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Hypospadias Repair and the Value of Double Dartos Flaps

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1. Abstract

1.1. Background: Hypospadias is a relatively common condition among male children. There are several techniques to repair hypospadias but the TIP (Tubularized Incised Plate urethroplasty) procedure is currently now the preferred procedure to repair hypospadias without chordee. This however is not without complications and one of the common complications is postoperative fistula formation. To overcome this, a variety of techniques were used. This report describes our experience with a double dartos flaps to protect the TIP procedure and reduce the incidence of fistula formation.

1.2. Methods: Over a 14-year period (January 2010- January 2024), 198 children with hypospadias underwent TIP urethroplasty with double dartos flaps. Their records were reviewed for type of hypospadias, technique of repair, hospital stay and complications.

1.3. Results: 198 children with hypospadias (88 coronal, 61 sub-coronal, 20 distal penile, 19 mid-penile and 10 proximal penile) had TIP repair which was reinforced with double dartos flaps. Their age at the time of repair ranged from 5 month – 8.4 years (mean 2.1 years). On follow-up ranging from 15 months - 2.4 years (mean 1.9 years), 6 (3%) developed fistula and 4 (2%) developed mild meatal stenosis that responded to dilatation.

1.4. Conclusions: TIP urethroplasty is a safe, single-stage procedure in the management of different types of hypospadias without chordee. This repair once it is protected with double dartos flaps it has low complication rate and good functional and cosmetic outcome.

2. Introduction

There are several techniques to repair hypospadias but currently the TIP urethroplasty is the procedure of choice to repair all types of hypospadias without chordee [1-3]. The results of the TIP urethroplasty are excellent but one of the main complications is the relatively high incidence of urethral fistula ranging from 10-20% [1, 2, 4-11]. The development of a urethral fistula is a disappointment to the family as it will require a second procedure to close the fistula and even this may result in a second fistula. In an attempt to reduce the high incidence of urethral fistula, a variety of techniques were tried including the use of tunic flaps [12-15]. This report describes our experience with a double dartos flaps to protect the TIP urethroplasty and reduce the incidence of fistula formation.

3. Patients and Methods

Over a 14-year period (January 2010- January 2024), 198 children with hypospadias underwent TIP urethroplasty with double dartos flaps. In all, we adopted a slight modification of TIP urethroplasty. In all, the urethroplasty is made by incising the urethral plate in the midline all the way up to the tip of the future external urethral meatus. The new urethra is made over a size 6F or 8F Foley's catheter using 6.0 subcuticular rapid vicryle sutures. We use a size 6.0 rapid vicryle sutures to create the new urethral. In all, we use interrupted rather than continuous subcuticular sutures. We found this technique more appropriate and makes approximation of the edges of new urethra more accurate. This technique takes longer than the continuous subcuticular technique. We prepare and dissect the dartos flaps prior to the urethroplasty from the foreskin dorsally. Once the flap is raised, we divided it in the midline, one on each side. Only a thin dartos layer is dissected to preserve the foreskin in case a Bayer's flap is required to cover skin defects ventrally. Oce the new urethra is made, the two dartos flaps are then sutured to cover the new urethra, one on each side to have a double dartos cover. The two dartos flaps are held in place with few 6.0 vicryl sutures. A size 6F or 8F Foley's catheter was used in all of them depending on the age of the child and the size of the new created urethra. The

catheter was left indwelling for one week. The two wings of the glans are approximated and sutured together using a single layer of vicryle 6.0 or 5.0 vicryl. Circumscion is done and if felt it was necessary to close the defect ventrally, Bayer's flaps are used from the foreskin dorsally and rotated ventrally. A simple dressing is applied using a bandage to avoid postoperative hematoma and edema. A bandage dressing was used in all of them and this was removed on the third or fourth post-operative day and the wound was left exposed. All were covered with antibiotics till the catheter was removed.

Figure 1: Clinical photographs showing coronal hypospadias.

