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RESEARCH ARTICLES

Outcome of Repair of Anterior Penile Hypospadias by Snodgrass Technique- A Study of 50 Cases

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ABSTRACT

Introduction: Hypospadias is a developmental anomaly characterized by a urethral meatus that opens onto the ventral surface of the penis proximal to the end of the glans. Hypospadias occurs in 1 in 125 live male births. Classically three abnormalities are found in the hypospadias penis: 1) an ectopic opening of the urethral meatus at the ventral surface. 2) A ventral curvature of the penis (Chordee), and 3). A hooded foreskin on the dorsum of the penis with a lack of skin on the ventral due to a V-shaped defect referred to as urethral delta. There are anterior (65%), middle (15%, and posterior penile hypospadias (20%). **Objective**: The objective of surgical repair of hypospadias is to provide complete straightening of the penis, placing the meatus at the tip of the glans, forming a symmetrical conical-shaped glans, constructing a nco urethra uniform in caliver and acceptable skin coverage. **Materials and Methods**: This is a Cross-sectional variety of descriptive type of observational study conducted in the department of pediatric surgery, Dhaka Medical College & Hospital, Dhaka, Bangladesh, from 1st January 2009 to 30th June 2010. The total number of cases is 50. Patients having anterior penile hypospadias were selected by simple random sampling. The mean age of the patients was 5.22 years (2 to 10 years). Surgical correction was done with the Snodgrass technique. The mean operative time was 90 minutes. Post-operative hospital stay was10 days. **Results**: Satisfactory results were obtained in 35 (70%) patients, and only 14 (28%) had urethrocutaneous fistula, wound infection 5(10%), and meatal stenosis 2 (4%). The final outcome was evaluated based on urethrocutaneous fistula, meatal stenosis, and cosmesis. Out of 50 patients, 35 (70%) did not have a urethrucutaneous fistula and were cosmetically acceptable. **Conclusion**: Early detection and correction are essential to minimize the complications and also to lessen the psychological trauma of the patient. For this, a thorough examination of the neonates following delivery in different maternal and child care clinics is mandatory. Early and timely measures also give the best cosmetic and functional results. So we should put all our efforts into achieving this goal.

KEYWORDS: Hypospadias, Anterior Penile, Urethral Meatus.

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INTRODUCTION

The term hypospadias is derived from the Greek language and refers to a rent (spadon) on the vent rum of the penis. It can be defined as hypospadias of tissue forming the ventral aspect (Ventral radius) of the penis beyond the division of the corpus spongiosum [1]. It is a wide spectrum of penile developmental anomalies characterized by a urethral meatus that opens onto the ventral surface of the penis at any site proximal to a normal opening at the tip of the glans. The meatus may be located anywhere from the glans along the shaft of the penis to the scrotum or even in the perineum. Hypospadias is the result of the failure of fusion of the urethral folds on the ventral aspect of the penis [2]. It occurs in approximately 3.2 per 1000 live male births or 1 in every 300 male children [3] or 1 in 125 live male births [4]. Among them, 65% are of distal variety (Glanular, Coronal & Anterior penile). Fathers of affected boys have an 8% incidence of hypospadias; male siblings have 14% [5]. Hypospadias may be manifested classically as an association of three anatomical anomalies of the penis: (1) an abnormal ventral opening of the urethral meatus, which can be located anywhere on the ventral aspect of the penis or in the perineum. (2) An abnormal

