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TUBULARIZED INCISED PLATE URETHROPLASTY (SNODGRASS) FOR HYPOSPADIAS REOPERATION

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Abstract

Reoperation for failed hypospadias has been considered to be seriously bothersome because abundant penile skin doesn't tend to remain for urethroplasty or for penile shaft skin coverage. in this study, the tubularization of incised urethral plate was employed for those who had no excessive penile skin after failure of hypospadias repair.

Between June 2003 and February 2006, 18 boys, (4.5-18) years old, underwent tubularized Incised-Plate (TIP) for previously failed hypospadias repair. The hypospadias defects included 9 (50%) distal (coronal or subcoronal), 5 (27.5%) distal penile and 4 (22.2%) mid shaft defects (three of them have residual chordee),13 patients had one operation and 5 had two operation previously. all patients did not have foreskin because of the previous surgery. There was not apparent scarring of the plate.

The operation was successful in eleven out of 13 (84.5%) patients who had undergo one operation before and 3 out of 5 (60%) of patients with 2 operation previously as well have sufficient outcome. Complication was observed in 4 patient.

The absence of preputial skin in reoperative cases makes tubularized incised-plate urethroplasty the ideal operation. In addition, this procedure can give excellent functional and cosmetic results however the patients require revisional hypospadias surgery. The technique has few complications as well as proved success and versatility that continue to expand its applicability and popularity.

Introduction

Hypospadias refers to incomplete urethral development that results in a meatus located anywhere from the proximal glans to the perineum.

The word (hypospadias) is Greek; hypo means under, and spadias to tear off. The condition ccurs in approximately 1 in 150 to 1 in 300 males, making hypospadias the second most common birth defect in boys after crypto-rchidism.

Recent surveys suggest that the incidence of hypospadias is increasing in industrialized countries, possibly due to environmental estrogen or anti-androgens[1,2].

The external genitalia are initially indifferent and, in the absence of androgen, inherently develop the female phenotype. The critical time frame for phallic development is from 8 to 12 weeks gestation, when the genital tubercle elongate and the urethral plate on its ventral surface tabularizes from proximally to the tip of the glans. During this phase, the penis is curved ventrally because of the corpora cavernosa, as well as shaft skin and prepuce, develop faster on the dorsal than the ventral aspect, after 12 week gestation, androgen stimulation increases the size of the phallus[3,4].

Hypospadias result from an arrest in these normal processes.

The incompletely tabularized urethra opens on the undersurface, the penis may curved downward, and the foreskin typically is deficient ventrally

(fig.1). In a related variant, the urethral meatus may be located properly on the glans, but the ventral foreskin is lacking. Less often complete prepuce conceals the urethral defect that is detected only during circumcision[4,5].

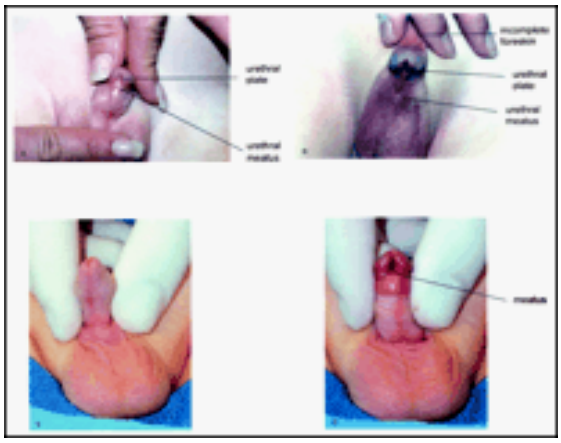

Figure 1:Varieties of hypospadias.

In most cases, the urethral opening is on or near the glans, and the tissue that should have completed tubularization extends distally as the "urethral plate." B. With proximal hypospadias, the urethral meatus is at the penoscrotal junction, with the urethral plate extending to the glans tips. Most cases of proximal hypospadias also have ventral curvature, commonly referred to as "chordee." C. Hypospadias variant with a completely developed foreskin concealing the defect. D. When the foreskin is retracted, the meatus is noted at the corona

Pathogenesis

Any error in masculinization theoretically could result in hypospadias and no specific defect has been found to explain the condition. The karyotype usually is normal[6]. Subtle abnormalities in the hypothalamic-pituitary-testis hormonal axis have been reported, although subsequent pubertal development appears unaffected[6,7].

Similarly, minor defects in testosterone formation, 5-alpha reductase activity and androgen receptor function have been detected.

Altered molecular process normally resulting from androgen stimulation also may play a role.

