CLINICAL PROFILES AND SURGICAL OUTCOME OF HYPOSPADIAS REPAIR IN PEDIATRIC SURGERY AT JIMMA UNIVERSITY MEDICAL CENTER, JIMMA, ETHIOPIA

JIMMA UNIVERSITY INSTITUTE OF HEALTH SCHOOL OF MEDICINE, DEPARTEMENT OF SURGERY

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ABSTRACT

Background: Hypospadias is one of the most common birth defect standing second after cryptorchidism in male. Surgery is the only effective treatment for hypospadias. If hypospadias is not managed appropriately and timely, it will affect the patient's psychological, emotional and sexual well-being. Despite advent of safe anesthesia, and advanced surgical techniques, the incidence of postoperative complication is significant and it remains a great challenge for pediatric urologists and surgeons. Studies regarding hypospadias pattern and outcome are lacking in Low and middle income countries including Ethiopia. Thus this study was conducted to assess the clinical profiles and outcomes of hypospadias patients who underwent surgery at Jimma University Medical center (JUMC) Pediatrics surgical unit.

Methods: This is a descriptive cross-sectional study conducted at JUMC on all pediatric patients who underwent surgery for hypospadias between 1 May 2018 and 30 April 2023. Predesigned extraction checklist was utilized for data collection and SPSS version 24 was used for data entry and analysis.

Results: A total of 86 patients, who were operated for hypospadias, were included by fulfilling the selection criteria. The mean age at surgery was 3.7yr (Range, 4months-14 years) and only one-third, 27(31.4 %) patients were operated on in the recommended age group (6-18 months). Anterior/distal hypospadias was the most common 37(43%) followed by Middle, 36(42%). The majority had chordee 46(53.5%) and 35(76.1%) were severe forms. Tubularized incised plate repair 51(59.3%) was the major surgical technique employed for anterior and middle hypospadias, while staged urethroplasty was used in 20(23.5%) of patients mostly with posterior hypospadias. Post-operative complications occurred in 30(34.9%) patients and the commonest was urethrocutanous fistula 15(50%). No significant correlation was found between the occurrence of these complications and other factors.

Conclusion: Most patients were presenting lately for hypospadias repair and anterior hypospadias was the most common type of hypospadias.

Recommendation: Public awareness creation concerning hypospadias should be done.

Key Words: Hypospadias; Complications; Ethiopia

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ACRONYMS AND ABBREVIATION

DSD	Disorder of sex development
EAU	European Association of Urology
JUMC	Jimma University Medical Center
MAGPI	Meatal Advancement and Glanuloplasty Incorporated
TIP	Tubularized incised plate
UDT	Undescended Testis

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1. INTRODUCTION

1.1 Background

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. The meatus may be located anywhere along the shaft of the penis from the glans to the perineum. Chordee, which is ventral curvature of the penis, has an inconsistent association with hypospadias. The degree of chordee is ultimately more significant in the surgical treatment of hypospadias than is the initial location of the meatus (1).

Hypospadias is one of the most common birth defect standing second after cryptorchidism in male newborns in some studies. These studies showed that the prevalence of hypospadias has increased by 60% from 1980 to 2010, and the condition affects about 0.2% of newborn males worldwide. If hypospadias is not managed appropriately and timely, it will affect the patient's psychological, emotional and sexual well-being (2-5).

Surgery is the only effective treatment for hypospadias. The advent of safe anesthesia, fine suture material, delicate instruments, and good optical magnification has allowed virtually all types of hypospadias to be repaired in infancy. However, the incidence of postoperative complication is 5–70%. Therefore, hypospadias repair remains a great challenge for pediatric urologists (4,5).

Different studies have investigated the risk factors for postoperative complications of hypospadias repair, and most of them focused on the age at time of surgery, type of hypospadias, method of anesthesia, length of reconstructed urethra, and postoperative constipation. In this study, the clinical and follow-up data of pediatric patients who underwent primary hypospadias repair were reviewed and factors associated with postoperative complications were explored (2-5).

1.2 Statement of the problem

Hypospadia is the most common congenital deformity in the reproductive system of children. It occurs in 1/300 to 1/250 live male births. The classic hypospadias triad consists of a proximal and ventrally positioned urethral meatus, a dorsal hooked foreskin, and ventral chordee (1,5).

The clinical significance of hypospadias is related to several factors. The abnormal location of the meatus and the tendency toward meatal stenosis result in a ventrally deflected and splayed stream. This fact makes the stream difficult to control and often makes it difficult for the patient to void while standing. The ventral curvature associated with chordee can lead to painful erections, especially with severe chordee. Impaired copulation and thus inadequate insemination is a further consequence of significant chordee. In addition, the unusual cosmetic appearance associated with the hooded foreskin, flattened glans, and ventral skin deficiency frequently has an adverse effect on the psychosexual development of the adolescent with hypospadias (1).

All of these factors are evidence that early surgical correction should be offered to all boys with hypospadias**.** To deny a child the benefit of repair because the defect is 'too mild' or the risk of complication is 'too high' is inappropriate**.** The surgical goals of hypospadias repair are based on three key factors: terminalization of the meatus, to allow urination in a standing position and natural insemination, a straight penis, and good cosmoses (1,6).

Sub-optimal management of hypospadias affects patients' psychological, emotional and sexual well-being. Despite the evolution of various repair techniques and improvement in anesthesia, operative complications of hypospadias remain a challenge and could occur following any form of reconstructive surgery even in the best of hands. Finally given its frequency, hypospadias can place a significant stain on healthcare spending. A significant risk of complications may necessitate many procedures, particularly in the most severe instances (5,7).

Years have been passing since surgery for hypospadias started at Jimma University Medical center. However, there is no organized and documented data concerning the sociodemographic conditions of patients with hypospadias, the types of procedures done, the magnitude and types of complication occurred post operatively in Medical Center. The goal of this study was to address these gaps.

