

COMPARATIVE STUDY OF MATHIEU AND SNODGRASS REPAIR FOR ANTERIOR HYPOSPADIAS

Anwar-ul-Haq, Nadeem Akhter, Nilofer, Samiullah*, Javeria

Department of Pediatric Surgery, The Children Hospital, Pakistan Institute of Medical Sciences, Islamabad, *Aga Khan University Hospital (student), Karachi

Background: This study was carried out to compare the operative time and rate of complications of Mathieu and Snodgrass procedures for the repair of primary anterior hypospadias. **Methods:** This study was carried out in the Department of Pediatric Surgery, The Children hospital, Pakistan Institute of Medical Sciences Islamabad, from March 2003 to Feb 2005. We managed 90 patients with primary anterior hypospadias. Children between 2 years to 12 years were included in the study. Those who had previous repair were excluded from the study. Only those patients were selected who never had their hypospadias repaired. Those with significant chordee were also excluded from the study. Patients were divided into two groups. Group I had Mathieu repair and Group II had Tubularized Incised Plate (TIP) urethroplasty (Snodgrass procedure). Stent was kept patent by frequent irrigation. Operative time was calculated for both the procedures separately. Patients were followed for subsequent complications. **Results:** A total of 90 cases were studied. Mathieu repair was performed in 45 patients and tubularized incised plate (TIP) urethroplasty (Snodgrass procedure) in the rest of 45 patients. Cosmetic results were excellent with Snodgrass repair with a normal looking slit like meatus. Meatal stenosis and wound breakdown was equal in each group whereas urocutaneous fistula and proximal urethral stricture were seen more frequently in Mathieu group.

Keywords: Anterior hypospadias, Mathieu repair, Tubularized Incised Plate urethroplasty (TIP), Snodgrass procedure

INTRODUCTION

Hypospadias is a congenital defect due to incomplete tubularisation of the urethral plate leading to abnormal location of the meatus any where along the ventral aspect of penile shaft and down on to the perineum. In the majority (over 80%) of cases the meatus is located distal to the midshaft.

The aim of surgery in hypospadias is to achieve a functional penis with a normal cosmetic appearance. The commonest repairs to correct distal hypospadias are the Thiersch-Duplay,¹ Mathieu,² Mustarde, meatal advancement and glanuloplasty (MAGPI) and tubularized incised plate (TIP) urethroplasty.^{3,4} Of these procedures Mathieu and TIP urethroplasty (Snodgrass repair) have been widely practiced. Snodgrass being now the preferred method since it creates a vertical slit-like normal appearing meatus, unlike a horizontally oriented and rounded meatus ('Fish mouth') produced by the meatal based (Mathieu) flap repair. This procedure allows construction of neourethra from the existing urethral plate without additional skin flaps. The technique is versatile and suitable for almost all distal lesions.⁵ Both Mathieu and Snodgrass make use of the urethral plate which makes the appearance to near natural.⁶

We are presenting our comparative study of both these procedures and compare the operative time and rate of complications.

MATERIAL AND METHODS

A total of 90 patients were studied. Mathieu repair was done in 45 patients and Snodgrass repair was performed in 45 patients. All patients were operated under general anesthesia with adjunctive caudal or a penile block and under optical magnification. A tourniquet was applied to maintain a bloodless field. A straight penis was confirmed by performing an artificial erection.

For Mathieu flip flap repair a paramental based flap was raised with its intact blood supply and anastomosed with the urethral plate after mobilizing the latter with two parallel incisions. Repair performed in three layers over a stent. Polyglycolic acid interrupted sutures were used for repair, keeping the knots inside the urethral lumen.⁷

For Snodgrass repair, a U-shaped incision was made extending along the edges of the urethral plate to healthy skin 2 mm proximal to the meatus. Flaps mobilized for a tension free repair. The urethral plate was then incised in midline from the hypospadiac meatus distally. Incised plate was then tubularised over a 6 Fr or 7 Fr stent using interrupted polyglycolic acid (vicryl no. 7/0) sutures. Neourethra was then covered with a vascularized dartos flap harvested from subcutaneous tissue of dorsal prepuccial skin.

All patients were maintained on antibiotic prophylaxis. Stent was removed after 7 days. Patients were followed for 6 months to one year.

Operative time was calculated for each repair. Patients were followed for complications. In both the procedures polyglycolic acid (vicryl) 7/0 was used for tubularisation, 6/0 used for the subsequent layers. Repair was performed over a stent (feeding tube Fr. 6 or 7). Circumcision was performed in all those patients who were uncircumcised and the fascia of the dorsal hood used to cover the neourethra.

RESULTS

A total of 90 cases were studied. Group I (n=45) underwent Mathieu repair and Group II (n=45) had Snodgrass repair.

Age ranged between 2 years to 12 years with the mean of 5 years. Majority of patients were within 4 to 6 years range. Coronal hypospadias was present in 50 (55.5%) and distal penile in 40 (44.4%) patients. 15 (16.6%) patients were already circumcised. Mathieu repair was performed in 45 (50%) patients and tubularized incised plate (TIP) urethroplasty (Snodgrass procedure) in the rest of 45 (50%) patients.

Urethral plate was healthy in all patients. Presurgical hormonal treatment was not given to any of our patients. Operative time ranged from 40 to 80 minutes (mean=60 minutes) for Mathieu group and 45 to 110 minutes (mean =80 minutes). Hospital stay was 48 hours to 5 days (mean=3days) for Mathieu repair and 48 hours to 4 days (mean 2.5 days) for Snodgrass repair.

