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Comparison between Perimeatal-Based Flap (Mathieu) and the Tubularized Incised-Plate Urethroplasty (Snodgrass) in Distal Hypospadias

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Abstract **Original Research Article**

Introduction: Hypospadias can be defined as a state in which the opening of the urethra is on the underside of the penis instead of at the tip. The specific cause of the hypospadiac penis is unknown but some factors such as endocrine & genetic factors are likely to be involved. The perimeatal based flap urethroplasty developed by Mathieu is commonly used for the correction of distal hypospadias. The pediatric urologist Warren Snodgrass described a newer procedure for distal hypospadias repair with a combination of incising the urethral plate & a meatal based flap with a low complication rate & better cosmetic outcome. A prospective comparative study was conducted to determine whether the Snodgrass or Mathieu urethroplasty is more appropriate for distal hypospadias in terms of complications, cosmesis of the meatus & glans. ***Aim of the study:*** This study aimed to determine whether the Snodgrass or Mathieu urethroplasty is more appropriate for distal hypospadias in terms of complications, cosmesis of the meatus & glans. ***Methods:*** This prospective study was conducted in the Department of Pediatric Surgery, Dhaka Shishu Hospital, Dhaka the period from 1 February 2002 to 30 "April 2003 for a total period of 15 months. A total number of 30 patients with distal penile hypospadias were selected for clinical study, of which 15 patients belong to group A (study group) treated surgically by SNODGRASS technique and another 15 patients belonging to group B (control group) surgically treated by MATHIEU technique. All these 30 patients were followed up for a minimum of 3 months and a maximum of up to 12 months (The average follow up was 7.5months). Urinary diversion in the form of urethral catheters was kept in position for 6-10 days. On the 4th to 6th post-operative day, the dressing was changed usually and details of the healing patterns and other findings were registered. Data were analyzed with SPSS-10 and MS Excel-16. ***Result:*** By comparing the surgical outcome of hypospadias management of the two groups the outcome of group-A (Study group) is significant over group B (control group), as evidenced by P-value is <0.01. This study demonstrates that the Snodgrass procedure shows fewer complications (20%) & cosmetically more acceptable meatus & glans than Mathieu urethroplasty (73.33%). ***Conclusion:*** This study was conducted to find out whether Tubularized incised-plate urethroplasty (Snodgrass) is more appropriate than perimeatal-based flap (Mathieu) urethroplasty in distal hypospadias. This study established P-value.

Keywords: Perimeatal-based Flap (Mathieu), the Tubularized Incised-plate Urethroplasty (Snodgrass) and Distal Hypospadias.

INTRODUCTION

The term hypospadias is derived from the Greek & refers to a rent (Spadon) on the ventrum of the penis [1]. Hypospadias may be defined as hypoplasia of the Ventral radius of the penis [2]. It is one of the commonest congenital abnormalities of the male genitalia occurring in approximately 0.8-8.2 per 1000 live male births or 1 in every 300 male children [3]. Three associated anomalies are classically found in the

hypospadiac penis. (1) An ectopic opening of the urethral meatus, there is a missing segment of the urethral tube of variable length that is replaced by a urethral plate extending from the ectopic meatus up to the glans cap. (2) a ventral curvature of the penis (Chordee) & (3) a hooded foreskin with a marked excess of skin on the dorsum of the penis & a lack of skin on the ventrum. The chordee & the hooded foreskin is not constant; hypospadiac meatus may be found under a normally formed prepuce; Chordee may be isolated without an ectopic urethral opening but is often associated with hypoplasia of the corpus spongiosum [2]. The most common anomalies associated with hypospadias other than chordee & hooded foreskin are undescended tests & inguinal hernia. A 9.3 percent of patients with hypospadias had an undescended test [4]. Because of the wide variation in the anatomic presentation of hypospadias no single method of urethroplasty applies to all cases [5]. Of patients with hypospadias ≈ 80% have a meatus in a coronal & sub-coronal position [6]. The perimeatal based flap urethroplasty (Mathieu technique) is commonly used for the correction of distal hypospadias. Mathieu in 1932 described a very clever flip-flap procedure to reconstruct distal hypospadias using penile nonhairy skin. His procedure is still in use & remains one of the most reliable [2]. The most frequent complications after hypospadias repair are urethrocutaneous fistula & meatal stenosis. Furthermore, meatal based flap repair creates a horizontal & rounded meatus which is cosmetically less acceptable than a normal vertical slit-like meatus [7]. The pediatric urologist Warren Snodgrass described a newer procedure for distal hypospadias repair with a combination of incising the urethral plate & a meatal based flap with a low complication rate & better cosmetic outcome [8]. In the Snodgrass procedure, the resultant neourethra has a normal diameter & uniform caliber. The meatus is vertically oriented & located at the tip of the glans which is cosmetically more acceptable. A prospective comparative study was conducted to determine whether the Snodgrass or Mathieu urethroplasty is more appropriate for distal hypospadias in terms of complications, cosmesis of the meatus & glans.

