MEGAMEATUS INTACT PREPUCE HYPOSPADIAS VARIANT: APPLICATION OF TUBULARIZED INCISED PLATE URETHROPLASTY

YUVAL BAR-YOSEF, JOSEPH BINYAMINI, MICHAEL MULLERAD, HAIM MATZKIN, AND JACOB BEN-CHAIM

ABSTRACT

Objectives. The characteristics of the megameatus intact prepuce (MIP) hypospadias variant present a unique challenge to surgeons. Dissatisfaction with the results of conventional repair methods led to the emergence of several alternative surgical approaches, including the glanular approximation (GAP) and pyramid procedures. The application of tubularized, incised plate (TIP) urethroplasty has not been documented in this setting.

Methods. Twenty-four patients (mean age 18.5 months, range 6 to 60) presented with MIP. They had all been circumcised. The meatus was glanular in 6, coronal in 15, and distal shaft in 3 patients. Glanular MIP was repaired by meatal advancement and glanuloplasty (n = 2) or the GAP technique (n = 4). Coronal MIP was repaired by the GAP (n = 7) or TIP urethroplasty (n = 8), and distal shaft MIP was repaired by TIP urethroplasty (n = 3). Stents or catheters were used only with TIP urethroplasty. The mean follow-up period was 40 months (range 8 to 80).

Results. Satisfactory cosmetic and functional results were achieved in 20 patients (83%). The other 4 patients included 1 patient who underwent GAP and meatoplasty and 3 of the 11 patients who underwent TIP urethroplasty, of whom 2 underwent meatoplasty and 1 simple local repair of a urethrocutaneous fistula without the need for urethral reconstruction.

Conclusions. The success rates for all selected techniques were satisfactory. TIP urethroplasty can be successfully used in the more severe, proximal forms of MIP. UROLOGY 66: 861–864, 2005. © 2005 Elsevier Inc.
among the first to recognize the distinct surgical challenges presented by the MIP variant, estimated its prevalence to be at least 3% of the cases of hypospadias. Dissatisfied with the results of the MAGPI and perimeatal-based flap procedures, they described what they called the “pyramid procedure.” Yet another technique specifically designed to overcome the challenges of a wide, deep glanular groove and a noncompliant fish mouth meatus is the glans approximation procedure (GAP).4

Another characteristic that makes MIP a surgical challenge is that most of the affected patients have been circumcised and are thus lacking preputial and dartos tissue to be used for reconstructive procedures. Moreover, many parents believe that the defect was inadvertently caused during circumcision, and the urologist must correct this misconception.5

MIP is not a uniform variant, but rather a spectrum of different combinations of its various characteristics. In a series reported by Hill et al.,6 an isolated megameatus was observed in 28% of the patients, an isolated deep glanular groove in 50%, and a combination of a megameatus and a deep groove in the remaining 22%. MIP hypospadias may be glanular or coronal or appear in the distal shaft. The tubularized incised plate (TIP) urethroplasty technique7 has achieved wide acceptance in the repair of distal hypospadias. It allows for excellent cosmetic and functional results and has become a preferred technique in many centers, as well as in our own. To our knowledge, however, the application of TIP urethroplasty in the repair of the MIP variant has not yet been documented in published studies. Previous larger reports of the TIP urethroplasty technique may have included patients with the MIP variant, but data specific to that subgroup were not provided. A technique that results in favorable outcomes in non-megameatal hypospadias is not necessarily applicable to the MIP variant. The results of the perimeatal-based flap and the MAGPI techniques, which are suitable for non-megameatal hypospadias, have led to the development of techniques specific to the MIP variant. We present our experience with the MIP variant and our approach to its surgical management, which includes the MAGPI, GAP, and TIP urethroplasty techniques.

