

Combined Techniques for Proximal Hypospadias Repair

LOAI EL-BASSIONY, M.D.

The Department of Plastic and Reconstructive Surgery, Faculty of Medicine, Mansoura University.

ABSTRACT

Repair of proximal hypospadias with significant chordee is still a challenging procedure. A good option for such problem is the Duckett vascularized island preputial flap. However, urethrocutaneous fistula has been reported with considerable rates. One way to lessen such complication rate is to harvest a shorter flap to ensure its robust vascularity. The present study was designed to evaluate the outcomes of tubularizing the available urethral plate as in Snodgrass description and to be anastomosed with the harvested short, as acquired, preputial island flap. The study was carried out on 14 boys, aged 2 to 10 years, eleven of them had proximal penile, while 3 had penoscrotal hypospadias. All patients underwent repair with combined Duckett (transverse preputial island flap; TPIF) and Snodgrass (tubularized incised plate; TIP) procedures. Patients were followed-up for 4-12 months. All patients, but two, showed satisfactory results; with a straight penis that has a meatus at the tip of a conical glans. Fistula rate was 28.5% (half of it healed spontaneously). Two patients showed dehiscence of the glanular part of the new urethra. The use of combined TPIF and TIP urethroplasty techniques is a reliable combination for difficult proximal hypospadias cases with significant chordee.

INTRODUCTION

Hypospadias is among the most difficult surgical problems to correct. The operation site is one where wound healing is difficult due to such factors as high edema potential, post operative erection and contamination with urine and faeces. This is also clear from the fact that over 250 surgical techniques to repair hypospadias have been developed in the last century [1]. The defined goals of treating hypospadias are to create a straight, free of chordee, penis (orthoplasty), to reform the glans into a more natural conical shape (glanuloplasty), to create a urethra with its meatus at the summit of the glans (urethroplasty) and to achieve cosmetically acceptable penile skin coverage [2].

One-stage hypospadias repair, even in proximal cases, is a more attractive option, providing less anesthetic exposure and to operate on unscarred tissue with normal blood supply. It also eliminates the psychosocial burden of staged procedures for

the patient and his family; as well as, minimizing the economic load [3].

After Snodgrass [4] had first described the tubularized incised plate (TIP) repair, as a modification of Thiersch-Duplay ventral tube repair [5,6], many centers have shifted to this technique, even for proximal cases. This is because of its excellent cosmetic appearance and low complication rates. Tubularized incised plate technique is suitable for cases without chordee or with minimal chordee at the most [7]. Proximal hypospadias usually involves significant chordee; making TIP repair yields sub-optimal results. For such cases the use of transverse preputial island flap (TPIF) of Duckett is a good option [8-10]. In this technique, the urethral plate is incised to get rid of the chordee, straightening the penis before inseting of the island tube. Reports showed a considerable rate of post operative urethrocutaneous fistula after TPIF procedure [8,9]. One suggestion to decrease the fistula incidence is to harvest a shorter preputial flap to ensure its abundant vascularity.

In this article, we managed proximal hypospadias patients with significant chordee by the Duckett preputial island flap; but we tubularized the urethral plate, after incising it in the distal shaft, as in Snodgrass technique. Then, the urethral plate tube was anastomosed to the proximal end of the island preputial tube, to complete the reconstruction of a new urethra. Outcomes of this maneuver will be elaborated and discussed.

PATIENTS AND METHODS

During the period from June 2006 till March 2008, 14 boys with proximal hypospadias underwent repair with combined Snodgrass (TIP) and Duckett (TPIF) procedures. They were followed-up for 4 to 12 months. Their ages ranged from 2 to 10 years. Eleven patients had proximal penile

and three had penoscrotal hypospadias. All cases were not interfered before (primary repair), with intact prepuce and significant chordee.

Operative technique:

Prior to surgery, routine biochemistry, hemogram, urine analysis and bleeding profile were done. The operation was performed under general anesthesia, in addition to penile nerve block for post operative analgesia. A 4X-loupe magnification was used. A 4/0 silk stay suture, on a tapered needle, was applied to the glans. Infiltration of the glans and along the lateral borders of the urethral plate with 1:1000,000 epinephrine was done. The bladder was filled with saline and then a suprapubic urinary catheter was inserted.

Coronal sulcus incision was done circumferentially, 5mm proximal to the glans and down to the Buck's fascia. The urethral plate was mobilized proximally while degloving the penis (Fig. 1-A). The fibrous chordee was being excised at that time. Artificial erection, through regular saline injection in the glans, may be needed to confirm enough straightening of the penis.