OBJECTIVES

General Objective

- To find out favourable outcome of surgery for distal penile hypospadias by comparing two surgical techniques.

Specific Objectives

- To reduce the complications rate
- To see the cosmesis of the meatus
- To see the cosmesis of the glans

METHODOLOGY & MATERIALS

This prospective study was conducted in the Department of Pediatric Surgery, Dhaka Shishu Hospital, Dhaka the period from 1 February 2002 to 30 "April 2003 for a total period of 15 months. A total number of 30 patients with distal penile hypospadias were selected for clinical study, of which 15 patients belonging to group A (study group) were treated surgically by SNODGRASS technique and another 15 patients belonging to group B (control group) surgically treated by MATHIEU technique. All these 30 patients were followed up for a minimum of 3 months and a maximum of up to 12 months (average follow-up was 7.5 months). In each case, detailed information about the patient was collected from the parents or accompanying guardians or the patients in the older age group. All this information was gathered systematically and put into the protocol of the questionnaire. These included name, age, sex, address, socio-economic condition, antenatal, natal and post-natal history, family history, consanguinity and immunization history etc. Patients having hypospadias without the major surgical problem for which they were admitted but hypospadias with local anomaly was included i. e. Associated ARM, Myelomeningocele. Bilateral Wilms' Tumor etc. Patients in whom surgery could not be done due to medical problems such as Bleeding disorders, Diabetes Mellitus (DM), Malignant diseases etc. Postoperatively all patients were treated with antibiotics, analgesics etc. Urinary diversion in the form of a urethral catheter was kept in position for 6-10 days. On the 4th to 6th postoperative day, the dressing was changed usually and details of healing patterns and other findings were registered. All the primary data were compiled on a master chart first, organized by using a scientific calculator and standard statistical formula. The percentage was calculated to find out the proportion of the findings. Further statistical analysis of the results was done by computer software devised in the statistical packages for social scientists (SPSS-10) and MS excel-16.

RESULT

Both the study and control groups were comparable in age distribution in the study. The mean age of the study group was 5.4 years (ranging from 1.0-9.5 years). The mean age of the control group was 5.57 years (range 0.75-9.5 years). There was no significant difference in both groups in the distribution of age (Figure-I). In our study, we considered the socioeconomic conditions of the hypospadias patients and the highest percentage of patients belonged to poor families, constituting several 53.33 percent and 60 percent in group A (study group) and group B (control group), respectively (Table-I). In this study, only one patient (3.33%) out of a total of 30 patients was detected as coming from a consanguineous family. In our study, 66.66 percent (10 patients) and 60.00 percent (9 patients) presented with chordee in group A and Group B, respectively; and meatal stenosis was present in 53.33 percent (8 patients) in groups A and 46. 66

percent (7 patients) in group B (Table-II). The catheter (feeding tube) was used as the simplest form of diversion in all the patients of both groups. Diversions were kept in position for 6-10 days. Postoperative function and cosmetic evaluation revealed that in group A (Study group) 80.00 percent (12 patients) and 26.66 percent (4 patients) in group B (control group) had no complications and achieved an excellent result. A urethrocutaneous fistula was developed in 2(13.33%) patients in group A and 6 (40%) patients in group B. Postoperative infections rate was 6.66 percent (1 patient) and 13.33 percent (2 patients) for patients in group A Group B respectively. Subsequently, one patient in group A developed a fistula and 2 patients in group B developed complete dehiscence. Pus was sent for culture and sensitivity and was treated accordingly with antibiotics. Glanular dehiscence developed 1 (6.66%) in group A and 2(13.33%) in group B. In addition, 2 patients (13.33%) developed complete dehiscence & 1 patient (6.66%) developed meatal stenosis in group B (Table-III). In group-A, one patient was complicated by infection and subsequently developed a fistula, which makes total number of patients is 3. Similarly, in Group B two patients had an infection which subsequently developed complete dehiscence and making a total number of patients 11 (Eleven) in this group. Z test is done which should that difference between the two groups is highly Significant ($p<0.01$).

