

## Modified Tubularized Incised Plate (TIP) Hypospadias Repair Using Dartos Fascia Flap

AHMED M. ABOUL WAFI, M.D.; SHERINE M. ABOUL FOTOUH, M.D. and  
KHALED M. EL-SHERBENI, M.D.

*The Department of Plastic Surgery, Faculty of Medicine, Ain Shams University.*

### ABSTRACT

This study was conducted in order to evaluate the results of modified (TIP) hypospadias repair using the dartos fascia as an axial transposition flap with the aim of lowering the incidence of occurrence of fistula.

Sixteen patients were included in this study with mean age 3.5 years. Fourteen patients had distal penile hypospadias and two patients had mid-penile hypospadias. All patients were not circumcised and had mild to moderate chordee.

Modified Tubularized Incised Plate (TIP) urethroplasty was done in all patients with using the dartos fascia as an axial transposition flap to separate the neourethra from glans and skin closure.

All cases ended by a slit-shaped, vertically oriented meatus with satisfactory stream in its girth, direction and jetting. None of the cases developed urethrocutaneous fistula. There was no stricture or meatal stenosis. Two patients had prolonged edema of the Pyars' preputial flap that covered ventral skin deficiency and it resolved after one month.

In conclusion, TIP urethroplasty in combination with proximally based axial Dartos fascia flap is a versatile operation with potential applicability to a wide spectrum of hypospadias conditions.

### INTRODUCTION

Hypospadias is one of the most common anomalies of the external genitalia [1]. There are myriads of surgical techniques to correct hypospadias. Determining the appropriate technique depends on several factors including meatal location, appearance of the meatus and glans, presence or absence of chordee, quality of ventral skin coverage, quality of the intact urethra and circumcision status of the patient.

The ultimate goal of hypospadias surgery is to create a normal looking penis with a terminally situated conical meatus, to correct chordee if present and to ensure a well directed, straight, and full urinary stream in the standing position [2].

The superficial fascia of the penis anatomically is divided into superficial and deep layers. The superficial layer is a thin membranous layer of loose sub-dermal tissue which lies immediately beneath the skin and should be reflected with the skin as a protection of delicate sub-dermal plexus, the deep layer (tunica Dartos) is a layer of areolar tissue that moves freely over Bucks fascia and is continuous with the Scarpas fascia, Colles fascia and tunica Dartos of the scrotum. The tunica Dartos contains a pair of axial vessels which form an arterial network within the fascia which forms the basis of the axial tunica Dartos flap [3].

Hypospadias repair utilizing the urethral plate dates at least to Mathieu's 1932 description of the flip flap [4] but in the past 15 years there has been a trend favoring procedures that incorporate the plate into the neourethra. This is the result of two wide spread perceptions: That the plate is usually not the cause of ventral penile curvature as previously thought and that repair using the plate have fewer complications. Tubularized incised plate (TIP) urethroplasty is a logical extension of this reasoning and it adds a third observation that incision into healthy plate heals by re-epithelialization without significant fibrosis [5].

Tubularized Incised Plate (TIP) hypospadias repair relies upon a midline relaxing incision to widen the urethral plate for urethroplasty without additional skin flaps. This incision, extending from within the meatus to the end of the plate, not only widens it, but also ensures creation of a vertically oriented neomeatus with a slit-like opening. Since its introduction in 1994 the procedure has gained widespread popularity because of its versatility, low complication rate, and good cosmetic results [6].

In spite of favorable results achieved with TIP urethroplasty, urethro-cutaneous fistula is still one

of the troublesome complications. In an attempt to decrease the occurrence of this complication, tunica Dartos axial flap has been utilized as a vascularized layer over TIP urethroplasty.

### PATIENTS AND METHODS

Sixteen patients were included in this study. Their ages ranged from 1.5-8 years (mean 3.5 years), fourteen patients had distal penile hypospadias and two patients had mid-penile hypospadias. All patients were not circumcised and had mild to moderate chordee.

#### *Operative Technique (Fig. 1):*

A stay suture was placed in the dorsal glans to aid in the traction of the phallus. A sound was passed into the meatus to assess the thickness of tissue overlying the distal urethra, and then a circumscribing incision was made extending in a "U" shaped direction back to healthy urethra 1-2mm proximal to the hypospadiac meatus (Fig. 1A). The skin was degloved to the penoscrotal junction and an artificial erection was performed to test for chordee. The chordee was improved by simple degloving of the penis. None of the patients required division of the urethral plate.

Parallel longitudinal incisions approximately 8-10mm apart was done defining the urethral plate with dissection of the glanular wings laterally (Fig. 1B). The urethral plate was incised in the midline from the meatus to the tip of the glans with dividing all transverse webs and exposing the underlying corporeal bodies. When there was meatal stenosis, the incision was extended 2-3mm proximally to dilate the meatus (Fig. 1C). Deepening of the groove was very important to yield a capacious future urethra.