1.3 Significance of the Study

This study was used as a tool for evaluating the previous works and setting a baseline for future work. It also gave an opportunities and specific targets to work on the future. This study had value in predicting pattern of Hypospadias and management outcomes for this institution .Furthermore, finding from this study could be incorporated with other studies in order to predict the country's condition on hypospadias management.

2. LITERATURE REVIEW

2.1 Epidemiology and Etiology

The mean worldwide prevalence of hypospadias according to an extended systematic literature review varies: Europe 19.9 (range: 1-464), North America 34.2 (6-129.8), South America 5.2 (2.8-110), Asia 0.6-69, Africa 5.9 (1.9-110), and Australia 17.1-34.8. There are conflicting data on the recent trends of prevalence – different trends in Europe and an increasing trend in the USA. Hypospadias was the second birth defect following inguinal hernia in one study in Bangladish. A study conducted by kassahun B. et al showed hypospadias contributed ~2% of the birth defects among neonates who were admitted Jimma university medical center (4,8,9).

The underlying defect in hypospadias is the incomplete tubularization of the urethral folds during embryonic development. Its etiology is unknown, however genetic, developmental, endocrine, and environmental factors are probably involved in its pathogenesis. A study showed that the risk of hypospadias in a second male sibling was 12%. If the index child and his father were affected, the risk for a second sibling increased to 26%. If the index child and a second-degree relative (rather than the father) were affected, the risk of the sibling being affected was only 19%. Other risk factors include low birth weight and use of oral contraceptives after conception increased the risk of hypospadias (1,4,6,10).

2.2 Classification systems

Hypospadias are usually classified based on the anatomical location of the proximally displaced urethral orifice as: Distal/anterior, intermediate/middle and proximal-posterior hypospadias. The Distal hypospadias includes glandular, coronal, or subcoronal meatal locations which is the most common, in 60% to 65% of cases. The middle hypospadias involves distal and mid hypospadias which comprised 20% to 30% of cases. The remaining 10 to 20% are proximal hypospadias which include meatal positions at proximal penile, penoscorotal, scorotal and perineal area. The pathology may be different after skin release in patients with chordee and should be reclassified accordingly (4,5).

Anatomical location of the meatus may not always be enough to explain the severity and the complex nature of this pathology. Therefore, a simple classification related to severity of the problem, which considers penile length, glans size, shape, urethral plate quality and penile curvature is commonly used. In this classification there are two types: mild hypospadias

(which encompasses glanular or penile isolated hypospadias without associated chordee, micropenis or scrotal anomaly; and severe hypospadias which includes penoscrotal and perineal hypospadias with associated chordee and scrotal anomalies (4).

A study conducted in Tazania pinpointed the distal hypospadias was the most common, 58.8%, followed by proximal and midshaft hypospadias which consists of 26.2% and 15% respectively. A study at St. Paul millennium Hospital College showed specific types of hypospadias as follows: Glandular 19.9%, Coronal 24.5%, Distal penile 14.8%, Midshaft 3.2% and Proximal penile 14.4%. Posterior hypospadias includes penoscrotal 16.6%, scorotal 1.8% and perineal 5.1%.The retrospective study by Tihitena M. et al. concluded the major three specific types of hypospadias were coronal, penoscorotal and distal penile which comprised 28.2%, 24.8% and 18.8% respectively(2,3,10).

Maru G. et al indicated the majority (63.5%) of the hypospadias had chordee of which 59.7% were severe forms. Moreover, chordees of the posterior hypospadias were tend to be more severe than anterior and middle. This was also supported by study that was under taken at Tikur Abessa Teaching Hospital. It showed 53.5% of patients had chordee and the severe forms were associated mostly with the proximal hypospadias ($p<0.01$) (3).

2.3 Diagnosis and Associated Anomaly

Most hypospadias patients are easily diagnosed at birth; Exception for the megameatus intact prepuce variant which can only be seen after retraction of foreskin. Diagnosis includes a description of the local findings: position, shape and width of the orifice; presence of atretic urethra and division of corpus spongiosum; appearance of the preputial hood and scrotum; size of the penis; and curvature of the penis on erection (4).

The diagnostic evaluation also includes an assessment of associated anomalies. Inguinal hernia or open processus vaginalis(PPV) and undescended testes are the most common anomalies associated with hypospadias. They occur in 9-15% and 10% of cases respectively. Tihetena M eth al showed coexistence of congenital anomalies in 18.3 % among which UDT accounts for 9.9 %, DSD 4.5% and inguinal hernias 2%. On the other hand Microphallus(10.5%) was the commonest anomaly followed by penile rotation (7.6%) and undescended testis(6.5%) in one study (1-4).

Severe hypospadias with unilaterally or bilaterally impalpable testis, or with ambiguous genitalia, requires a complete genetic and endocrine work-up immediately after birth to exclude DSD, especially congenital adrenal hyperplasia. Urine trickling and ballooning of the

urethra requires exclusion of meatal stenosis. The relationship between the severity of the hypospadias and associated anomalies of the upper- or lower urinary tract were not confirmed (4).

2.4 Treatment

The aims of hypospadias correction are divided into: Complete straightening of the penis, locating the meatus at the tip of the glans, forming a symmetric and conically shaped glans, constructing a neourethra uniform in caliber and completing satisfactory cosmetic skin coverage. If these objectives can all be attained, the ultimate goal of forming a 'normal' penis for the child with hypospadias can be accomplished (1).

More than 200 techniques to correct hypospadias are described in the literature. The surgery can be technically demanding and surgeons performing the procedure must have a range of techniques at their disposal, allowing them to provide the best possible surgical result based on their findings at operation (6).

2.4.1 Age at Repair

The technical advances over the past few decades have made it possible to repair hypospadias in the first 6 months of life in most patients. However, most surgeons who deal routinely with hypospadias prefers to perform the repair when the patient is 6 to 12 months old. The European Association of Urology (EAU) suggests the age at surgery for primary hypospadias repair is usually 6-18 (24) months. Age at surgery is not a risk factor for urethroplasty complication in pre-pubertal tubularised incised plate urethroplasty (TIP) repair but complication occurs 2.5 times higher in adults than in the pediatric (1,4).

