

Original Research Article

Incidence of types of hypospadias in and around Tumkur district, Karnataka, India: an anatomical classification

N. M. Suresh¹, Subramanya Katteppura^{2*}, N. Yathindra², Khizer Hussain Afroze¹

¹Department of Anatomy, ²Department of Pediatric Surgery, Sri Siddhartha Medical College, Tumakuru, Karnataka, India

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***Correspondence:**

Dr. Subramanya Katteppura,

E-mail: drsubbak@yahoo.com

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ABSTRACT

Background: Hypospadias is the second most common congenital anomaly in children. It is characterized by the abnormal ventral opening of the urethral meatus. Abnormal urethral opening may be located on the penile shaft, scrotum or perineum respectively. This article mainly deals with the embryology, etiology, anatomy and incidence of different types of hypospadias in Tumakuru rural district.

Methods: This study was interdepartmental and prospective, consisting of 80 cases conducted at department of pediatric surgery and Anatomy and the period of study was from April 2013 to March 2017. The hypospadias have been classified into 1) Proximal hypospadias 2) Midshaft hypospadias, 3) Distal Hypospadias according to the location of external urethral opening.

Results: Out of the 80 cases, distal hypospadias is the most common incidence followed by midshaft and proximal hypospadias.

Conclusions: The condition is repairable in the vast majority of cases, leaving a functional and normal looking penis. Early diagnosis and surgical intervention, hypospadias and chordee repair procedures are highly successful and can avoid the emotional distress.

Keywords: Abnormal Urethral opening, Congenital anomalies, Genital anomalies, Hypospadias, Penile anomalies

INTRODUCTION

Hypospadias is the second most congenital anomalies where the urinary opening is not usually located in the head of the penis. It occurs in approximately 1:250 to 1:300 live births.¹

Hypospadias is a disorder characterized by the abnormal ventral opening of the urethral meatus. Abnormal urethral opening may be located on the penile shaft, scrotum or perineum respectively. It may be associated with downward bending of the penis referred as chordee and also with foreskin being underdeveloped, leaving the undersurface of the glans penis uncovered.²

The above conditions lead to spraying while voiding urine and impaired sexual activity. The exact etiology of present study remains unclear.

The proposed hypothesis for etiology of hypospadias may be due to androgen metabolism abnormalities, androgen receptor defects, genetic defects and the theory of endodermal differentiation.²⁻⁸ By modern techniques and surgical intervention, this defect may be corrected.

This articles mainly deals with the embryology, etiology, anatomy and incidence of different types of hypospadias in Tumakuru rural district.

METHODS

The prospective study was conducted at department of pediatric surgery, Sri Siddhartha Medical College, Tumakuru, Karnataka, India and the period of study was from 2013 to 2017. The study includes 80 cases of hypospadias irrespective of caste, religion and socioeconomic status. Cases were analyzed in respect to different types of hypospadias. Sexual differentiation disorder and congenital anomalies cases were excluded from the study. The types of hypospadias have been classified into three according to the location of external urethral opening. They are

- Proximal hypospadias-the opening of urethra located somewhere near the perineal or scrotal or peno-scrotal junction,
- Midshaft hypospadias-opening located along the shaft the penis,
- Distal Hypospadias-the opening of urethra located somewhere near or in the glans penis.

RESULTS

The study includes 80 cases of ages ranging from 0 to 8 years. Most of the hypospadias cases was detected at early age groups (0-2 years) and very few cases were detected at later age groups (6-8 years).

In case of distal hypospadias, 34 cases were detected and corrected between 0-2 years of age (Table 1). These 80 cases were classified into proximal, midshaft and distal hypospadias. The most common among them were distal hypospadias with the incidence of 52 cases (65%).

Proximal hypospadias was least with the incidence of 10 cases (12.5%) (Table 2).

