

COMPARISON OF MATHIEU VS TUBULARIZED INCISED PLATE (SNODGRASS) TECHNIQUES OF URETHROPLASTY IN DISTAL PENILE HYPOSPADIAS

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ABSTRACT

Background: Hypospadias is a congenital abnormality characterized by opening of external urethral meatus on ventral aspect of the penis with an overall incidence of 1:300. Different treatment modalities have been employed in the treatment of distal penile hypospadias with varying degrees of success and complications. A number of studies have compared Mathieu and Snodgrass Techniques but the existing evidence is doubtful owing to small sample size and great variation in their results. **Objective:** To compare the outcome of Mathieu repair with that of tubularized incised Plate Urethroplasty (Snodgrass) in distal penile hypospadias. **Methodology:** 90 patients meeting the inclusion and exclusion criteria's were selected and divided into two equal groups randomly using lottery method. Group-A was treated by Mathieu technique and Group-B underwent Snodgrass repair. Operative time was noted in minutes from the start of procedure till the end. Patients were followed post-operatively at 15th day, 1 Month and 2 Months and functional recovery and complications were evaluated. **Results:** The age of the patient ranged from 1 to 25 years in both groups with mean age of 6.67±5.74 years in Group-A and 6.65±6.06 years in Group-B (p=0.982). Snodgrass was better in terms of mean operative time (67.37±8.85 minutes versus 87.86±8.22; p=0.00) as compared to Mathieu technique. The functional outcome in terms of meatal location at tip was better in Snodgrass (93.7% versus 80.2%; p=0.003) with a lower fistula rate (5.4% versus 21.6%; p=0.00) as compared to Mathieu technique. **Conclusion:** Tubularized Incised Plate Urethroplasty (Snodgrass) is better than Mathieu technique for the treatment of distal penile hypospadias in terms of operative time, success and complication rate.

Key Words: Hypospadias, Urethroplasty, Mathieu Technique, Snodgrass Technique

INTRODUCTION

Hypospadias is one of the most common genital anomalies in male newborns, mainly comprising of an abnormal ventral opening of the urethral meatus with an abnormal ventral curvature of the penis (chordee) and/or an abnormal distribution of the foreskin, having an incidence of 1:300.¹ The most accepted classification of hypospadias is according to the meatal location after chordee correction. It is anterior in 65-70%, middle in 10-15% and posterior in 20% of the cases.² Hypospadias features a urethral opening proximal to the normal position at the glandular tip. From this meatus, extending distally is the urethral plate which is a strip of epithelium overlying well-vascularized connective tissue.³ Complications of untreated hypospadias include deformity of urinary stream, sexual dysfunction, infertility, meatal stenosis and bad cosmetic appearance.⁴ Different techniques for the repair of distal penile hypospadias such as MAGPI, Mathieu, Horton Denine procedure, Anterior urethral advancement technique, Tubularized incised plate (TIP) urethroplasty and many others, have been described with varying degrees of success.⁵ Mathieu technique (Figure 1) has been used as

repair of choice for a long time, but now widely replaced by TIP urethroplasty (Figure 2) because of better cosmetic results and neo-urethra entirely lined with urothelium.⁶ Mathieu repair is one of the oldest practiced methods used for distal and mid-shaft hypospadias.⁷ A criticism of this repair is that the resultant meatus is horizontally oriented and round, than the normal, vertically oriented, slit like meatus.⁸ TIP urethroplasty has gained widespread acceptance because of its excellent functional and cosmetic results with minimal complications.⁹ Snodgrass described the TIP urethroplasty in 1994, which involves incising the urethral plate vertically, then tubularizing it to form the new urethra.¹⁰ A study done on 33 patients, in Iran showed that the mean operative time for Mathieu repair was 94 +/- 26.06 minutes and for the TIP repair was 106.11 +/- 23.04 minutes.¹¹ A prospective study done on 40 patients, in Cairo, showed that the mean operative time was 82 minutes in the Mathieu group and 63 minutes in the Snodgrass group. Hemorrhage noted in 1 case (5%) in each group. Wound disruption noted in 1 case (5%) in each group. Urethrocutaneous fistula was noted in 4 cases (20%) in Mathieu vs 1 case (5%) in TIP. Meatal stenosis was noted in 6 cases (30%) in Mathieu vs 4 cases (20%) in TIP. Urinary stream was

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forward in both groups. Meatal location was at tip in 17 cases (85%) in Mathieu vs 19 cases (95%) in TIP. Meatal shape was rounded in 70% cases in Mathieu vs vertical in 95% cases in TIP. This study has concluded that TIP urethroplasty takes less time and relatively of low incidence of complications and better functional outcome than Mathieu repair.⁸

Hypospadias surgery is challenging because of the fact that it has wide variations in extent of malformations, presentation and characteristics of local tissue available for reconstruction.¹ In our perspective, where operation lists are crowded, we need to establish a procedure having short operative time and better outcome. This study, will help us to suggest a better technique as a standard in our perspective, so that we can generalize that technique on the basis of our results.

