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Foreskin reconstruction at the time of single-stage hypospadias repair: is it a safe procedure?

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Abstract

Introduction Foreskin reconstruction (FR) is a recognised, yet debated, option for patients undergoing single-stage hypospadias repair (HR).

Methods We evaluated the incidence of complications after single-stage HR in our institution. This is a retrospective review of all single-stage HR. Patients were classified into group 1 (circumcision) and group 2 foreskin reconstruction (FR). Urethroplasty and foreskin complications were recorded. Statistics used are as follows: Mann–Whitney test to compare age at operation and length of follow-up (FU); Chi-Square test to analyse the incidence of urethral complications and need for reoperation; Log rank test to compare the survival curves; p statistically significant < 0.05. Data are presented as median (range).

Results 304 patients were identified, operated between January 2010 and December 2016, and 20 were excluded: 6 already circumcised at the time of the surgery, 3 with megameatus intact prepuce, 11 lost at FU. 284 patients were included: 161 circumcised and 123 FR. Median age at the operation was 17 months (8–179) (group 1) and 17 months (8–148) (group 2) ($p = 0.71$). Length of FU was 19 months (8–91) (group 1) and 17 months (4–87) (group 2) ($p = 0.45$). The survival curve was homogeneous ($p = 0.28$). Urethroplasty complications occurred in 32/161 (20%) (group 1) and in 21/123 (17%) (group 2) ($p = 0.55$). Foreskin complications occurred in 18/123 (15%). A second operation was required in 33 boys in each group, (20% group 1 and 27% group 2) ($p = 0.21$).

Conclusion FR does not increase the complication rate or the need for a reoperation after single-stage HR. Parents should be offered the option between the two procedures according to their personal preference.

Keywords Foreskin reconstruction · Hypospadias repair · Urethroplasty · Complications

Introduction

The ultimate goal of hypospadias surgery is to achieve a good functioning and cosmetic penis with the lowest complication rate. There is an ongoing debate [1] in regard of the fate of the foreskin at the time of the hypospadias repair with evidence available that the complication rate in the short period is comparable when considering single-stage hypospadias repair associated with foreskin reconstruction (FR) and classic repair with circumcision (C) [2, 3]. Our aim was to investigate whether foreskin repair is safe evaluating the incidence of complications after single-stage hypospadias repair in our institution in the long term.

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Materials and methods

This is a retrospective cohort study of all single-stage hypospadias repair performed between January 2010 and December 2016. Boys who had already been circumcised at the time of the hypospadias repair were excluded as well as those with megameatus intact prepuce (MIP) variant. Patients were divided in 2 groups: those who underwent circumcision were allocated in group 1 and those who underwent FR in group 2.

The foreskin was reconstructed in three layers, using absorbable sutures and postoperative foreskin retraction was not allowed in the initial 6–8 postoperative weeks and not recommended thereafter. Figure 1 shows how the reconstructed foreskin looks 4 years after the operation.

The following outcomes were analysed for each group: (i) age at operation and length of follow-up; (ii) number of urethral and foreskin complications; (iii) time of onset

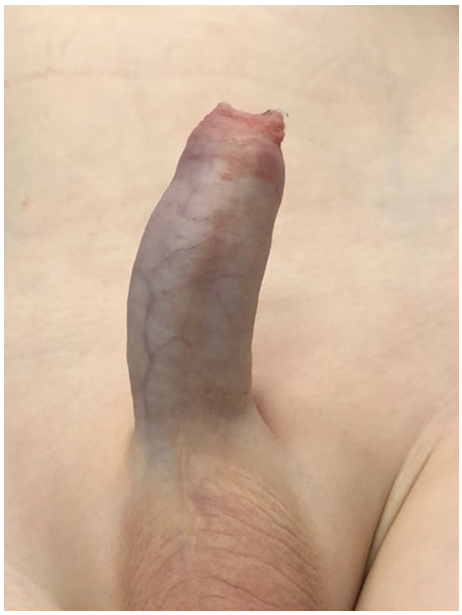

Fig. 1 Foreskin reconstructed at time of single stage hypospadias repair appearance at 4 year follow-up

of postoperative complications and (iv) need for a reoperation. Data are expressed in months and reported as median (range).

