Modified Tubularized Incised Plate Urethroplasty Repair: Frenuloplasty and Long-Term Results in 155 Patients

Süleyman Cüneyt Karakuş · Naim Koku

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Abstract To describe a modification of tubularized incised plate (TIP) urethroplasty which we refer to as “frenuloplasty”. We retrospectively reviewed 155 children who underwent TIP urethroplasty between June 2008 and August 2011 in our institution. In our technique, the circumcision incision went on through the mucocutaneous junction obliquely in order to form frenular wings instead of linear circumscribing incision joined the urethral plate vertically. The little triangle-shaped skin flaps between the oblique mucocutaneous incisions and urethral plate incisions were excised. The glans wings and frenular wings were re-approximated without tension after urethroplasty. The mean age of the patients was 4.63 ± 3.82 years. The mean follow-up was 15.94 ± 5.46 months. Location of hypospadias was distal penile in 126 patients (81.3 %) and mid-shaft in 29 (18.7 %). The following complications occurred in 21 patients (13.5 %): urethrocutaneous fistula formation in 7 (4.5 %), meatal stenosis in 14 (9 %) and no dehiscence. We suppose that there is no incompletely formed prepuce but a ventral fusion defect in the midline. Frenuloplasty reduces the necessity of ventral preputial flaps and provides satisfactory cosmetic outcomes with the appearance of normal circumcised penis.

Keywords Hypospadias · Urethroplasty · Frenuloplasty · Cosmetic outcomes

Introduction

Although many operations have been described for hypospadias repair, the tubularized incised plate (TIP) urethroplasty is

widely accepted and a reasonable method that is applicable to most of the hypospadias patients with low complication rate and good cosmetic result. Frenulum of the foreskin is a normal component of the penis. Although urethroplasty, spongiosoplasty, meatoplasty, glanuloplasty and skin coverage were described in TIP urethroplasty, reconstruction of the frenulum has not yet been considered. We modified the glanuloplasty in TIP operation for better cosmetic results and called that modification *frenuloplasty*. We would like to present our results with the modification of TIP urethroplasty.

Materials and Methods

We retrospectively reviewed 155 children who underwent TIP urethroplasty with frenuloplasty for hypospadias performed by the first and second authors together between June 2008 and August 2011 at Gaziantep Children Hospital, Turkey. Data collected included age, location of hypospadias, follow-up time, presence and severity of the chordee, complications and cosmetic results.

The technique is briefly as follows: under general anesthesia, a stay suture was placed through the glans for traction. The penis was incised approximately 1 cm proximal to the coronal sulcus and incision went on through the mucocutaneous junction obliquely in order to form frenular wings, instead of linear circumscribing incision joining the urethral plate vertically, as described by Snodgrass, and two parallel incisions were made on the glans to form the glanular wings (Fig. 1a, b) [1]. Then the penis was degloved. One midline deep incision was carried out in the urethral plate. The incised urethral plate was tubularized over a 6 Fr or 8 Fr catheter with a single-layer continuous running 6/0 polyglactin suture. The slit like neomeatus was constituted in order to avoid stenosis. Mobilized divergent corpus spongiosum was

S. C. Karakuş (✉) · N. Koku
Department of Pediatric Surgery, Gaziantep Children Hospital,
27560 Şehitkamil, Gaziantep, Turkey
e-mail: sckarakus@yahoo.com

Fig. 1 **a** key procedure of frenuloplasty; the penis was incised approximately 1 cm proximal to the sulcus and the incision went on obliquely in order to form frenular wings. **b** intraoperative view of incision went

on through the mucocutaneous junction obliquely. **c** skin flaps were excised and frenular wings were dissected sufficiently

approximated in the midline to cover neourethra. The little triangle-shaped skin flaps between the oblique mucocutaneous incisions and urethral plate incisions were excised (Fig. 1c). Both the glans wings and frenular wings were reapproximated without tension by using double-layer of interrupted 6/0 polyglactin suture. Thus frenulum was composed between the glanular tissue and the skin, called frenuloplasty (Fig. 2a, b). Light compression dressing antibiotic impregnated gauge was done. The catheter was removed 7 days after surgery.

