



Snodgrass (Tubularized Incised Plate) Urethroplasty better then Mathieu's Flip Flap and Onlay Flap for Hypospadias with Intact Urethral Plate?

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Abstract

Introduction: *Hypospadias is a congenital anomaly, for which number of procedures had been described. We compared Mathieu's flip flap, Onlay transverse preputial flap urethroplasties with Tubularized incised plate urethroplasty (TIP) as described by Snodgrass. This had been reported with the better results of meatal cosmesis and lesser complication rates.*

Methods: *These three procedures were done in patients, who had coronal, subcoronal, distal penile hypospadias, mid penile and proximal penile hypospadias in which urethral plate was not removed for the chordee correction. Following points were assessed. Meatal stenosis, Urethrocutaneous Fistula, Penile edema, Glanular dehiscence, Wound dehiscence*

Results: *Total 74 boys with mean age 6.22 years \pm 4.26 were included in this study Mathieu's urethroplasty (n=14), Onlay (n= 23) and Snodgrass TIP urethroplasty (n=37). Meatal stenosis occur in one patient each in Mathieu's and Onlay procedure as compared to Snodgrass TIP (n= 7) out of which 6 patients improved later on, with meatal dilatation. 15 patients developed fistula in TIP repair as compare to total 12 patients in Mathieu's and Onlay procedure. Five patients had dehiscence of glans in Mathieu, and Onlay procedure as compared to Snodgrass procedure in which none of the patients had glans dehiscence and it is statistically significant ($P < 0.05$).*

Overall complication rate came out to be 24.3 % in TIP procedure as compare to 32.4% in Mathieu's and Onlay procedure in combined. It was found that chances of improvement in TIP were higher by 48.33%.

Conclusion: *It is concluded that TIP is as good as Mathieu's and Onlay procedure with slight advantage of its use in reoperative surgery and cosmetic look and high chances of improvement in TIP.*

Keywords: *Mathieu's flip flap; Onlay transverse preputial flap urethroplasty; Tubularized incised plate urethroplasty (TIP).*

Introduction

Hypospadias (Hypo-below, Spades-opening) is a congenital anomaly in which, the urethral meatus is present on the ventral surface of the penis instead of its tip.

A Number of procedures had been done and described for the correction of this anomaly. Mathieu in 1932 introduced meatal based flap raised from penile skin but it was useful only in distal penile and coronal hypospadias.⁽¹⁾

Previously it was thought that bending of penis is because of skin tethering and abnormal corpora cavernosa development, but Smith explained that simply skin degloving straightened the penis.⁽²⁾ Later Duckett insisted on preservation of urethral plate.⁽³⁾ This urethral plate was incorporated in different urethroplasty procedures i.e. Mathieu's flip flap, On lay preputial flap etc. A criticism of these repairs was that they resulted in horizontally oriented and rounded meatus, which was cosmetically less desirable.

Rich *et al* ⁽⁴⁾ described hinging the plate by incising its distal aspect to improve meatal cosmesis. Snodgrass extended this midline incision deeply through the entire urethral plate and realized that it can be tubularized without using additional flap.⁽⁵⁾ The results of above modified techniques were experienced and reported by several centers leading to the idea that longer urethral plates with mid and proximal meatus can be incised and tubularized. This concept is gaining popularity and multi-center experiences are good.

We compared Mathieu's flip flap, Onlay transverse preputial flap urethroplasties with Tubularized incised plate urethroplasty (TIP) as described by Snodgrass. This had been reported with the better results of meatal cosmesis and lesser complication rates.

Methods

This comparative study was done in Paediatric Surgery unit, Government Medical College. All procedures were done in patients who had coronal, subcoronal, distal penile hypospadias, mid penile and proximal penile hypospadias in which urethral plate was not removed for the chordee correction after random allocation of patients. All boys are operated under general anesthesia with endotracheal intubation.

Above three procedures were also tried in previously failed hypospadias as reoperation and comparison was done.

All cases of urethroplasty were dressed postoperatively by non adhesive dressings

(sofratule/Bactigrass) and covered by gauze. Pressure is applied by tight dressing. Later on, penis was compressed over abdomen. Every urethroplasty was done on 6 Fr/7 Fr catheters. In all Mathieu's repairs and Onlay repairs stent was kept for atleast 7-10 days. In urethroplasties done by TIP method, initially catheter was kept for 7 days but gradually we decreased the time of diversion and then for the distal penile variety stent was kept only for 48 hrs and for proximal variety stent was kept for 72 hrs.