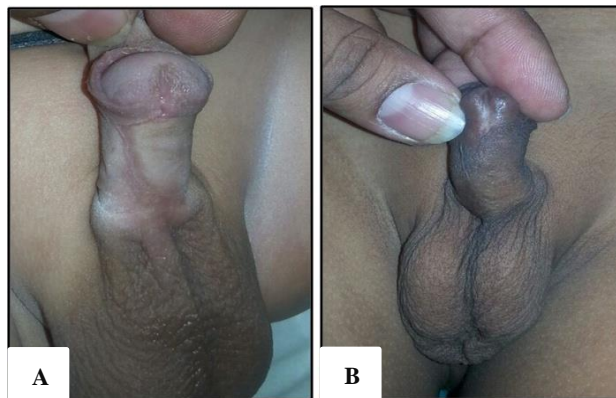


Figure 1: Distal hypospadias.

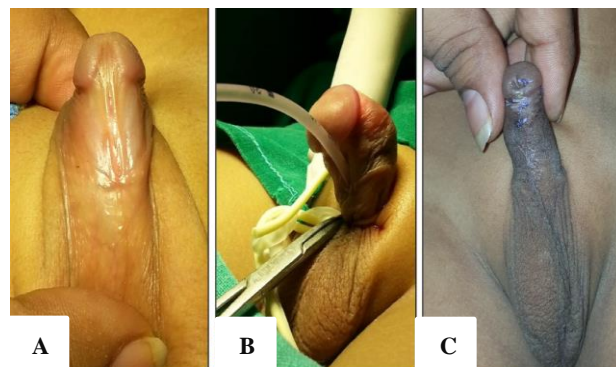


Figure 2: Midshaft hypospadias: a) Pre-operative, b) Operative, c) Post-operative.

Table 1: The age distribution among the study group.

Age (yrs)	Proximal hypospadias (n)	Midshaft hypospadias (n)	Distal hypospadias (n)	Total No. of cases
0-2	6	12	34	52
2-4	4	5	10	19
4-6	0	0	5	5
6-8	0	1	3	4

Table 2: Incidence of type of hypospadias.

Types of hypospadias	No. of cases	(%)
Proximal hypospadias	10	12.5
Midshaft hypospadias	18	22.5
Distal hypospadias	52	65

DISCUSSION

Urorectal septum divides the cloacal membrane into ventral urogenital membrane and caudal anal membrane. Urogenital membrane elongates cranio-caudally. Mesoderm on either side heaped up to form two

longitudinal elevations called primitive urethra folds. A median genital tubercle and two genital swelling are formed on either side. The genital tubercle in male becomes cylindrical called phallus. It gives rise to future penis. The urogenital membrane lies in a linear groove flanked on either side by primitive urethral folds. This primitive urethral groove lined by ectoderm extends into undersurface of the growing phallus.

The solid mass of endodermal cells derived from urogenital sinus extends into the phallus called urethral plate. The urethral plate breaks down and forms the urethral groove. The edges called urethral folds fused

with each other and convert into a tube called urethra. This fusion occurs caudal to cranial direction. Failure or alteration of fusion in urethral plate is called as hypospadias.⁹

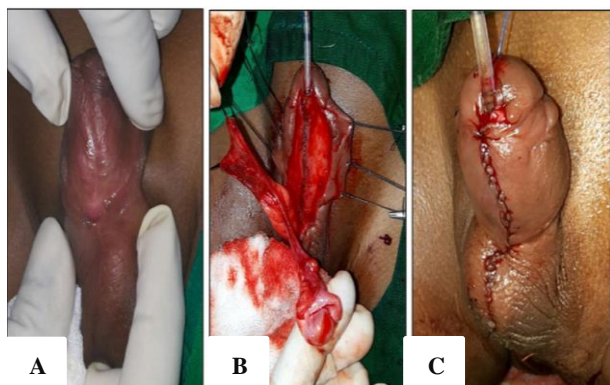


Figure 3: Proximal hypospadias: a) Pre-operative b) Operative, c) Post-operative.

