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Outcomes of hypospadias repair: A study in a tertiary care hospital in Bangladesh

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Abstract

Background: *Hypospadias is the second most frequent congenital defect of male neonates after cryptorchidism. Hypospadias repaired is one of the most common and difficult surgeries performed in paediatric patients.*

Aim of the study: *This study was carried out to evaluate the clinical characteristics and surgical outcomes of hypospadias correction.*

Methods: *The current study is a hospital-based retrospective analysis of pediatric hypospadias repairs at TMSS Medical College, Bogura, Bangladesh from 01 January 2021 to 31 December 2021 in which 40 cases were included. All collected data was entered into a Microsoft Excel Work Sheet and analyzed in SPSS 11.5 using descriptive statistics.*

Results: *A total of 40 paediatric patients underwent hypospadias surgery. Of these, 38 (95%) cases were investigated. Most common type of hypospadias was coronal type (26.3%). Most of our patients did not have any associated urogenital problem (63.2%) and the most common associated anomaly was microphallus (7.9%). Most common surgical techniques was tabularized incised plate (65.8%). Most of our patients did not have any postoperative complications (52.6%) and most common complications was urethrocutanous fistula (31.6%). the presence of severe chordee (AOR=3.09; 95% CI 1.21-7.54; p=0.013) was significantly associated with postoperative problems.*

Conclusion: *Our study found a higher rate of problems after hypospadias repair. Our study also found no substantial benefit to any repair procedure in terms of minimizing surgical complications. Extensive preoperative examination, a proper operating strategy, and regular follow-up of such patients are critical for a successful outcome.*

Keywords: *Hypospadias, Pediatric, Repair, Complications.*

I. INTRODUCTION

Hypospadias is a urogenital congenital condition involving the ventral side of the penis characterized by an ectopic ventral opening of the urethral meatus with or without ventral penis curvature (chordee) and faulty ventral distribution of the foreskin [1–7]. It is the second most frequent congenital defect in newborn men after undescended testis, with a frequency of 1 in 300 and a range of 0.4-8.2 per 1,000 infants [1, 4-7]. Because of increased environmental pollution, the prevalence has recently increased worldwide [1, 4]. Hypospadias is caused by a developmental halt in the male urethra between the eighth and sixteenth weeks of pregnancy. The majority of the time, the cause is unknown; nevertheless, hormonal factors may play a role. Interferences in androgen metabolism, as well as genetic susceptibility, are implicated in pathogenesis [1, 4, 6, 8]. Hypospadias can be present alone or in combination with other congenital urogenital defects such as undescended testis (UDT), inguinal hernia, pelviureteric junction (PUJ) blockage, vesicoureteral reflux, and renal agenesis [8, 9]. The aberrant urethral opening can be anywhere from the glans of the penis to the perineum [2, 4, 8, 10]. The meatus is located distally on the penile shaft in 70% of the boys and represents a mild form, whereas 30% have a proximal meatus and are severe forms [6, 11]. The primary mode of treatment is surgical repair of the anatomic defect. Over 300 hypospadias correction procedures are described in the literature [4, 9, 13]. Most surgeons favour the tubularized incised plate (TIP) urethroplasty (Snodgrass technique) for the treatment of anterior/distal hypospadias; however, more difficult reconstruction procedures (two-staged) are used in the care of posterior/proximal hypospadias [4]. If hypospadias is not properly addressed, it can have a negative impact on the

patient's psychological, emotional, and sexual well-being. The cosmetic and functional consequence determines the success. Overall, the outcome of hypospadias repair is determined by factors such as age at repair, type of hypospadias, chordee severity, associated urogenital anomalies, surgical technique used, duration of urinary diversion (stenting), availability of microsurgical instruments, and experience of the surgeon [2, 12, 14]. Following any type of hypospadias correction surgery, complications can develop. The principal early consequences of hypospadias correction are bleeding, edoema, urine retention, wound infection, wound dehiscence, skin and flap necrosis. On the other hand, late problems include meatal stenosis, urethrocutanous fistula, urethral diverticula, recurrent chordee, urethral stricture, and hairy urethra [3, 7, 8, 15-19]. The purpose of this study is to evaluate the clinical characteristics as well as the surgical outcomes (complications) after hypospadias repair.