ventral curvature of the penis (chordee), and (3) an abnormal distribution of the foreskin around the glans with the ventrally deficient hooded foreskin. The chordee and the hooded foreskin are common but not constant. The degree of chordee is more significant in the surgical treatment of hypospadias than in the initial location of the meatus. A significant degree of chordee is present in about 35% of patients with hypospadias; the most common anomalies associated with hypospadias other than chordee and hooded foreskin are undescended testes and inguinal hernia. 8-9 % of patients with hypospadias hal undescended testes, and 9-16 % of patients had inguinal hernia/hydrocele [6]. Hypospadias repair is technically difficult, and the results are often far from optimal. Despite extensive advances in surgical technique, the use of fine materials, delicate instruments, proper tissue handling, advances in anesthesia, and good optical magnification have allowed virtually all types of hypospadias to be repairable in younger plintric patients [7]. But still, it needs a lot of experience and exposure for a Nirgeon to obtain a good result. More than three hundred types of urethroplasty have been performed. New techniques and modifications continually appear, which confirms that it is a difficult surgery with many complications and frequently inadequate cosmetic and functional results. Because of the wide variation in the anatomic presentation of hypospadias, no single method of urethroplasty is applicable to all cases. Warren Snodgrass [8] described a procedure for distal hypospadias repair with a combination of incising urethral plate, and suture line was covered with a well-vascularized layer of subcutaneous dartos tissue which provides a low complication rate and better cosmetics outcome. In the Snodgrass procedure, the resultant neo urethra has a normal diameter and is uniform in calibre. The meatus is vertically oriented and located at the tip of the glans, which is cosmetically more acceptable [9]. The quest for perfection in the surgical treatment of hypospadias must continue [10]. The aim of surgical repair is to provide a normal-looking straight penis with a vertically oriented metal opening at the tip of the glans with a good flow of urine. Common postoperative complications after urethroplasty are stent blockage, the sign of infection, sloughing of skin flap, persistence of chordae, metal stenosis, urethral stricture, and urethra cutaneous fistula. Among them, urethra cutaneous fistula is the most common complication [11]. The aim of surgical repair is to provide the abnormal-looking straight penis with a metal opening at the tip in a single stage procedure, and our previous experience showed that this could be achieved easily in the majority of cases with anterior hypospadias by Snodgrass procedure. The present study is to evaluate the Snodgrass repair of hypospadias and to justify its acceptance on the basis of outcome and rate of complications.

MATERIALS AND METHODS

This is a Cross-sectional variety of descriptive type of observational study conducted in the department of pediatric surgery, Dhaka Medical College & Hospital, Dhaka, Bangladesh, from 1st January 2009 to 30th June 2010. The total number of cases is 50. Patients having anterior penile hypospadias were selected by simple random sampling. The mean age of the patients was 5.22 years (2 to 10 years). Surgical correction was done by the Snodgrass technique. The mean operative time was 90 minutes. Postoperative hospital stays was10 days. All cases were selected on the basis of exclusion and inclusion criteria. The variables of the study were age, socioeconomic condition, postoperative complications, such as infection rate, urethrocutaneous fistula, urethral stricture, meatal stenosis, wound dehiscence, etc. & cosmetic outcome such as the size of the meatus, shape of the glans. Chordee was corrected by degloving the penis and excising fibrotic tissue proximal to the urethral opening where needed. The neo-urethra was constructed by tubularizing in the incised urethral plate (Snodgrass technique).

Investigation: The following investigations were performed for the diagnosis and management of the patients.

Blood: Hb%, Total and differential count of WBC, bleeding time and clotting time, and serum creatinine.

Urine: Routine microscopic examination, culture, and sensitivity test. Significant bacteriuria: Bacterial count of more than 10% per ml of urine was considered an infection.

Ultrasonogram: USG of kidney, ureter, and bladder.

Operational definition:

- All patients were operated on under general anesthesia with a caudal epidural block with bupivacaine.
- Prophylactic antibiotic were used in all cases (Cephradine 50mg/kg iv given)
- Suture materials were 6-0 vicryl for urethral and glans wing reconstruction and 5-0 plain catgut for skin closure.
- Postoperative care: All patients were treated with an antibiotic (Cephradine for ten days orally) and an analgesic (Ibuprofen orally). For bladder spasms, Dotaverine hydrochloride was used whenever necessary.
- The urethra was stented by a JMS feeding tube (6-10 Fr) and kept in position for ten days. The dressing was usually changed on the 4th postoperative day, and details of healing patterns and other findings were registered. On the 10th postoperative day, the urethral stent was removed in all cases.
- Follow up: At 14" days, three months, and six months after the removal of the catheter, all cases were examined for complications.

Data processing and analysis: Data were processed and analyzed using computer software SPSS (Statistical Package for Social Science). The test statistics employed were descriptive statistics and Z-test for proportion. The significance level was set at 0.05, and $p<0.05$ was considered significant. The results were then presented in the form of tables and graphs.

RESULTS

This observational study was performed between January 2009 to June 2010 in Dhaka Medical College & Hospital, Dhaka, Bangladesh. A total of 50 cases were selected for clinical study; all patients were treated surgically with the Snodgrass technique. All these 50 patients were followed up at 14th days, three months, and six months. In the present series, the following observations were noted.

Age distribution: Patients who were between 2 to 10 years old were selected for the study. The mean age was found to be 5.22 years.

Table -1 Age variation at the time of presentation of study group.

Age group (Years)	Study group no = 50 No.	%
2-4	22	44
5-7	19	38
8-10	9	18

Socio-economic conditions: In this study, we considered the socio-economic conditions of the hypospadias patients and the highest percentage of patient's belongings to average families, constituting a number of 33 (66%)

Table - 2: Socio – economic conditions of study group of patients.