Finally genetic factors have been identified in approximately 20% of cases. The likelihood that a couple will have a boy who has hypospadias increases if the father, another sibling, or other relatives have the condition[8,9].

Diagnoses and evaluation

Most often, hypospadias is suspected at birth because of the abnormal appearance of the foreskin. Physical examination reveals the displaced urethral meatus and also should confirm the presence of two normally descended testicles. In more severe cases involving a proximal meatus, the scrotum may have a deep cleft and sometimes extends along the sides of the penis to engulf it partially. In the past, such cases often were evaluated further with radiography to detect renal anomalies. However, recognition that the arrest in penile development that creates hypospadias occurs after kidney formation has ended that practice. In addition, renal anomalies rarely occur in patients who have hypospadias[10,11].

Although hypospadias represents incomplete masculinization, typical cases are not considered evidence of intersexuality. However, most pediatric urologists recommend that a karyotype be obtained when cryptorchidism also is present. Under these circumstances, intersexuality is found in up to 50% of cases, especially when the urethral meatus is proximal and a testicle is not palpated. The most common abnormality is mixed gonadal dysgenesis with a 46XY, 45XO mosaic pattern. If neither testicle is felt, virilization of a female who has congenital adrenal hyperplasia must be excluded, even if the phallus is well formed[12,13].

Grading scales have been proposed to classify the severity of penile malformation. Primary care physicians commonly divide patients into three grades according to the position of the urethral meatus: First-degree, on the glans; second-degree, on the penile shaft; and third-degree, penoscrotal to perineal. The major shortcoming of this system is that it does not take into account either the extent of ventral penile curvature (so-called "chordee") or the occasional finding of a distal meatus with a dysplastic urethra that actually represents a form of proximal hypospadias (Fig. 2)[15]. Although both curvature and a poorly formed urethra often can be suspected preoperatively, the impact of either on surgical decision-making cannot be determined reliably until correction is undertaken. This emphasizes the need for even apparently minor hypospadias to be repaired by experienced pediatric urologists[14,15].

Figure 2. Dysplastic urethra. Although the meatus ends on the proximal glans, the distal urethra in this boy was very thin and closely adherent to the overlying skin. Under such circumstances, it may be necessary to reconstruct the entire penile urethra.

Management

Today, most boys who have hypospadias and related variants undergo surgical correction. It has been emphasized not to circumcise these boys, especially because some repairs incorporate preputial skin into the urethroplasty. Although most distal hypospadias currently are corrected by using techniques that do not require foreskin, it still is advised not to attempt newborn circumcision for any boy found to have a foreskin anomaly. In the event that an apparently normal child who has a complete prepuce is not recognized to have hypospadias until after circumcision, there is little cause for concern because urethroplasty still be can performed. The family should be reassured, however, that a "botched circumcision" did not cause the urethral anomaly. In some cases, examination may suggest a small urethral meatus, but no urinary obstruction, and meatotomy is not needed as an interim step before hypospadias repair. In fact, no special care of the penis is needed[16,17]

The need for surgery is obvious in boys who have severe hypospadias with a curved penis and proximal meatus. However, even a more distal urethral opening may produce a deflected or splayed urinary stream. Furthermore, the abnormal foreskin calls attention to the condition and may lead to ridicule in school locker rooms. Given these concerns, the ability to accomplish most surgical repairs in a single operation, and the excellent functional and cosmetic results of surgery, pediatric urologists now recommend that most boys who have hypospadias undergo surgery[18,19]

Repair is undertaken as an outpatient procedure in otherwise healthy infants between 3 and 18 months of age[20]. Most pediatric urologists prefer to operate at about 6 months of age, and it is believed best to complete this elective reconstruction before the development of genital awareness[21]. The goals of surgery are to straighten any curvature, extend the urethra to the tip of the glans, and correct the foreskin abnormality (Fig.3). In the United States, many families prefer circum-

cision during repair, although the foreskin also can be reconstructed in boys who have distal hypospadias to give a normal uncircumcised appearance when parents would not otherwise have desired circumcision. Nearly all distal and most proximal hypospadias are repaired with a single operation, although an occasional child who has a severe defect requires a two-stage procedure[22,23].

Following repair, the child may have a urethral stent that drains urine into the diapers for several days to allow healing of the urethroplasty before resumption of normal voiding. During this time, antibiotics are prescribed to reduce the likelihood of urinary tract infection. Recommendations regarding pain management, dressings, and bathing vary among surgeons. Families can be reassured that most patients who undergo surgery during the preferred timeframe do not experience substantial postoperative discomfort[24,25].

