



Surgery

RANDOMIZED CONTROLLED STUDY COMPARING COMBINED SNODGRASS TUBULARIZED INCISED PLATE (TIP) AND MATHIEU'S MEATAL BASED FLIP FLAP URETHROPLASTY WITH EACH OF THE INDIVIDUAL PROCEDURES FOR DISTAL HYPOSPADIAS

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ABSTRACT

Introduction: Distal hypospadias is addressed currently by two most common procedures namely Snodgrass tubularized incised plate urethroplasty and Mathieu's flip flap urethroplasty. These procedures have their own inherent disadvantages. An attempt is being made if combining these procedures would address these deficiencies.

Aims and objectives: To test if combining Snodgrass TIP and Mathieu's flip flap procedures would reduce specific complications by controlled randomized study.

Materials and methods: A total number of 165 cases of distal hypospadias with 51 in Snodgrass tip and 67 Mathieu's flip flap group and 47 in combination group. Random numbers were given for a total of 500 cases. Urethrocutaneous fistula, Meatal stenosis and total failure/dehiscence were parameters studied. A patient parent satisfaction was conducted in year 2015. Statistical tool used was Extended Mantel Haenszel Chi Square. Software used was epi info version 6.04. Consort 2010 have been followed.

Results: Meatal stenosis was seen in 7.84% with Snodgrass procedure ($p < 0.05$) Urethrocutaneous fistula was seen in 11.76% ($p > 0.05$) There was no total failure with combined procedure unlike with individual procedures ($p < 0.05$)

Conclusion: Combination procedure thus reduces urethrocutaneous fistula, Meatal stenosis and total failure. Urethrocutaneous fistula although p value was not significant, total number seem to be on declined.

Limitations: Larger numbers to be studied and other confounding factors like suture used, age of child, magnification, type of dressing, stenting/ urethral catheter/ drainage need to be included in further studies.

KEYWORDS : Distal hypospadias, Snodgrass tubularized incised plate (TIP) urethroplasty, Mathieu's meatal based flip flap Urethroplasty, combined procedure.

INTRODUCTION:

Distal hypospadias is a common external genital anomaly treated by pediatric surgeons and pediatric urologist. Innumerable procedures documented in literature [1, 2] have only compounded confusion regarding the ideal procedure. Mathieu has proposed meatal based flap in the year 1932. Snodgrass [3] popularize tubularized incised urethral plate urethroplasty. The popularity of Snodgrass reflected in the number of publications in the literature [4]. Both Mathieu's and Snodgrass procedures have their own limitations. Meatal stenosis being the commonest limitation of TIP and urethrocutaneous fistula being the common limitation of Mathieu's procedure.

Authors planned a randomized control study to compare the efficacy of combination procedure and individual Snodgrass TIP and Mathieu's meatal flip flap urethroplasty.

AIMS AND OBJECTIVES:

To analyze if a combination of Snodgrass and Mathieu's would address the limitations of each of the procedures.

Primary end points: Reduce fistula rate in mathieus and meatal stenosis in snodgrass urethroplasty.

MATERIALS AND METHODS:

Trial design was parallel group. Total number of 165 cases of distal hypospadias formed the cohort of this prospective random control study by third party statistician. These patients were divided into three groups (table 1).

Group 1 Snodgrass Tubularized incised plate (TIP) -51 cases
Group 2 Mathieu meatal based flip flap urethroplasty 67 cases
Group 3 Snodgrass-Mathieu's combination urethroplasty - 47 cases

Twenty six of children had prior circumcision. Most of them were 3-5 years of age (table 2).

The study was started in 2007 and is still in progress. Random numbers were selected by anesthetist from the random table for 500 cases on the first day. They were allocated as per that day as 123321123 and so on. Randomization and methodology adopted satisfied the criteria of consort 2010 checklist[5].

Inclusion criteria:

Distal hypospadias: coronal, distal penile hypospadias were included.

Exclusion criteria:

All syndromic hypospadias, redo procedures, glandular hypospadias and intact prepuce mega meatus syndrome were excluded.

The parameters studied included (table 3).

1. Urethrocutaneous fistula
2. Meatal stenosis
3. Total failure/ dehiscence

The surgeries were performed using an optical loop. The details of surgery procedure included (fig1):

Creation planning and mobilization of Mathieu's meatal based flap taking care of length of flap to be equal to distance from meatus to tip of penis and width equal to the urethral plate (fig 1A,B). Degloving of penis (fig 1C). Application of tourniquet. Snodgrass incision of urethral plate stopping short of tip of penis (fig 1C). Raising the lateral glandular wings (fig 1D). Tubularization of incised urethral plate with Mathieu's flip flap (fig 1E). Reinforcement with dartos flap (fig 1F). Approximation of glandular wings (fig 1G). Ventral transposition of prepuceal skin (fig 1H). Feeding tube was used as a stent. 5-0 monocryl was the suture used for all layers in all cases. A rosepetal pressure dressing was used in the post-operative period (fig 1I). Urethral stent was left insitu for atleast 7 days.

