

Distal hypospadias repair using only glans wing mobilization and approximation

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LACY JM, HENDRIX LN, GRANT C, ZIADA AM. Distal hypospadias repair using only glans wing mobilization and approximation. *Can J Urol* 2014;21(2): 7241-7245.

Introduction: Since its first description in 1994, tubularized incised plate (TIP) technique has become the most commonly performed hypospadias procedure and involves incision of the urethral plate with subsequent tubularization. Glans wings are then developed to cover the neourethra, thereby creating a cosmetically appealing repair. In some distal hypospadias cases, mobilization and approximation of glans wings is sufficient to create a normal appearing urethral meatus.

Materials and methods: A retrospective chart review of all pediatric urology patients who underwent hypospadias repair by a single surgeon at the University of Kentucky between July 1, 2010 and April 1, 2013 was performed. Of the 46 patients who underwent one-stage distal hypospadias repair during that time, we performed the

technique described above on 13 patients with amenable anatomy. Patients were evaluated for functional and cosmetic outcomes as well as complications at subsequent office visits and via telephone.

Results: Patients who underwent distal hypospadias repair with our technique had excellent functional and cosmetic outcomes analogous to those who underwent standard TIP repair. The only major complication in the study group was wound dehiscence in one patient that was required a second surgery. All other patients had excellent cosmetic and functional results without fistula formation, strictures or diverticuli, and with excellent parent satisfaction.

Conclusions: Perceived benefits of this technique include simplicity and rapidity of technique, applicability to glanular, coronal and subcoronal hypospadias, and avoidance of sutures between urethra and glans with potential decrease in meatal stenosis.

Key Words: hypospadias, tubularized incised plate, pediatric urology, urethra

Introduction

Hypospadias is one of the most common male congenital anomalies with an incidence of approximately 1 in 300 live births. The etiology of hypospadias is thought to be multifactorial, with multiple associated chromosomal abnormalities¹ as well as possible environmental factors that potentially disrupt genital development.² There have been several recent studies suggesting an increased incidence of hypospadias, but other studies revealed that incidence is stable or even decreasing.³⁻⁵

By definition, hypospadias describes an ectopic urethral meatus with or without penile curvature and a foreskin that is deficient ventrally. The urethral meatus may be located more proximally or distally along the ventral shaft depending on the timing of the arrested development. We consider the glans separation an essential component of the hypospadias anomaly. Correction of this component can in itself correct the penile function and appearance.

There are multiple surgical techniques for hypospadias correction, which are largely chosen based on surgeon preference in addition to consideration of the proximity of the hypospadias.⁶⁻⁹ One of the most popular techniques for hypospadias repair is the tubularized incised plate (TIP) technique or "Snodgrass Procedure." This involves a circumscribing incision and degloving of the penis, mobilization of glans

Accepted for publication January 2014

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wings lateral to the urethral plate, a midline relaxing incision to widen the urethral plate followed by tubularization of the urethral plate over a urethral stent. A dartos pedicle flap from the dorsal prepuce is transposed ventrally if sufficient tissue is present. Glans wings are approximated at the corona and skin is closed.¹⁰

We describe a new technique for hypospadias repair of glanular, coronal, subcoronal and select distal hypospadias that does not require incision or tubularization of the urethral plate. The technique corrects what we consider the fourth component of the hypospadias anomaly by mobilization and approximation of glans wings to correct their hypospadias without manipulation of the urethral plate and with minimal, if any, sutures from the urethra to the glans.

Materials and methods

Institutional Review Board (IRB) approval was obtained. A retrospective chart review was performed and all cases of hypospadias repair by a single surgeon at our institution from July 1, 2010 through April 1, 2013 were analyzed. Fifty-one patients undergoing hypospadias repair were identified from operating room logs and Current Procedural Technology (CPT) codes. Exclusion criteria included previous operation by another surgeon and two-stage repairs. Six patients were excluded from this study based on these exclusion criteria. All single-stage hypospadias repairs during this time period were evaluated and included in the study for a total of 46 patients. Operative reports were reviewed and analyzed for intraoperative findings and technique. Thirteen of these 46 patients underwent distal hypospadias repair that did not require tubularization of the urethral plate. The surgical technique is illustrated in Figure 1 and demonstrated with intraoperative and postoperative photos in Figure 2. Each of these patients was noted to have a wide urethral plate that closed around a 5-Fr catheter in a tension-free fashion with only glans wing mobilization and no manipulation of the urethral plate. All other patients underwent standard TIP repair and were included in the control group.

Subsequent clinic visits were reviewed and analyzed for cosmetic and functional results of the surgery as well as any postoperative complications. Specific outcomes were parent satisfaction with cosmetic appearance, presence of a slit-shaped meatus, and strength and quality of urinary stream. The authors also assessed postoperative complications to include the following: wound infection, urethrocutaneous

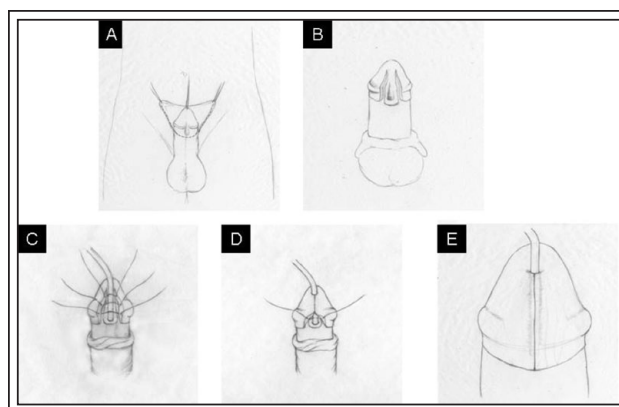


Figure 1. Surgical technique.

