

Decreasing Complications in Distal Hypospadias Surgery, with Single Stage Repairs

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ABSTRACT

Introduction: Hypospadias is one of the most common congenital anomalies of male population. The diversity of presentation, and the evolution of its surgical management have rendered the acceptance of a standard protocol. This article reports on the outcomes and complications of single stage tubularization for distal and midshaft hypospadias with no or mild ventral curvature.

Material and Methods: A total of 128 patients, with age range of 8 months to 28 years were included. All had distal or midshaft hypospadias with no or mild ventral curvature, with no previous procedures. All patients undergone two types of surgical repairs, Glanular Approximation Procedure and Tubularized Incised Plate urethroplasty.

Results: Most patients had smooth postoperative recovery. All patients were followed for six months to one year. Major complication of concern were urethra-cutaneous fistula in 8 (6%) and glanular dehiscence in 2 (2%) of patients, which required surgical closure.

Practical Implications: The practical implications of hypospadias surgery include improved urinary function, reduced risk of infections, improved sexual function, and improved psychological well-being.

Keywords: Hypospadias, Tubularization, Urethroplasty, Glanular approximation procedure, Incised Plate Urethroplasty

INTRODUCTION

Hypospadias is considered as the second most common congenital anomaly of male children, after undescended testis¹, with estimated incidence of 1 in 150-300 male births². This condition has been variously classified, with Duckett classification into distal and mild (glanular, coronal, distal and midshaft penile) and proximal and severe (proximal penile, penoscrotal, scrotal and perineal) most commonly used³. Though the variable and complex anatomy of penis makes only surgical classification reliable⁴, only after penile degloving and correction of ventral curvature⁵.

Cause of the anomaly have not yet been clearly elucidated, but various genetic, endocrine and environmental factors have been implicated⁶. Hypospadias, in general is an isolated anomaly but it can be a feature of 200 different syndromes⁷, which are more common in proximal or complex hypospadias and these patients require evaluation through karyotyping and radiography, to exclude disorders of sexual differentiation^{8, 9, 10, 11}.

Surgical correction of hypospadias is performed most commonly in two-time windows factoring the available facility, the risk of anaesthesia, penile dimensions and the psychological aspects of genital surgery. There is a recent trend for earlier correction between six months to 18 months of age, while the second time period is before the boy starts school, between three to four years¹².

The goals of hypospadias repair should be to achieve a straight penis with adequately sized slit like meatus at the apex of a conical shaped glans, a circumcised or circumferential retractable prepuce with acceptable aesthetic result¹³.

The operative steps include penile degloving, correction of ventral curvature, urethroplasty, fascial coverage of neourethra, glansplasty and circumcision or preputial reconstruction. The operative principles include magnification, minimal and atraumatic tissue handling with fine instruments and sutures, hemostasis^{4, 12} and the use urinary diversion thru catheters, but distal hypospadias can be repaired without stents¹⁴.

Depending on the severity, strategies in ventral curvature correction may include Penile degloving, division of urethral plate, dissection or release of the hypoplastic spongiosum and glans wings¹³, dorsal plication^{15, 16}, ventral corporotomy with coverage with dermal grafts, intestinal mucosa or tunica vaginalis flap¹⁷.

Correction of ventral curvature is addressed in different ways, depending on the degrees. Curvature of 15 degrees or

less requires no correction, while chordee between 15-30 degrees can be managed with dorsal tunica albuginea plication. Whereas curvature more than 30° requires more elaborate ventral procedures, as dorsal procedures may shorten penile length and such cases are often staged^{18, 19}.

Surgical options for urethroplasty may be divided into tubularization, augmentation or replacement of urethral plate, in accordance with the increasing severity of ventral curvature, in one- or two-stage procedures. Current ongoing prospective studies on surgical outcomes may determine a more evidence-based, standardized approach^{13, 19}.

Trends of tubularization of urethral plate in distal hypospadias and midshaft hypospadias with mild or no chordee, have been in favor of Snodgrass tubularized incised urethral plate (TIP) repair with 92% of surgeons prefer TIP repair in distal hypospadias while 83% in midshaft hypospadias²⁰.

Complications associated with hypospadias repair are urethra-cutaneous fistula, urethral or meatal stenosis, glans dehiscence, recurrent or persistent chordee, erectile dysfunction, cosmetic issues of skin tags, residual skin or inclusion cysts, splayed or misdirected urinary stream, and irritative urinary symptoms¹³. Although these complications are evident within the first few postoperative months, but urethral fistula and recurrent penile curvature have been noted after growth spurts in pubertal age¹².

Favorable outcomes have been noted in distal hypospadias, with complications occurring in 5-10% of cases¹³.