The urethral plate was tubularized over a silicon catheter 6-10Fr. With a running subepithelial 6/0 vicryl suture (Fig. 1D). A Dartos fascial flap was harvested from one of the Byar's preputial flaps as a proximally based axial flap (Fig. 1E) and brought ventrally to separate the neourethra from subsequent glans and skin closure (Fig. 1F). Glanduloplasty was done by closure of glandular wings and the skin closure was completed utilizing the other Byar's flap (Fig. 1G). A lightly compressive dressing was applied and the catheter was left for 7 days. The patients were followed up for at least 6 months.

### RESULTS

All cases ended by a slit-shaped, vertically oriented meatus with satisfactory stream in its

girth, direction and jetting (Fig. 2). None of the cases developed urethrocutaneous fistula. There was no stricture or meatal stenosis.

Healing proceeded smoothly with no wound complications as dehiscence or disruptions. Two patients had prolonged edema of the Pyar's preputial flap that covers the ventral skin deficiency and it resolved after one month.

### DISCUSSION

The history of hypospadias repair demonstrates the skills of reconstructive surgeons trying to create a functional neourethra. The French surgeon Duplay, who is considered by many the father of hypospadiology, in his initial attempts to correct proximal defects he incised a rectangular strip of ventral shaft skin with an adequate width for urethroplasty, but he found it difficult to close the wound, so he resorted to use a relaxing incision down the dorsal penile shaft. Later in his second method, Duplay reduced the width of the skin flap for urethroplasty to facilitate ventral shaft wound closure without the dorsal relaxing incision, but he had inadequate diameter of the neourethra. So he left the strip untubularized with the catheter under the skin, relying on postoperative epithelial growth over the stent to complete the ventral half of the neourethra—a maneuver later resurrected by Browne [7].

Other urologists have used tissues from a variety of locations including the prepuce, scrotum, and non-genital regions to either supplement the urethral plate or to create the entire neourethra. These procedures share in common the impression that the urethral plate alone is most often inadequate for tubularization into a urethra of adequate size [5].

The earliest description of urethral plate tubularization was by Nesbit [8], who depicted a mid-shaft repair by plate tubularization. King [9], later advocated the same technique for midshaft hypospadias with minimal or no chordee. In these procedures the neourethra extended only to the corona. Recently, Kass [10] has further developed this concept by making incisions lateral to the plate into the glans to produce a glanular meatus. This technique is applicable in boys who have a deeply grooved or excessively large urethral plate. For patients who have a mildly clefted or flat plate, attempts at tubularization inevitably require wider incisions, which encroach upon skin or glans adjacent to the plate, or acceptance of a smaller neourethral diameter.

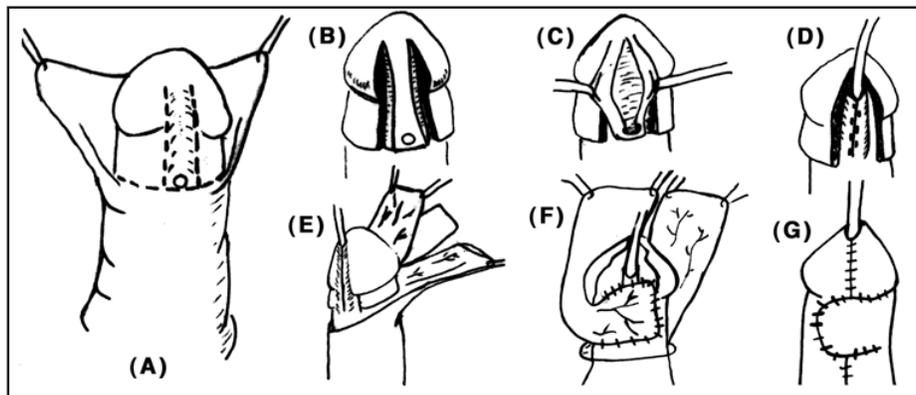


Fig. (1): Modified TIP urethroplasty.



Fig. (2-A): Preoperative view showing distal penile hypospadias.

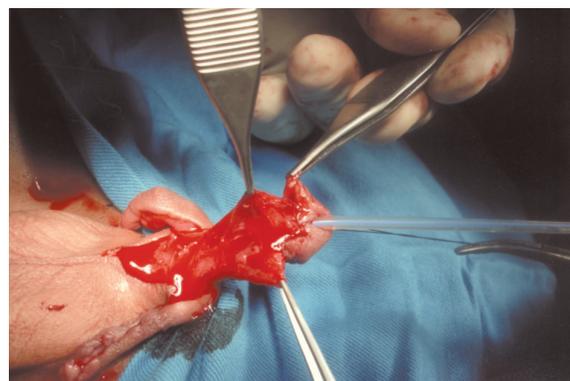


Fig. (2-B): Orientation of Dartos fascia flap from one of the Byar's flaps.