II. METHODOLOGY

The current study is a hospital-based retrospective analysis of pediatric hypospadias repairs at TMSS Medical College, Bogura, Bangladesh from 01 January 2021 to 31 December 2021 in which 40 cases were included. Binary logistic regression was used to identify risk factors for postoperative problems. A bivariate independent variable with a p-value < 0.2 was submitted to a multivariate analysis and was shown to be significant at p-values < 0.05. The study's findings were presented using text, central tendency statistics, and tables. All collected data was entered into a Microsoft Excel Work Sheet and analyzed in SPSS 11.5 using descriptive statistics.

III. RESULT

A total of 40 paediatric patients underwent hypospadias surgery. Of these, 38 (95%) cases were investigated. The results are shown in the following table. Table 1 shows that the most common type of hypospadias was coronal type (26.3%) followed by glandular, distal penile, midshaft, proximal penile, penoscrotal, scrotal and perineal types with 18.4%, 15.8%, 2.6%, 13.2%, 15.8%, 2.6% and 7.9% of frequency respectively. Most of our patients (Table 2) did not have any associated urogenital problem (63.2%) and the most common associated anomaly was microphallus (7.9%) followed by penile rotation (5.3%), inguinal hernia (5.3%), undescended testis (2.6%), pelvi-uretral junction obstruction (2.6%), disorder of sex development (2.6%), penoscrotal transposition (2.6%), penile rotation and microphallus (2.6%), penoscrotal transposition and microphallus (2.6%), penoscrotal transposition and undescended testis (2.6%). Table 3 shows that the surgical techniques performed in patients operated for hypospadias. Where most common techniques was tabularized incised plate (65.8%) followed by staged urethroplasty (21.1%), mathieu's repair (7.9%), onlay island flap (2.6%), meatal advancement and glanuloplasty incorporated (2.6%) and island flap (2.6%). In this study, (Table 4) shows that the most of our patients did not have any postoperative complications (52.6%) and most common complications was urethrocutanous fistula (31.6%) followed by meatal stenosis (7.9%), urethral stricture (2.6%), urinary tract infection (2.6%) and urethrocutanous fistula and recurrent chordee (2.6%). In (Table 5) the kind of hypospadias, presence of chordee, concomitant urogenital abnormality, operation type, and catheter duration were all significantly connected with postoperative problems in a bivariate study. However, on multivariate analysis, the presence of severe chordee (AOR=3.09; 95% CI 1.21-7.54; p=0.013) was significantly associated with postoperative problems.

Table -1: Types of hypospadias of patients (n=38)

General types	Specific types	Total n (%)
Anterior	Glandular	7(18.4%)
	Coronal	10(26.3%)
Middle	Distal penile	6(15.8%)
	Midshaft	1(2.6%)
	Proximal penile	5(13.2%)
Posterior	Penoscrotal	6(15.8%)
	Scrotal	1(2.6%)
	Perineal	3(7.9%)

Table-2: Associated urogenital anomalies of patients (n=38)

Urogenital Anomaly	Total n (%)
No anomalies	24(63.2%)
Microphallus	3(7.9%)
Penile rotation	2(5.3%)
Inguinal hernia	2(5.3%)
Undescended testis	1(2.6%)
Pelvi-uretral junction obstruction	1(2.6%)
Disorder of sex development	1(2.6%)

Penoscrotal transposition	1(2.6%)
Penile rotation and microphallus	1(2.6%)
Penoscrotal transposition and microphallus	1(2.6%)
Penoscrotal transposition and Undescended testis	1(2.6%)

Table-3: Surgical techniques performed in patients (n=38)

Surgical Technique	Hypospadias Type			Total
	Anterior n (%)	Middle n (%)	Posterior n (%)	
Tabularized incised plate	13(76.5%)	8(66.7%)	4(40.0%)	25(65.8%)
Staged urethroplasty	0(0%)	2(16.7%)	6(60.0%)	8(21.1%)
Mathieu's repair	3(17.6%)	0(0%)	0(0%)	3(7.9%)
Onlay island flap	0(0%)	1(8.3%)	0(0%)	1(2.6%)
Meatal Advancement and Glanuloplasty Incorporated (MAGPI)	1(5.9%)	0(0%)	0(0%)	1(2.6%)
Island flap	0(0%)	1(8.3%)	0(0%)	1(2.6%)

Table-4: Postoperative complications of patients (n=38)

Postoperative complications	Total n (%)
No complication	20(52.6%)
Urethrocutanous fistula	12(31.6%)
Meatal stenosis	3(7.9%)
Urethral stricture	1(2.6%)
Urinary tract infection	1(2.6%)
Urethrocutanous fistula and recurrent chordee	1(2.6%)