Two studies conducted in Ethiopia, at St. Paul's hospital millennium medical college and Tikur Ambessa Specialized Hospital, showed only 35.4% and 19.7% of patients were operated in the recommended age group(6-18months) respectively (2,3).

2.4.2 Types of procedures

Differentiation between functionally necessary and aesthetically feasible operative procedures is important for therapeutic decision making. A recent worldwide survey of pediatric urologists examined trends in hypospadias repair and showed the meatal advancement and glanuloplasty (MAGPI) procedure to be the most popular for glandular hypospadias with good appearance of the tissues and glans. In this survey, the tubularized incised plate (TIP) procedure, introduced by Snodgrass, is the most chosen technique in distal forms of hypospadias. The TIP procedure, although feasible, is not widely used for proximal

hypospadias. A two-stage technique is currently more popular for proximal hypospadias (4,6,11).

Snodgrass and staged hypospadias repair were the most utilized types of surgeries in Tanzania. Each of them comprises 55% and 18.7% respectively. Other study in Ethiopia by Maru G. et al indicated Tubularized incised plate(TIP) repair was the major(59.2%) surgical technique employed followed by staged urethroplasty (22%). Another study done at the country's biggest hospital showed that TIP was frequently performed for distal hypospadias 71.2 %, while transverse ventral preputal flap (TVPF) was the most common procedure done for proximal hypospadias (62.8 %) followed by two stage procedure (9.4%) and MAGPI(5.9%) (2,3,10).

2.5 Complications

The type and incidence of complications vary with the particular form of repair. Complications range from 6% to 48%, depending on the length of follow up and the techniques used. The most common recorded complications are poor cosmesis, fistulas, persistent chordee, urethral stricture, meatal stenosis, retrusive or proximal meatus, or glanular dehiscence (2-6,10)

A meta-analysis of complication rates of TIP repair found lower complication rates and incidence of re-operations in primary distal repairs (in 4.5%) than in primary proximal repairs (in 12.2%) and in secondary repair (in 23.3%). One should expect a predictable outcome with complication rates below 10% in distal hypospadias. A similar incidence of fistula (3.4-3.6%) can be expected after the Mathieu and TIP repairs of distal hypospadias (4).

The complication rates of TIP and onlay repairs of primary severe hypospadias are similar, 24% and 27%, respectively. It is higher in free graft and in preputial island tube urethroplasty. The complication rates of single-stage Koyanagi and Hayashi modification repairs go up 61%. A recent long-term study on two-stage flap repair showed a complication rate of 68%, another study showed a re-operation rate of 28% (4).

Approximately half, 48.7%, of the patients with hypospadias repair develop complications according to two institution based studies in Ethiopia. The type of hypospadias, presence of chordee, concomitant urogenital anomaly, type of procedure and duration of the catheter were significantly associated with postoperative complications. However, the presence of severe chordee remained significantly associated with postoperative complications on multivariate analysis (2,3).

3. OBJECTIVE

3.1 General Objective

To assess the clinical profiles and surgical outcomes of hypospadias patients who operated at Jimma University Medical Center Pediatrics Surgery Unit between 1 May 2018 and 30 April 2023GC.

3.2 Specific Objectives

- To assess the sociodemographic characteristics of pediatrics patients for whom hypospadias repair was done at JUMC Pediatrics Surgery Unit from 1 May 2018 and 30 April 2023GC.

- To identify the types of hypospadias presented at JUMC Pediatrics Surgery Unit from 1 May 2018 and 30 April 2023GC.

- To assess type of surgeries done for specific hypospadias types at JUMC Pediatrics Surgery Unit from 1 May 2018 and 30 April 2023GC.

- To assess outcome patients after hypospadias repair was done at JUMC Pediatrics Surgery Unit from 1 May 2018 and 30 April 2023GC.

4. METHODS AND MATERIALS

4.1 study Area and period

This study wasl conducted in Jimma University Medical Center (JUMC), one of the teaching and tertiary Hospital in Ethiopia located in Oromia Region, Jimma Zone; at Jimma Town. Jimma Town is located at about 346 km, south west of Addis Ababa. JUMC provides services for approximately 9000 inpatient and 80,000 outpatient attendants in a year coming to the hospital from the catchment population of about 20 million people within the catchments area covering a 250km radius.

There are different units under Surgery Department. Pediatrics surgery Unit is among the well-equipped units and has its own wards. It was established in 2014G.C. and it has been giving service for the population living in southwestern part of the country. There are two consultant pediatrics surgeons who are responsible in leading the overall activities in the unit. There are also attaching General Surgery Residents and Medical Interns who have been taking part in the patients' management.

This study included patients operated between 1 May 2018 and 30 April 2023G.C (Miazia 23, 2010-Miazia 22,2015E.C) at the Medical Center. The data was be collected from September to October 2023.

4.2 Study design

A cross-sectional descriptive study was conducted. Hospital based Chart review ….

4.3 Population

4.3.1 Source population

All Children who were admitted at pediatric surgery unit in the study period

4.3.2 Study population

Children who were under 14 years and underwent surgical management for Hypospadias at Jimma University Medical center at pediatrics surgery unit during study period.

4.4 Inclusion and exclusion criteria

4.4.1 Inclusion Criteria

The inclusion criteria was as follows: (I)all hypospadias patients who were Surgical managed as primary treatment for hypospadias; and (II) who has complete clinical data after their chart is retrieved.

4.4.2 Exclusion Criteria

The exclusion criteria will be as follows: (I) incomplete clinical data; and (II) less than 6 months of follow-up.