Complications of hypospadias surgery

Early Complications[34]	Late Complications
Wound Infection Poor Wound Healing Edema Acute Bleeding and Hematoma	Fistula Stricture Diverticulae Residual Chordee Meatal Stenosis BXO

Complications may occur after any reconstructive surgery. The most common problem after hypospadias repair is urethrocutaneous fistula. Usually these are small and can be closed at a secondary operation 6 months later. Stenosis of the new urethral meatus or stricture of the urethroplasty should be suspected if there is difficulty voiding or a very small and forceful stream. Occasionally, the repair dehisces and must be redone after the tissues heal. Another complication is formation of a urethral diverticulum, which is seen as ballooning of the urethra during voiding[26-28].

The incidence of complications varies according to the severity of hypospadias and the technique employed for repair. Generally, fewer than 8% of patients undergoing distal hypospadias surgery experience problems; complications may be more frequent when the original meatus was located at the penoscrotal junction or more proximally. Between 5% and 20% of boys who have these conditions experience problems leading to another procedure. However, even children who require additional surgery because of complications generally achieve good functional and cosmetic outcomes[29,30].

It is worth emphasizing that increasing attention has been given to improving cosmetic results of hypospadias surgery during the past 20 years. Prior to that time, some questioned the need to bring the urethral meatus to the tip of the glans; the primary concern was to create a functional urethra that allowed the boy to void while standing. Pediatric urologists now realize that the urinary stream is difficult to direct if the meatus is not positioned properly, and patients are more likely to be dissatisfied with the outcome if the glans does not appear normal. Therefore, the desired outcome of today's procedures is a functional penis that appears only to have been circumcised or, when the foreskin is preserved and repaired, never to have undergone surgical repair (Fig.3)[31-33].

Fig.3 Post operative appearance .A .with circumcision, note the normal appearing meatus at the tip of the glans. B. with foreskin reconstruction, creating a penis that looks as though no surgery was performed.

Aim of the Study

The aim of the study is to evaluate the midterm results of tubularized incised plate (TIP) urethroplasty (Snodgrass method) in reoperative patient with distal or midpenile hypospadias. The study discusses patient selection, complications, and the final outcome.

Patients and Methods

Between June 2003 and February 2006, 18 boys, 4.5-18 years old, underwent Tabularized Incised-Plate (TIP) for previously failed hypospadias repaire. The hypospadias defects included 9 (50%) distal (coronal or subcoronal), 5 (27.5%) distal penile and 4 (22.2%) mid shaft defects (three of them have residual chordee).13 patients had one operation and 5 had two operation previously.all patients did not have foreskin because of the previous surgery. There was not apparent scarring of the plate.

Methods

The surgical procedure began with the placement of 4-0 silk glans traction suture and insertion of an 8 Foley's catheter.

A U shaped incision was made around the hypospadiac meatus extending out to the glans tip Fig.4 (the width of this incision was predetermined by identifying the convergence of the mucosal collar onto the glans ventrally and attempting to approximate the urethral plate over the catheter).

Complete degloving of the penile shaft was performed circumferentially. In each case with chordee, degloving of the penis completely corrected the chordee, as evidenced by visual inspection and artificial erection using normal saline.

The entire urethral plate incised from the hypospadiac meatus distally. This incision extends into the submucosal tissues, dividing the urethral plate into two strips.

Interrupted 4-0 chromic sutures are used to close the urethral plate over the Foley's catheter with the knots placed outside.The dorsal surface of the plate was not sutured.

The entire neourethra is covered with layer of subcutaneous tissue dissected from the shaft skin.

The glanular wings are further mobilized laterally for subsequent tension free closure. The wings are closed in the midline with interrupted 4-0 chromic sutures.

The ventral subcoronal prepuce is reapproximated to complete the mucosal collar. The dorsal skin and prepuce is split longitudinally as release incision which allows ventral midline skin closure .

Partially concealing dressing was done.

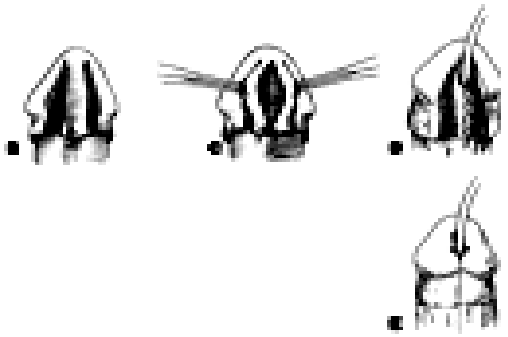

Figure 4. The urethral plate tissue, which should have completed development of the urethra, is separated initially from surrounding tissues, incised in the midline to widen it, and rolled into a tube. Consequently, repair is accomplished without need for the foreskin.