Condition	Study group (N=50) No.	%
Poor	13	26
Average	33	66
Rich	4	8

Consanguinity: In our study two (4%) patients was detected as coming from Consanguineous family.

Table-3: Consanguinity.

Consanguinity	Study group (N=50)	%
Present	2	4
Absent	48	96

Family history: Only two (4%) patients gave family history of hypospadias.

Table-4: Family history.

Family history	Study group (n=50)	%
Present	2	4
Absent	48	96

Outcome after repair of anterior penile hypospadias:
A) Urethrocutaneous fistula: Urethrocutaneous fistula developed in 14(28%) patients.
B) Meatal stenosis:. Meatal stenosis developed in 2 (4%) patients.
C) Unsatisfactory glans cosmesis: Glans appearance was unsatisfactory in 3 (6%) patients.
D) Total disruption: Total disruption of glans developed in 1 (2%) patients.
E) Infection: Post-operative infection rate was present in 5 (10%) patients.

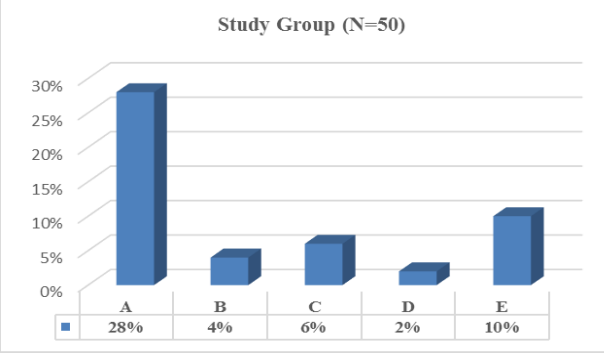

Fig-1: compiications after surgical method in study group patients.

A- Urethrocutaneous fistula, B- Meatal stenosis, C- Unsatisfactory glans cosmesis, D-Total disruption, E- Infection.

Urethrocutaneous fistula: In my study, nearly three-quarters (70%) of the patients did not develop any fistula, while the rest, 28%, developed the complication. A binomial test based on Z-approximation reveals that the observed proportion of patients not developing the fistula was statistically significant ($p < 0.05$).

Table -5: Distribution of subjects by urethrocutaneous fistula.

Urethrocutaneous fistula	Frequency	Percentage	Z-value	P - value
Developed	14	28.0	>2.83	0.05[s]
Total disruption	1	02.0		
Not developed	35	70.0		

S=Significant.

Meatal stenosis: Table-6: shows the distribution of patients complaining of a narrow stream and urethral opening found to be narrowed. Meatal stenosis confirms by examination of the external urethral meatus. In this study, only 2 (4%) patients developed meatal stenosis.

Table-6: Development of meatal stenosis after surgical repair in this study group.

Meatal stenosis	Frequency	Percentage	z-value	P-value
Not developed	48	96.0	>3.5	<0.001[s]
Developed	02	4.0		

S=Significant.

Cosmetic appearance: Table-7 shows the distribution of patients by the cosmetic value of the operative technique. The majority (94%) of the patients demonstrated acceptable outcomes in terms of cosmetic appearance. Z test reveals that the observed proportion is statistically significant ($p < 0.001$)

Table-7: Distribution of subjects by cosmetic apperarance.

Cosmetic Appearance	Frequency	Percentage	z-value	P-value
Acceptable	47	94.0	>3.1	<0.001[s]
Not developed	03	6.0		

S=Significant

Ultimate outcome:
a) Outcome within the acceptable limit: Patients who did not develop urethrocutaneous fistula and cosmetic appearance was acceptable were considered acceptable.

b) Outcome beyond the acceptable limit: Patients who developed either urethrocutaneous fistula or cosmetic appearance not acceptable were termed unacceptable.

Table-8: shows the distribution of patient by ultimate outcome.

Final outcome	Frequency	Percentage	z-value	P-value
Acceptable	35	70.0	2.3	0.05[s]
Unacceptable	15	30.0		

S=Significant

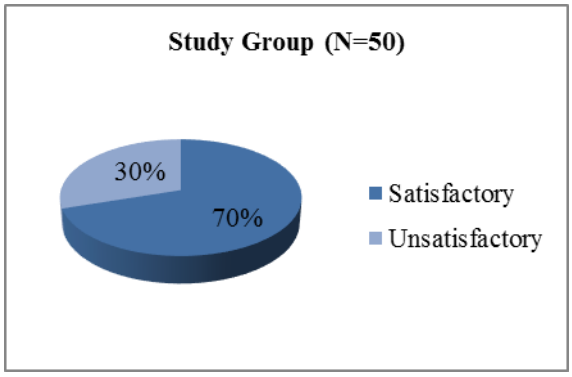

Fig-2: Ultimate outcome of hypospadias surgery.