Assessment

Results of both Mathieu's and Onlay procedure were compared with results of Snodgrass procedure. Each child was assessed on following points

1. Meatal stenosis
2. Urethrocutaneous Fistula
3. Penile edema
4. Glanular dehiscence
5. Wound dehiscence

For the management of fistula regular dilatation of distal neourethra was helpful in some patients for spontaneous closure. Otherwise closure was done after 6 months of primary repair.

Patients were followed for at least 6 months post operatively for complete assessment.

Observation and Results

Total 74 boys were included in this study after informed consent taken from their parents. Mathieu's urethroplasty was done in 14 and Onlay in 23 patients. 37 patients were operated by Snodgrass TIP urethroplasty with mean age was 6.22 years \pm 4.26 (Table -1)

Immediate postoperative only one patient in Mathieu's and Onlay procedure developed meatal stenosis as compared to Snodgrass TIP, which had 7 patients with meatal stenosis. Six patients improved later on, with meatal dilatation.

Fifteen patients developed fistula that had TIP repair as compare to total 12 patients in Mathieu's and Onlay procedure. (Table-2)

Five patients had dehiscence of glans, which resulted in coronal meatus in Mathieu, and Onlay procedure as compared to Snodgrass procedure in which none of the patients had glans dehiscence and it is statistically significant ($P < 0.05$).

At the end of study overall complication rate came out to be 24.3 % in TIP procedure as compare to 32.4% in Mathieu’s and Onlay procedure in combined After assessing overall complication it was found that chances of improvement in TIP were higher by 48.33% [being the upper limit of

95% confidence interval] with slight disadvantage of only – 9.04%.(Table-3)

Snodgrass (TIP) procedure was started in our institute after learning this method from various sources. Total patients were divided in two groups for assessment of learning curve. First group represent the cases done in initial one year and second group represent the patients operated in second year. It was found that overall fistula rate decreased by 10% although it is not statistically significant. (Table-4)

Table – 1

Procedure	Number of Patients
Mathieu’s flip flap	14
Onlay transverse preputial	23
Snodgrass TIP	37
Total	74

Table 2 Total Postoperative Complications

Complication	Mathieu’s (n = 14)	Onlay (n = 23)	Snodgrass TIP (n = 37)	Z Statistic & P value
Meatal stenosis	-	1	7	Z = 2.33* P < 0.05
Fistula	4	8	15	Z = 1.35 P > 0.05
Penile edema	1	2	0	Z = 1.81 P > 0.05
Glanular dehiscence	2	3	0	Z = 2.40* P < 0.05
Wound dehiscence	-	-	2	Z = 1.45 P > 0.05
Total	7(50%)	14(60.8%)	24(64.8%)	Z = 0.72 P > 0.05

Table 3 Improved patients at the end of the study

Complication	Mathieu’s (n = 7)	Onlay (n = 14)	Snodgrass TIP (n = 24)
Meatal stenosis	0	0	6
Fistula	2	4	7
Penile edema	1	2	0
Glanular dehiscence	0	0	0
Wound dehiscence	0	0	2
Total	3	6	15

Z = 1.34, P > 0.05, 95% CI – UL = 48.33% and LL = -9.04%

Table 4 Learning curve in Snodgrass Repair

Patients operated	1 st year of study (n = 23)	2 nd year of study (n = 14)
Fistula	9 (38.1%)	4 (28.1%)

Discussion

Modern repairs of hypospadias are aiming not only about bringing a functional meatus to tip but also its cosmetic look. When importance of urethral plate was identified and myths about chordee were cleared more and more surgeries were developed that incorporated urethral plate.

Meatal stenosis is not very common complication, usually caused by technical mistakes and if occurs easily managed. Meatal stenosis may be the cause of fistula formation in urethra.

In present study no case of meatal stenosis was found in Mathieu’s flip flap study. Only one patient developed meatal stenosis that had

undergone Onlay flap urethroplasty. 7 patients (18.9%) of TIP urethroplasty developed meatal stenosis. Six patients later on improved by simple meatal dilatation. Therefore overall complication rate was 2.7%.