4.5 Variables of study

4.5.1 Dependent variables

- Outcome of hypospadias repair
- Length of Hospital Stay after surgery

4.5.2 Independent variables

- Socioeconomic factor
    - Age at first presentation
    - Age at surgery
    - Residence
    - Birth order
- Type of Hypospadia
- Presence of chordee
- Presence of other congenital anomaly
- Preoperative antibiotics
- Performed procedure
- Operation time
- Postoperative antibiotics

4.6 Sample size and sampling technique

This was a descriptive hospital based retrospective study which reviewed all case notes (Charts) of patients treated for hypospadias between 1 May 2018 and 30 April 2023G.C.

4.7 Data collection procedure and instrument

Data on socio-demographic characteristics, clinical presentation, operative technique and surgical outcome were collected by using Data was collected by using predesigned extraction checklist. and by reviewing patients' charts. Format with English language was utilized as data collection instrument. The charts were retrieved from Archive Room after identifying the patients from operation Logbook, Nursing procedure Registration Book, and Previous senior Logbook. Patients' unique Medical Registration Number (MRN) was used to retrieve their Charts .The format reliability was checked by collecting at least 5% of the data. Then it was revised, edited, and those found to be unclear ware modified after pretest. Furthermore, the format was evaluated by pediatrics surgeons, my consultants, before undertaking the final data collection. The data were collected by two trained medical interns with the close supervision. When there was ambiguity with the data found in the chart the more senior resident's note was considered as valid.

4.8 Data quality management

Each Format was checked for its completeness and consistency every time during data collection and before coding. Unclear and Incomplete formats were separated and checked by principal investigator together with data collectors.

4.8 Data processing and Analysis

Data were checked for completeness, coded and entered to EpiData software Version 3.5.1 and it was exported to SPSS version 24 for cleaning, verification and analysis. The results were be displayed by using frequency distribution, cross tabulation and graphs. Associations between different variables were assessed by using binary logistic regression followed by multiple logistic regression at p value of < 0.2 and < 0.05 respectively.

4.9 Operational Definitions

Pediatric patients are patients who are under 14 years of age (3). Hypospadias was classified as Distal/Anterior (glandular, coronal, and subcoronal), Middle (distal, mid and proximal penile), or Proximal (penoscrotal, scrotal, and perineal) according to the opening of the urethra after penile curvature correction (3,5). There are two of hypospadias: Mild hypospadias which is glanular or penile isolated hypospadias without associated chordee, micropenis or scrotal anomaly and Severe hypospadias which is defined as penoscrotal, perineal hypospadias with associated chordee and scrotal anomalies(4). Primary Hypospadia

repair is Patients who underwent surgery with no previous attempts for hypospadias repair (5,7).

Assessment of outcome includes: complication rate, cosmetic appearance of the penis, functional outcome (micturition, sexuality), and psychological factors such as quality of life and psychosexual life. This study mainly focuses on Complication and postoperative length of hospital stay to measure out comes. The most common complications following hypospadias repair are: urethrocutaneous fistula, meatal stenosis, urethral stricture, urethral diverticulum, glans dehiscence, breakdown, and cosmetic unfavorable outcome requiring redo-surgery (12).Late presentation/Operation is defined as patient who presented or operated for Hypospadias after 18months of age (4).

4.10 Ethical consideration

This study was conducted after obtaining ethical clearance from Jimma University Ethical Review Board. The letter was submitted to Jimma University Medical Center. Patients' information was collected from their chart confidentially and personal information was not disclosed to third parity. There was no direct or face to face contact between the patient and data collectors. Furthermore, it was unnecessarily to write patient's name on the format and training was given to data collectors concerning confidentiality.

4.11 Dissemination plan

After completion of this research, the finding will be organized and disseminated to Jimma university medical center and all other relevant stakeholders. The report will be presented to the department staffs and my colleagues. Furthermore, the findings will be presented as seminars and posters in scientific conferences. It will also be submitted to be published in reputable journal.

5. RESULTS

A total of 120 patients were operated for hypospadias in the specified period. Out of these, 86(71.7%) cases were included in this study by fulfilling the inclusion criteria. The rest, 34(28.3%), were excluded because of inability to retrieve their chart from Record Room or due to their incomplete data according to exclusion criteria.

5.1. Socio-demographic Condition

The mean age at presentation was 3.44 years (Range, 3days- 14years). Approximately two thirds of the patients, 53(61.6%) presented above 1.5 years (18months) and 16(18.6%) presented less than 6months. The rest, 17(19.8%),boys presented between 6 and 18 months. Half of the patients, 43(50%) had age of 2years or below and 68(79.1%) boys had age of 5years or below at first presentation. Nearly half of the patients, 41(47.7%), came from towns and rural areas of Jimma zone and 32(37.2%) came from outside of Jimma Town and Jimma Zone. Only 13(5.1%) cases came from Jimma Town(Table). 1).

Table 1 : Age at presentation in patients operated for hypospadias at JUMC, Jimma, Ethiopia, from May 2018 to April 2023.

Age at Presentation	Frequency	Percent	Cumulative Percent
Less than 6 Months	18	20.9	20.9
6 to 12 Months	8	9.3	30.2
12 to 18 Months	7	8.1	38.4
18 Months to 24 Months	10	11.6	50.0
3 to 5 years	25	29.1	79.1
5 to 10 years	13	15.1	94.2
11 to 15 years	5	5.8	100.0
Total	86	100.0	

5. 2. Clinical Presentation

Anterior Hypospadias was relatively the most common, 37(43%) followed by middle, 36(42%), and posterior hypospadias, 13(15%). Subcoronal hypospadias was the most common specific type of hypospadias, 27(31.4%) and there was no Scrotal Hypospadias (Table 2).

Table 2 : Type of Hypospadias in patients operated for hypospadias at JUMC, Jimma, Ethiopia, from May 2018 to April 2023.