MATERIALS AND METHODS

A total of 128 patients were included, with age range of 8 months to 28 years (mean 4 years). Patients with distal (Coronal and Distal Shaft) and midshaft hypospadias, with no or mild ventral curvature and primary cases, were included.

Patients with glanular hypospadias were excluded because this subset requires different surgical strategies for correction and also because the reconstructed urethral length is short enough to be considered for urethroplasty complications.

The position of meatus was noted, and the degree of chordee quantified, by pulling on the prepuce and inspecting the phallus from the lateral view (Fig. 1).

On basis of pre-operative examination, hypospadias was categorized.

Next the urethral plate was inspected to determine its suitability for just tubularization (Glanular Approximation

Procedure GAP), incision in midline to widen the urethral plate with subsequent tubularization (Snodgrass).

After penile block of long-acting local anaesthetic and tourniquet, artificial erection was performed in all patients at the start of procedure. Chordee was noted.

First, midline urethral plate incisions were made and deepened up to corpora cavernosa in 91 % (n=116) while in 9% (n=12) urethral plate was found of adequate caliber and depth and could be tubularized without incision. Next stab incisions were made to create glans wings, extending onto shaft circumscribing the urethral plate and meatus, and further downward to penoscrotal junction, in Y fashion. Dorsal incisions were used only when parents or patients requested circumcision (n=23), so as to minimize operative trauma. Glanular wings were widely dissected from underlying tissues with care taken not to thin out inadvertently.

Catheter was inserted to judge the width of urethral plate for tubularization. Urethral plate width was considered adequate, when it could accommodate age specific catheter, such as 6 Fr for children less than a year, while 8 Fr in age group of 3-4 years and so on.

Urethral plate was freed from surrounding tissues just enough, so that it can be tubularized without tension. First suture of Vicryl was made at the apex of glanular wing incision to form the ventral extent of neomeatus. Next the edges of Urethral plate were minimally trimmed, to ensure well vascularized tissue and to help effectively invert the epithelium. Urethral plate was tubularized in two layers; a first interrupted subepithelial layer starting from distal to proximal, then a continuous layer from proximal to distal exiting in glans to be tied with the first glanular stitch. Vicryl 6-0 was used in all patients except in few older patients over 12 years, where Vicryl 5-0 was utilized for the second layer.

In longer urethroplasties, particularly in older children and adults, any defect in urethral tube was tested with insertion of canula thru the neomeatus and checking for the leakage of saline along the repair. In the event of any leak, additional interrupted mattress sutures were used to seal the repair. Waterproofing was done by harvesting Dartos fascia from penile shaft skin. Dartos fascia was harvested from proximal penile shaft particularly in distal hypospadias group, but occasionally from lateral penile shaft, when urethroplasties were longer like in midshaft hypospadias. Dartos fascia was sutured to the underlying glanular tissue and tunica albuginea, with two or three stitches of Vicryl.

Tourniquet time was reduced by using it just till the time of Dartos fascia harvest.

Haemostasis was achieved with bipolar cautry only in shaft region, and skin closed with subepithelial 6-0 or 5-0 Vicryl suture.

Postoperatively, the outer layer of gauze dressing was removed after 24 hours, so that the wounds could be washed with water. Catheters were removed on 7th postoperative day.

Patients were followed at intervals of one weeks, two months and six months, at which time circumcision were offered if no complications were encountered.

RESULTS

Based on preoperative examination 85% (n=109) were categorized as distal (coronal and distal shaft) hypospadias while 15% (n=19) as mid-shaft hypospadias as in Fig 2.

When patients were stratified according to the age, 49 % (n=63) of patients presented in 3-5 years age group while 27 % (n=35) in 5-10 years, 18 % (n=23) in less than 2 years and 5% (n=7) presented after 10 years of age as in Table 1.

Degree of chordee was quantified. 38% of patients were stratified as having no chordee (n=49) and 62% as having mild chordee (n=79) as in Table 2.

Most patients had smooth post-operative recovery. At catheter removal all patients were observed during voiding to note any urinary leak. A total of 8 patients demonstrated fistula,

and two patients had glanular dehiscence and 1 patient had periurethral sinus exuding pus that was treated with empiric antibiotic course over a week as in Table 2

Out of 10 patients with urethra-cutaneous fistula or glanular dehiscence, six were in 3-5 years age group, 3 in patients less than 2 years of age and one in adult of 16 years.

Interestingly, 2 fistulas and one case of glanular dehiscence were traced to patients that had urethral tubularization without midline incision in the urethral plate. Moreover, it was also noted that 3 urethro-cutaneous fistulas occurred in cohort of patients that had circumcision at the time of repair, and among all the cases of fistulae two cases were those that had both undergone tubularization without midline urethral plate incision and concomitant circumcision.