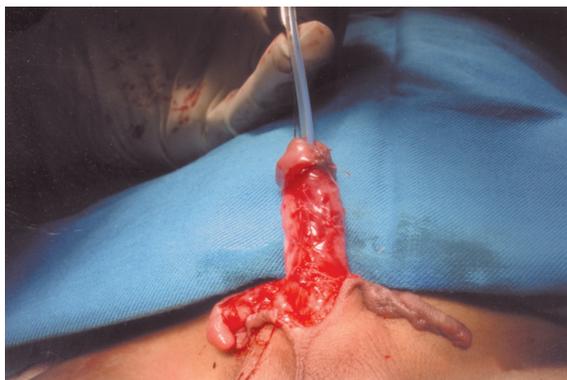


Fig. (2-C): Dartos fascia sutured in place.



Fig. (2-D): Skin closure using the other Byar's flap.

Fig. (2-E): Postoperative urine stream with good girth, direction and jetting.



The relaxing incision of the Tubularized Incised Plate (TIP) urethroplasty allowing tubularization of the plate regardless of whether it is flat or grooved without skin flaps or inclusion of glans tissues. This procedure is of potential use whenever the urethral plate is available, therefore, it is contraindicated in cases with significant penile curvature that requires division of the plate to achieve straightening or plate disturbance in redo cases [5].

Healing of the relaxing incision has been investigated in dogs and revealed re-epithelialization and subcutaneous healing without fibrosis [11].

In the original technique of (TIP) urethroplasty, Snodgrass [5] used the Dartos fascia flap dissected from the preputial and shaft skin, button-holed, and brought ventrally as a barrier between the neourethra and skin closure aiming at lowering the incidence of fistula formation, but the fistula was still present in 4% of his cases which is low and compares favorably to that of other techniques.

Dissecting the Dartos fascia from the preputial skin will compromise the vascularity of the skin that may be required to cover ventral skin deficiency. Button-holing the Dartos fascia will compromise the vascularity of the central part of the Dartos fascia flap which overlies the repair. These two technical factors in fashioning of Dartos fascia flap might be responsible for the incidence of fistula.

In this study, we dissected the Dartos fascia flap from one of the Pyar's preputial flaps (preserving the other for coverage ventral skin deficiency) as an axial proximally based flap and transposed to cover the repair. This well vascularized flap promoted rapid healing of the repair and acted as a barrier between the repair and skin closure.

This technique provided additional coverage of the neourethra, achieved the goal of non-overlapping suture lines, and might offer increased

vascularity while leaving part of the dorsal skin intact for additional coverage.

The tunica vaginalis flap was used by some authors to obtain an additional vascularized layer, but this required delivery of the testis into the operative field and dissecting the tunica from the testis and this might add additional trauma with high risk of testicular injury.

In conclusion, TIP urethroplasty in combination with Dartos fascia proximally based axial flap was a versatile operation with potential applicability to a wide spectrum of hypospadias conditions.

## REFERENCES

- 1- Duckett J. and Baskin L.: Hypospadias. In: Gillenwater J.G.J., Grayhack J., Howards S.S. and Duckett J.W. (eds.). Adult and pediatric urology. 3<sup>rd</sup> edition. St Louis, Mosby, p 2519, 1996.
- 2- Zaontz M.R. and Dean G.E.: Glanular hypospadias repair. Urol. Clin. N. Am., 29: 291, 2002.
- 3- Carney K.J. and McAninch J.W.: Penile circular fascio-cutaneous flaps to reconstruct complex anterior urethral strictures. Urol. Clin. N. Am., 29: 397, 2002.
- 4- Mathieu P.: Traitment en un temps de l'hypospadias balanique et juxta-balanique. J. Chir. (PAirs), 39: 481, 1932. Quoted after: Gregory E.D., Zaontz M.R. Glanular hypospadias repair. Urol. Clin. N. Am., 29: 291, 2002.
- 5- Snodgrass W.: Tubularized incised plate (TIP) hypospadias repair. Urol. Clin. N. Am., 29: 285, 2002.
- 6- Snodgrass W.: Tubularized incised plate urethroplasty for distal hypospadias. J. Urol., 151: 464, 1994.
- 7- Backus L.H. and DeFelice C.A.: Hypospadias-then and now. Plast. Reconstr. Surg., 25: 146, 1960.
- 8- Nesbit R.M.: Operation for correction of distal penile ventral curvature with or without hypospadias. J. Urol., 97: 720, 1967.
- 9- King L.R.: Hypospadias a one-stage repair without skin graft based on a new principl: Chordee is sometimes produced by the skin alone. J. Urol., 103: 660, 1970.
- 10- Kass E.J. and Chung A.K.: Glanuloplasty and in site tubularization of the urethral plate: Long-term follow-up. J. Urol., 164: 991, 2000.
- 11- Esposito M.P., Bleustein C.P., Felsen D. and Poppas D.P.: Meschanism of healing following snodgrass repair, 2000.