Type of Hypospadias	Specific type of Hypospadias	Frequency	Percent(%)
Anterior	Glanular	5	5.8
	Coronal	5	5.8
	Subcoronal	27	31.4
Middle	Distal Penile	11	12.8
	Mid Penile	8	9.3
	Proximal Penile	17	19.8
Posterior	Penoscorotal	12	14.0
	Perineal	1	1.2
	Total	86	100.0

Chordee was present in the majority of cases, 46(53.5%). Of these boys, 35(76.1%) had severe and 11(23.9%) had mild forms. Nearly one third, 15(32.6%), of boys with chordee were presented with proximal penile hypospadias, followed by penoscorotal hypospadias, 11(23.9%). Out of 35 cases with severe chordee, 11(31.4%) and 10(28.6%) occurred in patients with proximal penile and penoscorotal hypospadias consecutively (Table 3).

Nearly half, 40(46.5%) of the boys were circumcised at presentation. Out of patients with anterior hypospadias 19(54.3%) were circumcised. Fifteen (42.8%) boys with middle and 4(30.8%) boys with posterior hypospadias were circumcised respectively. More than half of subcoronal(59%) and distal penile(63.6%) hypospadias patients were circumcised at the first visit specifically.

Table 3 : Chordee status in relation to circumcision status and Hypospadias type in patients operated for hypospadias at JUMC, Jimma, Ethiopia, from May 2018 to April 2023.

Chordee status		**Circumcision Status**		**Type of Hypospadias**		
		Circumcised	Not Circumcised	Anterior	Middle	Posterior
Present	Mild	3(6.5%)	8(17.4%)	4(8.7%)	6(13.0%)	1(2.2%)
	Severe	12(26.1%)	23(50.0%)	6(13.0%)	18(39.1%)	11(23.9%)
Absent		25(62.5%)	15(32.6%)	27(73.0%)	12(33.3%)	1(7.7%)
	Total	40(46.5%)	46(53.5%)	37(43.0%)	36(41.9%)	13(15.1%)

Congenital anomalies were identified in 18(20.9%) boys. There were more than one urogenital anomalies identified in four patients. Among these anomalies, patients with undescended testis were 8(44.4%) followed by patients with penoscorotal transposition, 7(38.9%) and inguinal Hernia (PPV), 3(16.7%) (Table 4).

Boys with Mild hypospadias (which is glanular or penile isolated hypospadias without associated chordee, micropenis or scrotal anomaly) were 40(46.5%); while patients with Severe hypospadias (which is penoscrotal, perineal hypospadias with associated chordee and scrotal anomaly) were 46(53.5%).

Table 4: Associated urogenital anomalies in patients operated for hypospadias at JUMC, Jimma, Ethiopia, from May 2018 to April 2023.

Associate congenital Anomalies	Frequency	Percent(%)
Microcephalus	1	5.6
Penile rotation	1	5.6
Undescended Testis	8	44.4
Penoscorotal Transposition	7	38.9
DSD	2	11.1
Inguinal Hernia /PPV	3	16.7
Solitary/Ectopic Kidney	2	11.1

5.3. Patient Management

The mean age of patients during primary surgery was 3.75 years (Range, 4months-14years).One third, 27(31.4%), of the patients were age between 6 and 18months and 1(1.2%) boy was operated below 6months.The remaining, 58(67.4%), cases operated at age of more than 18 months. Sixty seven (77.9%) boys were operated at the age of 5 years or below(Table 5).

Table 5 : Age aof patientsduring primary Surgery in patients operated for hypospadias at JUMC, Jimma, Ethiopia, from May 2018 to April 2023

Age of patient During Surgery	Frequency	Percent	Cumulative Percent
Less than 6 months	2	2.3	2.3
6 to 12 Months	14	16.3	18.6
13 to 18 months	12	14.0	32.6
19 to 24 Months	14	16.3	48.8
3 to 5years	25	29.1	77.9
6 to 10 years	14	16.3	94.2
10 to 14 years	5	5.8	100.0
Total	86	100.0	

Out of 83 patients who had documentation, almost all, 81(97.6%) boys were given preoperative antibiotics and the rest, 2(2.4%) didn't receive.

In more than three fourth cases, 66(76.7%), single stage hypospadias repair was done in this institution. Tibularized incised plate (TIP) was the most performed procedure, 51(59.3%) followed by Staged Urethroplasty 20(23.3%)(Table 5). TIP was used to repair most patients with anterior, 19(51.3%) and Middle, 29(80.5%) hypospadias. Staged urothroplasty was performed mostly for boys with posterior Hypospadias, 10(76.9%).For patients who had severe chordee staged urotheroplasty and TIP were the most performed procedures, 18(51.4%) and 16(45.7%) respectively. The mean operation time to perform TIP, First stage of Hypospadia repair and MAGPI were 1Hr and 48minutes, 2hrs and 8minutes, and 58minutes consecutively.

Table 6 : Types of Performed procedures in patients operated for hypospadias at JUMC, Jimma, Ethiopia, from May 2018 to April 2023

Specific Type of hypospadias	**Performed Procedure at First Surgery**					**Total**
	Tibularized Incised Plate/TIP	Staged Urethroplasty	Mathieu's Repair	MAGPI	Transverse Preputal Island Flap	
Glanular	0(0%)	0(0%)	0(0%)	5(55.6%)	0(0%)	5(5.8%)
Coronal	3(5.9%)	0(0%)	0(0%)	2(2.2%)	0(0%)	5(5.8%)
Subcoronal	16(31.4%)	5(25%)	4(80%)	2(2.2%)	0(0%)	27(31.4%)
Distal Penile	10(19.6%)	0(0%)	1(20%)	0(0%)	0(0%)	11(12.8%)
Mid Penile	8(15.7%)	0(0%)	0(0%)	0(0%)	0(0%)	8(9.3%)
Proximal Penile	11(21.6%)	5(25%)	0(0%)	0(0%)	1(100%)	17(19.8%)
Penoscorotal	3(5.9%)	9(45%)	0(0%)	0(0%)	0(0%)	12(13.9)
Perineal	0(0%)	1(5%)	0(0%)	0(0%)	0(0%)	1(1.2%)
Total	**51(59.3%)**	**20(23.2%)**	**5(5.8%)**	**9(10.5%)**	**1(1.2%)**	**86(100%)**

Nearly all, 83(96.5%) of operated cases were given postoperative antibiotics. Only Ceftriaxone was given for 74(89.1%) boys and ceftriaxone combined with other oral medications such as cotrimoxazole, cephalexine etc was provided for 9(10.9%) patients.

