Egypt, J. Plast. Reconstr. Surg., Vol. 33, No. 1, January: 119-122, 2009

Further Experience with Urethral Advancement for Anterior Hypospadias Repair

ALAA EL-DIN A.M. EL-MOGHAZY, M.D.*; H.M. HAMMOUDA, M.D.**; Y.S. HASSAN, M.D.***; A.M. ABDELATEEF, M.D.*** and M.A. ELGAMMAL, M.D.**

The Departments of Plastic & Reconstructive Surgery and Burn Unit, El-Minia University Hospital*; Urology, Pediatric Urology Unit** and Plastic Surgery***, Assiut University Hospital.*

ABSTRACT

We report on our further experience with urethral mobilization and advancement as a treatment for anterior hypospadias. From January 2004 to March 2008, 67 children (mean age 5.1 years) of anterior hypospadias without hypoplastic distal urethra or marked curvature, were managed by urethral mobilization and advancement. The dissection began proximally in avascular plane above tunica albuginea covering each corpus cavernosum medially till reaching under the corpus spongiosum up to the meatus. Tension free urethral anastomosis was done. The mobilized urethra was covered by dartos flap. The urethral stent was stayed for 24 hours post-operatively. Mean follow up was 27 months (range 6 to 41). Three folds urethral mobilization was sufficient to achieve tension free urethral anastomosis. Slit-like orthotopic meatus at conical shaped glans of straight penis was achieved in all but 3 subcoronal cases that had mid-glans meatal retraction during our early experience. Post-operative urethral fistula was not recorded in any. Satisfactory urinary stream for parents and child was reported in 52/67 within normal range of flowmetric study in all.

INTRODUCTION

The majority of hypospadiac meatus (65-70%) are anterior, while about 30% are posterior in location **[1]**. Successful hypospadias repair should not only provide a functional penis adequate for sexual intercourse, but also provide the ability to void comfortably with satisfactory cosmesis. Children with anterior hypospadias may not have any functional handicapping. However, cosmetic reconstruction is usually required by both parents and children. Belman, reported on a technique for hypospadias repair which involved wide urethral mobilization and advancement **[2]**. Various experiences have been reported for urethral advancement as a treatment of hypospadias **[3-6]**.

PATIENTS AND METHODS

This multi-institutional study was carried upon at three different centers namely; Plastic & Reconstructive Surgery and Burn Unit, El-Minia University Hospital, Pediatric Urology Unit, Urology Department, and Plastic Surgery Department, Assiut University Hospital, in the period from January 2004 to March 2008. Sixty-seven children were enrolled in this study. Their ages ranged from 2.7 to 12 years with mean age 5.1 years. Cases presented by varying degrees of anterior hypospadias were included in this study. Children with hypoplastic distal urethra, severe curvature and other types than anterior hypospadias (mid-penile & proximal hypospadias) were excluded from this study.

Operative Technique:

A 6/0 traction suture was placed at the tip of the glans penis. A urethral stent was introduced into the urethra. The distance between hypospadiac meatus and tip of the glans was measured and recorded. A circumcising incision 5mm, proximal to coronary sulcus with U shape extension about 10mm proximal to hypospadiac meatus on the ventral aspect, was made. The penile skin was degloved down to the peno-scrotal junction, releasing any dartos tissues that may cause penile curvature. Routine artificial erection test was performed to assess penile orthoplasty.

The dissection began proximally in avascular plane between the corpora cavernosa and corporus spongiosum. Dissection was maintained above tunica albuginea covering each corpus cavernosum medially till reaching beneath the corpus spongiosum up to the hypospadiac meatus. Tension free urethral anastomosis was achieved; otherwise more proximal mobilization was required. The ventral glans was incised deeply at inter-balanitic groove. The 2 glans wings and ventral glanular mucosal flaps were mobilized laterally. The urethral meatus

was anastomosed to the glans with interrupted sutures. Few 6-0 absorbable interrupted fixation sutures were placed through the tunica albuginea of corpus spongiosum to the corpora cavernosa. The dartos fascia of the prepuce was dissected for covering the mobilized urethra. The 2 glans wings were approximated over the urethra in 2 layers with 6-0 absorbable sutures and circumcision was completed. The urethral stent was secured with a glanular retention suture, which was removed 24 hours post-operatively.

All patients were done under general anesthesia plus caudal block for post-operative pain. Potent non-steroidal analgesic was used in immediate post-operative period. All patients received 1st generation cephalosporin antibiotic and anti-inflammatory medication for 7 days.

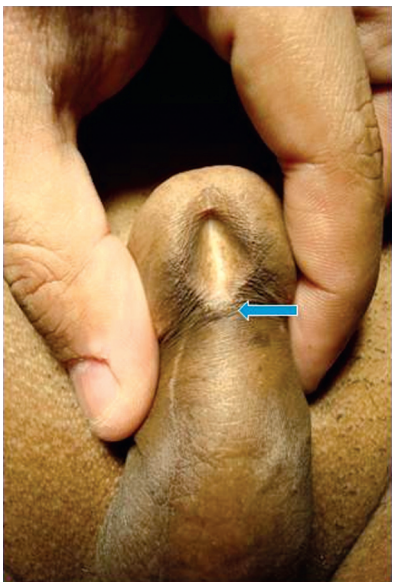

Fig. (1-A): Subcoronal hypospadias (pre-operative).

