

# Comparison of Snodgrass and Mathieu Surgical Techniques in Anterior Distal Shaft Hypospadias Repair

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## ABSTRACT

**Purpose:** To compare the outcomes of Mathieu and Snodgrass techniques in the repair of anterior distal shaft hypospadias.

**Materials and Methods:** From 2001 to 2003, 33 patients with the mean age of  $7.06 \pm 3.44$  (range 2 to 12) years suffering from anterior distal shaft hypospadias, were assessed. Inclusion criteria were anterior distal shaft hypospadias, and exclusion criteria were association with chordee, circumcision, and surgical repair history. Fifteen patients underwent surgical repair using Snodgrass technique and 18 patients, using Mathieu technique. Surgeries were performed by one single surgeon, acquainted with both techniques. Patients were examined 1 week, 1 month, and 6 months after discharge. Data including duration of the surgery, stenting time, duration of hospitalization, and any kind of complications such as break down, meatal stenosis, and fistula formation were collected. Also, success rate was calculated for every single patient and accordingly, the two groups were compared.

**Results:** Mean operative time, stenting duration, and hospital stay were  $94 \pm 26.06$  minutes,  $5.06 \pm 1.31$  days, and  $3.93 \pm 1.86$  days in Mathieu group and  $106.11 \pm 23.04$  minutes,  $5.11 \pm 1.56$  days, and  $4.55 \pm 1.29$  days in Snodgrass group, respectively ( $P > 0.05$ ). The rate of break down, meatal stenosis, and fistula formation were 0%, 0%, and 5.55% in Mathieu group and 0%, 6.66%, and 13.32% in Snodgrass group, respectively ( $P > 0.05$ ). Success rate was 80.02% in Snodgrass group and 94.45% in Mathieu group ( $P > 0.05$ ).

**Conclusion:** In spite of some reports about preference for Snodgrass technique, we concluded that these techniques are as acceptable and as effective as each other for hypospadias repairing, regardless of cosmetic outcomes; however, we need further studies and larger sample sizes to determine which is the superior technique.

**KEY WORDS:** hypospadias, Snodgrass technique, Mathieu technique, urethroplasty

## Introduction

Hypospadias is a congenital abnormality caused by incomplete development of urinary meatus, in which the meatus is opened on the ventral side of penis instead of apex of glans. Its incidence rate is reported to be about 1 in 300 male live births.<sup>(1)</sup> Hypospadias is divided into three types

of posterior, middle, and anterior, regarding the position of meatus. In anterior type, meatal orifice opens either on distal penile shaft, on corona, or under the glans.<sup>(2)</sup>

Anterior hypospadias is the most common form and several surgical methods have been suggested for its repairing, among which Mathieu and Snodgrass are the most common techniques.<sup>(1,2)</sup> Snodgrass technique has been more welcomed by urological circles in recent years.

Regarding the high incidence of this anomaly and need for choosing appropriate treatment, the

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results and postoperative complications of Mathieu and Snodgrass techniques in patients with anterior distal shaft hypospadias were compared in this study.

### Materials and Methods

In a randomized clinical trial from 2001 to 2003, 33 boys with the mean age of  $7.06 \pm 3.44$  (range 2 to 12) years with anterior hypospadias, were assigned into two groups to undergo either Snodgrass or Mathieu surgical repair. Inclusion criteria were anterior and distal shaft hypospadias and age of 12 years or less, and exclusion criteria were association with chordee, history of circumcision, and surgical repair history.

On a random basis, 18 patients underwent surgical repair using Mathieu technique and 15 patients using Snodgrass technique. All surgeries were performed by one single surgeon who was experienced enough to do both surgeries. Surgical instruments, suture materials (6-0 Vicryl) and urinary diversion (Nelaton 6 F to 8 F) were the same for all patients. The protective pedicle layer from dartos muscle covered the suture line in all patients and cautery would not be used, unless it was necessary. All of the patients were examined 1 week, 1 month, and 6 months after discharge. Data including duration of the surgery, stenting time, duration of hospitalization, and any kind of complications such as break down, meatal stenosis, and fistula formation were collected. Also, success rate was calculated for every single patient.

The information related to operation along with findings in follow-ups were recorded in forms and they were compared between the two groups. Data were analyzed using SPSS software. Mann-Whitney and *t* tests were used for quantitative data comparison and Fisher's exact test for comparison of qualitative data.

