group A (glanular 4, subcoronal 15, midpenile 6) aged 2–12 years (average age 3 years) underwent Snodgrass TIPU urethroplasty [1] (Fig. 1A,B).

In the next 25 consecutive patients, group B (glanular 5, subcoronal 12, midpenile 8) aged 2–10 years (average age 3 years), the urethral plate defining incision and the sagittal incision on the urethral plate (Snodgrass urethrotomy) were not extended distally up to the glans tip (Fig. 2A,B) and the neourethra was reconstructed over a 2F larger spacer, in a distal to proximal manner.

In the last 25 consecutive patients, group C, (glanular 4, sub coronal 13, midpenile 8) aged 2–11 years (average age 3 years), the urethral plate defining incision and Snodgrass urethrotomy were made along the entire length of the urethral plate as described in Snodgrass TIP urethroplasty [1]. Using self designed retractors, the hypospadiac meatus was splayed open and 3 mm of the ventral wall incised in the midline to expose the dorsal wall which was also incised and the resultant raw area was, in continuity, grafted with the incised urethral plate using a thoroughly defatted inner preputial free skin graft (Fig. 3). The grafted urethral plate and hypospadiac meatus were subsequently tubed. The meatal

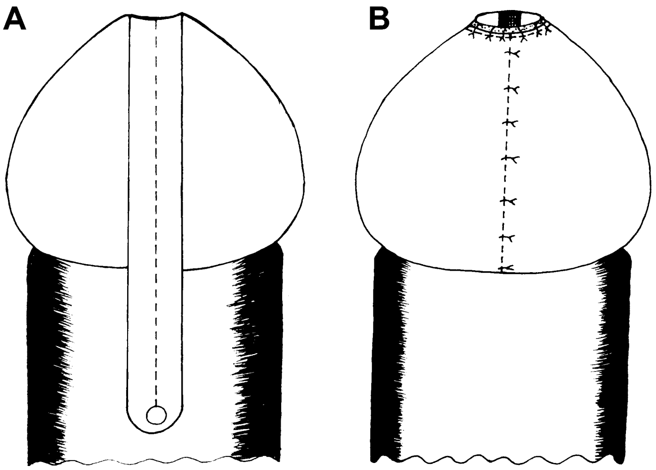

Fig. 1A Snodgrass urethrotomy carried up to the glans tip, **B** closure results in a tight, circular external meatus with raw area on its dorsum

retractors were made using 16G malleable copper wire. One end was flattened, smoothened and bent at an angle and length as per requirement, and the other end was fixed to a screwdriver handle (Fig. 4).

In 6 patients in group A and 5 each in group B and C, the dorsal subcutaneous tissue was insufficient and the tunica vaginalis (TV) flap [10] was used to cover the neourethra to prevent fistula formation. In all 3 groups, infant feeding tubes of 8F or 10F size were used in children below and above 10 years of age, respectively, and kept for 15 days. Six-zero chromic catgut was used throughout except for in-depth closure of glans where 6-zero vicryl was used. Postoperatively, ciprofloxacin ophthalmic drops were instilled 3 times daily and neomycin and polymyxin B sulfates and bacitracin zinc ophthalmic ointment USP (Neosporin antibiotic ointment, Burroughs Wellcome India) applied at night to keep the glans and neomeatus moist to prevent encrustation. Dressings were done on the 5th, 10th and 15th postoperative days. The minimum follow-up period was 9 months.

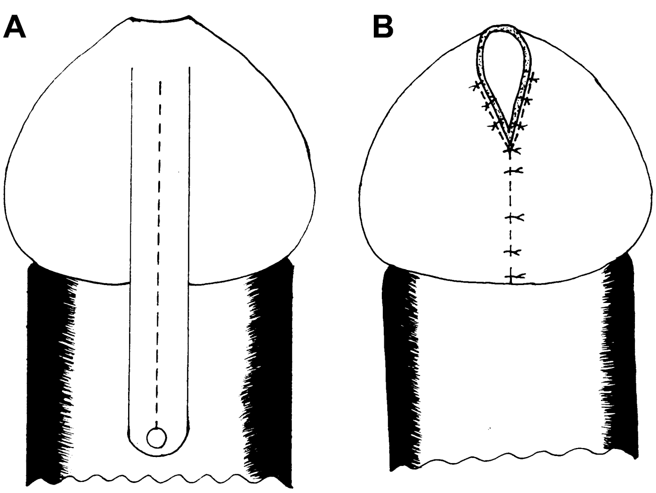

Fig. 2A Snodgrass urethrotomy limited slightly proximal to the glans tip, **B** closure results in a wide, elliptical meatus with no raw area on its dorsum

