

Research Article

Outcomes of Snodgrass (TIP) versus Slit Like Adjusted Mathieu (SLAM) in distal penile hypospadias repair in pediatrics

Mohamed K. Rady¹, Mohamed R. Abdalla¹, Mohamed F. Abdelrahman¹, and AbdElhalim Sh. Mohamed¹

¹Pediatric surgery unit, Minia university, Faculty of Medicine - Minia University

Abstract

Background: Hypospadias is the most common anomaly in male genital tract. Both Snodgrass tubularized incised plate (TIP) and Mathieu repair are widely accepted for treatment of distal hypospadias. The study aimed to compare outcomes of TIP versus SLAM for treatment of primary hypospadias in pediatrics. **Methods:** A prospective study was performed including 50 cases with distal primary penile hypospadias undergoing TIP from January 2020 to January 2022, at Minia University Hospital, Egypt. The cases were divided into two groups of equal number. In group I, 25 cases underwent TIP. In group II, 25 cases underwent SLAM. The assessed parameters were postoperative bleeding, edema, infection, fistula formation, meatal stenosis, stricture of the urethra, complete disruption of the repair, and cosmosis. **Results:** There was a significant less operative time in group I (65.64 minutes \pm 8.76 versus 94.46 minutes \pm 7.44, $P < 0.0001$). There were no significant differences in incidence of postoperative bleeding, edema, infection, incidence of urethrocutaneous fistula 8% in both groups, there was significant difference in incidence of meatal stenosis (16% and 0% respectively), $P 0.037$. **Conclusion:** Both TIP and SLAM repair had good outcome and minimal complication rate. Both are safe, reliable and reproducible techniques in distal hypospadias repair.

Keywords: Outcomes, TIP, Hypospadias, pediatrics

Introduction

Hypospadias is the most common male genital tract anomaly with approximately 1 per 300 male newborns^[1].

- Owing to complexity of the condition, more than 200 surgical techniques are described, but none of them is universally accepted. Onestage and twostage procedures are described, where onestage repair is currently preferred^[2].

- The most commonly used onestage procedures are Snodgrass or tubularized incised plate (TIP) and the modified Mathieu procedure (MMP). There is controversy about which one is better as regarding success and complication rates^[3].

In 1928, "Mathieu" described a surgical technique to repair distal penile or anterior hypospadias in a single operation. The results of this technique were first reported in 1932. Since then, and due to the success-ful results achieved, the maneuver has been popularized. Tabularized Incised Plate "Snodgrass" urethroplasty [TIP] first desc-ribed in 1994 by Snodgrass^[4].

The Mathieu technique has withstood the test of time for 80 years. The major drawback of the original Mathieu technique is the final appearance of the meatus (a fish-mouth meatus that is not at the tip of the glans). The technique has become less popular during the past 15 years in favor of the tubularized incised plate (TIP) technique partly because of the

slit-like meatus that could be achieved with the TIP technique. Ahmed T. Hadidi has been performing a modification of the Mathieu technique since 1986. There has been continuous evolution and modifications through the years from Y-V modified Mathieu (1992-2002) and inverted Y-V modified Mathieu (2003-2004) to the slit-like adjusted Mathieu (SLAM) technique, since 2005.

The SLAM technique avoids the drawbacks of the classic Mathieu (a transverse rounded meatus that is not terminal). The aim is to use the optimum operation that consistently produces good functional as well as cosmetic outcome (slit-like meatus) of the penis with a low complication rate^[5,6].

Therefore, the aim of the present study was to compare outcomes of TIP versus SLAM in distal hypospadias repair regarding infection, edema, urethrocutaneous fistula, meatal stenosis and cosmosis.

Subjects and Methods

The study was conducted at Department of Pediatric Surgery. The study included 50 patients suffering from distal hypospadias undergone the first procedure for hypospadias, at the unit of Pediatric Surgery, Minia University Hospital, Egypt, from January 2020 to January

2022. Patients were divided into 2 groups of equal numbers. In group I TIP was performed, and in group II SLAM was used.

The study included patients with distal primary penile hypospadias, 6 months to 18 years old. Cases with recurrent (secondary) hypospadias, age less than 6 months or above 18 years old, or cases with abnormal chromosomal studies or with severe other congenital anomalies were excluded.

All patients admitted to the hospital in the morning of the operation fasting, 3-6 hours prior to surgery according to their ages. They were subjected to general anesthesia. Caudal anesthesia was given to the candidates to decrease the dose of GA, and alleviate post-operative pain.

In group I, cases had undergone TIP. Circumscribing incision was made 2 mm proximal to the meatus, but if necessary, a U-shaped incision is extended proximally to healthy skin. The penis is degloved to the penoscrotal junction. The key step in the operation is a midline relaxing incision made from within the meatus to the distal extent of the plate. This incision extends through the epithelial surface of the plate deeply into underlying connective tissues down to the corpora cavernosa.