### Results

Mean operative time was  $94 \pm 26.06$  minutes and  $106.11 \pm 23.04$  minutes in Mathieu and Snodgrass groups, respectively. Mean stenting duration was  $5.06 \pm 1.31$  days and  $5.11 \pm 1.56$  days in Mathieu and Snodgrass groups, respectively. Hospital stay was  $3.93 \pm 1.86$  days in Mathieu group and  $4.55 \pm 1.29$  days in Snodgrass group. Statistical analysis showed no differences between the two groups.

Complication rates were as follows: break down was seen in none of the patients, meatal stenosis occurred in 0 (0%) and 1 (6.66%) cases in Mathieu and Snodgrass groups, respectively, and fistula formation was seen in 1 (5.55%) patient in Mathieu group and 2 (13.32%) patients in Snodgrass group, respectively ( $P > 0.05$ ). Success rate was 80.02% in Snodgrass group and 94.45% in Mathieu group ( $P > 0.05$ ) (table 1).

### Discussion

Hypospadias is a congenital anomaly in which meatal orifice opens to anterior part of penis instead of the glans apex, because of a defect in urethral development. Its incidence rate is about 1 in 300 male live births.<sup>(1)</sup> About 50% to 70% of hypospadias cases are the anterior types.<sup>(1,2)</sup>

Several surgical techniques have been advocated for repairing anterior hypospadias. Some of these techniques are MAGPI, Mathieu, Arap, Snodgrass, Mustard, and Barcat, among which Mathieu and Snodgrass are the most commonly used techniques.<sup>(1,2)</sup>

In a study by Hakim et al, Mathieu technique results with and without urethral stenting were compared in 336 cases of anterior hypospadias. No significant difference was seen in fistula formation (2.63% vs. 2.7%) and total surgical complications rate (2.63% vs. 3.6%) between these two groups. They concluded that hypospadias repairing success rate using Mathieu technique, does not depend on stenting.<sup>(3)</sup> Retik and colleagues used dartos muscle flap to cover neourethra in 204 patients who were operated on

**TABLE 1.** Comparison of the patients' characteristics and the outcomes of surgical techniques

	Snodgrass	Mathieu	P values
Number of patients	15	18	-
Mean age (years)	$6.88 \pm 2.16$	$7.26 \pm 3.01$	0.75
Mean operative time (minutes)	$106.11 \pm 23.04$	$94 \pm 26.06$	0.16
Mean hospital stay (days)	$4.55 \pm 1.29$	$3.93 \pm 1.86$	0.13
Mean stenting duration (days)	$5.11 \pm 1.56$	$5.06 \pm 1.31$	0.72
Break down (%)	0	0	-
Meatal stricture (%)	6.66	0	0.28
Fistula (%)	13.32	5.55	0.45
Success rate (%)	80.02	94.45	0.20

by Mathieu technique. Using this method, no fistula formation was seen and success rate was 98%.<sup>(4)</sup> In Sariyuce and coworkers' study on 52 patients who were operated on using modified Mathieu technique, they used delicate instruments and surgical materials and a 2.5-fold magnification. Complication rate was 5.8% (3 patients) and fistula formation rate was 1.9% (1 patient). Hence, they concluded that anterior hypospadias repairing, using Mathieu technique and delicate instruments, is completely successful.<sup>(5)</sup>

Uygur and colleagues repaired hypospadias in 197 patients using Mathieu technique in a period of 15 years and evaluated factors resulting in undesirable consequences. Previous surgical history, presence of chordee or torsion, circumcision, flap length, suture material type, and suturing technique were analyzed as prognostic factors. They divided the 15-year period into three 5-year periods and success rate was compared among these three groups. Flap length (less than 20 mm or more), suture material (monofilament or multifilament), suture material size (6-0 or 5-0) were recognized as the most effective factors on surgical success ( $P < 0.05$ ). Fistula formation rate was 52%, 28%, and 11% in these three periods, respectively ( $P < 0.01$ ). However, in multivariate analysis, only time period difference was significant. Consequently, this study suggests that surgeon's experience is a very important factor in success rate of hypospadias repairing, and they recommend to the surgeons not to change their technique unless they are familiar enough with another technique.<sup>(6)</sup>

Holland et al performed a study on 59 patients with a mean age of 13 months, using Snodgrass technique, and followed them for 9 months. Glandular meatus, conic form of glans, steady urinary outflow, fistula, and meatal stenosis were reported in 97%, 98%, 89%, 10%, and 5% of cases, respectively. Appearance and functional results were reported to be acceptable.<sup>(7)</sup>