Statistics used are as follows: Mann–Whitney test to compare the age at operation, length at follow-up and onset of complication.

Chi-square test to compare urethral complication and the need for a reoperation. Log rank test to compare the two survival curves. Value of $p < 0.05$ was considered significant.

Results

We identified 304 children who had single-stage hypospadias repair over the 7-year-period analysed. Twenty boys were excluded: 6 because already circumcised at the time of the operation, 3 with MIP variant and 11 lost at follow-up.

Of the 284 analysed patients, 161 were in group 1 (C) and 123 in Group 2 (FR). The age at the operation was 17 months in both groups (8–179 group 1), (8–148 group 2), $p = 0.71$; length of follow-up was 19 months in group 1 (3–91) and 17 months in group 2 (4–87), $p = 0.45$.

There were 128 (79%) distal hypospadias (14 glanular, 53 coronal and 61 subcoronal meatus) in group 1 and 117 (95%) 7 glanular, 74 coronal and 36 subcoronal meatus in group 2. Urethral tubularisation was the surgical technique most performed (157/161 and 121/123 in groups 1 and 2, respectively); MAGPI technique was adopted for the remaining patients.

In group 1, urethral complications occurred in 32/161 patients (20%). In particular, we observed 16 urethral fistulae, 13 meatal stenosis and 3 glans dehiscence; in group 2 urethral complications occurred in 21/123 patients (17%): 13 were urethral fistulae, 3 meatal stenosis and 5 glans dehiscence; $p = 0.55$.

In group 2, foreskin complications occurred in 18/123 patients (15%): 3 foreskin fistulae, 3 foreskin stenosis, 12 foreskin breakdown.

The number of boys who required a second operation was 33 in each group (corresponding at 20% in group 1 and 27% in group 2, respectively). ($p = 0.21$). Table 1 summarises the results of our study.

Discussion

The aim of hypospadias repair is to obtain a good functional and cosmetic reconstruction with the lowest complication rate. We measured the success of hypospadias surgery by analysing the incidence of urethral complications (that are associated with an impaired function) and the need for reoperation.

Whether FR is a safe procedure has been debated [1–4] and several studies are published suggesting that FR does not increase the overall complications rate as compared to those following circumcision in the short-term period [2, 5, 6]. Our results support this position and demonstrate that the results are maintained in a longer term. In our cohort, we have not found difference in incidence of urethral complications ($p = 0.55$) and number of reoperations ($p = 0.21$) among the two techniques.

Focusing on foreskin complications alone, Snodgrass et al., in a prospective study published in 2013, reported skin complications resulting in reoperation in 2.3% of the

Table 1 Comparison of the analysed outcomes between group 1 and group 2

	Total $n = 284$	Group 1 $n = 161$	Group 2 $n = 123$	p
Age at operation (months)	17 (8–179)	17 (8–179)	17 (8–148)	$p = 0.71$
Length of FU (months)	17 (3–91)	19 (3–91)	17 (4–87)	$p = 0.45$
Onset of complications (months)	6 (1–47)	7 (1–47)	6 (1–30)	$p = 0.55$
Urethral complications	53 (19%)	32 (20%)	21 (17%)	$p = 0.55$
Reoperations	66 (23%)	33 (20%)	33 (27%)	$p = 0.21$

patients receiving FR with a median follow-up of 7 months [2]. In another large series of FR, with 12-month follow-up, complications of the preputioplasty were observed in 4.8% of the reconstructions with only 17 patients out of 354 who needed a second operation for either persistent phimosis or dehiscence of the reconstructed foreskin [6]. Another recent retrospective review [7] with a length of follow-up slightly longer than ours reported a rate of urethral fistula of 6% in the FR group and of 32% in the circumcision group; the reoperation rate was 19% in the FR group and 46% in the circumcision. In our series, the complication rate related to the foreskin was slightly higher (15%).

