Original Article

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Modified Koyanagi Technique in Management of Proximal Hypospadias

Adham Elsaied, Basem Saied, and Mohammed El-Ghazaly

Pediatric Surgery Unit, Mansoura University, Mansoura – Egypt

Background/Purpose: One stage urethroplasty with parameatal foreskin flap (OUPF) applicable to all types of hypospadias was first described by Tomohiko Koyanagi, however high complication rates were reported .The aim of this study is to analyze the results of a modification of the Koyanagi technique as a one-stage repair of proximal hypospadias.

Patients and Methods: During the period of from March 2008 to March 2009, 30 patients underwent treatment of proximal hypospadias using the modified Koyanagi technique. Patient age at the time of surgery ranged from 6 to 24 months. In all cases, the urethral opening was at or just proximal to the penoscrotal junction. Follow up ranged from 3 months to 1 year.

Results: Primary success occurred in 27 cases (90%) with accepted cosmetic appearance. Complications occurred in 3 cases (10%). Urethrocutaneous fistula occurred in 2 cases (6.7%). Meatal recession occurred in 1 case (3.3%). There was no incidence of meatal stenosis, urethral stricture, residual chordee or complete flap necrosis.

Conclusion: The modified technique permits one-stage repair of proximal hypospadias with low complication rates.

Keywords: Hypospadias, Koyanagi, One stage urethroplasty**.**

INTRODUCTION

Hypospadias occurs in approximately 1:300 newborn boys [1]. The current goals of hypospadias surgery are; creating a cosmetically normal penis, positioning of the meatus on the penile tip, normalization of erection and voiding, creating a urethra of adequate and uniform caliber and symmetry in appearance of the glans and shaft [2]. The developmental, psychosocial, anesthetic and surgical factors considered suggest that the period between six and eighteen months is the optimal time for elective hypospadias repair [3]. One stage hypospadias repair has evolved and is now the standard treatment [4]. One stage urethroplasty with parameatal foreskin flap (OUPF) was first described by Tomohiko Koyanagi as a single stage technique that is applicable to all types of proximal hypospadias[5]. The technique appeared to provide an ideal treatment for severe proximal hypospadias, however reported complication rates were high. The technique was modified to improve the blood supply to the neourethral flaps. The modified technique was found to achieve nearly normal phallic cosmetic appearance with a low complication rate [6]. This work aims at evaluating the modified Koyanagi technique as a one-stage repair of

Correspondence to: Adham Elsaied, lecturer of pediatric surgery , Mansoura University Children Hospital, El-Gomhoria St. P.O.: 35516. Phone: +20 123912996. Email: Adhamawe@yahoo.com

proximal hypospadias.

PATIENTS AND METHODS

The present study included 30 patients with proximal hypospadias admitted to Mansoura University Children Hospital during the period of march 2008–march 2009. Patients' age at the time of surgery ranged from 6-24 months (mean 16 months). In all cases, the urethral opening was at or just distal to the penoscrotal junction. None of the patients had previously undergone hypospadias surgery. Human chorionic gonadotrophin was used in 9 patients (10 %) preoperatively. Bifid scrotum was present in 3 cases (10 %) and penoscrotal transposition in 3 cases (10%), both were corrected at the time of surgery.

All patients were subjected to thorough clinical examination, routine laboratory investigations, ultrasonography and intravenous urography. Prophylactic antibiotics were given to all cases intraoperative and continued through the entire hospital stay in the form of antibiotic combination (cefotaxime and ampicillin sulbactam) intravenous injection. All patients had the modified Koyanagi technique performed for the hypospadias anomalies, and were followed up for 3m to 1 yr.

All operations were performed by the authors,using fine instruments and under 3.5X loupe magnification.

The modified technique:

The meatal based yoke was outlined (Fig.1) and the inner incision was made first (Fig.2), this allows the urethral plate to be mobilized sufficiently to excise all of the lateral and ventral tissues that contribute to the chordee (Fig.3). The penis was essentially degloved circumferentially through the inner incision.

The outer incision was made but only through the skin, preserving the underlying lateral vascular supply to the skin flaps (Fig.4).

The well vascularized 7 to 8 mm wide flaps were ventralised (Fig.5) and then glanular cleavage and creation of the glanular wings was performed (Fig.6). The urethra was tubularized using 6/0 Vicryl sutures (Fig.7) and was placed at the glans tip. The circumference of attachment between the meatal skin and glans was made to be wider than the tube itself to decrease incidence of meatal stenosis. The repair was then covered by a tunica vaginalis wrap (Fig.8) which acts as an intervening layer between the two suture lines. Resurfacing the ventral penile shaft, which incorporates a multilayer skin and subcutaneous tissue coverage of the urethra was done without compromising the lateral blood supply of the urethra. A 6 Fr feeding tube was used for diversion of urine and as a stent, and the repair was covered by sterile dressing. The urethral stent was removed 5 days postoperative and the patient was discharged (Fig.9).

RESULTS

This technique was used to treat 30 patients with proximal hypospadias. Follow up ranged from 3 months to 1 year **(mean 8 ± 2 months).** Primary success occurred in 27 cases (90%) with accepted cosmetic appearance and adequate sized glanular meatus. Complications occurred in 3 cases (10%). Urethrocutaneous fistula occurred in 2 cases (6.7%). Meatal recession occurred in 1 case (3.3%). There was no incidence of meatal stenosis, urethral stricture, residual chordae or complete flap necrosis (table 1).