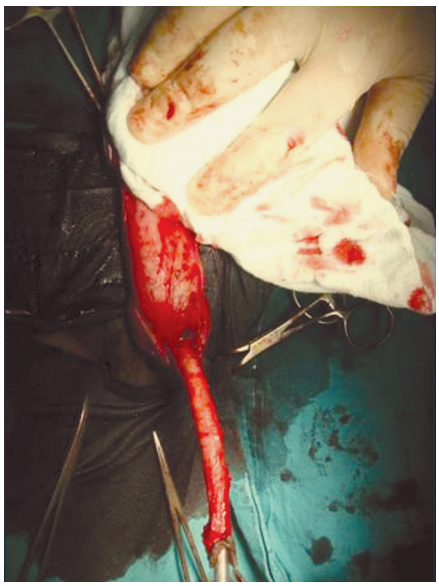

Fig. (1-B): The urethra was completely mobilized.

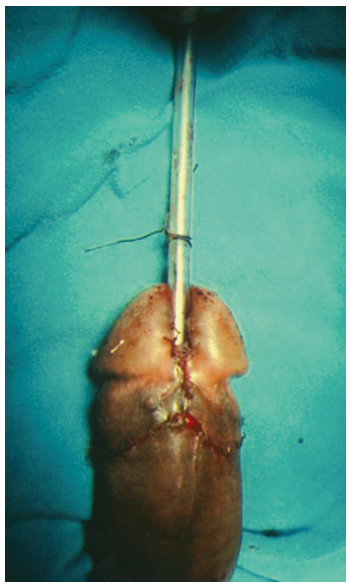

Fig. (1-C): The urethral meatus was anastomosed to the glans and the 2 glans wings were approximated over the urethra. Circumcision was completed.

Fig. (1-D): Removal of dressing 24 hours post-operatively.

Fig. (1-E): Six months post-operative with satisfactory urinary stream.

RESULTS

Sixty-seven children presented by varying degrees of anterior hypospadias (balanitic 17, coronal 32 and sub-coronal 18) were enrolled in this study (Table 1). Their ages ranged from 2.7 to 12 years with mean age 5.1 years. Cases mean follow-up was 27 months (range 6 to 41). Three folds urethral mobilization (the distance between the hypospadiac meatus and tip of glans penis) was sufficient to achieve tension free urethral anastomosis in all cases. The extent of advancement of the urethra ranged from 0.6 to 2.1cm. Slit-like (elliptical) orthotopic meatus at conical shaped glans of straight penis was achieved in all but 3 subcoronal cases that had mid-glans meatal retraction during our early experience. Post-operative urethral fistula was not recorded in any. Satisfactory urinary stream for parents and child was reported in 52/67 within normal range of flow-metric study in all **[7]**.

Table (1): Different clinical presentations of anterior hypospadias.

Presentation	Number	Percentage
Balanitic	17	25.4
Coronal	32	47.8
Sub-coronal	18	26.9

DISCUSSION

Many techniques have been described to correct anterior hypospadias. Despite the satisfactory cosmetic appearance of some techniques using hinged ventral penile skin flap, like Mathieu procedure **[8]** and its modifications, **[9,10]** they have the drawback of precarious blood supply and so, breakdown of this repair must occur occasionally **[11,12]**. Primary drawbacks of original meatal advancement and glanuloplasty (MAGPI) **[11]** are; meatal regression **[13]** and stenosis **[6]**. Tubularization techniques like glans approximation procedure (GAP) **[14]** reported good results in case of deep grooved glans together with adequate breadth of urethral plate. Tubularized incisized plate urethroplasty repair (TIP) **[15]** gained popularity for correction of anterior hypospadias, however, its results depend upon the characters of urethral plate, together with an incidence of disruption, fistula and meatal stenosis **[16]**.

We believe that U-shaped skin incision and proximal urethral mobilization enhances the dissection through normal tissues. According to our knowledge, Hammouda et al., was the first to describe this technique for proximal urethral dissection within its corpus **[17]**. Urethral mobilization should begin proximally, where the urethra is completely surrounded by spongiosum tissue and not distally, where the spongiosum tissues splays away laterally **[18]**. The used technique brings the urethra deeper inside the glans with wide slit-like (elliptical) orthotopic meatus. Three folds urethral length mobilization can provide tension-free urethral anastomosis in case of anterior hypospadias. Atala et al., **[6]** described 4-5 folds urethral mobilization to gain tension free urethral anastomosis. This difference may be due to their inclusion of mid-shaft hypospadias. The extent of advancement of the urethra ranged from 0.6 to 2.1cm, in agreement with other reports where the maximum length for urethral advancement was 1.5 **[19]** and 2.5cm **[20]** respectively.

Post-operative urethral fistula was not recorded in our technique, as there is no anastomosis between the urethra and the neo urethra, which can be a potential site for leakage and fistula formation.

Proper urethral mobilization, deep interbalanitic incision and wide dissection of the glans laterally are essential to avoid complications such as penile curvature, glanular disruption and meatal retraction or stenosis. Three cases in our series had meatal retraction. That was performed in the early phase of our series when we were not dissecting the glans laterally. Fine interrupted sutures between tunica albuginea of corpus spongiosum to that of both corpora cavernosa will contribute to urethral stability.

Hypoplastic urethra, that means closely adherent thin urethra with overlying skin, is not a good candidate for our technique. However, it may need more proximal mobilization with excision of its distal hypoplastic part which may be tried in a coming series. Our cases were limited to non-hypoplastic and the proximal dissection in proper avascular plane will preclude iatrogenic urethral injury, in addition to dartos flap covering that add more vascularity and protection to the mobilized urethra. Flow-metric results are superior to that reported after TIP repair **[16]**.

Conclusion:

Urethral mobilization should begin proximally. Three folds urethral mobilization and deep interbalanitic incision can provide slit-like orthotopic meatus with conical glans and straight penis in cases of anterior hypospadias without hypoplastic distal urethra or marked curvature.

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