DISCUSSION

This study was carried out in the Department of Pediatric Surgery, Dhaka Medical College & Hospital, Dhaka. Fifty patients were taken as sample volume and were subjected to urethroplasty by Snodgrass technique. In this study, postoperative analgesia was maintained with per rectal diclofenac suppository and oral ibuprofen and also by the effect of caudal anesthesia. Antispasmodic was used liberally to minimize bladder spasms. The postoperative hospital stay was ten days. The average age of the patients was 5.22 years. In the present study, we found that most of the patients presented to the hospital at 3-6 years of age, which were comparable to other studies [12, 13]. No conclusive data have been sorted out on the timing of the presentation of hypospadias. Usually, parents of this group of anomalies like to treat the problem before school-going age. The abnormal location of the meatus and the tendency towards meatal stenosis results in a ventrally deflected and splayed stream of urine in hypospadias. The operative procedure performed on our patients was the Snodgrass procedure. 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 anesthesia with caudal epidural bupivacaine. Caudal epidural anesthesia has the ability to an apparent reduction in operative bleeding and erection as well as postoperative pain [14]. Skin hooks were used to prevent over-handling of the tissues. We preferred 6/0 vicryl suture material with a continuous running suture for constructing the neo-urethra and chromic 5/0 catgut suture for the skin. Haemostasis was maintained by tourniquet for 20 to 30 minutes duration and by using a low current bipolar diathermy. The urinary diversion was provided by means of placing a feeding tube (6fr, 7Fr, 8Fr, etc.) in the neo-urethra and sutured to the glans, and attached to the thigh by micropore to prevent traction injury. The outer sheath of a 3cc disposable syringe was interposed between the feeding tube and urobag. A compression dressing was applied with a gauge socked with povidone-iodine to provide immobilization with prevention of hematoma, and oedema Urethrocutaneous fistula was developed in 14 (28%) patients. It was 31.38%, 33.33%, 40.0% in different studies in Bangladesh [13,15,16]. Urethrocutaneous fistula is likely to remain an inherent risk of hypospadias repair for many years afterward. The result is from the failure of healing at some points along the neourethral suture line and can range from pinpoint to large enough for all voided urine to exit at this point. Occasionally, small fistula seen early post-operatively may close spontaneously. To avoid fistulation, it is important to test the repair by injecting saline to identify the gaps in the suture line [17]. Meatal stenosis was present in 2 (4%) cases, which is similar to another study [18]. The meatus becomes stenotic by crusting, oedema, or synechia. A stent left in place usually avoids all three complications [5]. A narrowing of the meatus may be alleviated by simply elevating a glans flap, excising the scar beneath, and interdigitating the skin flap. Post-operative infection developed in 5 (10%) cases. It developed in 10% of the study. Every effort should be made to prevent wound infections. Separation of the foreskin adherent to the glans and removal of desquamated epithelial debris should be done under anesthesia prior to skin preparation. Prophylactic antibiotics are of little value in avoiding wound infections in hypospadias surgery [19]. Unacceptable glans cosmesis was noticed in 36%) of cases. Glanuloplasty and in situ tubularization of the urethral plate is an excellent technique for the majority of the boys with anterior hypospadias, producing a cosmetic result superior to the Mathieu procedure or MAGPI. Total disruption of glans developed in 1(2%) case. It is caused by the failure of healing of the glans closure and the breakdown of the devascularized neo-urethra. Correction can usually be accomplished by a repeat glansplasty or a metal-based flap.

CONCLUSION

The Snodgrass technique confirms the minimum rate of urethrocutaneous fistula, better cosmetic appearance, and provides optimal functional results than other established techniques. Though the fistula rate is high in this study compared to international publication, it can be reduced significantly by more precise technique, use of fine suture materials, and development of expertise.

RECOMMENDATION

We can recommend the Snodgrass technique as a single-stage primary treatment for the anterior penile hypospadias. Using delicate instruments, fine suture materials, optical magnification, creating a neo-urethra of appropriate size, careful attention to the blood supply of flaps, and meticulous wound hemostasis are of obvious importance. A further large-scale study may be carried out to validate the findings of this study.

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AUTHORS' CONTRIBUTIONS

The participation of each author corresponds to the criteria of authorship and contributorship emphasized in the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors. Indeed, all the authors have actively participated in the redaction, the revision of the manuscript, and provided approval for this final revised version.

COMPETING INTERESTS

The authors declare no competing interests with this case.

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