**MATERIAL AND METHODS**

Twenty-four patients (mean age 18.5 months, range 6 to 60) presented with MIP. All had undergone ritual neonatal circumcision, and all parents reported that the prepuce appeared normal before circumcision. The meatus was glanular in 6 patients and coronal in 15 and in the distal shaft in 3. The distribution of surgical techniques for the study group is displayed in Figure 1. The procedures were performed by the same surgeon (J.B.C.) using magnification loupes, needle tip cautery, and 5-0 polyglactin absorbable sutures. Because preputial tissue was unavailable for suture line coverage, we used subcutaneous tissue from the dorsal aspect of the penis for the TIP urethroplasty technique. Silicone stents or catheters were used only for the TIP urethroplasty technique and were removed 7 to 14 days after surgery. The success of the repair was judged according to physician and parental satisfaction during follow-up. The mean follow-up period was 40 months (range 8 to 80).

**RESULTS**

Initial and lasting satisfactory cosmetic and functional results were achieved in 20 patients (83%).
Meatal stenosis developed in 3 patients (2 underwent TIP urethroplasty for distal shaft hypospadias and 1 underwent GAP for coronal hypospadias) who subsequently underwent meatoplasty with a satisfactory final cosmetic and functional outcome. A small urethrocutaneous fistula had developed in 1 patient who underwent TIP urethroplasty for coronal hypospadias. It was closed with a simple local procedure without the need for urethral reconstruction.

**COMMENT**

The anatomic characteristics of the MIP hypospadias variant present a unique challenge to surgeons. Because most of the patients have been circumcised, the penile skin is usually thin and scarred. The dissection of the wide meatus and urethral plate may result in thin glanular wings that are more prone to dehiscence and urethral fistula formation. The TIP urethroplasty technique allows for better dissection of the glanular wings, because the lateral aspects of the urethral plate are not dissected as they are with the GAP and pyramid procedure, leaving thicker glanular wings for glanular reconstruction. In addition, it is a very popular procedure and one that can be readily performed by most surgeons.

Although the reports on the GAP and pyramid procedure were authored by surgeons who were dissatisfied with the results of the application of other available techniques to the MIP variant, several reports have been published of successful results when those procedures were used. For instance, Nonomura et al. reported on 9 children who underwent surgery using perimeatal-based flaps. Excellent cosmetic and functional results were reported in 8 patients; the ninth underwent reoperation for excision of redundant ventral foreskin. We similarly used the MAGPI technique in 2 of the 6 patients with glanular MIP, who presented with the mildest distal defects. The GAP is simple to perform and achieves good results when used for the remaining glanular defects. We used both the GAP and TIP urethroplasty in patients with coronal MIP. In the case of a wide urethral plate and poor glans tissue, which may lead to thin glanular wings, we opted for TIP urethroplasty, because it allows for more formal dissection of the glans wings on the expanse of the width of the urethral plate. This was compensated for by incision of the urethral plate. We implemented TIP urethroplasty for proximal, distal shaft defects. The hinging of the urethral plate allows for tension-free tubularization of the urethral plate, thereby offering an advantage over the pyramid procedure. The report by Duckett and Keating on the pyramid technique described a reduction of the ventral part of the urethral plate in some of their patients. We did not find it necessary to reduce the urethral plate when performing TIP urethroplasty. Although we believe that TIP urethroplasty may be applied in all cases of MIP, the added dissection may be unnecessary in the most distal cases. We currently use TIP urethroplasty for all coronal and distal shaft MIP cases.

We had 2 cases of meatal stenosis in patients with distal shaft MIP and 1 case of urethrocutaneous fistula in a patient with coronal MIP; all 3 patients underwent TIP urethroplasty. Considering that such defects are the most prone to complications, these results seem reasonable. The final outcome was favorable and complications were minor. All the patients included in this study had been circumcised during the neonatal period, but we believe that their parents’ report of an intact prepuce to be accurate. All newborns in our country are examined by neonatologists before their discharge from the hospital, and neonatal circumcision is deferred until a pediatric urologist has been consulted in the event that hypospadias is diagnosed. Furthermore, ritual circumcisers are trained to recognize hypospadias and the characteristic hooded prepuce, and they are instructed to refrain from circumcising these infants. Given these safeguards, we contend that it is unlikely that hypospadias with an incomplete prepuce would go unnoticed, and that all of our patients had, in fact, presented with the MIP variant.