Four 5/0 silk traction sutures were placed to fan out the ventral prepuce. Marking of the flap over the ventral prepuce, as 1.2-1.5cm in width and 3-4cm in length, was done. The length of the flap is determined according to the distance from the distal end of the urethral plate till the tip of the glans. Again, the flap width depends on the size of the penis. Incision along the marks was carried out just into the subcutaneous tissue. A dissection plane was developed between the flap and the dorsal skin, down to the base of the penis (Fig. 1-B). This shall provide a nice subcutaneous pedicle to that island flap. The flap was then rolled over a 10-12F catheter and approximated with 2 layers of interrupted subcuticular 6/0 polydioxanone absorbable suture. The catheter was replaced with a 6-8F silicone infant feeding tube and then the tube was rotated ventrally around the left side of the penile shaft (Fig. 1-C). The feeding tube was inserted in the original meatus, passing over the urethral plate, to rest in the urethral bulb working as a urethral stent. Make sure that the suture line of the tubed flap was placed against the corpora but without torsion of the penis.

The urethral plate was defined with 2 lateral incisions, 8-10mm apart, that meet about 2mm proximal to the original meatus. The plate was incised in its midline to facilitate tubularization around the feeding tube that was closed with 6/0 polydioxanone suture (Fig. 1-D). The proximal

end of the preputial tube was sutured to the distal end of the tubularized urethral plate with the same suture material. Anastomosis was started dorsally with the central stitch fixed to the corpora, to prevent tube kink. The stitches knots were kept outside the urethra all the way long. The anastomosis was fashioned obliquely and was covered by draping of the pedicle over it without jeopardizing its vascularity. Also, the pedicle was laid down over the ventrum and tucked in place to cover the repair as possible. Glanular wings were created. The distal end of the tube, after proper trimming, was fixed to the anterior distal glans, and the glanular wings were re-approximated over the tube with 6/0 polyglactin absorbable mattress stitches without tension; leaving an oval wide meatus. The skin was closed with 6/0 chromic catgut sutures after dividing the prepuce dorsally in the midline, to allow tension free repair (Fig. 1-B). After checking the stent position, it was cut short and fixed with the silk stay suture. The penis was dressed with antibiotic ointment and elastic cohesive gauze in moderate pressure.

The patients were given antibiotics, analgesics, antispasmodics and enough hydration, as long as the catheters are in. Dressing was removed in a week and then the penis was kept moist with antibiotic ointment application. Stent was removed after 2 weeks and after that, the suprapubic catheter was clamped to ensure proper urine stream and to be removed later.

RESULTS

Out of the 14 boys who underwent combined TIP and TPIF procedures, ten patients healed nicely and had a smooth post operative course (for two weeks after removal of the suprapubic catheter). The reformed penis was straight, without chordee, aesthetically nice and ending with a conical glans. Urine stream was forward and adequate (Figs. 2,3). Two boys showed recession of the meatus to a more proximal position; at the coronal sulcus. One was due to disruption of the glans and the other due to necrosis of the distal part of the tubed flap. One of those two boys was managed by TIP urethroplasty after 8 months, while the other boy did not accept further surgeries.

Four boys had fistula at the junction site between the preputial flap and urethral plate, 2 of them were from the 10 healed nicely boys who developed fistula after complete healing. The latter 2 fistulae were small enough to close spontaneously, in 2 months by instructing the patients to keep closing the fistula during urination. The other 2

fistulae were repaired after 6 months without recurrence. Three patients showed some degree of meatal stenosis after 4-6 weeks postoperatively. These patients were followed-up by frequent meatal

dilatation using the tip of a regular thermometer with the application of betamethazone ointment. The stenosis could be alleviated through this regimen.

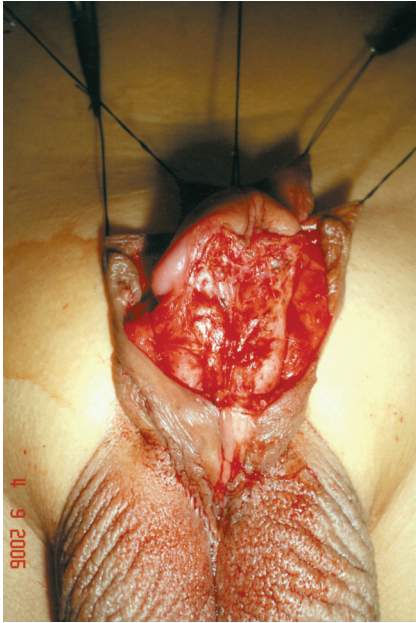


Fig. (1-A): The penis is degloved with removal of ventral fibrous chordae. The urethral plate is preserved and pushed proximally.