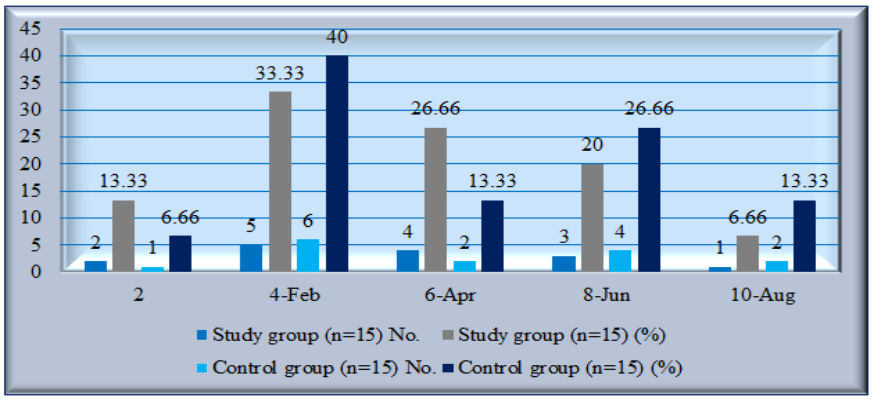

Fig-I: Age variation at the time of presentation of study group and control group of patients.

Table-I: Socioeconomic conditions of study group and control group of patients. (N=30)

Condition	Study group (n=15)		Control group (n=15)	
	N	%	N	%
Poor	8	53.33	9	60
Average	6	40	5	33.33
Rich	1	06.66	1	06.66

Table-II: Presence of chordee and meatal stenosis in the study group and control group of patients. (N=30)

Variables	Study group (n=15)		Control group (n=15)	
	N	%	N	%
Chordee	10	66.66	9	60
Meatal Stenosis	8	53.33	7	46.66

Table-III: Complication after surgical method in the study group and control group of patients. (N=30)

Complications	Study group (n= 15)	Control group (n=15)
	No.	No.
Infection	1	2
Urethrocutaneous fistula	2	6
Sloughed flaps/complete dehiscence	0	2
Glanular dehiscence	1	2
Meatal stenosis	0	1

DISCUSSION

The first description of hypospadias and its surgical correction was reported in the 1st and 2nd centuries (100 to 200 AD) by the Alexandrian surgeons Heliodorus and Antyllus. They described the defect of hypospadias and its relationship to problems with urination and ineffective coitus. They further described a surgical treatment consisting of amputation of the glans distal to the hypospadiac meatus [9, 10]. Snodgrass in 1994 chose urethral plate hinging for neouethra in distal repairs (Recently extended more proximally). Mathieu in 1932 described a very clever