From left upper corner: (A) Circumferential incision with no manipulation of the urethral plate and catheter in place. (B) Dissection of glans wings with adequate depth and mobilization to cover the catheter. (C) Three sutures approximately 1mm apart are used to reapproximate the glans wings. (D) Partial closure of glans wings from distal to proximal. (E) End surgical result with catheter in place and neomeatus nicely positioned on the ventral surface of the glans.

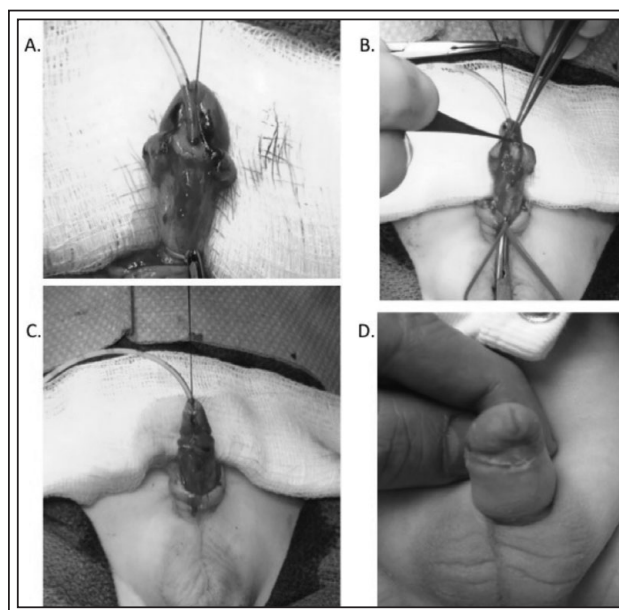


Figure 2. Intraoperative and postoperative photos. From left upper corner: (A) Circumferential incision with no manipulation of the urethral plate, catheter in place. (B) Dissection of glans wings with adequate mobilization to cover catheter. (C) End surgical result with closure of glans wings cover catheter to create neourethra. (D) Cosmetic result at 4 month postoperative visit with slit-shaped meatus and no meatal stenosis.

fistula formation, wound dehiscence, meatal stenosis, urethral stricture, diverticulum formation, and need for repeat operation. Mean operative times and meatal location were also noted.

Results

Thirteen patients underwent the modified technique described above during the study period. A comparison of the control and study groups is summarized in Table 1. Mean age at time of surgery was 19.6 months (range 8-48 months) in the study group (modified TIP technique) compared to 12.1 months (range 6-55 months) in the control group. Mean follow up was 10 months in the study group compared to 5.8 months in the control group. Mean operative time was shorter in the study group, with a mean of 79 minutes compared to 93 minutes in the control group. None of these values reached statistical significance due to the small size of the study.

Table 2 compares complications between the control and study groups. Parents were generally satisfied with the cosmetic outcome of the procedure and postoperative examination revealed slit-shaped meatus appropriately positioned in the mid-glans in both groups. In the control group, 2 patients (6%) were noted to have meatal stenosis at routine follow up visits. One patient underwent meatoplasty; the other patient was asymptomatic with no voiding difficulties and his parents declined intervention. One patient (3%) developed a urethrocutaneous fistula and underwent surgical repair with excellent results. There were no patients with formation of urethral strictures or diverticuli and no episodes of glans dehiscence. Three patients (9%) had redundant penile skin or penile adhesions. One of these patients underwent

TABLE 2. Comparison of surgical complications

	Control (TIP)	Study (modified TIP)
Fistula	1	0
Glans dehiscence	0	1
Meatal stenosis	2	0
Urethral stricture	0	0
Diverticulum	0	0
Return to OR	3 (fistula repair, meatoplasty, circumcision revision)	2 (repair of glans dehiscence, circumcision revision)

TIP = tubularized incised plate

circumcision revision, one underwent adhesion release in clinic under local anesthetic with topical eutectic mixture of lidocaine and prilocaine (EMLA) cream, and one case resolved with betamethasone cream.

In the study group, parents of 2/13 (15%) patients voiced concern over cosmetic outcomes. One parent perceived lateral curvature of the penis, but his penis was normal on clinic examination with no evidence of curvature. Another patient had redundant penile skin following the procedure. Examination of this patient revealed a significant suprapubic fat pad that was causing his penile skin to obscure his penis but this patient ultimately underwent circumcision revision. There was wound dehiscence requiring repeat operation in 1/13 (7%) patients which ultimately required a repeat hypospadias repair. There were no cases of urethrocutaneous fistula, meatal stenosis, urethral stricture, or urethral diverticulum. There were no complaints of splayed urinary stream or any other voiding difficulties at subsequent clinic visits or telephone calls.