Postoperative

All patients were stented for a mean duration of 7 days (range 5-10 days). Change of dressing was done when the stent was removed. The length of in-patient stay was 5 days (range 4-7 days).

Follow-Up

Our follow-up was by history,physical examination, and investigations:

- *History*: The parents were asked if they had noticed any abnormality in the caliber and direction of the urinary stream, evidence of fistula and chordee

and whether they were satisfied with the overall general appearance.

- *Examination*: all patients were examined regularly at the time of change of dressing and removal of the stents, then one week later, then monthly, by inspection for any evidence of meatal stensosis, urethrocuteneous fistula, residual chordee and overall general appearance.
- *Investigation* : urethroscopy and urethrography were not done for technical and circumstantial causes, instead urethral stenting was made easily with 8F catheter 3 months after the operation.
- The duration of follow up was 3-6 months (mean 4+/-1.2 months).

Results

The operation was successful in eleven out of 13 (84.5%) patients who had undergo one operation before and 3 out of 5 (60%)of patients with two operation previously as well have sufficient outcome. Complication was observed in 4 patients (22.2%).

The complications of the operation were divided into early and late complications**:**

- The early was only one patient who had coronal hypospadias developed postoperative infection followed by wound dehiscence that repaired surgically 6 months later.
- One patient who had also coronal hypospadias had developed meatal stenosis followed by urethrocutaneous fistula. It was treated by meatatomy and urinary diversion (Foley's catheter) for another two weeks.
- tow patients (one of them had distal, and the other mid shaft penile hypospadias) were developed urethracuetaneous fistula. There were treated by urinary diversion for further two weeks; one patients treated surgically later on the other loss follow up.
- The parents of all patients with successful operation were satisfied with the overall glanular appearance and they did not give any evidence of residual chordee or any abnormality in the caliber of the urinary stream.
- The examination revealed a conical glans, slit meatas, circumferential mucosal collar and a straight phallus.
- Urethrograms were not done for technical and circumstantial causes, but urethral catheterization with 8 F. catheter was done without any resistance.

We considered the operation successful, when there were neither subjective nor objective complications 3 months after the surgery.

Discussion

- Repair of hypospadias in subsequent surgery usually depends on the severity of the scarring of the urethral plate and the experience of the surgeon[35].
- Patient selection included those with coronal, subcoronal, distal and midshaft penile hypospadias with failed previous repairs.
- The key step in the procedure (TIP) is the incision of the urethral plate which extends into the submucosal tissue dividing the urethral plate into two stips, this incision widens & deepens the plate to enable tubularization without additional skin flaps[36,37].
- In our study, the most important complication was the urethrocutaneous fistula, which occurred in those patients in whom the neourethrae were not covered with second layer (vascularized subcutaneous tissue), especially when the ventral skin sutured in the midline resembling the median raphe, where the line of anastomosis overly that of the neourethra.
- Meatal stenosis most often indicates a technical error, including

failure to deeply incise the plate and /or tubularization of the urethral plate too far distally[38].

- Infection is an important factor in the success of hypospadias repair as we noticed in one patient who had infection that resulted in wound dehiscence[39].
- The results of our study were comparable to other studies, such as the one carried out by Hayashi Y et al[16], with a higher rate of complications in our study which may be attributed to:

1. Unavailability of magnification instruments.
2. Use of improper instruments like ordinary forceps.
3. Sutured used (4-0- chromic cat gut were the only available)
4. Higher infection rate.

Conclusions and recommendations

The absence of preputial skin in reoperative cases makes tubularized incised-plate urethroplasty the ideal operation. In addition, this procedure can give excellent functional and cosmetic results even in patients who require revisional hypospadias surgery. The technique has few complications as well as proved success and versatility that continues to expand its applicability and popularity**.**

Appendices

Table (1): Incidence of Complications

Percentage	No.of Complicated Cases/Total	Complication
0	0	Haematoma
5.5٪	1/18	Wound Infection + Dehiscence
11٪	2/18	Fistula Alone
5.5٪	1/18	Meatal Stenosis+Fistula
0	0	Urethral Stricture
0	0	Urethral Diverticulum
0	0	Residual Chordee
0	0	B.O.X
22٪	4/18	Total

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