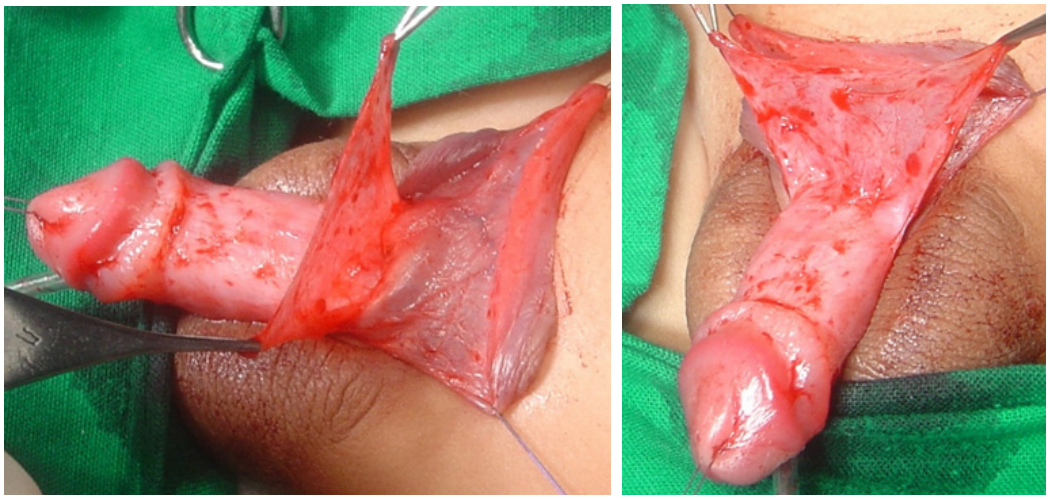
4. Results

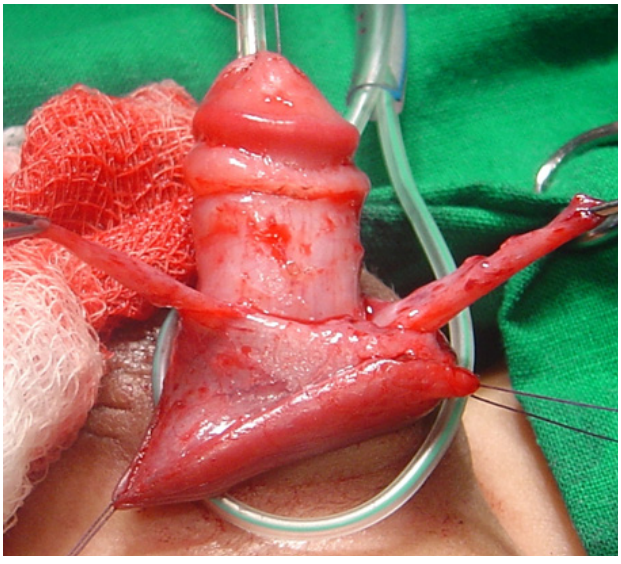
198 children with different types of hypospadias (88 coronal, 61 sub-coronal, 20 distal penile, 19 mid-penile and 10 proximal penile) had TIP urethroplasty (Figures 1, 2, 3A, 3B, 4A, 4B). The repair which was reinforced with double dartos flaps (Figures 5A, 5B, 5C, 6A, 6B, 6C, 6D). Their age at the time of repair ranged from 5 month – 8.4 years (mean 2.1 years). On follow-up ranging from 15 months - 2.4 years (mean 1.9 years), 6 (3%) developed urethral fistula and 4 (2%) developed mild meatal stenosis that responded to dilatation.

Figure 2: Clinical photographs showing subcoronal hypospadias. Note the good deep urethral plate.

Figures 3A and 3B: Clinical photographs showing distal penile hypospadias. Note the good deep urethral plate.

Figures 4A and 4B: Clinical photographs showing mid and proximal penile hypospadias. Note the good deep urethral plate.





Figures 5A, 5B and 5C: Clinical photographs showing the already dissected dartos flap from the prepuce skin that was divided in the midline. The two flaps will be rotated and sutured ventrally over the already created new urethra.