Table-1: Complications in the two groups

Complications	Group I: Mathieu (n=45)	Group II: Snodgrass (n=45)
Wound breakdown	1 (1.1%)	1 (1.1%)
Fistula	7 (7.7%)	3 (3.3%)
Meatal Stenosis	5 (5.5%)	5 (5.5%)
Stricture	3 (3.3%)	2 (2.2%)

Wound breakdown was seen in 1.1% (n=1) in each group and urocuteaneous fistula in 7.7% (n=7) in Mathieu group and 3.3% (n=3) in Snodgrass group. This was later on repaired by a local rotational flap. Meatal stenosis was seen in 5.5% (n=5) in each group which was subsequently treated with meatal dilatation and meatotomy. Proximal urethral stricture was seen in 3.3% (n=3) in Mathieu group and 2.2% (n=2) in Snodgrass group. Stream abnormality was seen only in those having meatal stenosis which improved with meatal dilatation or meatotomy. Wound dehiscence was equal in both the procedures i.e.1.1% (n=1) each. Cosmetic results were excellent with Snodgrass repair with a normal looking slit like meatus.

DISCUSSION

Hypospadias is a common clinical problem with an incidence of 0.8-8.2 per 1000 live male births.⁸

In the majority of cases abnormal meatus is situated in the glanular, coronal or in the distal part of the shaft. The goal of repair is a functionally and cosmetically normal penis. More than 200 methods of repair have been introduced throughout the 125 years history of hypospadias repair. Earlier most of the distal lesions were repaired with meatal-based flip flap procedure (Mathieu repair). Although this repair produced a glanular meatus, the opening was often rounded, in contrast to the slit like appearance of a normal meatus.

This technique was first described by Mathieu in 1932 for distal hypospadias using a meatal based flap.⁹ Then in 1981 Wacksman reported his initial experience with this technique.¹² Subsequently in 1987, Rabinowitz described catheterless repair using the Mathieu repair.¹⁰ Although 1 and 2-layer neourethral anastomoses have demonstrated satisfactory results, the two layer technique has produced lower complication rates.¹¹

Careful preservation of the vasculature of the flap and avoidance of overlapping suture lines produce a watertight closure with minimal risk of postoperative fistula formation.

Mathieu repair also provides good functional results but cosmesis is more preserved in Snodgrass repair. Minimal complication rate has been reported even with stentless repair.¹¹ Even now, Mathieu procedure is considered as the standard by some surgeons, for distal hypospadias.^{2,11,12} Rich et al incised the urethral plate in the midline to improve cosmesis of a hypospadias repair in 1989.¹³ Later, in 1994, Snodgrass advanced this concept by extending the incision of the urethral plate from the meatus to the tip of the glans.⁴

This maneuver allowed construction of a new urethra from the existing urethral plate. It was suggested that healing may occur through re-epithelialization of the relaxing incision without obvious scarring, allowing the incised edges to remain separated.¹⁴

Today TIP urethroplasty has become a preferred method for repairing distal hypospadias because of its versatility, to correct different meatal variants, the simplicity of the operative technique, low complication rate and reliable creation of a normal appearing glanular meatus.¹⁵ Severe chordee and unhealthy urethral plate are the two limiting factors for this procedure. Fistula can be avoided by interposition of a vascularized dartos flap between the neourethra and overlying skin.

Recently Cheng et al have suggested a two layer closure of the neourethra to minimize the fistula rate.¹⁶ Meatal stenosis is mostly the result of technical error; not confining the dorsal midline incision to the urethral plate. Other complications such as urethral stricture, diverticulum, and wound breakdown are infrequent.

Excellent cosmetic results have been reported with 0.5% meatal stenosis, 1 % urocutaneous fistula and rate of re-operation 1.5%.⁷

Rabinowitz¹⁰ has reported the complication rate of 13.5% in stentless Mathieu repair. Hakim et al¹¹ compared the results of the Mathieu procedure with and without a catheter and reported complication rate of 2.7% in stented and 3.6% in unstented repair. However, Buson et al¹⁷ noted a significantly higher complication rate of 18.9% in stentless versus 4.6% in stented cases. In our study there is a significantly high rate of fistula formation with Mathieu repair than in Snodgrass repair (7.7% vs 3.3%). Other complications like wound breakdown and meatal stenosis are equally frequent in both the procedures. Stricture formation is also slightly more common in Mathieu group (3.3% vs 2.2%). These results are comparable with other similar studies.

In one similar comparative study¹⁸ wound dehiscence and flap necrosis have been seen more frequently with Snodgrass repair group with no difference between groups regarding fistula formation. And total success rate similar (78.6% in Snodgrass repair and 77.8% in Mathieu repair group).

In another study²⁰ the mean duration of surgery was found significantly lower for Snodgrass procedure than for Mathieu repair (75 vs. 115 minutes. $P < 0.05$) with urocutaneous fistula more frequently in Mathieu repair and meatus being slit like in Snodgrass repair and rounded and horizontal in Mathieu repair.

In yet another study¹⁹ both the procedures were combined to avoid the risk of devascularisation of the neourethral flap. Another study²⁰ has shown the comparison and it has been concluded that the operative time and complication rate was less than Mathieu repair and had better cosmetic results producing a slit like normal looking meatus. In our study the same findings have been observed

CONCLUSION

From this study it was concluded that TIP urethroplasty is a more favored technique for anterior hypospadias because of its less operative time than Mathieu repair and its low rate of complications. Moreover the cosmetic appearance of the meatus is

also near normal with this procedure. However when a healthy plate is not available, Mathieu repair should be done.

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Address For Correspondence:

Dr. Anwar-ul-Haq, 17-B Mehran Block, Gulshan-e-Jinnah, F-5/1, Islamabad, Pakistan. Ph. No. 0333-5326972

Email: drahaq@hotmail.com