Location of meatus prior to intervention was also compared between the groups and is summarized in Table 3. In the control group, there were 4 patients (13%) with glanular hypospadias, 3 patients (9%) with coronal hypospadias, 2 (6%) patients with subcoronal hypospadias and 23 patients (72%) with mid or distal shaft hypospadias. One patient's anatomy was not clear from the operative report. In the study group, there were 7 patients (54%) with glanular hypospadias, 2 patients (15%) with coronal hypospadias, 2 (15%) with subcoronal hypospadias and 2 (15%) with megameatus intact prepuce (MIP).

TABLE 1. Comparison of groups

	Control (TIP)	Study (modified TIP)
Age at surgery (months)	12.1 + 9.86	19.6 + 15.76
Follow up (months)	8.1 + 6.52	10.0 + 8.12
Operative time (minutes)	93.6 + 37.12	79.7 + 30.33
Significant complication rate	3/32 (9.4%)	1/13 (7.7%)

TIP = tubularized incised plate

TABLE 3. Meatus location between control group (standard TIP) to study group (modified TIP) prior to intervention

	Control (TIP)	Study (modified TIP)
MIP	0	2
Glanular	4	7
Coronal	3	2
Subcoronal	2	2
Shaft	23	0
Unknown	1	0

TIP = tubularized incised plate

Discussion

There are several surgical techniques employed in the treatment of distal hypospadias. Complication rates are similar between different surgical techniques and choosing between techniques is largely due to surgeon preference.¹¹ At the authors' institution, TIP is the preferred technique for all hypospadias cases. In evaluating patients for hypospadias repair, the authors hypothesized that certain patients with distal hypospadias do not require tubularization or incision of the urethral plate. Instead, excellent cosmetic and functional outcomes can be obtained with only mobilization and approximation of the glans wings. Initial results in this small cohort of patients are excellent with short term follow up. The one patient who had wound dehiscence in the study group has missed his postoperative appointment and subsequently kept his catheter in place for an additional 14 days before presenting to the emergency department with a urinary tract infection. Importantly, in the case of potential failure or complication, this technique does not preclude use of any other technique if second-stage repair is needed.

The novel technique we report has several perceived benefits. There are no or minimal urethral sutures and no sutures from the urethra to the glans which serves to eliminate the risk of meatal stenosis. In addition, avoiding urethral manipulation leads to better healing and less fistula formation. It is a simple, fast technique with minimal tissue handling. This technique is widely applicable to many different cases of distal hypospadias – glanular, coronal or subcoronal. The decision of which technique to employ can be decided upon during the procedure since it involves the same

incision as a regular TIP. The ability to develop deep glans wings and having a deep grooved urethral plate would be helpful to carry out this procedure. The goal is to get the meatus opening to the normal position on the undersurface of the glans. Usually this can be achieved by two to three glans sutures approximately 1 mm apart between the coronal sulcus and the meatus.

The ventral subcoronal is not an area of perceived weakness in our opinion because the lack of sutures in the urethra allows for healing without fistula. In addition, the urethra at the end of the procedure is mostly covered by the glans. Spongioplasty was attempted whenever feasible. It is worth mentioning that with TIP cases at our institution, the urethra is tubularized independently from the glans. The glans and urethra are not sutured together at any stage and as a result, the urethra may end at a more proximal location to the glans.

This technique is similar to the glans approximation procedure (GAP) described by Zaontz in 1989,¹² but there are several key differences. First, the GAP is described as suitable for patients with a wide glanular groove while our modification is suitable for all distal hypospadias including coronal, subcoronal and possibly distal shaft. Using our technique, the glans can be used irrespective of the position of the urethral meatus. Secondly, the GAP technique also described urethral closure in the midline by approximating glans epithelial edges which is not performed in our modification. Thirdly, Zaontz used a preputial flap to cover the urethra prior to glans closure whereas we do not interpose tissue prior to glans closure. Our technique would not result in fistula due to lack of urethral tubularization and serves to prevent meatal stenosis by avoiding sutures between the glans and urethra. We acknowledge that the study has several limitations. First, it is a retrospective chart review rather than a prospective study and it is a small cohort of patients. There was also an inherent selection bias in these patients, as only patients with distal hypospadias and an adequate urethral plate were chosen to undergo this technique. This subset of patients is naturally expected to have a low complication rate based on meatal location alone. Finally, the follow up was relatively short with a mean follow up of 10 months whereas complications have been reported > 5 years after surgery in other studies.¹³

Conclusions

Our initial experience using a novel technique for distal hypospadias repair that does not require incision or tubularization of the urethral plate has been

promising. In this small series, we attained excellent cosmetic and functional results in patients with distal hypospadias with only glans wing mobilization and reapproximation with minimal, if any sutures from the urethra to the glans. Perceived benefits of this technique include simplicity and rapidity of technique, applicability to glanular, coronal and subcoronal hypospadias and avoidance of sutures of urethra to glans with potential decrease in meatal stenosis. □

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