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Comparison of the perimeatal-based flap (Mathieu) and the tubularized incised-plate urethroplasty (Snodgrass) in primary distal hypospadias

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Objectives To determine whether the perimeatal-based flap technique or the tubularized incised-plate repair is the more appropriate treatment for distal hypospadias in terms of fistula rate, cosmesis of the meatus and operative duration.

Patients and methods Between July 1997 and August 1998, 60 children (none of whom had previously undergone a procedure for hypospadias) underwent primary distal hypospadias repair in a prospective randomized trial. Thirty patients were allocated to undergo a Mathieu repair (mean age 24.9 months, range 9–72) and 30 a Snodgrass procedure (mean age 23.1 months, range 7–19). The mean follow-up was 15.4 months.

Results The mean duration of surgery was significantly lower for the Snodgrass procedure than for the Mathieu repair (75 vs 115 min, $P < 0.05$). Three children undergoing a Mathieu repair had complications (two a urethrocutaneous fistula and one a meatal stenosis), compared with only one in the Snodgrass group (glanular dehiscence). The resultant meatus was slit-like in all patients undergoing the Snodgrass repair whereas those with a Mathieu repair had a rounded and horizontal meatus.

Conclusion The overall complication rate was lower and the surgery significantly quicker with the Snodgrass urethroplasty, which also had a better cosmetic outcome. The Snodgrass technique is recommended as a primary treatment for distal hypospadias.

Keywords Distal hypospadias, perimeatal flap, urethroplasty, Mathieu, tubularized incised plate, Snodgrass, complications, outcome

Introduction

Of patients with hypospadias, ≈ 80% have a meatus in a coronal or subcoronal position [1]. The perimeatal-based flap urethroplasty is commonly used for the primary correction of distal hypospadias [2–4]. The most frequent complications after hypospadias repair are urethrocutaneous fistulae and meatal stenosis, which have been reported in up to 21% of patients [5]. Furthermore, the meatal-based flap repair creates a horizontal and rounded meatus which is cosmetically less acceptable than a normal vertical slit-like meatus [6]. A combination of incising the urethral plate and a meatal-based flap technique to improve the cosmetic outcome has been described [7]. However, the location of the neomeatus and the final appearance of the glans are often predetermined by the shape of the glans and the depth of the urethral groove. Therefore, Snodgrass [8] described a technique with a low complication rate for correcting distal hypospadias by tubularizing the urethral plate, combined with a deep longitudinal incision of the groove to create a vertical meatus. The present study was designed to determine whether the Mathieu or Snodgrass repair is the more appropriate treatment for distal hypospadias, assessing the fistula rate, cosmesis of the meatus and operative duration.

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Patients and methods

The two procedures for correcting distal hypospadias were assessed in a prospective randomized controlled trial conducted between July 1997 and August 1998. Sixty consecutive patients were randomized in equal groups to undergo either a Mathieu repair (mean age at presentation 24.9 months, range 9–72) or Snodgrass procedure (mean age 23.1 months, range 7–19) performed by one surgeon (M.R.). Patients were then followed every 3 months to determine any complications and the cosmetic result; the mean (range) follow-up was 15.4 (10–23) months.

Surgical technique

After degloving the penis an artificial erection was induced to assess any deviation; if there was significant chordee it was corrected by dorsal plication [9]. The glans

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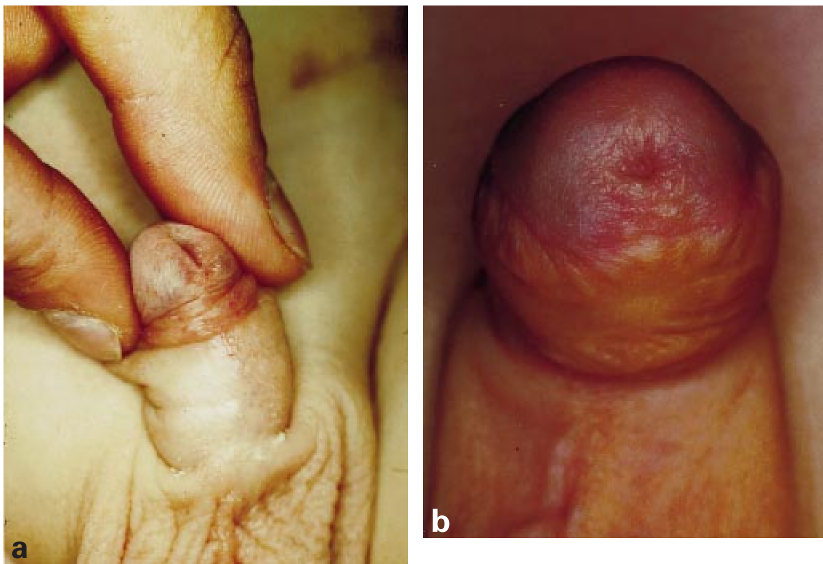

