
EVALUATION OF THE TUBULARIZED INCISED PLATE URETHROPLASTY (TIP) FOR REPAIR OF DISTAL HYOSPADIAS

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Abstract

This study aimed to describe the tubularized incised plate (TIP) urethroplasty method for distal hypospadias repair and to describe certain technical aspects to decrease the incidence of complications such as meatal stenosis and urethrocutaneous fistula.

Tubularized incised plate urethroplasty was undertaken in 25 patients in the last three years. The age of patients ranged from one to 7 years. Three cases had undergone a previous repair. Certain technical points were strictly adhered to during the TIP urethroplasty so as to achieve a normal slit like meatus and to decrease the incidence of meatal stenosis and urethrocutaneous fistula. The procedure included placement of transurethral catheter which was removed after 7 days. Average follow up was three months. There was complete dehiscence of the repair in two patients. Meatal stenosis was seen in two cases. Fistula was seen in three patients. The patients with a successful repair could void with a straight urinary stream in a forward direction and had a normally situated slit like glanular meatus.

It is concluded that TIP urethroplasty is a simple operation with good cosmetic results. Certain technical considerations if strictly adhered to, help in preventing complications and achieve a satisfactory result.

Introduction

Since its introduction in 1994 by Snodgrass¹, the Tubularized Incised Plate (TIP) urethroplasty has become a very popular repair for hypospadias. Rich et al² first described an incision in the urethral plate to obtain a cosmetically acceptable vertical slit like meatus for the Mathieu repair. This was adopted for the entire length of the urethral plate as a complement to the Thiersch Duplay urethroplasty for distal hypospadias¹. The dorsal relaxing incision over the urethral plate results in a new urethra of adequate caliber, with no stricturing^{1,3,4}. Incision of the urethral plate does not seem to compromise the blood supply and re-epithelialization occurs without gross scarring due to the rich vascularity of the urethral plate^{5,6}.

The aim of this article is to evaluate the role of the TIP urethroplasty for repair of distal hypospadias. The other aim is to describe certain technical points to minimize the complications in TIP urethroplasty.

Patients & Methods

TIP urethroplasty was undertaken in 25 patients in the period from December 2004 to September 2007 in AL-Kadhemyia Teaching hospital. The age of the patients ranged from one to seven years. The patients were selected for TIP urethroplasty only if they had a good urethral plate of a reasonable width and had minimal chordee. The repair was done under general anesthesia. The TIP repair was performed as previously

described by others^{1,2}. The penis was degloved and the ventral tethering tissues lateral to the corpus spongiosum and urethral plate was excised. Artificial erection was produced to make sure there is no residual chordee. Tunica albuginea plication was not required in any of the patients. During degloving of the penis special care was taken to achieve a good distance gap between the hypospadiac meatus and the degloved skin. This helped in covering the site of the original meatus completely and thoroughly with the vascularized pedicle later on.

After division of the urethral plate in the midline, the neourethra was formed by tubularization of the urethral plates using 4/0 vicryl or chromic catgut on round body needle. The process of tubularization started proximally from the site of the original meatus and proceeded distally. The following technical aspects were adhered to during the procedure in all patients:

1. The tubularization of the urethral plate was done only till the level of the midglans and not till the tip of the glans.
2. The edges of the neomeatus were sutured to the edges of the glans wings using 4/0 chromic catgut.
3. A vascularized pedicle of subcutaneous tissue, harvested from the dorsal prepuce was brought ventrally to cover the neourethra. Special care was taken to cover the site of the original meatus completely and thoroughly with the vascularized pedicle. This step was not done in all the three cases repaired in the past as the prepuce was not available.

Post operatively antibiotics (in the form of parenteral cephalosporin for the first three days and then oral cephalosporin or ampicilline for the last days) were given for 10 days. Bladder relaxants, in the

form of antispasmin or oxybutynin hydrochloride, were given to all patients for eight to ten days. The dressing and the urethral stent were removed after 7 days.

Results

All the 25 patients were assessed on the seventh postoperative day after removal of dressing and the catheter. They were followed up at one and three months. Follow up involved inquiry from the parents about the ease of voiding of their children and the force and the direction of the urinary stream. Meatus was calibrated at one and three months. It varied from 10 Fr to 12 Fr. Calibration was done by gentle introduction of the largest Foley's catheter that could pass easily into the urethra using 8, 10, and 12 French catheters. The patients were then asked to follow up at six monthly intervals. The maximum follow up has been six months and the minimum follow up has been one month. The average follow up has been of two months duration.

Early complications were seen in two patients in whom complete repair dehiscence did occur. The first child aged 1.5 years and the second aged three years. The repair was tried in the first boy after three months with better results. The second boy showed poor follow up.

Two cases developed meatal stenosis, which needed correction in the form of meatotomy done at three and five months respectively.

Urethrocutaneous fistula was seen in three patients. In all the cases the fistula was at the site of the original hypospadiac meatus. Out of these three patients, two were lost for follow up after three months while one underwent successful fistula repair four months after the primary repair. None of the patients with urethrocutaneous fistula had meatal stenosis.

All the patients with successful repair (18 patients, 72%) had a normally situated vertical slit like meatus and voided with a straight urinary stream.