Figure (1): Final appearance of TIP

In group II, cases had undergone SLAM:

Under general anaesthesia and caudal block, a 5/0 vicryl traction suture is placed through the tip of the glans. A tourniquet is applied at the base of the penis, and an artificial erection test is performed

1. Careful assessment of the penis is performed

If the native urethral meatus is narrow, it is incised proximally to create a wide spatulated meatus. If the urethra proximal to the meatus was thin and paper-like, it is incised to reach a healthy urethral tissue covered with corpus spongiosum. The degree of glans clefting (grooving) is evaluated. The limits of the final meatus are marked with the aid of an appropriate catheter according to the caliber of the proximal normal urethra and the age of the patient. If the glans is clefted (grooved), the lateral borders of the groove are marked and will constitute the roof of the neourethra. If the glans is flat or small, a narrow strip (5 mm in width) is marked, allowing an adequate width of the glanular wings. A catheter of appropriate size (according to the caliber of the proximal urethra) is introduced into the bladder^[7].

2. Flap design

The boundaries of the urethral plate are outlined. In patients with a globular flat glans, special attention was given to create large glanular wings, and the urethral plate could be outlined as narrow as 3 mm in width. The narrow urethral plate is compensated by a wider flap from the paramental flap proximal to the meatus. At the distal end of the urethral plate, the 2 incisions converge toward each other to allow free mobility of the glanular wings to wrap around the neourethra to produce a slit-like meatus free of sutures. Incision of the flap begins at the coronal sulcus using a scalpel or scissors and continued distally very deep into the glans to create large glanular wings. Proximally, the flap was elevated using sharp scissors taking care to

include dartos fascia and part of the corpus spongiosum with the flap. The redundant epithelial dog ear is removed from the angle of the flap to reduce the chances of fistula formation at this common fistula site^[7]



Figure (2): Perimeatal flap

3. Urethroplasty

The flap is sutured to the tip of the glans, 2 mm from the distal end of the incision in the glans. The idea is to keep the meatal edges free of any sutures and to have a smooth, near-normal meatus. A continuous subcuticular running polyglactin 6/0

suture on a cutting needle was the standard suture for urethroplasty. The subcuticular suture is continued until the distal stitch is reached, and then the surgeon returns back with same suture as a running suture approximating the flap fascia to the depth of the glans and the shaft of the penis

(double breasting). Thus, there will be a single knot for the whole 2 layers. In older children and adults, the author

inserts a third layer with the continuous suturing approximating the wall of the neourethra to the glanular wings ^[7].



Figure (3): Urethroplasty

4. Meatoplasty and glanuloplasty

A small V is excised from the apex of the paramental flap, and the 2 edges of the final meatus are sutured together to the center of the V, creating a slit-like meatus using a single 7/0 polyglactin stitch. No other sutures are needed in the meatus. The glanular wings are closed using interrupted polyglactin 7/0 transverse mattress sutures. The remaining wound is closed using a continuous 7/0 polyglactin mattress stitch ^[7].

All cases were discharged at the next day after surgery. Post-operative instructions are informed well to the parents. Post-

operative medications were given to all patients. Dressing was removed 3 days post operatively at our outpatient clinic. The catheter was removed at the 7th day post-operative. Follow-up was done routinely for all cases weekly at the outpatient clinic for two months, assessment was done and complications were reported.

The assessed postoperative items included: infection, oedema, fistula formation, meatal stenosis, stricture of the urethra, complete disruption of the repair, and postoperative bleeding.



Figure (4): Final appearance

Statistical analysis

The collected data were coded, tabulated, and statistically analyzed using SPSS program (Statistical Package for Social Sciences) software version 19. Descriptive statistics were done for numerical data by mean, standard deviation and minimum & maximum of the range, while they were done for categorical data by number and percentage.

Results

The preoperative demographic and clinical characteristics of the studied patients are shown in table 1. The mean age was 24 months (range: 6-132 months) in group I (TIP) and 29 months (range: 6-156 months) in group II (SLAM). Type of hypospadias was subcoronal hypospadias (64%), coronal (32%), and glandular (4%) in group I while group 2 (SLAM) has (68%) cases of subcoronal and (32%) cases of coronal type.

The associated anomalies included 5 cases undescended testis (4 in group I and 1 in group II), with insignificant differences.

The mean operative time in group I was less than that in group II (65.64 minutes \pm 8.76 versus 94.46 minutes \pm 7.44) with a significant difference.

There was insignificant difference between both groups regarding post-operative outcomes except meatal stenosis (Table 3). Postoperative infection was reported in 1 case (4%) in group I and 1 case (4%) of group II, they were treated using topical and systemic antibiotics, Fistula was reported in 2 cases (8%) in group I and 2 cases (8%) in group 2. All cases of fistula failed to be treated conservatively and needed another operation 6 months after the primary repair, while in group II two cases were treated conservatively and spontaneous closure of the fistula. Complete disruption and urethral Stricture not reported in both groups, meatal stenosis reported in 4 cases in group 1 and no cases in group 2 all went regular dilatation and improved except one case which required meatotomy 6 months after surgery.

