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Tubularised Incised Plate Urethroplasty with Spongioplasty and Tunica Vaginalis Flap in Hypospadias Repair- A Case Series of 30 Cases

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Abstract: The objective of the study was to evaluate the cosmetic and functional results of tabularised incised plate (tip) urethroplasty with spongioplasty and tunica vaginalis flap in hypospadias repair. From February 2008 to February 2011, 30 patients with distal (n=21) and mid-penile (n=9) hypospadias had surgical repair. The mean age of the patients was 4.2 years (range, 2-6 years). All patients received primary TIP repair with spongioplasty and tunica vaginalis flap. All the patients were followed for a period one year. Of the 30 cases, 27 patients (96%) had successful outcome with regard to a straight urine stream, vertically slit meatus, and acceptable cosmetic appearance. Three patients with mid-penile hypospadias developed a small fistula at the site of the native meatus among whom one had healed spontaneously with the rest two requiring secondary repair which was done after six months. Spongioplasty along with tunica vaginal flap repair is a reliable and important adjunct for covering the neo-urethra in TIP hypospadias repair. This surgical technique results in a low rate of fistula formation and good cosmetic and functional outcome of hypospadias repair.
Keywords: urethroplasty, spongioplasty, tunica vaginalis.

INTRODUCTION

Hypospadias is one of the most common congenital anomalies occurring in approximately 1 in 125 live male births. In the recent years, rate of severe hypospadias seems to have increased three to five folds this may be because of more frequent reporting and earlier diagnosis or it may reflect other undefined biological factors during pregnancy.

Various advances in instrumentation, suture materials, and anatomical and histological understanding have evoked an exponential number of new and modified techniques for the correction of hypospadias [1, 2]. However, despite obvious surgical advances in hypospadias repair, no single technique has been developed that is completely without complications. The most common and particularly annoying complication is urethro-cutaneous fistula. Several procedures have been described for preventing fistula formation [3]. The aim of the present study was to evaluate the results of tabularised incised-plate (TIP) repair of distal and mid-penile hypospadias, using the hemi-corpora spongiosum along with tunica vaginalis flap as an additional cover of the neourethra.

METHODS

This was a prospective study conducted in Burdwan Medical College and Hospital between February 2008 and February 2016.

Participants

There were 30 patients with well-developed spongiosal tissue (those with underdeveloped spongiosal tissue were excluded from this study) were enrolled in the study after proper counselling and with written informed consent.

Their mean age was 6.2 years (range, 3-14 years). The hypospadiac meatus was distal in 21 children (70%) and mid-shaft in 9 (30%). None of the patients had associated congenital anomalies or needed preoperative hormonal therapy.

Procedure

All children received single staged hypospadias repair using standard primary TIP urethroplasty, in conjunction with spongiosal tissue along with tunica vagina flap for cover of the neourethra to prevent the occurrence of urethro-

cutaneous fistula. The operation was done under caudal anaesthesia without the use of tourniquet.

The patient was draped from the umbilicus to the upper part of the thigh; the penis was placed on tension with a glans traction suture and the dorsal hood was lysed from the glans head. Then the urethral meatus was calibrated. The integrity, thickness, and width of the urethral plate and skin were assessed. Mucosal collar traction sutures with 3-0 vicryl were placed on the ventro-lateral inner prepuce, as described by Firlit [4] and injection of 1: 10000 epinephrine in 0.5 % xylocaine was infiltrated at the proposed site of incision and in glans using 26 gauge needle. It helps in haemostasis. The collars were distracted laterally to tent the ventral skin at the level of the native meatus. A U- shaped incision was made around the meatus and penis was degloved by a circumcoronal incision incorporating the meatus. The incision in the midline was adjusted to skirt around the native urethral meatus. Extreme care was taken to incise only through the dermis on top of the distal urethra. Artificial erection test done to assess the chordee and if present the chordee corrected.

The urethral plate was incised dorsally in midline from meatus to just proximal to tip of the glans till the white glistening tunica albuginea became visible in the floor of incision. Glans wings were raised on either side of plate up to midglans level only. Size 6 Fr catheter was placed into the bladder and tabularisation of urethral plate was done over it by a continuous suture of 6-0 polyglactin.

Orthoplasty was performed by dorsal tunica albuginea placation, if needed. Two parallel longitudinal incisions separated the urethral plate from the glans wings. The urethral plate was then incised in the midline from the hypospadiac meatus to the area just proximal to the glans tip. The urethral plate was then tabularised over a suitable silicone stent using 6/0 polyglactin sutures. The spongiosal tissue was dissected from the underlying tunica albuginea on its lateral edges deep enough to be closed without tension. Then, medial approximation of the two dissected hemi-corpora spongiosum created a covering layer over the TIP urethroplasty.

