

Clinical Profile and Surgical Outcomes of Snodgrass Urethroplasty in Distal Hypospadias

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Abstract:

Background: Hypospadias is complex disorder affected by both genes and the environment. Chordee and penile torsion is frequent, particularly in more advanced forms of hypospadias. Several classification systems have been suggested for hypospadias. Many methods for the surgical repair of hypospadias have been described throughout history.

Objectives: To assess the Clinical Profile in Children with Distal Hypospadias and Surgical Outcomes after Snodgrass Urethroplasty.

Methods: It was a prospective observational study on patients of Distal Hypospadias admitted in Department of Surgery presented with abnormal meatal location, glans configuration, chordee less than 30 degree. Local examination was done in every patient. Special attention was given to prepuce whether intact, circumcised or utilized in previous operation. Surgical procedure done was Snodgrass Urethroplasty; patients were followed up to 2 years.

Results: Patients were distributed as per type of hypospadias and it was observed that sub coronal hypospadias, distal penile and coronal hypospadias were found in 25 (50%), 17 (34%) and eight (16%) patients, respectively. Shape of meatus was slit shaped in 24 (48%) patients, stenotic in 21 (42%) patients and circular in five (10%) patients in our study. Out of 50 patients studied, midline raphe was found in 32 (64%) patients while as deviated from midline raphe was seen in 18 (36%). Only 10 (20%) patients had associated chordee in our study. After 24 months of follow up, acceptable cosmetic results were observed in 47 (94%) patients. Small meatus was seen in two (4%) patients while as bulky tissue was present in one (2%) patient.

Conclusion: Most of the patients in our study presented late because of unawareness among people about the disease. The surgical procedure done was Snodgrass Urethroplasty and was associated with good surgical outcomes and fewer complications.

Keywords: Hypospadias, Chordee, Snodgrass Urethroplasty, Prepuce, midline skin raphe.

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Introduction

Hypospadias is a common congenital malformation in boys. It is a complex disorder affected by both genes and the environment. It is an isolated malformation in the majority of cases, although it can also occur in association with other abnormalities, most frequently undescended testes or micropenis [1]. During a time window in gestational weeks 8 and 9, the Müllerian ducts regress in a cranio-caudal direction under the influence of AMH2. By week 10, the Müllerian ducts become insensitive to AMH2. The continued differentiation of the Wolffian ducts into the epididymis, vas deferens, and seminal vesicles

require such high testosterone concentrations that it can only occur in the immediate vicinity of the Leydig cells of the testes. During this time, the labioscrotal swellings develop as additional swellings lateral to the urethral folds [3]. At nine weeks, virilisation of the external genitalia by DHT and testosterone begins with the lengthening of the anogenital distance [2]. The walls of the cloacal membrane in the genital tubercle then come together in a distal-to-proximal direction, resulting in the formation of a solid plate of endodermal epithelium, the urethral plate [4]. This replaces the urogenital membrane and extends to the tip of the

phallus [5]. Elucidation of the development process for the normal male genitalia and urethra has indicated that hypospadias results from a disruption of the normal closure of the edges of the urethral groove that inhibits formation of the urethral tube [6,7]. Chordee and penile torsion is frequent, particularly in more advanced forms of hypospadias [8,9].

Congenital ventral curvature can also occur in association with a normal urethral meatus, which is commonly called chordee without hypospadias or crypto-hypospadias. In these cases, the glanular urethra is often normal while the spongio-penile urethra is deficient [10]. Rarely, the curvature can exist in association with a completely normal urethra [11]. The cause of ventral curvature is debated [10], as is the use of the term chordee to describe the ventral curvature [12]. Ventral curvature can occasionally be surgically released after degloving of the penile skin, although this is not the case for most patients [13], who will require an orthoplasty with excision of chordee tissues. Penile torsion usually presents with the penile shaft rotated to the left and the raphe deviating to the right [9]. Torsion can occur in the absence of hypospadias or chordee, but it is most commonly found in association with these anomalies [14]. The cause of the torsion is unknown [24], though an association with asymmetric ventral tissues is reported [15,16].

Several classification systems have been suggested for hypospadias [17], mainly based upon the position of the meatus [18]. However, a comprehensive classification of the phenotype must also account for the position of the meatus after correction of the ventral curvature (excision of the chordee) [17].

Many methods for the surgical repair of hypospadias have been described throughout history [8]. Improvements in equipment and materials, such as magnification glasses and sutures, as well as refinements to surgical technique, have made it possible for many patients to have defects repaired in one session, minimizing complications, rather than in two sessions followed by possible secondary repairs due to complications. Ultimately, the phenotype or the degree of the malformation will determine the choice of surgical technique and the risk for complications [8,19].