One of most accepted etiology of hypospadias may be due to androgen metabolism abnormalities or androgen receptors defects. 5 α -reductase enzyme deficiency is one of the causes of hypospadias. Genetic syndromes such as hand foot genital syndrome, an extremely rare autosomal-dominant disorder characterized by mutation in HOXA13. The environmental pollutants with substances enriched in estrogenic activity (insecticides, natural estrogens from plants and chemicals from plastic industry) are transmitted through food chain also possible

aetiological factors for worldwide increase in incidence of hypospadias.³

According to review of literature, there are many types of hypospadias depending on the location of opening of the urethra which has been described in the Table 3.

The most accepted and simplest classification has been described by Kaufmann who classified hypospadias into first degree (Glanular), Second degree (Penile) and Third degree (Proximal).¹⁰ Our study was based on similar classification.

In the present study, the most common type was distal hypospadias (65%) followed by incidence of midshaft (22.5%) and proximal hypospadias (12.5%). The present study revealed a very high incidence of distal hypospadias (65%). Similar finding was reported by Duckett et al who had recorded the incidence of distal hypospadias in 49% cases.¹⁵ Very low incidence 7.6% and 10% was reported by Patra et al and Hadidi et al respectively.^{16,19}

The incidence of midshaft hypospadias in our study was 22.5% which is almost similar with incidence reported by Duckett et al (21%). But it was contradicting to Orkiszewski et al, Hadidi et al and Patra et al, who reported the incidence was 63.3%, 75% and 78.6% respectively.^{16,18,19} This incidence was higher than the present study. Wang-Hsengwu et al did a similar study and reported a lower incidence of midshaft hypospadias (9.6%).¹⁷

Table 3: Various classification of hypospadias according to the opening of the external urethra.

Kaufmann 1886 ¹⁰	Smith 1938 ¹¹	Browne 1953 ¹²	Schaefer 1950 ¹³	Avellan 1975 ¹⁴	Duckett 1996 ¹⁵	Hadidi 2004 ¹⁶
1 st Degree (Glanular)	1 st Degree	Glanular	Glanular	Glanular	Glanular	Glanular
2 nd Degree (penile)	2 nd Degree	Sub-coronal midshaft	Penile	Penile	Sub-coronal distal penile midshaft proximal penile	Distal
3 rd Degree (proximal)	3 rd Degree	Penoscrotal midscrotal perineal	Perineal	Penoperineal perineal perineal with or without bulb	Penoscrotal scrotal perineal	Proximal

Table 4: Incidence of hypospadias in different population.

Types of hypospadias	Duckett et al ¹⁵	Wang-Hseng Wu et al ¹⁷	Hadidi et al ¹⁶	Orkiszewskiet al ¹	Patra et al ¹⁹	Present Study
Proximal hypospadias	30%	65.7%	15%	10%	13.8%	12.5%
Midshaft hypospadias	21%	9.6%	75%	63.3%	78.6%	22.5%
Distal hypospadias	49%	24.7%	10%	26.7%	7.6%	65%

Table 5: Operative procedure for hypospadias.

Type	Operative procedure
Distal hypospadias	TIP Urethroplasty (Tabularized incised plate)
Mid penile / Shaft hypospadias	<ul style="list-style-type: none"> • TIP Urethroplasty (Tabularized incised plate) • On-lay repair (pedicle skin graft) • In-lay for narrow Urethral Plate
Proximal penile hypospadias	Staged repair (Byer's skin flaps / Buccal grafts)

The incidence of proximal hypospadias in the present study was 12.5%. Studies by Orkiszewski et al, Patra et al, and Hadidi et al also recorded the almost similar results in 10%, 15% and 13.8% of cases respectively.^{16,18,19} The higher incidence was reported by Wang-Hseng Wu et al (65.7%).¹⁷ Brief description regarding the operative procedure for Hypospadias has been explained in Table 5.

CONCLUSION

We proposed the standard classification of hypospadias with the higher incidence was found to be distal hypospadias. The exact cause of hypospadias is not known. In the vast majority of cases, the condition is repairable, leaving a functional and normal looking penis. With modern technologies and techniques, hypospadias and chordee repair procedures are highly successful provided early diagnosis and treatment is done and with the right support, any emotional distress is avoidable.

.....ing: No funding sources

Conflict of interest: None declared

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

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