Results from other series were collected and compared with present study (table 4).

Statistical method used:

A blinded statistical analyses was performed using statistical tool like Extended Mantel Haenszel Chi Square for linear trend. Software used was Epi info version 6.04.

A patient parent satisfaction survey was conducted in the year 2015 including following parameters

- Site of meatus
- Shape of Meatus
- Shape of glans
- Shape of penis
- Straight urinary stream
- Single urinary stream
- Number of procedures done
- Cost, comfort convenience and overall satisfaction and any other point of dissent dissatisfaction improvement.

This survey was conducted by department of secretary on telephone email post.

Parents were worried about straight urinary stream and not on shape of glans meatus or penis, none of them asked for intact prepuce.

Ethical statement

The study was performed in a manner to confirm with the Helsinki Declaration of 1975, as revised in 2000 and 2008 concerning human and animal rights, and the authors followed policy concerning informed consent as shown in Springer.com.

Results:

Sixty-three coronal hypospadias and 102 distal hypospadias of which 51 of them had Snodgrass TIP Urethroplasty, 67 had Mathieu's meatus based flip flap Urethroplasty and 47 had combination procedure. Twelve children were less than 1year, most of the children were between 3-5 years of age. There were 12 children beyond 10 years of age.

Urethrocutaneous fistula was seen 11.76% in Snodgrass procedure ($p>0.05$). Total failure was also seen in Snodgrass more than Mathieu's and combined procedure ($p<0.05$). There were no total failure in combined procedure. Meatal stenosis was least in Mathieu's and combined procedure ($p<0.05$)

Comparison of various complications with present study and other studies from literature.

Discussion:

Distal Hypospadias is a common visible external genital anomaly seen 1 in 300 births. Although it is visible it is often neglected and referred late. Present study also showed most common age at surgery was between 3-5 years. Number of surgical procedures in literature for distal hypospadias only indicate the never emerging or alluring single most ideal operation or procedure. The two very popular operations are Snodgrass tubularized incised urethral plate urethroplasty and meatal based Mathieu flip flap procedure.

Several studies have shown that there is increased incidence of urethrocutaneous fistula with Mathieu flip flap urethroplasty. Oswald et al [6], Rashid Hamid et al [7], Imammoglu and Bakirtas[8] showed an incidence varying from 3.3 to 12.5 in Mathieu flip flap urethroplasty. Similarly Chatterjee et al [9] Singh et al [10], Tonvichien and Nirmais [11] show 5.5% to 14% of urethrocutaneous fistula with Snodgrass alone. In present study 11.76 % with Snodgrass urethrocutaneous fistula 4.47% with Mathieu flip flap urethroplasty showed urethrocutaneous fistula. Combined Snodgrass and Mathieu had urethrocutaneous fistula in 6.38 % ($p>0.05$). Although the P value was not significant, the numbers clearly shows that there is decreased incidence of urethrocutaneous fistula with combined Mathieu and Snodgrass compared to individual procedure. Similar experience was observed in other studies, Alireza Aminsharifi et al [12], but combined procedure had less number of urethrocutaneous fistula.

Number of reviews have shown that the Snodgrass TIP urethroplasty is becoming popular but most of them showed higher incidence of meatal stenosis with Snodgrass procedure alone. Al Saeid and Gamal et al [13], Singh et al [10], Rashid hamed [7] and Imamoglu and Bakirtas [8] et al showed meatal stenosis with Snodgrass ranging from 1.9% to 6.2%. Meatal stenosis was also seen with Mathieu flip flap

urethroplasty ranging from 1.1% in Chatterjee et al [9] series to 12.5% in Rashid hamed et al [6]. The present studies showed 7.84 % with Snodgrass had meatal stenosis. No meatal stenosis was seen with Mathieu flip flap urethroplasty, 2.12% with combined procedure had meatal stenosis as complication. When the results were compared using Extended Mantel Haenszel Chi square, p value was significant ($p<0.05$). It clearly showed that meatal stenosis decrease with combined procedure compared to single procedure alone. Other series in literature like Alireza Aminsharifi et al [12], although the results does not shows significance but number of cases with post-operative meatal stenosis decrease with combined procedure. Therefore it was concluded that the incidence of both urethrocutaneous fistula and meatal stenosis will be less with combined Mathieu flip flap urethroplasty and Snodgrass TIP urethroplasty.

Literature did not reveal many studies on total failure as complication of hypospadias repair Rashid hamed et al [7] series showed 6.5 % with Mathieu flip flap urethroplasty had complete failure. In present study 3.92% with Snodgrass, 1.49% with Mathieu flip flap urethroplasty had complete failure there was no complete failure with combined procedure in this study. Decreased incidence of failure was observed with combined procedure ($p<0.05$).