flip-flap procedure to reconstruct distal hypospadiac using penile non-hairy skin which is known as the perimeatal based flap urethroplasty. To compare between perimeatal-based flap (Mathieu) & the tubularized incised-plate urethroplasty (Snodgrass) in distal hypospadias in this study, surgical complications & cosmetic outcomes between the two groups were compared. In the study group (group A), the average age of the patients was 5.4 years (range 1.0-9.5 years) and in the control group (group B), the average age was 5.57 years (range .75 -9.5 years). We found that most of the patients presented to the hospital at 2 to 4 years of age. Both the study and control group are incomparable in age distribution, which was comparable to other studies [11, 12]. No conclusive data have been sorted out on the timing of the presentation of the hypospadias patients. Schultz and colleagues pointed out that an ideal time for hypospadias repair might be age 6 to 18 months to minimize the emotional effect of this traumatic insult.[13] Patients from well-to-do socioeconomic backgrounds seek earlier advice about any congenital anomaly in their children. Our observation is that parents of this group of anomaly usually like to treat the problem before the boys go to school. In this study, children from poor families constituted 53.33% and 60% in group A and group B respectively, one of the highest sufferers followed by the middle class 36.66% and the least was in the rich class 6.66%. In our study, major of the hypospadias patient belongs to the village (56.66% on average) where the monthly income is less than Taka 5000/-. A similar frequency (59.38%) of poor socioeconomic conditions was reported by Masud & (60%) by Shadrul [11, 12]. In our study, one patient has been detected as arrived from a consanguineous family (3.33%). Although genetic factors in the etiology of hypospadias are certainly indicated by the higher incidence of the anomaly in the first-degree relatives of hypospadias patients [14]. In our small series (n=30) none of the patients had any family history of hypospadias among their maternal or paternal relatives. In this study, chordee was present in 66.66% (n=15) and 60.00% (n=l5) in groups A and B respectively. The chordee was composed of only skin. Retik mentioned in a study that 100 percent of scrotal or perineal hypospadias have severe chordee [15]. In another series, chordee was present in 86.46 percent of patients with hypospadias; 93.33% in hypospadias [11, 12]. The abnormal location of the meatus and the tendency toward meatal stenosis result in a ventrally deflected and splayed stream in the hypospadias anomaly. Mild to moderate or severe forms of meatal stenosis may be associated with any variety of hypospadias. The size of the meatus and the quality of the surrounding supportive tissue as well as the configuration of the glans are quite variable and ultimately determine the surgical procedure. In our observation, 50% of patients had meatal stenosis ranging from mild to moderate stenosis. Seven to thirteen per cent of hernia and undescended testes are associated with hypospadias, with a higher incidence when the meatus is more proximal in location [4]. In our observation all patients (n=30) were suffering from anterior variety of hypospadias & none of the total patients (n-30) had any associated hernia or undescended testes. The operative procedure performed on our patients for group A (study group) was the Snodgrass procedure and the Mathieu technique for group B (control group). For all cases, we followed the principles of plastic surgery regarding fine instruments and fine suture materials along with precise and delicate tissue handling. All patients were operated upon under general anaesthesia with caudal epidural bupivacaine. Skin nooks were used to prevent overhandling of the tissues. We preferred 6/0 polyglycolic acid (Dexon) or Polyglactin (vicryl) suture material with a continuous running Suture for constructing the neourethra and chromic fine 5/0 catgut suture for the skin. Hemostasis was maintained by tourniquet for 20 to 30 minutes and by using low-current diathermy. The urinary diversion was provided using placing a feeding tube (6 Fr, 7 Fr & 8 Fr, etc.) in the neourethra and sutured to the glans. A compression dressing was applied with MEFIX or HYPOFIX to provide immobilization with prevention of hematoma & edema. In our series, postoperative analgesia was maintained with per rectal diclofenac suppositories and paracetamol and also by the effect of caudal anaesthesia. In some cases, injection of pethidine was used through the intramuscular route. The postoperative hospital stay was 7-14 days. In this series, there were no complications or complaints in 80% of patients in group A, and 26.66% of patients in group B and achieving an excellent result. Urethrocutaneous fistula was developed in only two (13.33%) patients in group A, whereas 6 (40%) patients in group B. Postoperative infection developed in 1(0.66%) case and 2 (13.33%) cases in group A and group B respectively. Glanular dehiscence developed in 1(6.66%) patient in group A & 2 (13.33%) patients in group B. Besides, 2 cases (13.33%) developed sloughed flaps or complete wound dehiscence & one case (6.66%) developed meatal stenosis in group B. Complications are common after hypospadias surgery. Urethrocutaneous fistula is the commonest complication. In our series, urethrocutaneous fistula tops the list of various complications, 40% in Mathieu & 13.33% in Snodgrass urethroplasty. There is no specific data on complications of the Snodgrass procedure in our country. But in one series in our country, urethrocutaneous fistula was found 34.38% of the complications [11]. In another series of this country is 33.33%; [12] in our study (Snodgrass Technique) the urethrocutaneous fistula rate is much less (only 13.33%) than these studies. In this study, a small no. of cases was involved. For a definite conclusion, a large number of cases are required and the same surgeon should operate. By comparing the surgical outcome of hypospadias management of the two groups the outcome of group-A (Study group) is significant over group B (control group), as evidenced by P-value is <0.01. This study demonstrates that the Snodgrass

procedure shows fewer complications (20%) & cosmetically more acceptable meatus & glans than Mathieu urethroplasty (73.33%).

Limitations of the study

Our study wasn't blinded so patient bias was present along with observer bias in subjective recording and the small sample size, single-centre study, blinding was not done, short follow-up period.