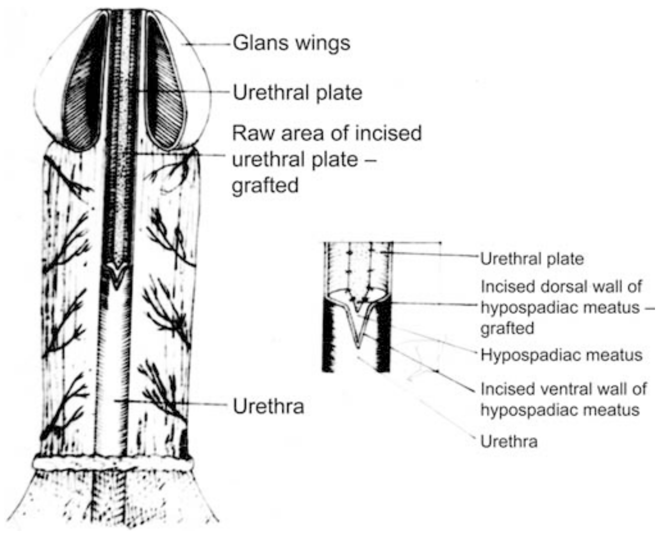

Fig. 3 Raw area of the dorsally incised urethral plate and hypospadiac meatus grafted in continuity under direct vision. Inset shows precise suturing of the graft in the dorsal wall of hypospadiac meatus

Results

In one child in group A, the urethral tube failed to work and suprapubic cystostomy was done 6 h after surgery. Superficial necrosis of Byars flap (5 in group A and 4 each in groups B and C) was managed by dressings alone. Five patients in group A, 3 in group B and 4 in group C developed urethrocutaneous fistulae which were all of pinhead size and healed spontaneously in 3–6 weeks except in 2 patients (1 each in groups A and B) that required closure at 6 months. One patient in group A where the TV flap was used as a soft tissue cover developed scrotal hematoma.

In group A all patients developed meatal stenosis as evidenced by: (i) progressive thinning of the urinary flow and (ii) stiff resistance to calibration of the neomeatus by a blunt tip size 6F bougie. Intermittent (weekly)

Fig. 4 Self-designed meatal retractor

dilatation was required in all patients in group A for 3 months postoperatively. After this period of healing the perimeatal tissues softened and hydrostatic dilatation by urinary flow alone was sufficient to maintain the caliber of the neomeatus. No stenosis or stricture was noted thereafter up to 9 months follow-up. None had meatal stenosis in groups B and C.

Discussion

Superficial necrosis of the Byars flaps in 13 patients can be attributed to the separation of dorsal subcutaneous tissue from the outer preputial and dorsal penile skin. Spontaneous closure of 10 fistulae can be accredited to the dorsal subcutaneous tissue. The successful prevention of fistulae in 16 patients with TV flap was due to the security provided by the long, wide and vascular flap cover to the neourethra [10]. Scrotal hematoma resulted from inadequate hemostasis during harvesting of the TV flap. Meatal stenosis was initially attributed to (i) extensive glanular wing mobilization resulting in edema, ischemia and subsequent contraction, (ii) formation of adhesions between raw areas of incised urethral plate, (iii) inadequate or excessive depth of incision of the urethral plate and (iv) recurrent meatal encrustation, ulceration, scarring and stenosis during healing. Nonetheless, some of the cases of meatal stenosis resulted from contraction of the raw area at the neomeatus and the same has also recently been observed by the author of this technique [11, 12]. The variable healing characteristics of the incised glans tip as compared to the urethral plate may account for this complication.

In group B by avoiding the urethral plate incision at its distal most part (glans apex) and by reconstructing the neourethra in a distal to proximal manner, enabled the fashioning of a wide and elliptical external meatus having no raw area on its dorsum (Fig. 2B) thereby preventing meatal stenosis.

None of the patients in group C developed meatal stenosis or stricture as the raw area had been completely eliminated by immediate grafting.

Conclusions

The high incidence of meatal stenosis in group A, in our experience, was partly due to technical errors and partly due to contraction of the raw area of the distal urethral plate at the glans apex. Adoption of one of the modifications described can effectively prevent meatal stenosis following the Snodgrass technique.

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