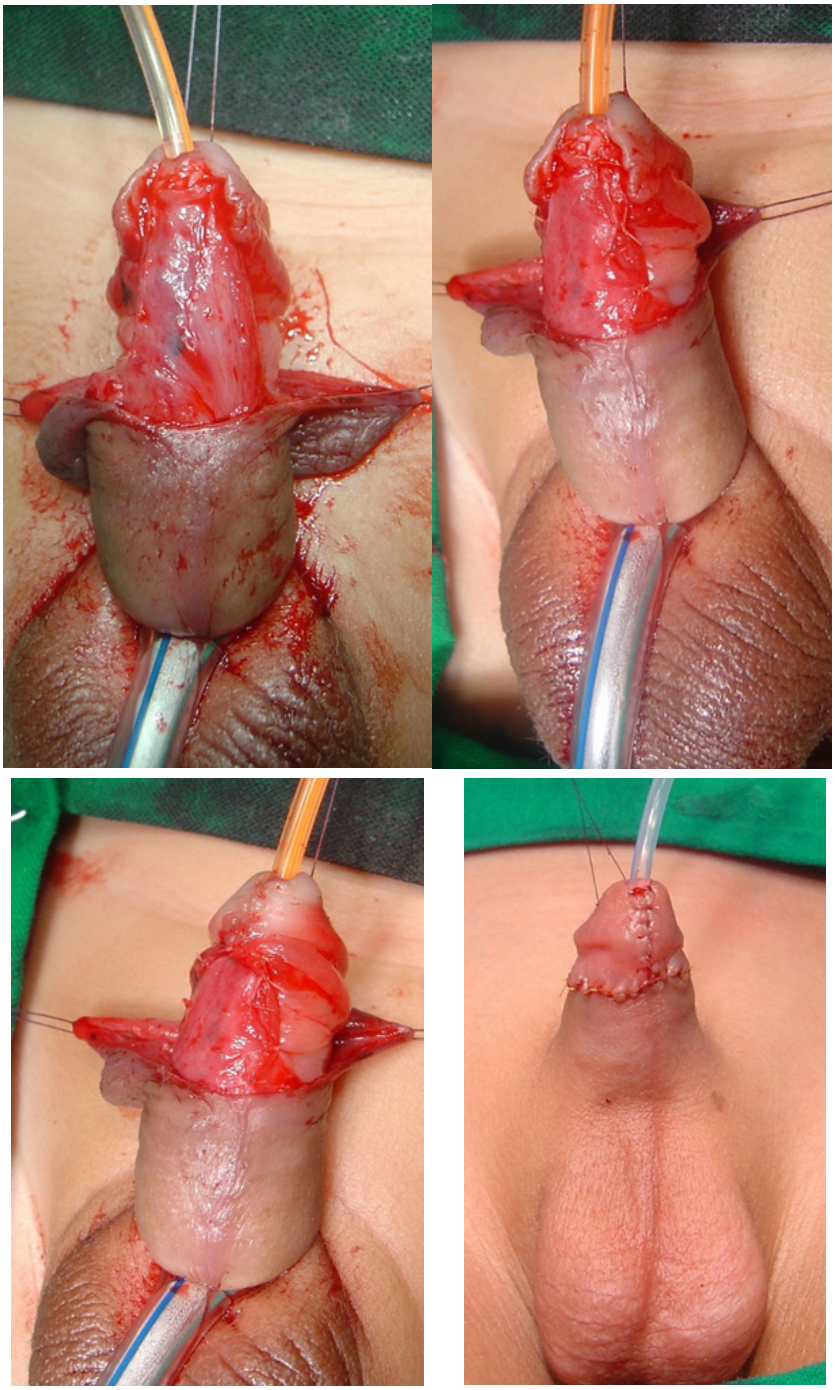


Figure 6A, 6B, 6C and 6D: Clinical photographs showing the already sutured dartos flaps over the new urethra. Note also the already unfolded skin at the external urethral meatus which is important to reduce the incidence of meatal stenosis and the final results from two different patients.