Author proposed the following advantages of combining the two procedures. Incision over the urethral plate not extending to the tip was described by Sivaji mane et al [14]. Authors also do not extend the incision over the urethral plate till the tip stopping just short of glans tip. Various anatomical advantages of combining Snodgrass and Mathieu's with less lateral mobilization of glandular flaps effectively reduce the stress at anastomotic line. Mathieu's flip flap helps in tubularizing the incised urethra plate with least tension on suture lines and better preserved vascularization of Mathieu's flap and inner glandular flap. Dartos cover over this Mathieu's flip flap also reduces the incidents of urethrocutaneous fistula. The combination leaves the fistula prone site covered well all around with vascularize tissue, Mathieu's flip flap ventrally, Snodgrass dorsally. Combination procedure also produces less edema and less wound failure rate. And authors did not have any case of total failure.

Prepuceal reconstruction was advised by Sivaji mane [14] and was not tried in this series. The parent satisfaction questionnaire responded by more than 98%. None of the parents seem to be bothered about shape of glans or meatus or intactness of prepuce glandular shape is well maintained in combination procedure. Parents were worried about straight urinary stream and not on about slit or oval external urethral meatus. None of them asked for intact prepuce. Authors would like to conclude combining Snodgrass and Mathieu's seems to reduce the limitation of either of the procedures. The present randomize work is going on till the series of 500 are completed. Author would add prepuceoplasty and normal intact looking prepuce after urethroplasty into parents satisfaction questionnaire.

Limitations: the age, type of suture, use of magnifying loops type of skin cover, type of dartos or tunica vaginalis flap, urethral stent and type of dressing have not been included as confounding factors. Authors would like to include all this parameters in fourth coming analysis.

Conclusion: combining Snodgrass TIP and Mathieu's flip flap urethroplasty statistically reduces the incidents of total failures and meatal stenosis. Urethrocutaneous fistula also was addressed with combining Mathieu's and Snodgrass.

Abbreviation:

Snodgrass TIP Urethroplasty: Snodgrass Tubularized Incised Urethral Plate Urethroplasty.

Table 1: Distribution of patients in groups as per the technique used

Group	Procedures	Coronal	Distal	Total
Group I	Snodgrass	21 12.72%	30 18.18%	51 30.9%
Group II	Mathieu flip flap	22 13.33%	45 27.27%	67 40.6%
Group III	Combination	20 12.12%	27 16.36%	47 24.48%
Total		63 38.18%	102 61.8%	165 100%

Table 2: Age wise distribution of patients

Age	Coronal			Distal		
	I	II	III	I	II	III
<1 yr	2 1.2%	0 0%	0 0%	3 1.8%	4 2.4%	3 1.8%
1yr-3yrs	4 2.4%	4 2.4%	4 2.4%	6 3.6%	15 9.09%	10 6.06%
3yrs-5yrs	8 4.8%	8 4.8%	8 4.8%	11 6.6%	24 14.5%	8 4.8%
5yrs-10yrs	5 3.03%	8 4.8%	7 4.2%	8 4.8%	1 0.6%	2 1.2%
>10yrs	2 1.2%	2 1.2%	1 0.6%	2 1.2%	1 0.6%	4 2.4%
Total	21 12.72%	22 13.3%	20 12.12%	30 18.18%	45 27.27%	27 16.36%

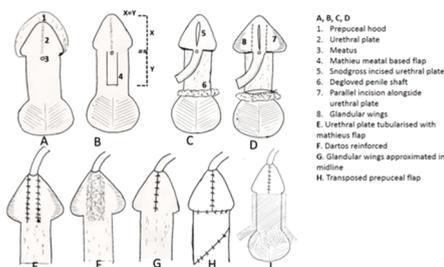
Table 3: Incidence of complications in different groups

Parameters	Group I	Group II	Group III	Extended Mantel Haenszel chi square	P value
Urethrocutaneous fistula	6 (11.76%)	3 (4.47%)	3 (6.38%)	2.47	0.1159
Meatal stenosis	4 (7.84%)	0 (0%)	1 (2.12%)	6.01	0.01425
Failure (total dehiscence)	2 (3.92%)	1 (1.49%)	0 (0%)	5.5	0.0194

Table 4: Comparison of various complications with present study

Complication	Study	Snodgrass	Mathieu's	Combination procedure
Urethrocutaneous fistula	Present study	11.76%	4.47%	6.38%
	Tonvichien & Niramis	14%	Not mentioned	
	Singh et al	11.5%	Not mentioned	
	Chatterjee	5.5%	5.5%	
	Oswald et al	0%	3.3%	
	Raashid Hamid et al	Not mentioned	12.5%	
	Imamoglu and Bakirtas	Not mentioned	4.7%	
Meatal stenosis	Present study	Not mentioned	0%	1%
	Al-Saied & Gamal	6.2%	Not mentioned	
	Singh et al	1.9%	Not mentioned	
	Raashid Hamid et al	5.76%	12.5%	
	Imamoglu & Bakirtas	5.3%	7.4%	
	Chatterjee	Not mentioned	1.1%	
Total failure	Present study	3.92%	1.49%	0%
	Kashmir series	0	6.5	

Fig 1: Steps of Combined Snodgrass and Mathieu's Urethroplasty



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