Figure I: Tubularized incised plate Urethroplasty

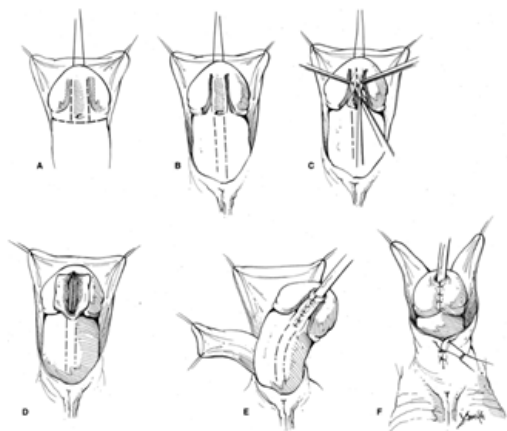
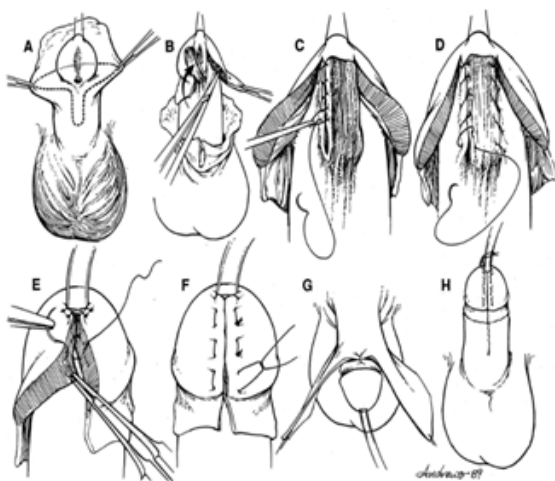


Figure II: Mathieu Hypospadias Repair (flip-flap)



METHODOLOGY

A Randomized Controlled Trial conducted at Department of Urology, Services Hospital Lahore from July 2013 to December 2015. The sample size estimated using 95% confidence level, 5% margin of error, 80% power of test, with an expected incidence of Meatal location at tip in Mathieu group as 85% and in TIP group 95%, is 90, (45 in each group). Patients were selected by randomization through lottery method. Inclusion criteria was all male patients with age range from 1 to 25 yrs and distal hypospadias (Subcoronal, Distal penile) assessed on physical examination, patients with Glanular, Coronal hypospadias on examination, patients having hypospadias with significant Chordae on clinical examination, previous history of hypospadias repair, and Patients with (lab proven) diabetes mellitus were excluded.

A total of 90 patients fulfilling inclusion criteria were selected from outpatient department of urology, services hospital Lahore after approval from ethical committee. Informed consent was obtained. According to sampling technique, the patients were divided in two groups, 45 in each group. Group A: Mathieu urethroplasty and Group B: TIP urethroplasty. All patients were operated by same surgeon. All study patients were followed from the admission time to discharge and then followed up till 02 months for complications in term of urethrocutaneous fistula and functional results in terms of meatal location at tip. All the data was recorded on especially designed Performa.

The collected information was analyzed by SPSS version 10. Mean±standard deviation was calculated for quantitative variables i.e. age and operative time. Frequency and percentage were calculated for qualitative variables i.e. urethrocutaneous fistula and meatal location at tip. Student's 'T' test was applied to compare mean operative time while Chi Square was applied to compare the frequency of complications and functional results. P value equal to or less than 0.05 was considered as significant. Stratification was carried out for age.

RESULTS

90 patients were included in this comparative study which were randomly divided into two groups using lottery method Group-A; was treated by Mathieu and Group-B was treated by TIP.

The age of the patient ranged from minimum of 1 year to a maximum of 25 years in both groups with

mean age of 6.67 ± 5.74 years in group-A and 6.65 ± 6.06 years in Group-B. However there was no significant difference in the two groups in terms of age ($p=0.982$).

Mean Operative time was 87.86 ± 8.22 minutes in group-A and 67.37 ± 8.85 minutes in group-B and the difference was statistically significant ($p=0.000$) (Table I).

Table 1 Mean Operative Time in Both Groups

	Study Group	N	Mean	Std. Deviation	Std. Error Mean
Operative Time	Mathieu Urethroplasty	45	87.86	8.222	.780
	TIP Urethroplasty	45	67.37	8.848	.840

At 15th post-operative day 6 (13.5%) patients in Mathieu group had urethrocutaneous fistula as compared to only 1 (2.2%) in TIP group and the difference was statistically significant ($p=0.003$). Similar statistically significant difference was noted at 1 Month (18% vs. 3.6%; $p=.001$) and 2 Months (21.6% vs. 5.4%; $p=0.000$). (Table II)

At 15th post-operative day, 37 (82.9%) patients in group-A has Meatal location at tip as compared to 43 (95.5%) patients in group-B and the difference was statistically significant ($p=0.002$). Similarly significant difference was noted at 1 month (81.1% vs 94.6%; $p=0.002$) and 2 months (80.2% vs 93.7%; $p=0.003$) between the two groups.