Fistulas in all 8 patients were closed in three layers with local tissue rearrangement, while the two patients with glanular dehiscence undergone redo TIP repair.

Some patients had splaying of urinary stream (n=3), but none agreed to further pursue the problem with investigations or surgery. When contacted after six months of surgery, or when presented for subsequent planned circumcision two patients reported or observed with normal urinary stream without splaying, while the third patient was lost in follow up.

Few patients complained about excess skin, skin tags, that were all managed during circumcision.



Fig. 1: Position of Meatus

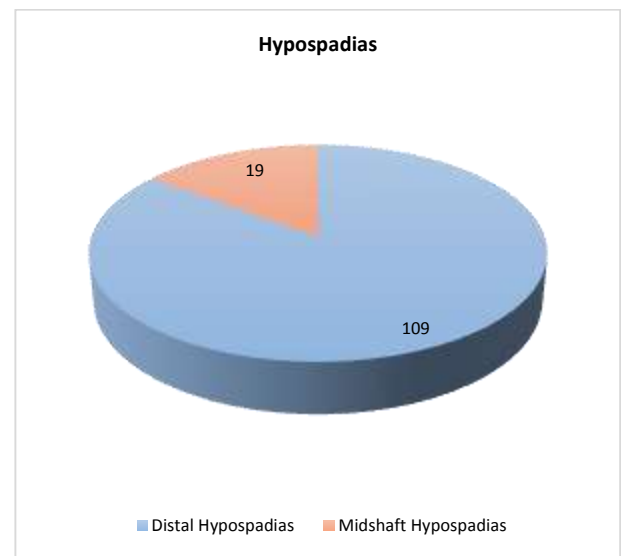


Fig. 2: Type of hypospadias by Position of meatus

Table 1: Age groups distribution of Patients

S.No	Age group (in years)	Frequency (n)	%age
1	>2	23	18%
2	3-5	63	49%

3	5-10	35	27%
4	<10	7	5%
Total		128	

Table 2: Quantification of Degree of Chordee

S.No	Degree of Chordee	Frequency (n)	%age
1	No	49	38%
2	Mild	79	62%

Table 3: Post-op complications of Surgery

S.No	Post-operative complications	Frequency (n)
1	Fistula	8
2	Glanular Dehiscence	2
3	Septic periurethral sinus	1

DISCUSSION

The surgical management of hypospadias had been evolving during most part of the twentieth century, but after 1980s, the practices have been simplified and principles standardized^{21, 24}.

Hypospadias, being one of the most common congenital anomalies and its stratification into distal (75%) and proximal forms with varied pathology^{25, 26}, the need to adopt a standard approach for both forms and long term follow up is immense.

The operative trends for distal anomaly with no or mild chordee, have shifted from more complex older procedures to tubularization with or without incision in the urethral plate, depending on its width²⁰.

The delicate and complex anatomy of penis mandates meticulous technique, attention to detail and close long term follow up care. The author believes that, deepening the dorsal incision in urethral plate obviates meatal stenosis, ample glans wing dissection with no use of electrocautry in this region avoids glanular dehiscence and adopting a two layered urethroplasty closure counteracts any possible fistula, the three main complications of concern in any hypospadias. Also, it has been authors' observation, that violet color of Polygalactin 910 suture provide a better contrast to the white background of penile tissue, than undyed sutures, which helps a great deal in tubularization.

Also limiting the total tourniquet time to just the necessary elements of surgery, limits the extent of postoperative edema, which may further translate into decreasing the amount of stretch on incision lines of urethroplasty and glanular approximation.

Though this article provides a limited inference into the possibility of increased incidence of fistula when hypospadias repair is combined with circumcision, the subject is worth investigation, as there can be a possibility of impeded healing at the junction of incisions on the delicate ventral penile skin and also because hypospadias as an anomaly and postoperative fistulae as a major complication, are fairly common, and as such, a larger randomized series of cases by a single surgeon can authenticate the issue.

Complications after repair are many, but as noted, issues of concern in distal hypospadias with no or mild chordee are mainly fistulas or dehiscence and meatal stenosis¹², which warrant surgical strategies to correct.

Glanular Approximation Procedure (GAP) and Tubularized Incised Plate (TIP) urethroplasty, may be the answer to human efforts for a single stage correction of the more common distal hypospadias with no or mild ventral curvature, with an acceptable complication rate¹³.

With the advent and progress in telecommunication and social media, long term follow up of these patients have become easier and acceptable to patients.

CONCLUSION

Hypospadias being a common congenital anomaly, with a variable presentation and with long term functional implications, there is a need to standardize the operative approach based on the extent of aberrations.

Distal cases with no or mild chordee can be successfully managed by simpler tubularization techniques, minimizing penile trauma and acceptable outcome.