Out of the twenty patients for whom Staged urothroplasty were done 14(70%) boys had documentation for second surgery. The Average length of stay between the first and second surgery was 10.46 months. All patients were given antibiotics preoperatively and the mean operation time was 1hour and 56minutes. Ceftriaxone was given for 13(92.9%) of cases postoperatively and only one patient was not received.

5.4. Patient Outcome

Twenty seven (31.8%) of the patients had documented Postoperative complications on the first surgery, while 3 out of 14(24.4%) boys had developed postoperative complications on the second surgery. Overall, 30(34.9%) of the cases developed postoperative complications. Of these, 6(20.0%) patients had more than one complication. UCF was the most common complications which occurred in 15(50%) of the boys. Meatal stenosis and wound infection which were comprise 6(20.0%) and 5(16.7%) in descending order. No death was recorded as complication neither in the first nor the second Surgeries (Table 6).

Table 7: Postoperative complications in patients operated for hypospadias at JUMC, Jimma, Ethiopia, from May, 2018 to April, 2023

Post-operative complications	**Total cases**	**Percent(%)**
UCF	15	50.0
Meatal Stenosis	6	20.0
Wound infection	5	16.7
Catteter Slip	1	3.3
Recurrent Chordee	1	3.3
Scar contracture	1	3.3
Others	4	13.3

Out of the 30 patients who developed postoperative complications, 22(73.3%) of cases were operated at the age of above 18 months. Twenty seven (90%) of the boys came from outside of Jimma Town out of which 15(50%) came from Jimma zone. Among patients who had anterior, middle and posterior types of hypospadias, complications occurred in 8 (26.7%), 18(60.0%) and 4(13.3%) of cases respectively. Most complications, 10(33.3%) occurred in patients who had proximal penile hypospadias followed by patients who had subcoronal and distal hypospadias, 5(16.7%) each.

Out of the patients who had complications, 17(56.7%) boys had chordee; out of these 12(40%) boys had severe Chordee. With regard to degree of hypospadias more than half of the postoperative complications, 18(60%) were occurred in patients with severe hypospadias. The rest, 12(40%), complications were developed in boys with mild type of Hypospadias. Two thirds of post-operative complications, 20(66.7%), occurred in patients who underwent TIP repair and they comprise 39.2% of the Total patients for whom TIP was done.

Among the patients who developed postoperative complications 14(46.7%) were operated for the complications. UCF Repairs, 6(42.9%) and Meatoplaty/Meatotomy, 3(21.4%) were the most commonly performed procedures. The rest procedures were redo Urethroplasty, Recurrent chordee and post Buccal flap contracture release, Catheterization under anesthesia and suprapubic cystostomy to remove retained catheter.

The average preoperative hospital stay of the patients was 6.74 days whereas the mean post-operative hospital stay was 9.98 days and total duration of hospital stay was 16.54 days for the primary surgery. The mean postoperative hospital stay after second surgery was 10.57 days.

Factors associated with postoperative complications

Most complications occurred in patients operated at the age of above 18 months, came outside of Jimma Town, had Middle and Severe types of hypospadias, had chordee, and TIP repair was done. However; Age at Surgery, Residence, the type and degree of hypospadias, presence and grade of chordee, and type of procedures and operation time were analyzed for association with postoperative complications by using bivariate and multivariate analysis and there were no significant statistical association.

6. DISCUSSION

This study showed that the mean ages at presentation and primary operation were 3.44 years(Range, 3days- 14years) and 3.75 years (Range, 4months-14years) respectively. Above two thirds of the patients (67.4%) were operated at age of more than 18 months. Only one third (31.4%) of the patients were operated in the recommended age range (between 6 and 18months) or below 6months (1.2%). More than three fourth (77.9%) of boys were operated at the age of 5 years or below. The majority of the cases (84.9%) came from outside of Jimma Town. This finding is similar to a study conducted at St paul Mellineum Hospital College which showed the mean age at operation was 3.8 years (Range,0.5-14 years) and more than half (54.9%) of the patients reside in a rural area. The majority (64.6%) of the boys were above the age of 1.5 years (18 months). Another study conducted by Tihetena eth al. also showed 80% of patients were operated after the age of 18 months and many children were referred from outside of Addis Ababa (41.6%) (2,3). Slightly higher hypospadias repair was done at the age of 5 or below in this hospital(77.9%) when it is compared to a study conducted in Tanzania(61.2%)(10). Late presentation might be associated with lack of knowledge with hypospadias and poor socioeconomic status.

Anterior Hypospadias was relatively the most common (43%) than middle (42%) and posterior hypospadias (15%). Subcoronal hypospadias (31.4%) was the most common specific type of hypospadias. This is supported by a study conducted in Tanzania in which distal hypospadias was the most common (58.8%) followed by proximal and midshaft hypospadias which consists of 26.2% and 15% respectively. A study by Maru eth al. showed the most common hypospadias were Coronal (24.5%) followed by Glandular (19.9%). On the other hand, The study conducted at Tikur Ambessa Specialized Hospital confirmed the major three specific types of hypospadias were coronal, penoscorotal and distal penile which comprised 28.2%, 24.8% and 18.8% respectively (2,3,10). This gap might be due to difference in classification of distal and middle hypospadias in the studies. In addition to more complicated cases might be referred to Tikur Ambessa Specialized Hospital from different corners of the country.

Most patients, 53.5%, had chordee and among these, 76.1% had severe chordee. Sixty percent of severe chordee present with proximal hypospadias which might makes it difficult during repair. This finding agrees with studies conducted in Addis Ababa at two Big Hospitals (2,3).