Table (1): Preoperative demographic and clinical characteristics of the studied patients

Characteristics	Group I (n=25)	Group II (n=25)	P-value
Age (months):			
Range	6-132	6-156	.884
Median	24 (15-48)	29 (12-48)	
Type of hypospadias:			
Coronal	8 (32%)	8 (32%)	0.11
Subcoronal	16 (64%)	17 (68%)	
Glanular	1 (4%)	0 (0%)	
Associated anomalies:			
Undescended testis	4 (16%)	1 (4%)	0.2

Table (2): Operative time in the studied patients

Operative time (min)	Group I (n=20)	Group II (n=20)	P-value
Range	60-90	90-115	< 0.0001*
Mean \pm SD	65.64 \pm 8.76	94.46 \pm 7.44	

* Significant difference

Table (3): Postoperative complications in the studied patients

Characteristics	Group I (n=25)	Group II (n=25)	P-value
Early postoperative bleeding	0 (0%)	0 (0%)	
Postoperative infection	1 (4%)	1 (4%)	0.9
Oedema	4(16%)	3(12%)	0.6
Meatal stenosis	4(16%)	0(0%)	0.037*
Fistula	2(8%)	2 (8%)	<0.99
Complete disruption	0(0%)	0(0%)	
Urethral Stricture	0 (0%)	0 (0%)	

Discussion

Surgery to repair hypospadias has a history of more than 150 years. There are more than 300 surgical procedures with accompanying variation have been proposed for the repair of hypospadias. Such repair should be simple, easily learned, applicable to most cases, completed in a single stage with good cosmetic result with a low complication rate. Whenever possible, a single-stage repair of hypospadias is desirable^[8].

Both the Mathieu and TIP techniques are widely used in the current popular techniques for distal hypospadias. They were crucial constituents of neourethra formation, with low complication rate, acceptable cosmetic appearance and favorable prognosis.

In the present study, the operative time was calculated from the beginning of the operation once we take the traction suture of the glans until the dressing is applied. The mean operative time was significantly different between both groups as it was 65.64 ± 8.76 minutes in group I (TIP), while in group II (SLAM) it was 94.46 ± 7.44 minutes, with 30 minutes as a mean difference. This difference in operative time might be consumed in Urethroplasty.

In agreement with our findings, Javid et al^[9] operated 30 cases of TIP using Dartos flap with mean operative time: 62 ± 8.72 minutes while he was comparing the results of TIP to onlay island flap in the repair of mid and posterior penile hypospadias. Also, Hamid et al., 2014,^[10] revealed that the mean operative time in

52 cases that did TIP repair was 63.7 ± 14.3 (45-90) minutes, while it was 95.0 ± 19.1 (70–125) minutes in 48 cases which did Mathieu repair.

The incidence of infection in the present study was 4% in group I and 4% in group II. incidence of infection between both groups was statistically insignificant.

In a study by Hamid et al.,^[10] the incidence of wound infection was 19.2% in 52 cases of hypospadias, while in a study by Saleem et al.,^[11] it was 6%.

In the present study, the incidence of urethrocutaneous fistula was 8% in group I, and it was 8% in group II. In a recent study by Ozturun K, 2017^[12] reported that the incidence of urethrocutaneous fistula in cases that did TIP was 14.2% while the incidence of fistula in cases which did Mathieu was 11.4%.

In the present study meatal stenosis was reported in 4 cases 16% in group I versus 0% in group 2 (SLAM), with significant difference. The adhesions between both sides of the incised plate can result in meatal stenosis that may be one of the causes of fistula formation^[13]. Keeping the meatus one stitch short of complete closure reduces the rate of meatal stenosis^[14].

in HoSeong Bae, 2014^[15] meatal stenosis had developed in 24% in cases which did TIP, and not occurred in any cases of Mathieu.

As regarding cosmosis, In the present study, Evaluating the appearance shows a satisfactory overall appearance for both

techniques. In group 1 (TIP) the incidence of cone shaped glans was 25 cases (100%) and slit-like meatus was 22 cases (92%) while in group 2 (SLAM) the incidence of cone shaped glans was 22 cases (88%) and slit-like meatus was 24 cases (96%).

In these studies; Guo 2004^[16], Nezami 2010,^[17] and Hamid 2014^[10], Both Mathieu and TIP techniques showed a satisfactory overall cosmesis superior cosmetic results provided by TIP technology can be attributed to the fact that it creates a vertical slit-like urethral orifice, while Mathieu technology always provides a circular urethral orifice.

Conclusion

In the present study we reported that SLAM repair is associated with lower incidence of meatal stenosis than TIP. On the other hand, SLAM repair consumes a significantly longer time than TIP. Both techniques show satisfactory overall cosmesis.

So, the present study shows that TIP and SLAM repair had a good outcome and minimal complication rate. Both are safe, reliable and reproducible techniques in distal hypospadias repair.

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