Table-5: Factor associated with postoperative complications of patients (n=38)

Variables	Postoperative complications		Crude odds ratio (95%CI	Adjusted odds ratio(95%CI)
	Yes	No		
Age				
<18 months	22	18	1	1
>=18 months	27	33	0.67(0.40-1.10)	1.02(0.57-1.82)
Type of Hypospadias				
Anterior				
Middle	25	32	1	1
Posterior	28	29	2.43(1.38-4.26) **	2.57(0.89-7.42)
	31	23	5.86(2.99-11.44) **	2.63(0.59-11.69)
Chordee				
No chordee	15	27	1	1
Mild to moderate	12	19	1.75(0.93-3.30)	1.47(0.74-2.92)
Severe	26	11	5.39(2.29-9.78) **	3.09(1.21-7.54) *
Urogenital anomaly				
Yes				
No	25	21	1.81(1.10-2.98) *	0.96(0.51-1.80)
	32	35	1	1
Surgical Technique				
Mathew's				
TIP	6	12	1	1
Staged	17	36	1.80(0.72-4.52)	1.23(0.45-3.35)
Island Flap	12	5	8.78(3.16-24.43) **	3.38(0.80-14.13)
On lay island flap	2	1	5.43(0.42-69.76)	2.92(0.19-45.63)
MAGPI	3	2	4.07(.59-29.73)	1.79(0.19-16.20)
	1	2	1.36(.10-17.42)	1.32(0.10-17.71)
Catheter duration				
≤ 1 week	14	34	1	1
>1 week	32	16	2.6(1.60-4.23) **	0.39(0.13-1.18)

IV. DISCUSSION

A total of 40 paediatric patients underwent hypospadias surgery. Of these, 38 (95%) cases were investigated. In our study, the most common type of hypospadias was coronal type (26.3%) followed by glandular, distal penile, midshaft, proximal penile, penoscrotal, scrotal and perineal types with 18.4%, 15.8%, 2.6%, 13.2%, 15.8%, 2.6% and 7.9% of frequency respectively. In contrast, Baskin LS et al and Subramaniam R et al found that the posterior/proximal type was the most common in Asia [5, 10]. In addition, an Indonesian investigation found

a similar result. In Nigeria and Pakistan, the middle type was determined to be the predominate form [9, 18]. This disparity could be explained by differences in study subjects and study design. Hypospadias can occur with or without chordee/ventral penile curvature, in addition to the ectopic opening of the urethral meatus. It is caused by aberrant development and fusion of multiple levels of the penis's ventral tissues, including the skin, Buck's fascia, corpus spongiosum, and tunica albuginea [1]. Penile rotation, microphallus, penoscrotal transposition, ambiguous genitalia, undescended testis, inguinal hernia, pelviureteric junction (PUJ) obstruction, vesicoureteral reflux, and renal agenesis can occur in conjunction with hypospadias [1,4,8,9,11]. In this study, most of our patients did not have any associated urogenital problem (63.2%) and the most common associated anomaly was microphallus (7.9%) followed by penile rotation (5.3%), inguinal hernia (5.3%), undescended testis (2.6%), pelvi-uretral junction obstruction (2.6%), disorder of sex development (2.6%), penoscrotal transposition (2.6%), penile rotation and microphallus (2.6%), penoscrotal transposition and microphallus (2.6%), penoscrotal transposition and undescended testis (2.6%). Mammo TN et al and Schneuer FJ et al found a higher likelihood of concomitant urogenital malformations in proximal lesions, as did our analysis [7, 12]. UDT is one of the most common related anomalies observed in this analysis and other investigations [1, 2, 8, 9, 12, 17]. According to Aulia l et al, the most prevalent anomaly (14.5%) is microphallus. If hypospadias occurs with UDT and a tiny penis (2.5cm), an intersex anomaly should be recognised and investigated using imaging, hormone testing, and karyotyping [9]. The only concurrent upper urinary tract abnormality observed in the recent investigation was PUJ blockage. The authors also documented vesicoureteral reflux and renal agenesis in severe hypospadias cases [1].