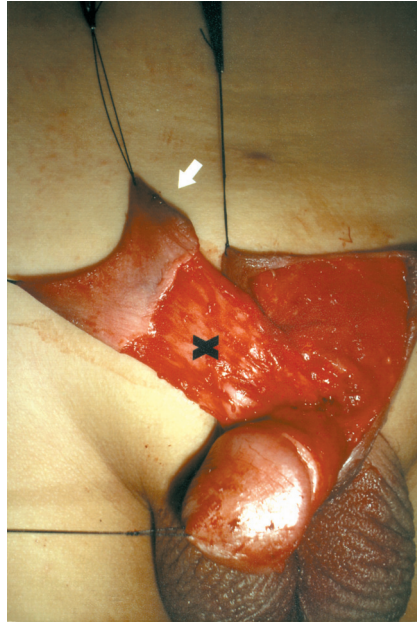


Fig. (1-B): The preputial flap (arrow) is harvested with a well vascularized pedicle (X) down to the penile root.

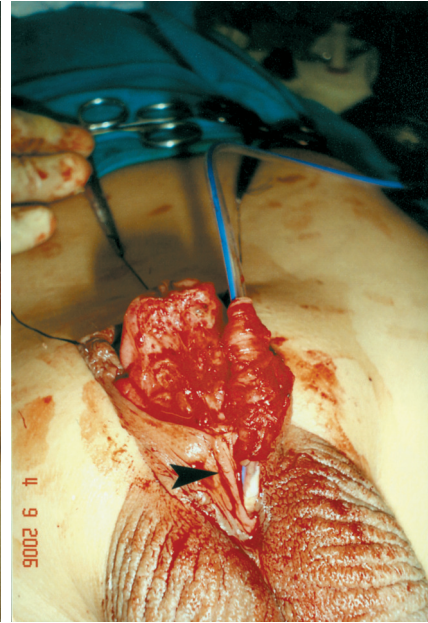


Fig. (1-C): The tubularized preputial flap rotates ventrally and the feeding tube enters the meatus, passing over the urethral plate (arrow head).

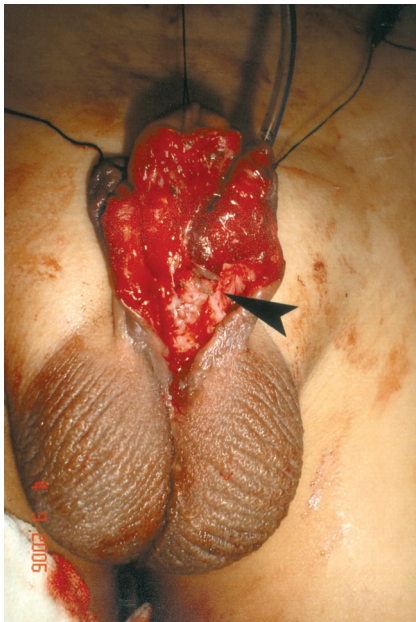


Fig. (1-D): The urethral plate is tubularized over the feeding tube. The opposing ends of both tubes (arrow head) are now ready to be anastomosed.



Fig. (1-E): Final appearance after completed reconstruction with a straight penis and a conical glans.



Fig. (2): A 3-year-old boy with penoscrotal hypospadias. (Left) Preoperative view: Severe ventral curvature. (Right) Six-week Postoperative view: Straight penis with forward adequate urinary stream.



Fig. (3): A 7-year-old boy with proximal penile hypospadias. (Left) Preoperative view: Curved penis with reasonable urethral plate. (Right) Four-week postoperative view: Nice looking penis with good forward urinary stream.

DISCUSSION

After all those techniques, old and recent, to reconstruct the hypospadias anomaly, still that field is ready to accept new techniques, ideas, or tricks searching for perfection. It is clear that, there is no single solution for various types of hypospadias deformity. Surgeon should use his expertise to tailor the reconstruction technique according to many factors; namely, location of the meatus, degree of chordee, presence or absence of prepuce, laxity of penile skin and whether the interference is a primary or a secondary one.