Local tissues in the immediate vicinity of the urethral plate can be used for construction of the neo-urethra in some cases, but preputial flaps or transplants are often required to allow for adequate length of the neo-urethra in more advanced cases [8,20]. In patients with ventral curvature, the repair must begin with excision of the chordee [8]. The most frequently used local flap is from the prepuce. Use of scrotal flaps has also been described [20].

However, when skin from the proximal penile shaft or the scrotum is used, the surgeon must account for the (future) presence of hair, as a neo-urethra with internal hairs can cause both cosmetic and obstructive problems [21]. When local tissues are absent or inadequate, grafts, most frequently oral mucosa, must be used [20,22]. Generally, the more advanced reconstructions are performed in two steps. The first for excision of the chordee with repair of the ventral defect with a flap or graft, which leaves a surplus of tissue on the ventral side that, is used in the second session for the urethral repair [22]. The two sessions should be separated in time to allow for adequate tissue healing and neovascularization [23].

The challenges of constructing a long neo-urethra in patients with proximal hypospadias are considerably greater than in the more distal cases. The neo-urethra also lacks the native propulsive qualities of the native, spongiosum-covered urethra, and the longer the reconstruction, the greater the risk of abnormal micturition and ejaculation. Furthermore, the risk of vascular scarcity in long reconstructions is always greater as the base of the flap has to be thinned in order to reach the required distance [24,25]. However, as there is, yet, no reconstructed urethra that possesses the same biological and urodynamic properties as the native urethra, functional outcomes can be affected even in uncomplicated cases [26]. To minimize the risk of fistula formation a fascial layer (Buck or Darto's) can be interposed between the suture lines [27].

Ventral curvature with chordee is common in hypospadias, although the true nature of the chordee, in terms of its role in the pathology of the ventral curvature and the importance of its excision, remain unclear [28-30,12]. Recent literature has recommended three ways to manage chordee with respect to the urethral plate: (1) division and excision of the urethral plate followed by extensive ventral dissection along the corporal bodies; (2) extensive mobilization, without division, of the urethral plate, followed by further dissection at the ventral corporal bodies; and (3) preservation of the urethral plate as a template for an onlay island flap combined with dorsal plication for residual penile curvature [28].

Hypospadias surgery is beset with difficulty and complications. The most common complications include recurrent curvature, preputial dehiscence, glans dehiscence, urethral fistula, meatal or urethral stenosis, urethral stricture, urethral diverticulum, hairy urethra, penile skin deficiency, and abnormal penile skin configuration [19]. Although complications can be isolated, they are often clustered [31,32]. The term hypospadias cripple describes those patients who are affected by the greatest incidence of multiple complications and

failed repairs, in which the penis may be scarred, hypovascular, and shortened [19].

Aims and Objectives

- To assess the clinical profile in children with Distal Hypospadias
- To assess the surgical outcome in children with Distal Hypospadias after Snodgrass Urethroplasty

Material and Methods

The study was conducted in the Postgraduate Department of General Surgery at Govt. Medical College Srinagar from November 2018 to November 2020.

It was a prospective observational study on patients of Hypospadias admitted in department of surgery over a period of 24 months and was conducted after taking consent from parents of patients and getting clearance from institutional ethical committee. A detailed history and examination of patients was recorded.

Inclusion Criteria

All cases of distal hypospadias presenting with abnormal meatal location, glans configuration, skin coverage and mild degree of chordee less than 30 degree

Exclusion Criteria

- All patients with proximal Hypospadias (proximal penile, penoscrotal and perineal)
- Patients having severe degree of chordee more than 30 degree
- Patients having congenital ventral curvature with normal meatus
- All patients having contraindications to general anesthesia

In addition to general physical and systemic examination, a detailed local examination was done in every patient. Preoperative antibiotic prophylaxis was given one hour before intubation. Meticulous part preparation was done with 10% povidone Iodine. All the procedures were done as elective surgeries under general anesthesia. To obtain a bloodless field, a tourniquet (released every 30-45 min) used. Hemostasis was ensured using bipolar diathermy. Urethroplasty was performed around a 7/8 feeding tube catheter.

A compressing dressing was applied post-operatively for 48 hours for hemostasis, and feeding tubes removed on 10th postoperative day. Surgical procedure done for Distal Hypospadias was Snodgrass Urethroplasty for Glanular, Coronal, and Sub coronal and Distal Penile Hypospadias. The tubularized incised plate (TIP) urethroplasty combines modifications of techniques of urethral plate incision and tubularization. The

concept of a urethral plate “relaxing incision” as an adjunct to hypospadias repair is to allow tension-free neourethral tubularization. Patients were regularly followed up for two years for outcome and complication of hypospadias. The follow up was done on OPD basis at an interval of 2 weeks for one month then six monthly for two years.