Congenital anomalies were identified in 20.9% of boys. Among these anomalies, undescended testis was 44.4% followed by penoscorotal transposition, 38.9% and inguinal Hernia, 16.7%.

Different studies also pinpointed the association between Inguinal hernia or open processus vaginalis(PPV) and undescended testes they occur in 9-15% and 10% of cases respectively. Tihetena M eth al. showed coexistence of congenital anomalies in 18.3 % among which UDT accounts for 9.9 %, DSD 4.5% and inguinal hernias 2%. On the other hand, Microphallus (10.5%) was the commonest anomaly followed by penile rotation (7.6%) and undescended testis (6.5%) in one study. This finding is also supported by a study conducted in Tanzania where 17.5% of patients had coexisting congenital anomaly and UDT was the commonest. Severe hypospadias with unilaterally or bilaterally impalpable testis, or with ambiguous genitalia, requires a complete genetic and endocrine work-up immediately after birth to exclude DSD, especially congenital adrenal hyperplasia (1-4,10).

Tibularized incised plate (TIP) was the most performed procedure (59.3%) followed by Staged Urethroplasty(23.3%). This study showed that mostly TIP was used to repair patients who had anterior(51.3%) and Middle(80.5%) hypospadias whereas Staged urothroplasty was performed mostly for patients with posterior Hypospadias(76.9%). This is concomitant with other similar studies done at St. paul, in Tanzania, india and Europe (3,4,6,10,11) except Tikur Ambessa Hospital in which they use transverse ventral preputal flap (TVPF) for proximal hypospadias (62.8 %) (2).

The overall success rate in hypospadias repair in this institution was 65.1%. There was relatively low postoperative complications in this study (34.9%) when compared to studies conducted in Tikur Ambessa Specialized Hospital (44.1%) and St paul Mellinium college Hospital(48.7%)(2,3). However, it is higher when compared to a study which was conducted in China (11.2%)(5). Uretrocutaneus fistula was the most common complication (50%) in our study and this was similar to other studies conducted in Ethiopia and abroad(2-6). A study that was conducted by M. Massati eth al. in Tanzania showed 16.2% cases developed UCF while 17.4% of boys from total cases in this study; therefore it is comparable (10). Overall, the difference between the rate of complications with in the country's institutions might be almost all hypospadias surgeries were being performed by pediatric seniors(in our institution), while others are training centers for Fellows. The gap with the china might be

early presentations of the patients and medical technology advancement might be the reasons; but further studies will be required.

Out of 30 patients who developed complications anterior, middle and posterior types of hypospadias, comprise 26.7%, 60.0%, and 13.3% of cases respectively. This was equivalent to 21.6%, 50%, and 30.7% of total cases of the anterior, middle and posterior hypospadias repair developed complications consecutively. Most patients (56.7%) who had complications had chordee; out of these 40%of boys had severe Chordee. Regarding to procedure, Two thirds of post-operative complications (66.7%) occurred in patients who underwent TIP Repair and they comprise 39.2% of the total patients for whom TIP was done. This finding is higher when compared to different literature which shows distal repairs with MAGPI, glans approximation procedure (GAP), TIP, and meatal-based flap have overall complication rates of about 1–5%(1,4).This difference might be partly due to hypospadias classification difference(e.g penoscorotal hypospadias is classified unde posterior Hyposapadias).

This study revealed that more than half of the postoperative complications (60%) were occurred in patients with severe hypospadias and the rest complications (40%) were developed in boys with mild type of Hypospadias. Results from other literature vary, ranging from 4-60%, but the higher rates of complications were mainly occurred in the studies done on severe hypospadias (2,4). Severe hypospadias with unilaterally or bilaterally impalpable testis, or with ambiguous genitalia, requires a complete genetic and endocrine work-up immediately after birth to exclude DSD, especially congenital adrenal hyperplasia.

Finally, this study showed no significant association between postoperative complications and different variables. However, different studies showed the outcomes were related to age at surgery, the type of hypospadias, glans size, presence of chordee, concomitant urogenital anomaly, length of reconstructed urethra, postoperative constipation and type of procedure, exprience of the surgeon and operation time (2-5).The lack of association might be related to small sample size compared to other studies.

The mean post-operative hospital stay was 9.98 days for the first surgery while total duration of hospital stay was 16.54 days. The average postoperative hospital stay after second surgery was 10.57 days for Staged Urethroplasty. Hypospadias repair is performed as outpatient bases in developed countries(1), however; this might not be applicable in our conditions where people has low socioeconomic status, low awareness and travel a long distance to visit health institutions.

7. STRENGTHS AND LIMITATIONS OF THE STUDY

7.1. **Strengths of the study**

This study can be considered as one tool for evaluating the past five years works on hypospadias. It provided important baseline information to the institution on patients' age at presentation, pattern of hypospadias and management outcomes. This information can be used as baseline for evaluating the future works on hypospadias and in improving patient management. Furthermore, finding from this study will be incorporated with other studies in order to predict the country's condition on hypospadias management.

7.2. Limitations of the study

Utilizing secondary data to as source of information was the short coming of this study. Including all patients who were operated for hypospadias in specified period were impossible because some charts were lost and some were incomplete. The total numbers of cases were relatively small when compared to other studies. There were also incomplete data regarding details of the techniques and materials used, experience of the operating surgeon, maternal age, birth order, duration of catheter, glans size and other factors affecting the patient's management outcomes in this study. Furthermore, short postoperative follow-up is also a limitation which is mainly attributed by the retrospective nature of the study.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusions

From this study the following conclusions were drawn:

- Most patients with hypospadias present lately and most hypospadias repair was being done above the recommended age.
- There was no association between residence and arrival at early age.
- Anterior Hypospadias was relatively the most common while Subcoronal hypospadias was the most common specific type of hypospadias.
- Chordee was present in the majority of cases,
- Nearly half of the boys were circumcised at presentation.
- The most common associated anomalies were UDT.
- In most of cases single stage hypospadias repair was done. TIP was used to repair most anterior and Middle hypospadias whereas Staged urothroplasty was performed mostly for posterior hypospadias.
- The overall two thirds of hypospadias repair in this institution were successful. UCF was the most common postoperative complications after hypospadias repair.