Discussion

The goal of hypospadias surgery is a penis that is both functionally and cosmetically normal. This requires a penis that is straight on erection with a vertically oriented slit like meatus at the tip of the glans, thus promoting a single, coherent urinary stream⁷. Bracka showed that 72% of young adults felt that normal appearance was as important a goal as normal function⁸. TIP urethroplasty is associated with minimum complications and achieves satisfactory results with a normal looking penis and meatus^{1,3}.

The main advantages of the TIP urethroplasty are:

1. It is technically easy.
2. It gives a normal looking vertical slit like meatus.
3. As skin flaps are not used for reconstructing the neourethra, it can be done even in those where previous attempts at hypospadias repair had failed^{9,10}. However for a particular type of hypospadias to be suitable for TIP urethroplasty, the presence of a good urethral plate of adequate width and minimal chordee are the two primary requirements.

Absence of a good urethral plate of adequate width and good vascularity is associated with failure. The contraindications to TIP urethroplasty include previous resection of the urethral plate or obvious scarring of the plate¹⁰. Thus patients with severe chordee and/or poor urethral plate, where division or excision of the urethral plate is required, are not candidates for the TIP urethroplasty.

A recent trend in hypospadias repair has been to preserve the urethral plate. This is the result of two observations

- Incorporation of plate into the urethral reconstruction may reduce complications^{11,12}.
- The urethral plate is usually not the cause of ventral curvature and so its resection often does not correct chordee^{5,13}.

Hence degloving the penis, without division or dissection under the urethral plate corrects the curvature of the penis in most of the cases, in this study this was enough to correct chordee in all the cases. Tunica albuginea plication was not needed in any of the cases.

Metal stenosis is one of the complications seen with the TIP urethroplasty. The incidence has ranged from 0%¹ to 14%¹⁴. Meatal problems can be the cause of unsatisfactory cosmetic appearance and can also cause fistula. In the series by Elbarky, four of the first seven patients had a fistula and it was associated with meatal stenosis in all the cases. He advocated regular urethral calibration in all the patients after the TIP urethroplasty⁽¹⁵⁾ Lorenzo and Snodgrass disagreed with this and felt that regular calibration was not needed¹⁶.

In the present study meatal stenosis was seen in two cases (8%). But after certain technical aspects were strictly adhered to; this resulted in a normal meatus in all the remaining cases.

For the meatus to be termed as normal it should fulfill the following criteria:

- Location at the tip of the glans.
- Shape vertical slit like.
- No meatal stenosis
- Good stream flow of urine

To achieve a normal slit like meatus it is imperative that the tubularization of the urethral plates should end at the level of the midglans and not till the tip of the glans. The appearance of a properly positioned meatus results more from the closure of the glans wings from the corona to the meatus than from tubularizing the neourethra too far distally. Tubularizing the urethral plate too

far distally can create obstruction even in the absence of scarring.

In all the patients in this study the edges of the neourethra were sutured to the edges of the glans wings. This helps in preventing the insinuation of the epithelial edges of the glans wings inside the glans wound. It also achieves primary healing between the two epithelial edges. Also it prevents the edges of the neomeatus from getting buried beneath the glans wings when they are approximated and sutured ventrally. Thus, the suturing of the edges of the neomeatus helps not only in achieving an cosmetically good meatus but also prevents meatal stenosis.

Another technical consideration in this study has been to use a urethral stent, which is smaller than the size of the neourethra. Animal studies have proved that the midline incision through the dorsal aspect of the urethra heals without fibrosis by reepithelialization¹⁷. The purpose of the stent is to have urinary drainage. It does not serve as scaffolding around which epithelial growth occurs. This fact is borne out from the fact that though the stent size used in the series by Warren Snodgrass in 1994 was 6 Fr, the size of the neourethra was greater than 10 Fr in all the patients¹. In the series by Steckler and Zaontz there was no high incidence of meatal stenosis or stricture formation despite not using a stent¹⁸.

Urethrocutaneous fistula formation is another complication, which afflicts repair of hypospadias. TIP urethroplasty is associated with a low fistula rate. Number of series on this repair have described a fistula rate ranging from 0-21%^{1,3,9,19}. In the present study three patients (12%) had urethrocutaneous fistula. One of the key reasons for this low fistulae rate is the coverage of the neourethra with a layer of the vascularized pedicle of subcutaneous tissue harvested from the dorsal prepuce⁹. In the present study all the fistulae were at the site of the original hypospadiac meatus. The urethra around the hypospadiac meatus and for some distance proximal to it is very often thin and poorly vascularized due to paucity of spongiosum over it. Hence in the patients undergoing Onlay Island flap or Transverse Preputial Island flap repair, the recommendation is to slit the meatus till the normal spongiosum²⁰. As no such maneuver is recommended for the TIP urethroplasty, it would be logical to provide good coverage of the area of the hypospadiac meatus with a vascularized tissue after the tubularization of the urethral plates.

In conclusion, TIP urethroplasty is a single stage, technically simple operation with good cosmetic results. It is recommended to use certain technical aspects to decrease the incidence of meatal problems and fistula formation.

The table shows the percentage of complications

Complications	Number of patients	Percentage
Complete dehiscence	2	8%
Meatal stenosis	2	8%
Fistula formation	3	12%

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