Statistical Method: The recorded data was compiled and entered in spreadsheet (Microsoft Excel) and the exported to data editor of SPSS version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as mean SD and Categorical values were summarized as frequencies and percentages. Graphically the data was presented by bar and pie diagrams.

Results

Our study patients age ranged between 5 months to 12 years with maximum patients i.e. 19 (38%) falling in their first decade of life followed by 12 (24%) patients aged between 5-6 years with a mean age of 5.4 ± 1.89 years.

Majority of patients i.e. 35 (70%) came with abnormal urinary stream followed by cosmetic deformity of penis in 15 (30%) patients. 38 (76%) were diagnosed at birth while as 12 (24%) patients were diagnosed at circumcision. No family history of hypospadias was seen in all the 50 patients. 46 of the 50 patients (92%) had no associated congenital abnormalities. Only four patients were found to have associated congenital abnormality including two (4%) patients with undescended testes and two (4%) patients with inguinal hernia. Only 8 (16%) of the 50 patients were circumcised.

Patients were distributed as per type of hypospadias and it was observed that sub coronal hypospadias, distal penile and coronal hypospadias were found in 25 (50%), 17 (34%) and 8 (16%) patients, respectively. Shape of meatus was slit shaped in 24 (48%) patients, stenotic in 21 (42%) patients and circular in 5 (10%) patients in our study.

Out of 50 patients studied, midline raphe was found in 32 (64%) patients while as deviated from midline raphe was seen in 18 (36%). Only 10 (20%) patients had associated chordee in our study. Catheter was removed on 10th postoperative day in 45 (90%) patients, catheter was removed on 11th POD and $\geq 13^{\text{th}}$ POD in 2 (4%) patients while as catheter was removed on 12th POD in 1 (2%) patient. 12 (24%) patients had postoperative complications comprising of urethrocutaneous fistula in 8 (16%) patients, meatal stenosis in 3 (6%) patients and 1 (2%) infection. At 24 months, acceptable cosmetic results were observed in 47 (94%) patients. Small meatus was seen in 2 (4%) patients while as bulky tissue was present in 1 (2%) patient.

Table 1: Age, symptoms at presentation, associated congenital abnormality, History of circumcision, Type of hypospadias

		No. of Patients	Percentage
Age (Years)	< 3 Years	7	14
	3-4 Years	4	8
	4-5 Years	8	16
	5-6 Years	12	24
	≥ 6 Years	19	38
	Total	50	100
	Mean SD (Range)=5.4±1.89 (5 Months-12 Years)		
Symptoms	Abnormal urinary stream	35	70
	Cosmetic deformity of penis	15	30
Associated congenital abnormality	Undescended testes	2	4
	Inguinal hernia	2	4
	No congenital abnormality	46	92
History of circumcision	Yes	8	16
	No	42	84
Type of hypospadias	Sub coronal	25	50
	Coronal	8	16
	Distal penile	17	34

Table 2: Distribution of study patients as per shape of meatus, Midline skin raphe, associated chordee, Postoperative complications and cosmetic results

		No. of Patients	Percentage
Shape of meatus	Slit shaped	24	48
	Stenotic	21	42
	Circular	5	10
Midline skin raphe	Midline	32	64
	Deviated from midline	18	36
Associated chordee	Yes	10	20
	No	40	80
Postoperative complications	Urethrocutaneous fistula	8	16
	Meatal stenosis	3	6
	Infection	1	2
Cosmetic results	Small meatus	2	4
	Bulky tissue	1	2
	Acceptable cosmetic results	47	94

Discussion

In our study, we had total number of 50 patients. Mean age of presentation is 50 months, minimum age is 5 months and maximum age is 12 years. Age of presentation is early as compared to study of clinical profile of hypospadias in Medical College South Gujarat³³ where mean age of presentation was 7.5 years. In our study, age of presentation is still late i.e. 15 months, ideally patient should be operated between 6-18 months of age³⁴. Parents of the patients are still unaware about the disease and present late. 35 cases that is 70 percent presented abnormal urinary stream while 30 percent presented with cosmetic deformity of penis.