Table II: Urethrocutaneous Fistula at 15 Days

			Urethrocutaneous Fistula-15 Days		Total
			No	Yes	
Study Group	Mathieu Urethroplasty	Count	39	6	45
		% within Study Group	86.6%	13.5%	100.0%
	TIP Urethroplasty	Count	44	1	45
		% within Study Group	97.7%	2.2%	100.0%
Total		Count	83	7	90
		% within Study Group	91.9%	8.1%	100.0%

The observed difference was statistically significant between two groups.

At 15 days P value (0.003)

At 1 month P value (0.001)

At 2 month P value (0.000)

DISCUSSION

Hypospadias is a congenital abnormality in which meatal opening lies on the anterior part of penis instead of the glans apex, because of a flaw in urethral development with an incidence rate of about 1 in 300 male live births.¹ Around 50% to

70% of hypospadias cases are the anterior types.^{1,2} Several surgical techniques have been proposed for repairing anterior hypospadias. Some of these techniques are Snodgrass, Mustard, MAGPI, Mathieu, Arap, Thiersch-Doupley and Barcat, among which Mathieu and Snodgrass are the most frequently used techniques.^{1,2}

The purpose of the current study was to compare outcome among patients undergoing Mathieu versus Snodgrass repair technique. 90 patients were divided into two equal groups randomly using lottery method. The age of the patient in both groups ranged from 1 to 25 years without any significant difference among the two groups ($p=0.982$). The mean operative time in Mathieu group was 87.86 ± 8.22 minutes as compared to 67.37 ± 8.84 minutes in Snodgrass group which meant Snodgrass procedure to be more easy and quick to perform as compared to Mathieu repair. Similar results were achieved by Saleem et al.¹⁵ However, reciprocal results were seen by Anwar et al.¹³ and Ahmed et al.¹⁴ The p value in the current study is highly significant ($p=0.000$), supporting the validity of our results.

Functional recovery was measured in terms of meatal location at tip evaluated at 15th day, 1 month and 2 months post-operatively and the rate was higher in Snodgrass group (95.5%, 94.6%, 93.7% versus 82.9%, 81.1%, 80.2% respectively) as compared to Mathieu group with a p value of 0.002.

Table III: Studies comparing Mathieu with Snodgrass

Author	Year	N(Mathieu/ Snodgrass)	Mean Operative time		Urethrocutaneous Fistula Rate		Meatal Location at Tip	
			Mathieu	Snodgrass	Mathieu	Snodgrass	Mathieu	Snodgrass
Guo et al. ¹²	2004	79 (43/36)	N/A	N/A	25.6	8.3	N/A	N/A
Moradi et al. ¹¹	2005	33 (18/15)	94±26.06	106.11±23.04	5.6	13	94.45	80.02
Anwar et al. ¹³	2006	90 (45/45)	60	80	7.7	3.3	N/A	N/A
Majeed et al. ⁸	2007	40 (20/20)	82	63	20	5	85	95
Akmal et al. ²	2008	60 (30/30)	N/A	N/A	13.2	12.1	83.3	86.6
Castagnetti et al. ⁶	2009	73 (47/36)	N/A	N/A	N/A	N/A	40	73.68
Ahmed et al. ¹⁴	2010	34 (11/23)	98.2±13.1	105.6±15.7	11.8	5.9	47.1	70.6
Saleem et al. ¹⁵	2012	64 (32/32)	90	62	9.38	6.25	N/A	N/A
Current Study	2015	90	87.86±8.22	67.37±8.84	21.6	5.4	80.2	93.7

Our results closely agree with the already available literature as shown in table 3 except Moradi et al. (2005)¹¹ who showed recovery to be better in Mathieu group (94.45% vs. 80.02%; $p>0.05$) as compared to Snodgrass group. However in our study the difference is again statistically significant ($p=0.003$) and seems more valid. Complications among the two groups were compared in terms of urethrocutaneous fistula rate at 15th day, 1 month and 2 months post-operatively. It was found that Snodgrass carried better results with a very low frequency of

fistula (2.7%, 3.6%, 5.4% versus 13.5%, 18%, 21.6% respectively) as compared to Mathieu repair. The results of our study match closely with those of already existing literature except Moradi et al. (2005)¹¹ who showed the frequency of urethrocutaneous fistula to be higher in Snodgrass group (5.6% vs. 13%; $p>0.05$). The results of our study are however supported by significant p value of 0.003.

The hypothesis designed at the beginning of the study is thus well proved and the advantage of Snodgrass over Mathieu Repair is thus confirmed.

CONCLUSION

Tubularized Incised Plate Urethroplasty (Snodgrass) is better than Mathieu technique for the treatment of distal penile hypospadias in terms of operative time, functional outcome and complication rate.

Conflict of interest

The authors have declared no conflict of interest.

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