5. Discussion

Hypospadias is one of the common congenital malformations in male newborns. The estimated incidence of hypospadias is 3.2 per 1000 live male birth [16]. There are several degrees of hypospadias and the classification of hypospadias depends on the location of the abnormal urethral meatus which can be located anywhere from the glans to the perineum. In the majority of hypospadias, the external urethral opening is located distal to the mid-shaft of the penis (>80%). There are several techniques to repair hypospadias and the technique use will depend on the location of the urethral opening and the presence or absence of chordee. One of the commonly used techniques to repair hypospadias is the TIP (Tubularized Incised Plate) urethroplasty. This was introduced in 1994 by Snodgrass technique to correct distal penile hypospadias. Since then, it has become the most popular procedure to repair hypospadias [1]. This is attributed to its low complication rate, good cosmetic result, and technical simplicity. The indications for TIP urethroplasty have extended and currently the TIP urethroplasty is used for all types of hypospadias with a good urethral plate of adequate width and no or minimal chordee. There are however contraindications to TIP urethroplasty. These include severe chordee, previous resection of the urethral plate and scarring of the urethral palate.

TIP urethroplasty is an excellent procedure to repair hypospadias but it is known to be associated with complications. One of the most common complications of TIP urethroplasty is urethrocutaneous fistula. The incidence of urethrocutaneous fistula is variable ranging from 0%-21% (mean 5.9%) [1, 2, 4 -11]. There are

several factors which contribute to the incidence of urethrocutaneous fistula. The most important factors are the surgeon skills and experience and the surgical technique used to repair hypospadias. The TIP urethroplasty is known to be associated with a relatively low incidence of urethrocutaneous fistula compared to other techniques. In the past, the TIP urethroplasty was associated with a high fistula rate (14%) but this decreased to about 5% following the use of a dartos flap [22- 25]. Snodgrass has modified his technique in an attempt to reduce the postoperative fistula rate. He reported that the fistula rate was reduced from 33 to 11% when performing a two-layer urethroplasty and the fistula rate reduced to almost 0% when in addition to two-layer neourethra closure, the urethroplasty was covered with a tunica vaginalis flap instead of a dartos flap [26, 27]. Cheng et al, reported <1% complication rate and suggested a two-layer closure of the neourethra [28]. He incorporates the periurethral vascularized tissue to cover the first layer of the new urethra which is closed with a running subcuticular suture. We adopted a modified technique where we construct the new urethra with interrupted subcuticular sutures using 6.0 vicryl and the repair was reinforced and protected with double dartos flaps. In our series, 6 (3%) developed urethrocutaneous fistula. We feel the reason for this low fistula rate in our series is the use of double dartos flaps to cover the neourethra. A double dartos flap is vascular, readily available, and easily harvested. The dartos flap is divided in the midline and the two flaps are transferred ventrally to cover the new urethra as double layers. The TIP urethroplasty is a versatile technique in repairing proximal hypospadias without chordee as shown in our series [29, 30]. We have expanded the use of TIP urethroplasty to include those with midshaft and proximal hypospadias. The use of double dartos flaps to protect the repair is valuable to reduce the fistula rate.

Another common complication following TIP urethroplasty is meatal stenosis. The incidence of meatal stenosis is however variable ranging from 0% to 14% [1, 4, 8, 12-15]. To overcome this, Elbarky advocated regular urethral calibration for all the patients after the TIP urethroplasty [20]. Meatal stenosis was seen in 2% of our patients and we like others feel that regular urethral calibration is painful and unnecessary [21]. We usually start the urethroplasty from distal to proximal and we do this with interrupted sutures and we think the site of insertion of the first stich in the TIP urethroplasty is important. If the first stich in the TIP urethroplasty is placed too far distally it can cause narrowing of the external urethral meatus. The first stich should be inserted just before the tip of the new urethra as this will lead to out folding of the glans skin resulting in a urethral tip that is lined by normal glans skin. This will also reduce the incidence of meatal stenosis. The edges of this out folded part are sutured to the wings of the glans which further widen the new external urethral meatus.

In conclusion, TIP urethroplasty is the procedure of choice to correct distal hypospadias and can be used to correct selected cases of midshaft and proximal hypospadias without chordee. A good urethral pate is important for the success of this operation. To reduce the incidence of urethrocutaneous fistula we use a double dartos flaps harvested from the foreskin and transferred ventrally. This act as a double vascularized layer protecting the TIP urethroplasty. To reduce the incidence of meatal stenosis, it is important not to insert the first stich too far distally and this will also lead to out folding of the glans skin resulting in a new urethral tip that is lined by normal glans skin. Suturing the out folded part of the new urethra to the wings of the glans will also widen the new external urethra and reduce the incidence of meatal stenosis.

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