Decter et al performed a study on 197 patients and reported that fistula was seen in 6.4% of patients for whom adjacent tissue had been used to cover urethroplasty, and it was seen in 0.8% of those for whom pediculated tissue had been used. They concluded that in case of using Snodgrass technique, fistula formation is very rare if we use vascularized pedicle to cover neourethra, and Snodgrass method is the best technique for

hypospadias repairing.<sup>(8)</sup>

In a study by Gurdal et al, they analyzed long-term functional and cosmetic results of Snodgrass technique in anterior and mid-penile hypospadias repairing in 70 patients. Mean follow-up period was 3.1 years and uroflometry was performed in all patients. All of the patients had a normal appearance of penis after operation and proportional meatal stenosis was seen in just 1 patient in whom meatomy was done. They concluded that Snodgrass is a successful technique with acceptable cosmetic results.<sup>(9)</sup>

In some studies, these two techniques were compared with each other. For example, in the study by Imamoglu et al, 56 patients were operated on using Snodgrass technique (32 patients experienced primary repairing and 24 experienced secondary repairing) and 54 patients were operated on using Mathieu technique (33 primary repairing and 21 as secondary repairing). They were followed for 24 months. These two groups had no significant difference demographically. Meatal stenosis, fistula formation, wound dehiscence, and flap necrosis were reported in 2, 4, 2, and 2 patients with Mathieu method, and 5, 4, 3, and 0 patients with Snodgrass method, respectively. Wound dehiscence and flap necrosis were the rarest complications and meatal stricture was the most common complication in patients who were operated on using Snodgrass technique and a significant statistical difference was seen. No significant difference was seen between these two groups in fistula formation rate. Mean hospitalization period, stent removing time, and catheterization time were significantly lower in patients who had been operated on using Mathieu technique. Success rate was reported the same (78.6% in Snodgrass and 77.8% in Mathieu), but cosmetic appearance was obviously better in Snodgrass technique. They concluded that if the urethral plate is intact, Snodgrass technique will be preferable and if not, Mathieu technique will be much better.<sup>(10)</sup>

In the study by Oswald J et al, these two techniques were compared regarding fistula formation, appearance, and duration of surgery in patients with anterior hypospadias. Sixty children were divided into two groups of 30 patients. Operative time was much shorter in Snodgrass technique (75 minutes vs. 110 minutes) ( $P < 0.05$ ). Three patients experienced complications in Mathieu technique group

(2 cases of fistulas and 1 meatal stenosis); whereas, only one patient experienced glandular dehiscence in Snodgrass technique group. In all patients who had been operated on using Snodgrass technique, meatal appearance was slit like; whereas, in patients who had been operated on using Mathieu technique, meatus was rounded and horizontal. They concluded that Snodgrass technique is accompanied by better results and more natural meatal appearance.<sup>(11)</sup>

As it was shown in the above studies, the success of hypospadias repairing operation depends on flap circulation, type and quality of suture, instruments used, neourethral protecting cover, and the surgeons' experience, and both methods have had acceptable results. General agreement about glans appearance is in favor of Snodgrass technique. In our study, regarding the surgeon's enough experience in both techniques, using delicate instruments and sutures (6-0 Vicryl), not using cautery in order to avoid circulation defect, and hypospadias repairing basics consideration, no significant difference between these two groups was observed; however, there were two suture lines in Mathieu technique. In our study, duration of surgery was a little more than that in other studies, which is maybe because of not using cautery during the operation. In the present study, penile appearance was not considered as a parameter, and as a result it was not compared between the two groups.

### Conclusion

In spite of some reports about Snodgrass preference, we concluded that these techniques are as acceptable and as effective as each other for hypospadias repairing, regardless of cosmetic results; however, we need further studies and larger sample sizes to determine which is the superior technique.

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### Editorial Comment

Accomplished urologists, who perform hypospadias repair frequently, decide on the technique they use in each case, according to their experience with different surgical methods and also to the anatomical condition and associating factors in each case. For instance, the type of urethral plate or its dept and width, especially on glans site is decisive; in cases with shorter width, Snodgrass technique is more helpful.

Eventually, regarding the prevalence of hypospadias, a larger sample is needed to justify the success of this surgical repair method.

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