We believe that the suitable procedure for each patient should be tailored according to the location of the meatus and the anatomic features and that no single technique is appropriate for all cases and variants of MIP hypospadias. On the basis of the width and mobility of the urethral plate and the degree of hypospadias, an experienced surgeon who is familiar with all the above-mentioned techniques should be able to identify the best technique for a specific case and achieve good results in correcting this challenging variant. On the basis of our results, we advocate using TIP urethroplasty for the more proximal MIP hypospadias variant.

**CONCLUSIONS**

The MIP variant is considered a surgical challenge. On the basis of its anatomic features, several techniques can be used with good functional and cosmetic results. TIP urethroplasty, which allows for tension-free reconstruction of the urethra, can be successfully applied in cases of a proximal meatal location.

**ACKNOWLEDGMENT.** To Esther Eshkol for editorial assistance and to Lior Goldbrener for secretarial assistance.
REFERENCES

EDITORIAL COMMENT
Hypospadias presents as a spectrum of anomalies. No single urethroplasty provides a universal solution to each. Variants having a generous meatus and widened urethral plate also occur on a spectrum. Technique selection is the factor most crucial to their successful repair.

True MIP (megameatus intact prepuce) variants are typically accompanied by a deeply clefted, fish-mouthed glans and widened distal urethra extending onto a generous urethral plate. The plate projects to the tip of the penis and allows for appropriate centralization of neourethras created by its simple tubularization. The urethral plates of these unusual anomalies rarely require incision to give additional caliber to the neourethras created by the plate tubularization techniques that have become so widely popular.

The intact prepuce perhaps points to a different mechanism in pathogenesis from that of most hypospadias, which are typically accompanied by a hooded prepuce. Some believe that MIP variants might be better categorized as glanular megaulurethras. Obstruction, rather than an end-organ endocrinopathy, suggested of most hypospadias, has been implicated.

In contrast, somewhat generous urethral plates that mimic the MIP commonly occur with generic hypospadias. How these are related embryologically is unclear. As with the MIP, some can be simply tubularized using a GAP-type technique. Others are amenable to plate incision and consequent tubularization using TIP urethroplasty. However, many are unsuitable candidates for either approach. The complications we see echo repetitive themes.

Glands configuration and urethral plate projection are key factors in selection. Tubularizing plates that do not extend to the tip of the glans result in neourethras positioned on the periphery of the glans. These are not well supported ventrally by spongiosum and risk glans breakdown or, at best, a suboptimal cosmetic result. The more deeply clefted glans, whose plate typically projects distally, allows for better centralization of the neourethra, more ventral support, and a better cosmetic outcome.

The minimal plate width required of TIP urethroplasty is not well defined. I, perhaps, ask less of the technique than others; 6 mm of healthy, pliable plate, before its incision and lateral distraction, seems a reasonable template for construction of an 8F neourethra (normal caliber in an infant). Expecting more of narrower plates risks stricture formation.

The overlapping suture lines of tubularization techniques risk fistula formation. Interposing tissue between the neourethra and glans minimizes their occurrence. A less widely recognized threat is posed by the widened distal urethra. This should be tapered in caliber to that of the neourethra. Otherwise, merely tubularizing the plate beyond, results in varying pressure differentials that cause turbulence and risk a “blowout” fistula.

The apparent simplicity of the TIP belies the complex tissue transfers required for its success. The lessons learned from the MAGPI (meatal advancement and glansplasty), another technically “simple” urethroplasty that was overapplied to unsuitable candidates and gradually fell from favor, should not be taken lightly. The TIP and other urethroplasties that use tubularization of the urethral plate offer a reasonable option in correction of some, but not all, hypospadias variants presenting with a “megameatus.”

Michael A. Keating, M.D.
Orlando, Florida
doi:10.1016/j.urology.2005.06.092
© 2005 ELSEVIER INC.
ALL RIGHTS RESERVED