

Combined Use of the Mathieu and Incised Urethral Plate Techniques for Repair of Distal Penile Hypospadias

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Abstract Though both the Mathieu and incised urethral plate techniques are individually described for single-stage repair of distal penile hypospadias, each has its own shortcomings. We describe the combination of the two techniques by taking their advantages and reducing their limitations. Thirteen patients belonging to the age group of 3–22 years with distal penile hypospadias and mild chordee were operated by this technique with a mean follow-up of 8 months. One patient had urethrocutaneous fistula, and another patient had partial skin necrosis which healed spontaneously without fistula. Both of these complications occurred in adult patients. None developed urethral stenosis, and the cosmesis of the glans was excellent in all cases. This technique is very helpful in patients having small flat glans and shallow urethral groove.

Keywords Hypospadias · Urethroplasty · Mathieu technique · Incised plate

Introduction

Hypospadias is a congenital urogenital anomaly due to incomplete fusion of urethral folds [1]. Modern-day objectives of hypospadias surgery are straightening of the penis and positioning the urethral meatus at the tip of the glans, and normalization of voiding and erection, and symmetric appearance of the glans and shaft at the earliest possible age to avoid any psychological trauma during the child's development [2].

Many surgical techniques have been reported for the repair of distal penile hypospadias. The Mathieu procedure is one of these popular techniques, based on the preparation of a

perimeatal artery-based flap to construct the urethra. The flap usually creates a horizontal and round meatus, which is cosmetically less acceptable than a normal vertical slit-like meatus [3, 4].

Incised urethral plate technique results are superior to many other techniques, but some authors have reported on 12–33 % of incidence of meatal stenosis or urethrocutaneous fistula after this procedure [5–7].

Materials and Methods

During the period from 2009 to 2012, 13 patients (age ranges from 3 to 22 years) with distal penile hypospadias admitted to our department were enrolled into this study. All of them were primary cases. Patients with severe chordee, those with previous urethroplasty, or mega meatus were excluded from the study. All the patients underwent repair with the Mathieu technique with incising urethral plate. The postoperative results and complications were studied and analyzed.

Surgical Technique

Following the standard preparation and draping of the operative field, a silicone catheter or infant feeding tube is inserted per urethra which is fixed to the glans with 4-0 mersilk. The distance between the site of the native meatus and the glans tip was measured. A U-shaped perimeatal-based skin flap was created, with a sharp single deep cut up to the *tunica albuginea* with the aim of keeping more soft tissue under the flap to be flipped. The width of the distal end of the flap was made narrower than the base (Figs. 1 and 2). Then a degloving incision was given at the corona, and the penile skin was degloved up to the base of the penis. In majority of the patients with skin or dartos chordee, this maneuver was

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Fig. 1 The preoperative markings of perimeatal flap and incision at the urethral plate

helpful in correcting the chordee, but patients with chordee at the urethral plate required a modified Mathieu technique.

A midline incision was given on the urethral plate from the native urethral meatus to the glans tip, involving the epithelial and subepithelial layers. Then, urethroplasty was completed by onlay of the perimeatal-based skin flap over an appropriately sized catheter by using vicryl 6-0 suture in a running subcuticular manner, keeping in mind that at no point the skin epithelium should be visible. The suturing is started proximal to the meatus so as to avoid leakage at the meatal site. During taking bites, the soft tissue is taken, not the epithelium, with care not to include the perimeatal vessels inside the sutures. Then the catheter is removed, and the repair is checked for water seal by injecting normal saline through the reconstructed urethra followed by gentle insertion of an immediate lower-sized catheter (Fig. 3). This maneuver allows space for subsequent inflammation and edema during the postoperative



Fig. 2 Photograph after elevation of the flap and incision of the urethral plate



Fig. 3 Photograph showing on table checking for water seal after removal of the catheter

period without compromising the vascularity of the flaps, and also there will be no gripping on the catheter during its removal. The neourethra was covered by an inner preputial layer that had been dissected from the prepuce and rotated ventrally with 5-0 chromic catgut sutures. Then, glanular wings were closed symmetrically over the neourethra with 6-0 vicryl suture in two layers, and the penile shaft was covered by the available penile skin.

Dressing was applied with medium pressure with the penis kept perpendicular to the body to abate edema formation. The inner layer consists of nonadherent material (Jelonet), while the outer layer consists of a thin pad.

All patients received injectable antibiotic and analgesic immediately after operation. Oral laxative and anxiolytics were started from first post operative day for 7 days.

The dressing was routinely changed after 48 h of operation. The catheter was kept in place for 14 days. All patients were allowed to void after catheter removal, the caliber and force of the urinary stream and site of any leakage was noted carefully. Dilatation of urethra was started from the next day with the available traditional dilator (Fig. 4).

All patients were reassessed 1 week after catheter removal and once a month thereafter for 6 months. All patients were advised with a once-a-day dilation of the reconstructed urethra with a traditional dilator made from animal horns available in the local market.

Results

None of the patients in the age group of 3–11 years developed any complications, but a 22-year-old developed urethrocutaneous fistula, and another 20-year-old patient developed partial skin necrosis which spontaneously healed without fistula. The urine caliber and projection is well appreciable (Fig. 5).



Fig. 4 Photograph of the traditionally available urethral dilator made from animal horns

Discussion

Although distal hypospadias is of a mild degree in the spectrum of hypospadias, still it is usually hard for any patient, especially adults, to accept an abnormally shaped ectopic meatus [8].

The Mathieu technique has remained one of the most reliable procedures for the repair of distal hypospadias. The complication rate of the Mathieu procedure is variable, ranging from 4 to 15 % in different series. However, one of the major drawbacks of this procedure is abnormally shaped neomeatus [9].

In 1994, a new method for distal hypospadias repair was described by Snodgrass, in which tubularization of the urethral plate (TIP) without skin flaps was facilitated by midline plate incision [5]. TIP urethroplasty has gained widespread acceptance for urethroplasty for both distal and proximal hypospadias. The deep plate incision is a crucial maneuver, allowing optimal rotation of glanular wings with the result of tension-free glanuloplasty. The technique is simple and

provides good cosmetic results. This technique simplified decision making in distal hypospadias surgery because the operation was successful regardless of various meatal and urethral plate configurations encountered [10].

Some concerns have been always raised regarding meatal and neourethral complications (i.e., meatal stenosis and fistula formation) and the need for regular urethral dilations after TIP procedures; these complications would be potentially more prominent in patients with a flat and narrow urethral plate [11, 12].

In the current study, the incised urethral plate step was added to the Mathieu technique to facilitate glanuloplasty. Few other modifications were added to the Mathieu technique including placing the incision on the glans medially, compared to conventional Mathieu, so as to have more tissue in the glans to facilitate closure of the glanular wings without tension, thus decreasing the incidence of glanular dehiscence.

The current modification maximizes the functional and esthetic results by adding the TIP principles to the standard Mathieu procedure. On the other hand, it seems to decrease the incidence of meatal stenosis and fistula formation.

Conclusion

The procedure of combining the Mathieu with incised urethral plate technique reduces the incidence of fistula and meatal stenosis and improves the cosmetic results. This technique is helpful in patients where the glans is small and flat with shallow urethral groove. Meticulous technique and gentle tissue handling are still crucial prerequisites as is the case in all types of hypospadias repair. The technique is still for proper evaluation in a large number of cases.

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Fig. 5 Photograph showing well-projecting urinary stream after removal of catheter

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