Our study shows that the most common surgical techniques was tabularized incised plate (65.8%) followed by staged urethroplasty (21.1%), mathieu's repair (7.9%), onlay island flap (2.6%), meatal advancement and glanuloplasty incorporated (2.6%) and island flap (2.6%). Celsius and Galen shared their experience with hypospadias correction in the first and second centuries AD, and since then, over 300 restoration procedures have been documented to improve functional and cosmetic outcomes [3, 4, 9, 10, 13, 14, 19]. This reflects the fact that there is no universally approved single treatment that is suitable for all hypospadias variations [19, 13]. All procedures, however, attempt to encourage urine in a standing position without interruption or spraying, to establish normal coitus and insemination, and to achieve acceptable penile cosmesis [3-6, 12, 14]. Meatal position, penile curvature and size, foreskin condition, urethral plate quality, and availability of professional competence and setup all influence procedure selection [10, 11]. According to the literature, the majority of repairs can be completed in one stage. Complex restoration procedures (two-staged) are reserved for severe (proximal) hypospadias [1, 4, 9-11]. According to a global assessment on hypospadias surgery, 52.9%-71.0% of surgeons choose TIP for the treatment of distal (anterior and midshaft) abnormalities. Similarly, the recent study and findings from other literature showed acceptable results [12, 14, 16, 18]. In this study, the most of our patients did not have any postoperative complications (52.6%) and most common complications was urethrocutanous fistula (31.6%) followed by meatal stenosis (7.9%), urethral stricture (2.6%), urinary tract infection (2.6%) and urethrocutanous fistula and recurrent chordee (2.6%). Patients should be monitored routinely in the postoperative period (during the first week, first month, third month, sixth month, then yearly for two years), and the final outcome is only determined at mid-teenage or puberty [1, 9]. All of the participants in our study were followed for at least 6 months. The literature indicated a range of postoperative problems ranging from 6 to 68% [2, 3, 9, 11-17]. Even if the complication rate in our evaluation (48.7%) is within the indicated range, it is significantly higher than in most other studies. Hagos M (13.4%) and Mammo TN et al (44.1%) found a lower rate of problems than we did [12]. This could be related to differences in patient characteristics and surgical follow-up time. Furthermore, differences in surgery and training practise may contribute to the variation [2]. Almost all centres reported UFC as the most prevalent complication after hypospadias correction (range, 7.7-47%), which is supported by the current study (34.3%) [2, 3, 9, 11-17]. Furthermore, the current study's (8.7%) and others' (3-14%) findings identified meatal stenosis as the second most common consequence of hypospadias surgery [2, 3, 9, 11, 16, 19]. Other problems, such as infection and persistent/recurrent chordee, are being reduced as a result of the prudent use of prophylactic antibiotics and an erection test during the procedure [20]. Bhat A et colleagues observed that by adhering to hypospadias repair principles, post-operative problems (in plate preservation techniques) were reduced to 5% and 10% in distal and proximal hypospadias, respectively [3]. The presence of severe chordee was shown to be the only factor significantly linked with increased risks of postoperative complication (AOR=3.09; 95%CI 1.21-7.54; p=0.013) than their respective groups in our multivariate analysis. This is consistent with research conducted locally and elsewhere [12, 14, 16]. Mammo TN et al discovered 59.7% and 34% incidences of problems in patients with severe and no chordee, respectively [12]. In contrast, no statistically significant link was identified between complications of hypospadias surgery and characteristics such as age at repair, occurrence of concomitant urogenital abnormalities, and surgical method [2, 7, 11]. In contrast, numerous similar studies conducted in Africa, the West, and around the world have shown that these characteristics have a significant effect on the occurrence of postoperative problems [2, 3, 12, 16, 18, 20]. This disparity may be explained in part by differences in study subjects and analysis methods used. As seen in our

study and others the duration of urine diversion has no link with a higher likelihood of an unfavourable result [12, 14].

Limitation of the study:

This study had a single focal point and small sample sizes. Additionally, the study was completed in a very condensed amount of time. Therefore, it's possible that the study's findings don't accurately capture the overall situation in the nation.

V. CONCLUSION & RECOMMENDATION

In this study, the majority of our patients were operated on after the suggested age. TIP and two-stage treatments were the preferred techniques in distal/middle hypospadias and proximal hypospadias, respectively. Our setup had a greater rate of operational complications than most other centres. Only the presence of severe chordee was related with an increased risk of surgical complications. In terms of these issues, our research found no significant advantage to any repair approach. Extensive diagnosis, a proper surgical plan, and continuous follow-up are critical in the therapy of hypospadias, especially in individuals with severe chordee. Prospective studies with long-term follow-up are required for additional results.

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