Fig. 1. a, The slit-like meatus produced after the Snodgrass repair and **b,** the horizontal, rounded neomeatus produced by the Mathieu repair.

wings were created after making parallel longitudinal incisions to define the urethral plate. A skin flap was outlined proximal to the meatus, long enough to reach the tip of the glans in the Mathieu group. The flap was raised to the meatus and anastomosed to the distal urethral plate with a 7/0 polyglactin 910 running suture on each side. In the Snodgrass group the urethral plate was incised in the midline, including the mucosal and submucosal tissues from meatus to the glans tip, and the plate tubularized with a 7/0 polyglactin 910 running suture. Dorsal subcutaneous tissue dissected from the preputial and shaft skin was rotated ventrally to cover the neourethra in both groups. Finally, the glanular wings were symmetrically closed over the neourethra with 6/0 poliglecaprone 25 sutures in two layers. The neourethra was stented for 7 days with an 8 F or 10 F silicone stent and a suprapubic diversion used to drain the bladder for the same period.

Results

The mean (SD) operative duration (defined to be from placing the traction suture to applying the surgical dressing) was significantly less for the Snodgrass technique than for the Mathieu repair, at 75 (14) and 115 (12.5) min, respectively ($P < 0.05$). There were three complications after the Mathieu procedure; two patients developed a coronal urethrocutaneous fistula and one had meatal stenosis. In the Snodgrass group, one child had glanular dehiscence 6 days after surgery caused by skin breakdown. Six months later both fistula were repaired, the child with meatal stenosis underwent open meatotomy and the patient with the glanular dehiscence underwent a successful second Snodgrass repair. The resultant meatus was centrally located, vertical and slit-like in all patients after the Snodgrass repair, whereas most patients in the Mathieu group had a meatus that was distorted, rounded and horizontal (Fig. 1).

Discussion

Complications are common after hypospadias repair, ranging from fistulae to complete loss of the neourethra requiring total reconstruction [10]. Even in experienced hands, hypospadias repair is associated with the development of urethrocutaneous fistulae. The meatal-based flap urethroplasty is commonly used for the primary correction of distal hypospadias. However, the two suture lines necessary for the flap increase the risk of developing a coronal urethrocutaneous fistula. There is also an increased risk of meatal stenosis because the blood flow in the distal part of the flap is reduced [11].

The incidence of complications (defined as those requiring re-operation) after primary meatal-based flap urethroplasty is reportedly < 3–21% for distal hypospadias repair (Table 1). Because hypospadias surgery is complex, it is difficult to compare complication rates; there are many variables, e.g. anatomical variations, surgical technique, tissue handling, suture material, bladder drainage and stenting. To reduce the risk of fistulae an adjacent vascularized tissue flap was used to cover the neourethra in all the present hypospadias repairs. The subcutaneous flap provides a repair with no crossing suture lines; this causes fewer fistulae [17,18]. The modified technique of tubularizing the urethral plate and incising the urethral groove allows the urethra to hinge, creating a neourethra of normal diameter irrespective of the plate, the glans configuration and

Table 1 The reported overall complication rates for the Mathieu and Snodgrass repairs for distal hypospadias

Reference	*No. of patients*	*Overall rate (%)*
Mathieu		
[10]	34	15.0
[12]	50	8.0
[13]	114	2.6
[13]	222	3.6*
[5]	42	21.0
[14]	37	18.9*
[14]	65	4.6
[15]	52	5.8
[16]	216	15.0
Snodgrass		
[8]	16	0
[19]	148	7.0
[20]	32	6.2

*Not stented.

the location of the meatus [8]. With this technique only one suture line is necessary, saving operating time and decreasing the possible risk of a urethrocutaneous fistula. In addition, with the dorsal urethral incision it is possible to create a vertical meatus of natural appearance. Other recent studies indicate that the Snodgrass procedure causes fewer complications than the Mathieu repair, especially fistulae (Table 1).

The present study confirms the lower complication rate of the Snodgrass repair, but because there were relatively few patients in each group, a much larger study is required to provide statistically significant differences between such groups. However, the Snodgrass procedure was significantly faster than the Mathieu repair and the cosmetic appearance of the neomeatus more natural. Thus we recommend the tubularized incised-plate repair as the primary therapy for children with distal hypospadias.

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