Results

The mean age of the patients was 4.63 ± 3.82 years (range, 1 to 16 years). The mean follow-up was 15.94 ± 5.46 months (range, 6 to 28 months). Location of hypospadias was distal penile in 126 patients (81.3 %) and midshaft in 29 (18.7 %). 24 (19 %) of distal penile cases had superficial skin tethering. All the patients with midshaft hypospadias had chordee, but only 8 of them had fibrous chordee and the others had superficial skin tethering. Superficial skin tethering was

Fig. 2 **a** and **b**, View of the penis after frenuloplasty performed

corrected by releasing the skin bridging and fibrous chordee was resolved by penile degloving.

The following complications occurred in 21 patients (13.5 %): urethrocuteaneous fistula formation in 7 (4.5 %), meatal stenosis in 14 (9 %) and no dehiscence. One of the urethrocuteaneous fistula spontaneously disappeared, while the others repaired primarily. All of the meatal stenosis resolved after regular dilatation.

Discussion

The *frenulum*, or *frenum*, is a connecting membrane on the underside of the glans, similar to that beneath the tongue. It is one of the most important components of the physical erogenous stimulation of the penis [2]. Embryologically, in the normal penis, the preputial skin has a decreased growth rate on the ventral surface during penile development while the dorsal prepuce proliferates at a faster rate. As tubularization of the urethra proceeds distally, the fusion of the prepuce on the ventral aspect of the glans creates the frenulum, a bridge-like structure that joins the ventral prepuce to the glans [3]. In the penis with hypospadias, the ventral glans and preputial skin do not fuse in the midline. We noticed that glanular wings, one on each side of the urethral plate, usually proceed with frenular wings proximally. An incision which is performed at this side separates the penil skin from the frenular wings. We suppose that there is no incompletely formed prepuce but a ventral fusion defect. On the basis of this supposition, with frenuloplasty, we try to reconstitute this fusion defect. Near normal appearance of the frenulum postoperatively and accomplishing to perform frenuloplasty in all of our patients support our supposition and technique. Decter used similar M-shaped incision in the procedure for correction of the distal hypospadias. The M-shaped incision extends to include mucosal collars and these collars were approximated in the midline as in our frenuloplasty technique [4]. As distinct from his technique, we extend the M-shaped incision more proximally from the glanular sulcus to the skin for the reconstitution of the frenulum. Our ventral fusion defect supposition is also supported by thick dorsal prepuce in the hypospadias penis that results from an arrest of ventral migration.

Firlit described the technique of mucosal collar, which consisted of transposing the inner surface of the prepuce to the ventral aspect of the penile shaft in order to recreate the normal-appearing, circumcised penis and frenulum [5]. In our technique, the frenulum was created by using frenular wings. Although we performed frenuloplasty only in TIP urethroplasty, it may be used

in all hypospadias surgery, regardless of the type of repair similar to the technique of mucosal collar.

Chordee is present in 25–55 % of all patients with hypospadias and a vast majority of it is perioperatively correctable by penile degloving [6–8]. But it usually causes the paucity of the ventral skin and the preputial skin transposed ventrally as Byars flaps [9]. Frenuloplasty reduces the necessity of ventral preputial flaps in most of our patients with superficial skin tethering and fibrous chordee.

In TIP urethroplasty, the ventral view of the penis is usually different from the normal circumcised penis and cosmetic outcomes are not always good enough. However, frenuloplasty provides satisfactory cosmetic results with the appearance of the normal circumcised penis and frenulum.

The most important point in frenuloplasty is enough dissection of the glanular wings in order to approximate the oblique mucocutaneous junction with no tension. Tension may result in dehiscence, fibrosis or fistula. Our fistula rate was not different from the literature data given for conventional TIP urethroplasty [10, 11]. Therefore, adding the frenuloplasty to conventional TIP urethroplasty hypospadias repair seems to be a promising method to refine the cosmetic results in this group of patients without increasing the complication rate.

Conclusion

We suppose that there is no incompletely formed prepuce but a ventral fusion defect in the midline. Frenuloplasty reduces the necessity of ventral preputial flaps and provides satisfactory cosmetic outcomes with the appearance of the normal circumcised penis.

Conflict of Interest The authors declare that they have no conflict of interest.

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