CONCLUSION AND RECOMMENDATIONS

In this study, the comparison was performed on postoperative complications, such as infection rate, urethrocutaneous fistula, meatal stenosis, wound dehiscence etc. & cosmetic outcome such as the size of the meatus, the shape of the glans etc. between the two groups. In study group (group A), chordee was corrected by degloving the penis & excising fibrotic tissue proximal to the urethral opening where needed. The neourethra was constructed by tabularizing the incised urethral plate (Snodgrass Technique). The neourethral suture line was covered with a well-vascularized layer of subcutaneous dartos tissue. Satisfactory results were obtained in 80.00 percent of patients. Only 6.66 percent had a postoperative infection controlled by antibiotics according to C/S of pus,13.33 percent of patients developed a fistula and 6.66 percent of patients developed glanular dehiscence. In group B (control group), 15 patients underwent the Mathieu urethroplasty, which is the most common current technique for distal hypospadias. In all cases, the urethral plate was preserved. Chordee was corrected by dissecting skin and dartos fascia from the shaft. Neourethral suture lines (two suture lines) were covered with a well-vascularized layer of subcutaneous dartos tissue. Satisfactory results were obtained in only 26.66 percent of patients. 13.33 percent ad postoperative infection, 40 percent of patients developed fistulae, 13.33 percent of patients developed sloughed flaps, 13.33 percent of patients developed glanular dehiscence and 6.66 percent developed meatal stenosis. This study established P-value <0.01. So, a significantly better outcome was found after the Snodgrass technique than the Mathieu technique. Further study is needed with a larger sample size to get an accurate result.

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Ethical approval: The study was approved by the Institutional Ethics Committee.

REFERENCES

1. Duckett, J.W. (1981). "Hypospadias" In Gllenwater J. Y. Grayhack J.T. Howards S. S. Duckett JW (eds): Adult and Pediatric Urology. Mosby Yearbook. St. Louis. 2103-2140.
2. Mouriquand. P.D.E. Mure. P.Y. (2001). "Hypospadias". In Gearhart, JP, Rinc, RC. Mouriquand, PDE (eds). Pediatric Urology. W. B. Saunders Company. 713-728.)
3. Sweet. R.A., Schrott, H.G. Kurland. R. Culp. O.S. (1974). "Study of the incidence of hypospadiasin Rochester, Minnesota, 1940-1970. And a case-control comparison of possible etiologic factors". Mayo Clin Proc. 49:52-8.
4. Khuri. F.J. Hardy, BE. Churchill, BM. (1981). "Urologic anomalies associated with hypospadias". Urol Clin N Am 8:565-571.
5. Keating. M.A., Rich. M.A. (1999). "Onlay & Tubularized Island Flaps": In. Ehirlich RM. Alter GJ (eds) Reconstructive & plastic surgery of the external genitalia - adult & pediatric, W. B Saunder Company. 70-78.
6. Devine. C.J., Jr., Allen, T.D. Kelalis, P.P. (1978). "Hypospadias". Dial Ped. Uro - 1.22-4.
7. Rabinowitz, R. (1987). Outpatient catheter less modified Mathieu hypospadias repair. J Urol 138:1074–1076
8. Snodegrass, W. (1994). "Tubularized, incised–plateure thyroplasty for distal hypospadias". *J Urol*, 151; 464-5.
9. Roger. D.O. (1973). "History of external genital surgery." In: Horton, CE. (ed). Plastic and Reconstructive Surgery of the Genital Area. Little. Brown and CO., Boston. 3-47
10. Hodgson, N.B. (1999). "History of hypospadias repair": In. Ehrlich RM. Alter GJ (eds) Reconstructive & plastic surgery of the external genitalia – adult & pediatric, W. B Saunder company: 13-17
11. Masud, A.K.M.M. (1998). Hypospadias surgery: A short outcome (thesis) University of Dhaka, Dhaka.
12. Shadrul, M. (2000). VT. Joseph's & Onlay Island Technique (Thesis) University of Dhaka, Dhaka.
13. Schultz, J.R., Klykylo, WM., & Wacksman. J. (1983). Timing of elective hypospadias repair in children". Paediatrics, *71*; 342:351.
14. Bauer. S.B., Retik. A.B., Colony. A.H. (1981). "Genetic aspects of hypospadias". Urol Clin North Am 8:559-564.
15. Retik. A.B. (1994). Management of severe hypospadias with a two-stage pair". Uro. 152:749.