Ghali⁽⁶⁾ while comparing Mathieu's and Onlay technique he found that none of the case operated by Mathieu's procedure had meatal stenosis. One boy of Onlay repair had meatal stenosis. In a meta-analysis of TIP urethroplasty 3% patient had this problem.⁽⁷⁾ When Mathieu's procedure is compared with TIP, incidence of meatal stenosis is slightly higher in TIP (i.e. 5.6%) as compared to Mathieu's i.e. 2.3%.⁽⁸⁾ In this study results are comparable with these findings. Many studies on TIP urethroplasty claimed about nil complication.^(9,10) Thai experience also mentioned high incidence of meatal stenosis i.e. 22.7% which was simply managed by meatal dilatation.⁽¹¹⁾

Urethrocutaneous Fistula

Fistula is the commonest complication of Hypospadias repair. It may be associated with distal stricture, meatal stenosis. Other factors may be the devitalisation of tissue, in-appropriate covering over neourethra etc.

In the present study it was found that post operative fistula rate was 28.5% (4 out of 14) in Mathieu's procedure, 34.7% in Onlay procedure and 40.5% in TIP urethroplasty procedure. Many patients later on improved and after 1 month total fistula rate decreased to 21.4%, 13%, 21% respectively.

Previous studies of Mathieu's repair as done by Uygur shows 21% incidence of urethrocutaneous fistula.⁽¹²⁾ Guo Y also reported high rate of fistula with Mathieu's i.e. 25.6% as compared to TIP urethroplasty.⁽⁸⁾ Whereas in the present study overall fistula rate is higher as compared to other studies. Fistula rate was found to be 4% in distal variety of hypospadias.⁽⁷⁾ When TIP was used for proximal variety of hypospadias chances of fistula increases. Snodgrass found it as common problem occurred in 21% of boys in proximal variety⁽¹³⁾.

Glanular Dehiscence

It may result from glanuloplasty done under tension or excessive use of electrocautery. 2 patients out of 14 of Mathieu's repair had glans dehiscence and neomeatus came at corona. 3 patients of Onlay repair also had glans dehiscence and similar problem of coronal meatus was there. None of the patients with TIP urethroplasty showed glans dehiscence. It was suggested that long stenting may press neourethra and dehiscence may occur.⁽⁹⁾ Oswald mentioned 1 patient out of 30 in his TIP repair⁽¹⁴⁾ while a multicenter trial mentioned only 2 patients who developed glans dehiscence.⁽¹⁵⁾ Although in our study of 37 patients none of them developed this problem in TIP repair

Wound Dehiscence

This includes dehiscence of covering skin, disruption of neourethra. Devascularization of local tissue flap may lead to wound disruption. Another cause may be infection.

In this study wound dehiscence was found in two patients of TIP urethroplasty, one led to urethrocutaneous fistula and another had only skin disruption. Neither patients of Mathieu's repair nor Onlay repair had wound disruption.

Ghali mentioned 3 out of 216 patients of Mathieu's repair had flap necrosis as compared to the Onlay, which had none in 42 patients⁽¹⁶⁾. In a comparative analysis of Mathieu's and TIP urethroplasty it was found that 8.3% of TIP patients and only 2.3% of Mathieu's patients had wound dehiscence,⁽⁸⁾ while Oswald found only one patient had dehiscence in TIP and none in Mathieu's repair for distal hypospadias⁽¹⁴⁾. It shows that chances of the wound dehiscence are more with TIP urethroplasty as compared to Mathieu's and Onlay procedure.

Total post-operative complications

In the present study total postoperative complications in Mathieu's, Onlay and TIP procedure are 50%, 60.8%, 64.8% respectively. When total complications of Mathieu's and Onlay

are combined and compared with that of Snodgrass, it comes out to be 56.7% and 64.8%. Although complication rates are higher in Snodgrass TIP as compared to Mathieu's and Onlay it is not statistically significant ($P > 0.05$). After improvement of complication when overall results are compared it is found that there are 48.33% chances of improvement in TIP procedure. Oswald while comparing Mathieu's with TIP concluded that TIP is more suitable as its low complication rate, quicker and better cosmetic outcome⁽¹⁶⁾. Soliman and Kiss advised the hinging of urethral plate with Mathieu's repair to decrease the complication rate and good cosmetic results^(17,18).

Conclusion

Tubularized incised plate urethroplasty although having slightly more complications as compared to Mathieu's and Onlay flap urethroplasties, giving good cosmetic results of neomeatus at tip with slit like appearance.

TIP can also be done in failed Mathieu's or Onlay flap but the reverse is not possible. It is concluded that TIP is as good as Mathieu's and Onlay procedure with slight advantage of its use in reoperative surgery and cosmetic look.

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