The outcomes of FR are influenced by the technique used to reconstruct the urethra. The use of ventral skin graft to reconstruct the urethra can make foreskin reconstruction more difficult and the foreskin reconstructed under tension [8]. In our institution, we perform TIP repair or MAGPI with wide lateral dissection of the glans; the foreskin is then reconstructed in three layers. The timing of postoperative foreskin retraction has also been considered an important prognostic factor of the success of the FR: early foreskin retraction after the operation is, in fact, associated with higher complication rate [4]. The majority of the authors recommend delaying the first retraction for at least 4–8 weeks [2, 5]. We instruct parents to not retract the foreskin for at least 6–8 weeks after the operation and do not encourage retraction afterwards. Foreskin retraction is assessed at the first postoperative control (usually 3–6 months after the operation) and if it is found difficult, a topical steroid may be used with success [2, 9]. Kallampallil et al. have suggested that the full retractility of the reconstructed foreskin at the end of the hypospadias surgery should be considered an important predictor of the development of postoperative phimosis [10]. We do not routinely assess it because we do not feel this to be essential considering that in some patients a certain degree of oedema may be present at the end of the procedure.

The median onset of postoperative complication in our cohort was 7 months (1–47) in the circumcision group and 6 months (1–30) in the FR group; for both these outcomes, length of follow-up and onset of complication, our two groups were similar. Analysing the KM curve it appears that the median follow-up in both groups is longer than the onset on the majority of the complications and the survival curve is homogeneous between the two groups ($p = 0.28$) (Fig. 2).

Interestingly, all the foreskin complications were diagnosed before 18 postoperative months (Fig. 3), except one occurring 26 months after the procedure.

In particular, looking at our cohort, at the time of the median follow-up (19 months for group 1 and 17 months for group 2), 85% and 95% of the reported complication had already occurred. Compared with some of the most relevant papers published so far about this topic, we present results with longer follow-up.

Snodgrass et al. [2] reported a median follow-up of 7 months (IQR 3–10) for the circumcision group and 8 months (IQR 4–11) for the FR group; Esposito et al. [6] presented a follow-up of 12 months. The median follow-up for our patients was 19 months in the circumcision group and 17 months in the FR group with the longest follow-up being 91 and 87 months, respectively.

These data can partially explain the higher complication rate reported and are important in the evaluation of the long-term results of both techniques. The urethroplasty

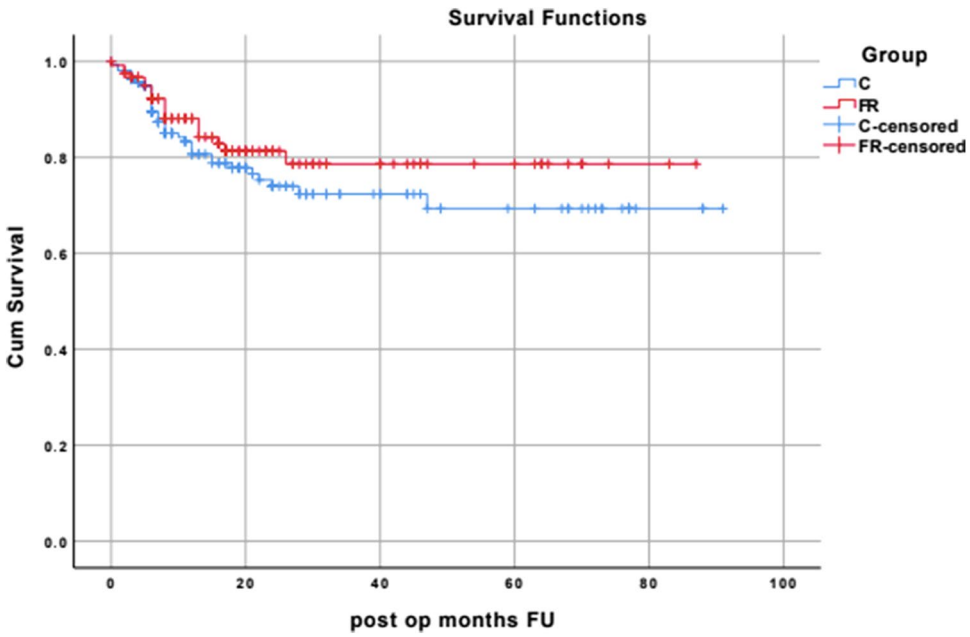

Fig. 2 Kaplan–Meier curve comparing the onset of complications in Group 1 and Group 2