Then 2-4 cm long vertical incision was made over anterior wall of left/right hemiscrotum. Scrotal attachments were dissected free from tunica vaginalis.

Testis was delivered out through scrotal incision. Tunica vaginalis flap was harvested in the form of soft tissue pedicle flap from testis & spermatic cord. [Fig: 1] Vascular supply of TVF was based on underlying spermatic fascia which must be carefully preserved while dissecting near the epididymis. The spermatic fascia was dissected from cord towards the superficial inguinal to keep pedicle tension free. This tunica vaginalis flap was used to cover the neourethra. [Fig: 2]Glans wings were re-approximated and after sacrificing the excess skin, the skin was covered over the shaft using an eccentric suture line. The catheter was secured. A dressing was applied around the penis in the stretched position.

First dressing was changed on fourth or fifth post-op day, second dressing on 8th or 9th and then finally at the time of catheter removal. Catheter was removed after 12th postoperative day.

RESULTS

The thirty patients included in the study were all repaired with single staged operation as described above and were assessed on the 12th post-operative day after removal of dressing and catheter. They were followed up at one, three and six months. The mean operative time was 92 minutes (range 80-120 minutes).

Of the thirty patients 4 of them (13.3%) developed meatal retrusion. Three patients (10%) developed minor urethro-cutaneous fistula all of them being at the native urethral meatus.

Two cases were found with iatrogenic higher testis. Only one of them was found to have developed urethral stricture at a follow up after 3 months which was treated with repeated urethral dilatation.

In a couple of patients accidental removal of catheter occurred within 5 days of the surgery, however there was no complication noted in them.

Except for the three patients who had developed post operative urethro-cutaneous fistula, rest 27 patients had successful outcome with regard to straight urine stream vertically slit meatus and acceptable cosmetic appearance.

Among the three patients with fistula, in one them the fistula healed spontaneously and in the rest two patients the fistula closure was done after six months with a multilayer repair approach.

For other complications no intervention was done and patients were reassured about the outcome.

Fig-1: After creation of neourethra harvested tunica vaginalis flap

Fig-2: Neourethra covered with Tunica Vaginalis flap

DISCUSSION

The goal of hypospadias surgery is a penis that is both functionally and aesthetically normal. This requires a penis that is straight on erection with a vertically oriented slit like meatus at the tip of glans thus promoting a single coherent urinary stream [5]. Bracka showed that 72% of young adult felt that normal appearance was an important goal as normal function [6].

TIP urethroplasty is associated with minimal complications and achieves satisfactory results with a normal looking penis and meatus [7, 8]. The main advantages of TIP urethroplasty are –

- It is technically easy
- It gives a normal looking vertical slit like meatus
- 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].

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

Urethro-cutaneous fistula is the most common complication in up to 17% [10, 11].

Interposition of well vascularised tissue between the penile skin and urethra is essential to decrease the fistula rate [12, 13].

Many procedures have been described to achieve vascularised coverage of suture line [14, 15].

Snodgrass in his original article in 1994 used a dorsal based dartos flap for urethral coverage. Although harvesting of dartos tissue for dorsal penile and/or preputial skin has become a standard technique, it has potential complications such as penile torsion, chordee formation or skin loss when aggressive dissection between the skin and dorsal dartos is conducted. A number of series on TIP urethroplasty

repair have described the fistula rate ranging from 0 to 21%.

In our study 3 patients (10%) had urethro-cutaneous fistula. We attribute this low rate of fistula in our case series to the double covering of the neo-urethra with firstly a layer of local surrounding spongiosal tissue (spongioplasty) and secondly another layer of tunica vaginalis flap.

Meatal stenosis is one of the complications seen with the TIP urethroplasty. The incidence has ranged from 0 to 14%. Meatal problems can be the cause of unsatisfactory cosmetic appearance and can also cause fistula. In the series by Elbarky (16) 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. However Lorenzo and Snodgrass disagreed with this and felt that regular calibration was not needed [16, 17]. In present study meatal stenosis was seen in two cases (7%).

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

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

To achieve a normal slit like meatus it is imperative that the normal tabularization of the urethral plates should end at the level of mid glans and not at the tip of the glans. In this study 4 cases (13%) developed meatal retrusion. It was because tunica vaginalis flap was not extending up to the external ring.

CONCLUSION

It is well known that a series of 30 patients with a mean follow up of 6 months is not enough to make a comment regarding the results of the technique. A larger series with a longer follow up period is needed to prove efficacy of the technique. However the initial results show encouraging results and hence a with the preliminary results may draw initial conclusion that TIP urethroplasty with spongioplasty and tunica vaginalis flap is single stage technically efficient operation with good operation result.

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