Evidence suggests that eventually, patient reported outcome after a long term follow up may predict the success of any surgical strategy.

REFERENCES

- Bouty A, Ayers KL, Pask A, Heloury Y, Sinclair AH (2015) The genetic and environmental factors underlying hypospadias. *Sex Dev* 9:239–259
- Paulozzi LJ, Erickson JD, Lackson RJ. Hypospadias trends in two US surveillance systems. *Pediatrics* 1997; 100:831-834.
- Duckett JW Jr (1989) Hypospadias. *Pediatr Rev* 11:37–42
- Snodgrass W, Macedo A, Hoebeke P, Mouriquand PD (2011) Hypospadias dilemmas: a round table. *J Pediatr Urol* 7:145–15
- Marcedo AJ, Rondon A, Ortiz V. Hypospadias. *Curr Opin Urol* 2012, 22:447–452
- Van der Zanden LF, van Rooij IA, Feitz WF, et al. Aetiology of hypospadias: a systemic review of genes and environment. *Hum Reprod Update* 2012; 18:260-283.
- Moreno-Garcia M, Miranda EB. Chromosomal anomalies in cryptorchidism and hypospadias. *J. Urol.* 2002; 168: 2170-2.
- Kaefeer M, Diamond D, Hendren WH et al. the incidence of intersexuality in children with cryptorchidism and hypospadias: Stratification based on gonadal palpability and meatal location. *J. Urol.* 1999; 162: 1003-6.
- Kojima Y, Hayashi Y, Maruyana T, Sasaki S, Kohri K. Comparison between ultrasonography and retrograde urethrography for detection of prostatic utricle associated with hypospadias. *Urology* 2001; 57: 334-7.
- McAlleer IM, Kaplan GW. Is routine karyotyping necessary in the evaluation of hypospadias and cryptorchidism? *J Urol* 2001; 165; 2029-31.
- Cox MJ, Coplen DE, Austin PF. The incidence of disorders of sexual differentiation and chromosomal abnormalities or cryptorchidism and hypospadias stratified by meatal location. *J Urol* 2008; 180: 2649-52.
- Manzoni G, Bracka A, Palminteri E, Marrocco G. hypospadias surgery: When, when and by whom? *BJU Int* 2004; 94: 1188-95.
- Keays MA, Dave S. Current hypospadias management: Diagnosis, surgical management and long-term patient-centered outcomes. *Can Urol Assoc J.* 2017 Jan-Feb;11(1-2Suppl): S48-S53.
- Chalmers DJ, Siparsky GL, Wiedel CA, et al. Distal hypospadias repair in infants without a postoperative stent. *Pediatr Surg Int* 2015; 31: 287-90.
- Mingin G, Baskin LS. Management of chordee in children and adults. *Urol Clin North Am* 2002; 29: 277-84.
- Kraft KH, Shukla AR, Conning DA. Proximal hypospadias. *Scientific World Journal* 2011; 11: 894-906.
- Braga LHP, Pippi Salle JL, Dave S, et al. Outcome analysis of severe chordee correction using tunica vaginalis as a flap in boys with proximal hypospadias. *J Urol* 2007; 178: 1693-7.
- Braga LH, Lorenzo AJ, Bagli DJ. Ventral penile lengthening versus dorsal plication for severe curvature in children with proximal hypospadias. *J Urol* 2008; 180: 1743-7.
- Dason S, Wong N, Braga LH. The contemporary role of 1 vs 2-stage repair for proximal hypospadias. *Transl Androl Urol* 2014; 3: 347-58.
- Cook A, Khoury AE, Neville C, Bagli DJ, Farhat WA, Pippi Salle JL. A multicenter evaluation of technical preferences for primary hypospadias repair. *J. Urol.* 2005; 174: 2354-7.
- Duckett JW. Transverse preputial island flap technique for repair of severe hypospadias. *Urol. Clin. North Am.* 1980; 7: 423-31.
- Elder JS, Duckett JW, Synder HM. Onlay island flap in the repair of mid and distal penile hypospadias without chordee. *J. Urol.* 1987; 138: 376-9.
- Snodgrass W. Tubularized incised plate urethroplasty for distal hypospadias. *J. Urol.* 1994; 151: 464-5.
- Snodgrass W, Koyle M, Manzoni G, Hurwits R, Caldamone A, Elrich R. Tubularized incised plate hypospadias repair for proximal hypospadias. *J Urol.* 1998; 159: 2129-31.
- Baskin LS, Ebberts MB. Hypospadias: anatomy, etiology, and technique. *J. Pediatr. Surg.* 2006; 41: 463-72.
- Hadidi AT, Azmy AF. eds. Hypospadias surgery: an illustrated guide: Springer Verlag, 2004