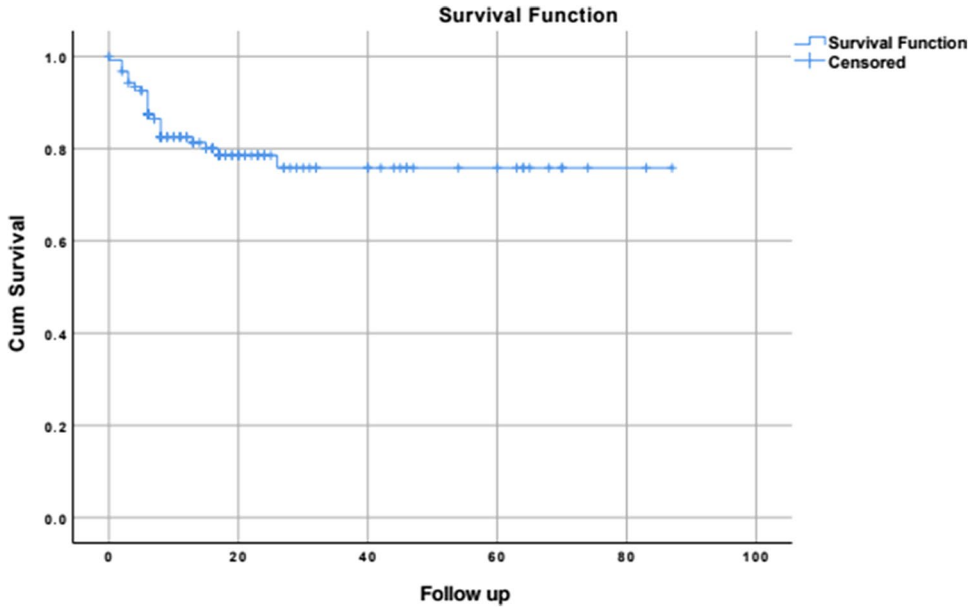

Fig. 3 Kaplan–Meier curve showing onset of complication only in Group 2

complication rate in our study was 20% in the circumcised group and 17% in the FR group ($p = 0.55$).

For what regards the complications related to the reconstruction of the foreskin, our rate of dehiscence was 9.7% (12/123) and of phimosis was 2.4% (3/123). Those data are in line with a recent review that shows a range of 4%–21% urethral complication, 2%–30% of preputial dehiscence and 0–9% of post-FR circumcision reported in the studies included [11].

Its retrospective nature may represent a limitation of our study: the choice to proceed with either FR or circumcision was taken by the operating surgeon (in our unit we have 3 consultant paediatric urology surgeons who perform both foreskin reconstruction and circumcision for distal hypospadias repairs) unless a specific request was made by parents (children referred to our hospital are a cohort of different religions and backgrounds). Options for treating distal hypospadias include also reconstructing only the foreskin without performing any urethroplasty [12]; in our review, we have not included children who have undergone foreskin reconstruction alone. We are maintaining our prospective database updated for capturing also late presenting complications [13].

We believe that even more interesting data will be achieved following the children beyond puberty considering the changes that usually occur during the pubertal growth when there may be a discrepancy between the penile and the foreskin growth [10] and also when it would be possible exploring the psychosexual satisfaction. A review article published in 2011 in fact found that, despite objective assessments revealing good cosmetic results, hypospadias patients were less satisfied with penile appearance compared to controls [14]. Long-term analysis of patient satisfaction with penile appearance and sexual activity comparing FR and circumcision is lacking; we therefore recommend maintaining a prospective database with the aim to perform an evaluation of those patients beyond puberty.