Opponents of one-stage repairs stated that such techniques have the disadvantages of inability to

completely assess the final outcomes after chordee release and result in higher complication rates [8,11]. However, multiple-stage procedures have some disadvantages; namely, multiple surgical and anesthetic exposures, working on scarred relatively ischemic tissue and repeated psychological trauma for patients and family. Meanwhile, one-stage procedures are adopted by most centers even for the proximal or complicated cases [2,3,12].

The present study was based on a one-stage procedure that comprises a combination of 2 established techniques to correct difficult proximal hypospadias cases with significant chordee. We had an overall complication rate of 28.5% and the

final outcome was satisfactory in 86% of cases (all cases except one large fistula and one dehiscence of the glanular closure till the coronal sulcus level).

During hypospadias repair, techniques preserving the urethral plate (tubularized plate, meatal based flaps, or only preputial flaps) should be looked for first. The urethral plate is well vascularized, richly innervated and has an extensive support from the underlying muscular and connective tissue constituents. These criteria should lead to a safer and more stable urethroplasty with less complication rates [13,14]. This is not the case in the presence of severe chordee, where the plate should be transected to allow proper straightening of the penis after excision of fibrous chordee. In our modification, instead of discarding the urethral plate completely, we tubularized it as in Snodgrass description and used it to form the proximal part of the urethra. Current evidences in the literature states that urethral plate healing after TIP urethroplasty occurs through normal re-epithelization with no scar formation [15,16]. Meanwhile, there should be no narrowing in the tubularized urethral plate after its midline incision.

Duckett island tube urethroplasty, although more difficult technically, is more reliable than free tube operations, whether skin [11,24,25] or mucosa [26,27]. Hence the vascularized preputial island flap should be resorted to whenever the prepuce is available. Some literatures reported low complications rate for Duckett urethroplasty; Hollowel et al., 5% [17] and Perovic and Vukadinovic 16% [18]. Other series showed higher rates; Barraza et al., 31% [19], Nuhoglu et al., 31.3% [20] and Mollard et al., 50% [21]. The complication rate in the current study, 28.5%, is still comparable to the latter studies. Still we shall need a larger sample size to give more accurate rates. Some factors were suggested to lower the complication rate; namely, thorough skin cleaning before operation, using electrocautery as little as possible, leaving no ischemic tissue in the field and using fine instruments under suitable magnification. In addition, prophylactic antibiotic has to be offered as long as the catheters are in [20,22].

Urethrocutaneous fistula, as the most common complication in all series and also in ours, can be minimized by: Avoiding tissue ischemia, closing the tube in 2 different layers invaginating the epithelium inward and covering the new urethra and the anastomosis site with adequate tissue before skin closure [2,4,23]. For this, we redrape the prepu-

tial pedicle on the anastomotic site and the penile ventrum to seal the urethral repair as distal as possible.

The use of an indwelling catheter is accused to be a significant source for post operative discomfort and spasm [28,29]. So, we put the catheter as a stent reaching the urethral bulb only. In the mean time, the risk of urinary obstruction is avoided by the application of suprapubic diversion.

In conclusion: The Duckett vascularized preputial island flap is one of the best options to reconstruct proximal hypospadias after control chordee excision. Preservation of the urethral plate during such reconstruction should be tried, to serve as the proximal part of the new urethra after being tubularized (Snodgrass urethroplasty). Having the proximal part of the urethra already formed from the plate, we are allowed to harvest a shorter preputial flap ensuring its reliable vascularity. The use of such combination has proved to be a good option for proximal hypospadias cases. However, longer follow-up is needed to declare if any unwanted sequels may elicit.

REFERENCES

- 1- Horton C.E. Jr. and Horton C.E.: Complication of hypospadias surgery. Clin. Plast. Surg., 15: 371, 1988.
- 2- Duckett J.W.: Hypospadias. In: Walsh P.C., Retik A.B., Vaughan E.D., et al. (Eds.): Campbell's Urology. 7th Ed. Philadelphia, Pa: WB Saunders Co, pp: 2093-2119, 1998.
- 3- Uygur M.C., Erol D. and Germiyanoglu C.: Lessons from 197 Mathieu hypospadias repairs performed at a single institution. Pediatr. Surg. Int., 14: 192, 1998.
- 4- Snodgrass W.: Tubularized incised plate urethroplasty for distal hypospadias. J. Urol., 151: 464, 1994.
- 5- Thiersch C.: On the origin and operative treatment of epispadias. Arch. Heilk., 10: 20, 1869.
- 6- Duplay S.: Sur le traitement chirurgical de l'hypospadias et de l'epispadias. Arch. Gen. Med., 145: 257, 1880.
- 7- Nesbit R.M.: Operation for correction of distal penile ventral curvature with or without hypospadias. J. Urol., 97: 720, 1967.
- 8- Duckett J.W.: Correspondence-hypospadias repairs: The two-stage alternative. Br. J. Urol., 78: 659, 1996.
- 9- Elder J.S., Duckett J.W. and Snyder H.M.: Onlay island flap in the repair of mid and distal penile hypospadias without chordee. J. Urol., 138: 376, 1987.
- 10- Ghali A.M.A.: Hypospadias repair by skin flaps: A comparison of onlay preputial island flaps with either Mathieu's meatal-based or Duckett's tubularized preputial flaps. Br. J. Urol. Int., 83: 1032, 1999.
- 11- Bracka A.: A versatile two-stage hypospadias repair. Br. J. Plast. Surg., 48: 345, 1995.