One of the cases with Urethrocutaneous fistula closed spontaneously within three weeks post operatively, the other needed an operation to close the fistula six months later. The case with meatal recession had a subcoronal meatus, however this was actually satisfactory for the parents thus no further intervention was needed.

Table (1): Complications of modified Koyanagi technique:

Complications	Number	Percentage
Urethrocutaneous fistula	2	6.7%
Meatal stenosis	-	-
Meatal recession	1	3.3%
Urethral stricture	-	-
Residual chordee	-	-
Complete flap necrosis	-	-

Fig. 1: Outlining the outer incision

Fig. 2: The inner incision

Fig. 3: Excision of chordee

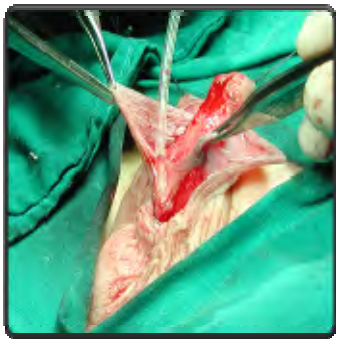

Fig. 4: The outer incision

Fig. 5: Ventralisation of the flap

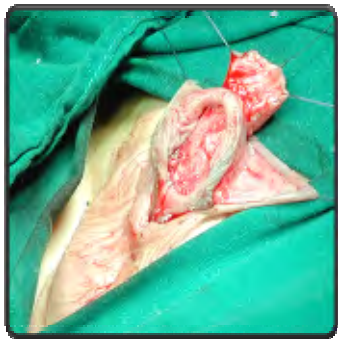

Fig. 6: Creation of glanular wings

Fig. 7: Tubularisation of neourethra

Fig. 8: Tunica wrap

Fig. 9: Early postop. view

DISCUSSION

In the present study, we chose a single stage repair for proximal hypospadias with chrodee preferring it to two stage repairs. We find that even if the patient needs a second operation for remedy of a complication it is better than having a planned two stage operation which may be complemented with a third stage for a complication. This comes in accordance with many authors especially in the past three decades as in Kaplan [7], Duckett [4], Kiss et al.[8] and Venkata & Jayanthi [9].

We performed surgery for hypospadias at an early age ranging from 6 to 24 months with a mean of (16 ±

3 months). However we paid great attention to meticulous dissection and fine surgical technique using fine instruments and optical magnification using a 3.5X optical loupe. This is in agreement with VanderWerff and Wultee [10] and Emir et al [6].

Human chorionic gonadotrophin (80 IU/kg per dose for 3 weekiy doses) was used in only nine cases of our study to enlarge the size of the glans penis. These cases had small sized glans penis regardless of the size of the penis itself, we found it easier to create glanular wings and situating the neourethral meatus at the tip in cases with adequate sized glans.

The modified Koyanagi one stage repair of proximal hypospadias is an innovative technique and fulfills many criteria for predictable successful surgical results. It is highly applicable for severe proximal hypospadias because it ensures enough skin for the neourethra as the distance from the meatus to the dorsal preputial midline is always longer than the distance between meatus and glans tip. In addition, the use of parameatal tissues and adjacent skin flaps reduces the overall degree of tissue mobilization, and eliminates the need for a circumferential anastomosis between the urethra and neourethra.

The modified Koyanagi technique was applied in our study of 30 cases of proximal hypospadias. Primary success occurred in 27 (90%) of our cases showing adequate cosmotic appearance of the penis, glanular meatus of adequate size and normal urinary stream. Our study showed an overall complication rate of 10% (3cases). These results are superior to results of Koyanagi and colleagues who reported complication rates 47%[5]. Glassberg and others reported 50% complication rate [11]. This is attributed to the modifications of the technique which improved the blood supply to the flap and decreased complication rates.

Our results are comparable with Hayashi et al [12]. who reported complication 8% in their series. They used the modified Koyanagi repair for proximal hypospadias. However our results are superior to Emir et al [6] and Elhalaby [13] who reported 20% and 19% complication using the same technique.

Joseph[14] and PiroBioscal et al.[15] used tubularized dorsolateral preputial flap and transverse preputial island onlay flap consecutively for repair of proximal penile hypospadias and reported 7% and 12% complication rates consecutively, which are comparable to our study.

On the other hand, our results come superior to MacGillivary et al. [16] who used Glassberg's modification of Ducketts for repair of proximal penile hypospadias and reported 42% complication rate. Demirbilck et al.[17] reported 90%, 38% and 33% complication rates using double faced tubularized island flap, tubularized island flap and onlay island flap techniques consecutively for repair of proximal penile hypospadias.

All patients were followed up for 3 months to 1 year. They visited our outpatient clinic twice per week for two weeks then weekly for a month then every two weeks for two months then monthly for a year. The postoperative evaluation was mainly clinical, no dilataion was needed in any of the cases, however gentle probing of the meatus was done for the first month to ensure patency.

Our results were found to be exceptional, however this has not been always the case. Four years before, we used the same technique on a number of cases and we had 30% complication rate. The results in this study were far better, we unified the surgeons, we gained more experience and understanding of the modifications of the technique thus preserved adequate blood supply to the neourethra and created a wide meatus preventing meatal stenosis. We operated on all cases using 3.5X loupe which provided suitable magnification and led to better results.

CONCLUSION

The modified Koyanagi one stage repair of proximal hypospadias is an innovative technique and fulfills many criteria for predictable successful surgical results. Great care should be given to meticulous dissection, optical magnification, use of fine sutures and delicate instruments. We also believe that the use of tunica vaginalis wrap as a cover for the urethroplasty improves the results .

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