Conclusion

We have demonstrated that FR at the time of single-stage hypospadias repair does not increase the number of complications nor the need for reoperation in a long-term. The procedure is safe and should be offered to all children undergoing single-stage hypospadias repair. There is no valid medical indication for supporting routine circumcision in the general population [15] and because an accepted "cosmetic normality" is dependent on culture, race and religion [10, 16–18], the choice between FR and circumcision should be given to parents/caregivers. The surgeon should counsel them about outcomes and complications on the basis of literature evidence and parents/caregivers should be given the choice according to their personal preference. Long-term studies are required to prove that the reconstructed foreskin does not generate problems after puberty.

Author contributions Mr. RM: data collection/data management, data analysis, manuscript writing/editing. Ms. CS: data collection. Mrs. KP: manuscript editing, surgeon of operations. Mr. AT: manuscript editing, surgeon of operations. Mr. MG: project development, manuscript editing, data analysis, surgeon of operations.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

Informed consent Informed consent was obtained from all individual participants included in the study.

References

1. Heloury Y, Cheng EY (2014) Distal hypospadias: circumcision vs preputial reconstruction. J Urol 191:17–19
2. Sndograss W, Dajusta D, Villanueva C, Bush N (2013) Foreskin reconstruction does not increase urethroplasty or skin complication after distal TIP hypospadias repair. J Pediatr Urol 9:401–408
3. Suoub M, Dave S, El-Hout Y, Braga LH, Farhat WA (2008) Distal hypospadias repair with or without foreskin reconstruction: a single-surgeon experience. J Pediatr Urol 4:377–380
4. Klijn AJ, Dik P, de Jong TP (2001) Results of preputial reconstruction in 77 boys with distal hypospadias. J Urol 165:1255
5. Antao B, Lansdale N, Roberts J, Mackinon E (2007) Factors affecting the outcome of foreskin reconstruction in hypospadias surgery. J Pediatr Urol 3:127–131
6. Esposito C, Savanelli A, Escolino M et at (2014) Preputioplasty associated to urethroplasty for correction of distal hypospadias: a prospective study and poposition of a new objective scoring system for evaluation of esthetic and functional outcome. J Pediatr Urol 10:294–299
7. Rampersad R et al (2017) Foreskin reconstruction vs circumcision in distal hypospadias. Pediatr Surg Int 33:1131–1137
8. Snodgrass W (2012) Foreskin reconstruction. Bolnick et al Surgical guide to circumcision. Springer, London, pp 177–181
9. Snodgrass W, Koyle M, Baskin L, Caldamone A (2006) Foreskin preservation in penile surgery. J Urol 176:711–714
10. Kallampallil J, Hennayake S (2013) Foreskin retractility following hypospadias repair with preputioplasty—medium term outcomes. J Pediatr Urol 9:1204–1209
11. Castagnetti M, Bagnara V, Rigamonti W, CImador M, Esposito C (2017) Preputial reconstruction in hypospadias repair. J Pediatr Urol 13:102–109
12. Zimmermann E, Woodward M (2014) O Isolated preputial reconstruction in distal hypospadias. J Pediatr Urol 10:399.e1-399.e2
13. Schneuer FJ, Holland AJA, Pereira G, Bower C, Nassar N (2015) Prevalence, repairs and complications of hypospadias: an Australian population-based study. Arch Dis Child 100:1038–1043
14. Rynja SP, de Jong TP, Bosch JL, de Kort LM (2011) Functional, cosmetic and psychosexual results in adult men who underwent hypospadias correction in childhood. J Pediatr Urol 7:504–515
15. Singh-Grewal D, Macdessi J, Craig J (2005) Circumcision for the prevention of urinary tract infection in boys: a systematic review of randomised trials and observational studies. Arch Dis Child 90:853–858
16. Hayashi Y, Kojima Y, Mizuno K et al (2008) Modified foreskin reconstruction for distal hypospadias and chordee without hypospadias. Int J Urol 15:646–648
17. Laumann EO, Masi CM, Zuckerman EW (1997) Circumcision in the United States. Prevalence, prophylactic effects, and sexual practice. J Am Med Ass 277:1052–1057
18. Shimada K, Matsumoto F, Matsui F, Takano S (2008) Prepuce sparing hypospadias repair with tubularized incised plate urethroplasty. Int J Urol 15:720–723