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Urethral plate grafting improves the results of tubularized incised plate urethroplasty in primary hypospadias

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Abstract *Objective:* We conducted a competitive efficacy trial in order to examine whether grafting the raw area of the urethral plate (UP) with inner preputial skin in children with primary hypospadias (PH) during tubularized incised plate urethroplasty (TIP) improves the results of the operation.

Material and methods: Fifty consecutive patients with pathology ranging from glanular to proximal penile PH were randomized into two groups, comparable for age and pathology, to be operated on either with TIP or a grafted TIP (G-TIP) procedure. Three patients failed the re-examination protocol, so the TIP group comprised 23 children aged 9.0 months–9.6 years (mean age 3.4 years) and the G-TIP group comprised 24 children, aged 10.0 months–9.4 years (mean 3.5 years). The patients were followed up for a period of 2–5 years (mean 3.2 years). *Results:* Within the TIP group, we observed the development of fistula with concomitant neourethral stenosis in two cases (8.7%), stenosis without fistula in four (17.4%), and glans dehiscence in one case (4.35%). Within the G-TIP group there was one case of fistula without stenosis (4.16%), no case of neourethral stenosis, and one case of glans dehiscence (4.16%). Two cases of non-slit-like meatus were observed in the TIP group. The results show that the complications of neourethral stenosis are significantly reduced ($p < 0.05$) in the G-TIP group, as is the total number of complications and unsatisfactory results. The duration of the TIP operation was 72–110 (mean 92) min, and for the G-TIP 100–136 (mean 115) min. No postoperative symptoms were observed that could be attributed to prolonged anesthesia time.

Conclusion: UP grafting with inner preputial skin, when added to the TIP procedure in the treatment of PH, results in a significantly smaller number of unsatisfactory results, and particularly fewer cases of neourethral stenosis. G-TIP can be used as the procedure of choice in PH patients. © 2013 Journal of Pediatric Urology Company. Published by Elsevier Ltd. All rights reserved.

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Introduction

The tubularized incised plate urethroplasty (TIP) procedure, popularized by Snodgrass et al. [1], has certainly been a breakthrough in hypospadias surgery [2]. The additional placement of an inlay graft at the raw urethral plate (UP) surface has been suggested to modify the healing process and may improve the results of the operation [3]. We investigated the hypothesis that the grafted tubularized incised plate urethroplasty (G-TIP) procedure has more favorable results than the simple TIP procedure, when applied as a procedure of choice to all primary hypospadias (PH) cases, ranging from glanular to proximal penile.

Materials and methods

We designed a competitive efficacy trial in which we included children with glanular to proximal penile PH, having their preputial hood intact and not suffering from any dermatological pathology of the genitalia. No hormonal treatment had been administered to the children.

The children were recruited between March 2008 and February 2010. They were randomized into two groups of 25 patients each: one group to be operated on with the TIP procedure and another group with the G-TIP procedure. In order to assign cases of equivalent gravity in each group, a patient was assigned in one group and the next arriving patient with the same type of PH was assigned to the other group. This way, the groups were homogenized, without any other criterion than the order of appearance.

All patients had regular clinical and laboratory preoperative examinations. The parents were informed about the operation, the postoperative care needed, especially the calibration procedure and the possible complications and their management. They were operated on by two of the authors of this article, often interchanging as surgeon and assistant.

Three patients failed the re-examination protocol (described below) and were omitted from the study. In total, the TIP group comprised 23 children aged 9.0 months–9.6 years (mean age 3.4 years) and the G-TIP group 24 children aged 10.0 months–9.4 years (mean 3.5 years). The patients were followed up for a period of 2–5 years (mean 3.2 years). The characteristics of each group, as well as the results, are shown in Table 1. We explored our results with the chi-square Fisher's exact test with the help of an SPSS package. Absolute risk, confidence interval, and the number need to treat were calculated by hand.

Operative technique

The ventral penile skin and the preputial hood are marked as described by Firlit [4] (Fig. 1a, b). The skin is incised along the marked lines and the penis is degloved. The glans is infiltrated with 1:100,000 epinephrine along the borders of the UP, where it is incised, in order to create the ventral neourethral flaps and elevate the glans wings. These are further dissected from the corpora cavernosa in order to cover the neourethra without tension (Fig. 5b). Careful hemostasis is applied.

Artificial erection is next performed and an occasional curvature is corrected by dorsal plication and excision of inelastic ventral shaft tissue, as necessary. The UP is incised longitudinally in the midline as described by Snodgrass and Nguyen [5] (Fig. 2). In the TIP group, the incision comprised only the length of the UP, taking care not to extend it towards the glans tip. In the G-TIP group, we allowed ourselves to extend the incision a bit further towards the tip, when we felt that we could achieve a better slit-like appearance at the tip of the glans. In the G-TIP group, a free graft was then measured and harvested from the inner prepuce (Fig. 3). The graft measured 8–12 mm in width, and its length depended on the type of the hypospadias, ranging from 10 mm in glanular and distal cases to 25 mm in proximal hypospadias cases. The graft was defatted and placed on the raw incised area, trimmed into a diamond shape to fit relaxed into it, and was sutured to the margins as described by Kolon and Gonzales [6] using polyglycolic 6:0 stitches (Safil Quick). Quilting stitches of the same kind were placed anchoring the graft to the corpora cavernosa (Fig. 4). The graft was fashioned to cover the whole of the urethral raw area.

The neourethra was rolled around a 6- or 8-Fr Foley catheter. A double layer of running subepithelial 7:0 polyglycolic stitches (Safil) was used for urethral closure. In five patients (two from the TIP group and three from the G-TIP group) a spongioplasty was performed according to the principles of Dodat et al. [7]. The dartos flap was button-holed, transposed ventrally, and stabilized with polyglycolic 6:0 stitches as a second barrier for waterproofing

Table 1 Cases and complications.

Type of hypospadias	Type of operation, number of patients, and complications	
	TIP	G-TIP
Glanular	2 (1 stenosis)	3 (1 glans dehiscence)
Coronal	8 (1 fistula with stenosis, 1 glans dehiscence)	9
Distal	7 (2 stenoses)	6 (1 fistula)
Midpenile	3 (1 fistula with stenosis)	3
Proximal penile	3 (1 stenosis)	3
Total	23	24
	2 fistulas (8.7%)	1 fistula (4.16%)
	6 stenoses (26.1%)	
	1 glans dehiscence (4.35%) appearing in 7 patients (30%)	1 glans dehiscence (4.16%) appearing in 2 patients (8.33%)
Age	9.0 months–9.6 years (mean 3.2 years)	10.0 months–9.4 years (mean 3.5 years)
Orthoplasty	2	3
Spongioplasty	2	3

TIP = tubularized incised plate urethroplasty; G-TIP = grafted TIP.

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