- 12- Ghali A.M.A., El-Malik E.M.A., Al-Malki T. and Ibrahim A.H.: One-stage hypospadias repair. *Eur. Urol.*, 36: 436, 1999.
- 13- Erol A., Baskin L.S., Li W.Y. and Liu W.H.: Anatomical studies of urethral plate: Why preservation of the urethral plate is important in hypospadias repair. *Br. J. Urol. Int.*, 85: 728, 2000.
- 14- Snodgrass W., Patterson K., Plaire J.C., Grady R. and Mitchell M.E.: Histology of the urethral plate: Implications for hypospadias repair. *J. Urol.*, 164: 988, 2000.
- 15- Lopes J.F., Schned A., Ellsworth P.I. and Cendron M.: Histological analysis of urethral healing after tubularized incised plate urethroplasty. *J. Urol.*, 166: 1014, 2001.
- 16- Bleustein C.B., Esposito M.P., Soslow R.A., Felsen D. and Poppas D.P.: Mechanism of healing following the Snodgrass repair. *J. Urol.*, 165: 277, 2001.
- 17- Hollowell J.G., Keating M.A., Synder H.M. and Duckett J.W.: Preservation of the urethral plate in hypospadias repair: Extended applications and further experience with the Onlay island flap urethroplasty. *J. Urol.*, 143: 98, 1990.
- 18- Perovic S. and Vukadinovic V.: Onlay island flap urethroplasty for severe hypospadias: A variant technique. *J. Urol.*, 151: 711, 1994.
- 19- Barraza M.A., Roth D.R., Terry W.J., Liwne P.M. and Gonzales E.T. Jr.: One stage reconstruction of moderately severe hypospadias. *J. Urol.*, 137: 714, 1987.
- 20- Nuhoglu B., Ayyildiz A., Balci U., Ersoy E., Gurdal M., Germiyanoglu C. and Erol D.: Surgical treatment options in proximal hypospadias: Retrospective analysis of 171 cases at a single institution. *Int. Urol. Nephrol.*, 38: 593, 2006.
- 21- Mollard P. and Castagnola C.: Hypospadias: The release of chordee without dividing the urethral plate and Onlay island flap (92 cases). *J. Urol.*, 152: 1238, 1994.
- 22- Gonzales E.T. and Terry W.J.: Hypospadias and epispadias. *Andrology Butterworths Int. Med.*, 31: 83, 1987.
- 23- Kass E.J. and Bolong D.: Single stage hypospadias reconstruction without fistula. *J. Urol.*, 144: 520, 1990.
- 24- Devine C.J. Jr., and Horton C.E.: A one stage hypospadias repair. *J. Urol.*, 85: 66, 1961.
- 25- Bracka A.: A long-term view of hypospadias. *Br. J. Plast. Surg.*, 42: 251, 1989.
- 26- Redman J.F.: The surgical correction of incomplete scrotal transposition. *J. Urol.*, 129: 565, 1983.
- 27- Chu L.Z., Zheng Y.H. and Sheh X.Y.: One stage urethroplasty for hypospadias using a tube constructed with bladder mucosa: A new procedure. *Urol. Clin. North Am.*, 8: 463, 1981.
- 28- El-Sherbiny M.T.: Tubularized incised plate repair of distal hypospadias in toilet-trained children: Should a stent be left? *Br. J. Urol. Int.*, 92: 1003, 2003.
- 29- Aslan A.R., Yucebas E., Tekin A., Sengor F. and Kogan B.A.: Short-term catheterization after TIP repair in distal hypospadias: Who are the best candidates? *Pediatr. Surg. Int.*, 23: 265, 2007.