In our study 38 (76%) were diagnosed at birth and 12 (24%) were diagnosed at the time of circumcision. In our study no patients had associated family history of Hypospadias In our study 11 cases that is 22 percent had already

circumcised penis while 39 cases that is 78 percent had uncircumcised penis. Still there needs a lot of awareness in our society about delaying of circumcision in Hypospadias as lot of patients about 22 present are already circumcised, but in our patients most of the circumcised patients have distal hypospadias and it did not overall affect the surgical outcome, but circumcision should be avoided in hypospadias encountered especially in Proximal Hypospadias where prepuce may be needed for surgical reconstruction. In our study 2 (4 %) patients had associated undescended testes and 2 (4%) had inguinal hernia. There were no other anomalies associated. During antenatal period, 1 case that is 2% cases had history of small for gestational age. Type of hypospadias was assessed on clinical examination. 25 cases that is 50 % had sub coronal type of Hypospadias, 8 cases that is 16% had coronal and 17 cases that is 34% had distal penile. Shape of meatus was also

assessed on clinical examination 24 cases that is 48 % had slit shaped meatus 21 cases that is 42 % had stenotic and 5 that is 10 % cases had circular type of meatus. In our study, skin raphe was midline in 32 cases that is 64% while 18 that is 36% patients had deviated raphe. 10 (20%) patients of cases had associated mild degree of chordee less than 30 degree. Mean age at the time of surgery was 50 months that is 4.166 years. Catheter was removed on post op 10th day in 90% of cases while 10 percent cases needed catheterization for more than 10 days because they failed to pass urine after giving trial and developed retention and were catheterized again.

Surgical procedure done was Snodgrass urethroplasty. This procedure was associated with good surgical outcomes and less complication and was procedure of choice in Distal Hypospadias. Our study was consistent with the Hamid R et al [35] comparative study of Mathieu and Snodgrass Repair of Hypospadias which favoured Snodgrass repair as procedure of choice in distal hypospadias with good surgical outcomes and fewer complications. Our study results are consistent with the current study done at Alribat University hospital, Department of Pediatric Surgery by Yassir HA ET al [36], for patients who underwent distal hypospadias repair in the period August. 2012 to September using patient's record. 31 children (aged between 2 years and 13 years) with distal hypospadias have been treated from August 2012 to September 2013. The average age at operation was 5.8 years. They underwent primary repair using different type of operations, and they had no history of previous hypospadias repair. The preoperative meatal sites were glanular in 7 patients, coronal in 8 patients, and sub coronal in 16 patients.

Data collected using predesigned Questionnaire including information such as age, family history, type of Hypospadias, type of surgery, complications etc. Results were that all Patients enrolled in this study have no family history of hypospadias most of the patients were diagnosed at birth (87.1%), and only 12, 9% diagnosed at circumcision The most common presentation of patients is abnormal shape of penis and abnormal stream of urine (71% and 25,8% respectively). According to the site of meatus, sub coronal hypospadias is the commonest 51.6% of patient. Associated chordee is present in 19.4% of patients (6 patients). Associated external genitalia anomalies are inguinal hernia and undescended and they are equals 3.2% for each. Only one patient had been circumcised before surgery representing about 3.2%. Mean age at time of surgery was 5.8 and 74.2% of patients underwent surgery after 3 year of age post-operatively 35% of our patients had been catheterized more than 7 days. All these results of

study are almost matching to our study. Chordee associated in our patients was also supported by another study by Gohil A ET al [32] which found association of chordee in 19 percent of patients Assessment of surgical outcome in hypospadias was done by assessing complications. Cosmetic appearance of penis. In our study most common complication during follow up was urethrocutaneous fistula in about 16 % of patients followed by meatal stenosis in about 3 percent of patients and 2% developed postoperative infection as our study is consistent with study of William Appeadu-Mensah et al [37]. On complications of hypospadias surgery in a tertiary hospital of a developing country in which 18% patients developed urethrocutaneous fistula and 3% developed meatal stenosis during follow up period. Cosmetic results were assessed during follow up of 24 months 2 cases that is 4 % of patients had small meatus, 1 case that is 2% had bulky tissue. Rest cases had acceptable cosmetic results. Complications and cosmetic outcome during follow up in our study was consistent with study done by Aslam R et al [38] a retrospective case note review was undertaken of all patients undergoing a primary, single stage, tubularised incised plate (TIP) hypospadias repair between April 2000 and January 2003, Mean age of 3.5 years with a mean follow-up of 56 months. Data was recorded regarding complications such as re-operation, fistula, meatal stenosis, urethral stricture. The complication rates for the two groups and the overall complication rate were assessed. This study had similar complications and cosmetic outcome to our study.

Conclusion

The conclusion of our study was that most of the patients in our study presented late because of unawareness among people about the disease. Good amount of patients had already circumcised penis. Patients usually presented with abnormal urinary stream more than concerning about cosmetic deformity. The surgical procedure done was Snodgrass Urethroplasty for distal Hypospadias and was associated with good surgical outcomes and fewer complications.

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