7. Recommendations

Based on this study the following recommendations were stated:

- This Institution, the Zonal Health Bureaus within the catchment area, and other concerned public health professionals should be involved on public awareness creation concerning hypospadias and on the importance of early identification and referral.
- Future prospective cohort or case control or cross sectional studies should be considered to further elucidate factors affecting the late presentation, short and long term outcome, to explore what were the strengths in this institution and to share experiences to others

ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific ethical and technical conduct of the research project and for provision of required progress reports as per terms and conditions of the Institute of Health School of Medicine in effect at the time of grant is forwarded as the result of this application.

Name of the student: _____

Date._____ Signature _____

APPROVAL OF THE FIRST ADVISOR

Name of the first advisor: _____

Date._____ Signature _____

APPROVAL OF THE SECOND ADVISOR

Name of the second advisor: _____

Date._____ Signature _____

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ANNEX I: Data collection Format

This study will be conducted to assess the clinical profiles and surgical outcomes of pediatrics patients who underwent surgery for hypospadias at Jimma University Medical center, Pediatrics surgery Unit Unit between 1 May 2018 and 30 April 2023GC. This study has been approved by the university ethical committee. Only anonymous data will be analyzed. It is essential to fill the format with correct information by reviewing patient's Chart and relevant sources' of information.

The format has four parts. The first three parts include: ***the Sociodemographic***, ***Clinical presentation, operative technique and surgical outcome for the first or definitive surgery***. The ***fourth part will be only filled for staged surgery for hypospadias***. Therefore, it is important to identify the surgery type and order before filling this format.

The format has structured and semi structured questions. Encircle your findings from the choices available or fill your findings with illegible handwriting on space provided based on the questions. Before selecting **'' Missing''** for a given question, you have to review all relevant sources such as operation and Nursing Log books in addition to patient charts. For Unclear conditions you can communicate the principal investigator with the phone number that was provided.

MRN_____

Part I: Socio-demographic information

No	Questions	Codes of possible response
1	**Age at (first) presentation**	**_____months** **99.Missing**
2	**Age at (first) surgery**	**_____months** **99. Missing**
3	**Date of Admision (for first surgery)**	**DD/MM/YY_____E.C** **99. Missing**
4	**Birth Order**	**1. First** **2. Second** **3. Third** **4. Fourth** **5. Other (specify)_____** **99. Missing**
5	**Date of surgery** **(N.B: This is date for the first surgery in case of staged urethroplasty: for the second surgery Go to Q)**	**DD/MM/YY_____E.C** **99. Missing**
6	**Residence**	**1.Jimma town** **2. Jmma zone** **3. Outside of Jimma zone** **99. Missing**
7	**Maternal age**	**_____years** **99. Missing**
Part II: clinical presentation		
8	**Type of hypospadias**	**1. Anterior** **11. Glanular** **12. Coronal** **13. Subcoronal**

		1. Middle **21.Distal penile.** **22.Mid penile** **23.Proximal penile** **3. Posterior** **31.Penoscorotal** **32. Scorotal** **33.Perineal** **99. Missing**
9	**Was there Chordee?**	**1.Present** **2.Abesent** **99.Missing**
10	**What was the Grade of Chordee?**	**1. Mild** **2. Severe** **99. Missing**
11	**Was the patient Circumcised?**	**1. Yes** **2. No** **99. Missing**
12	**Was there any associated congenital Anomaly?**	**1.Yes** **2.No** **99.Missing**
13	**If the answer is Yes for the Q12 What type Congenital anomaly/ anomalies was identified? (more than one answer is possible)**	**1.Microphallus** **2.Penile rotation** **3.Inguinal hernia** **4.Undescended testis(UDT)** **5.Pelvi-uretraljunction obstruction** **6.Disorder of sex development(DSD)** **7. Penoscrotal transposition** **8. Other(Specify)_____** **99. Missing**
Part III: operative technique and surgical outcome (postoperative complications)		
14	**Was Preoperative antibiotics**	**1. Yes**

	given?	**2. No** **99.Missing**
15	**Performed procedure**	**1.Tabularized incised plate** **2. Staged urethroplasty** **3.Mathieu's repair** **4. Onlay island flap** **5.Meatal Advancement and Glanuloplasty Incorporated (MAGPI)** **6. Transverse preputal island flap** **7. Other(specify)_____** **99. Missing**
16	**Operation Time**	**_____hrs** **99. Missing**
17	**After how many post days was the catheter removed?**	**_____days** **99. Missing**
18	**Was there any complications?**	**1.Yes** **2. No** **99. Missing**
19	**If yes for Q 18 What was the complication? (more than one answer is Possible)**	**1. Catheter slip** **2. Urethrocutanous fistula** **3. Meatal stenosis** **4. Urethral stricture** **5. Urinary tract infection (UTI)** **6. Urethrocutanous fistula(UCF)** **7. Recurrent chordee** **8. Glans breakdown** **9. Wound Infection** **10. Bleeding** **11. Other(specify)_____** **99. Misssing**
20	**Was post-operative antibiotics was given?**	**1. Yes** **2. No** **99. Missing**

21	**what type of antibiotics was given**	**1. Ceftriaxone** **2. Ampicillin and Gentamicin** **3. Cotrimoxazole PO** **4. Other(specify)_____** **99.Missing**
22	**Was the patient operated for the complication?**	**1. Yes** **2. No** **99. Missing**
23	**If the answer for Q22 is yes What was the procedure?**	**1.UCF Repair** **2. Meatoplasty** **3. Redo Urethroplasty** **4. Other(specify)_____** **99. Missing**
24	**When was the patient discharged?**	**DD/MM/YY _____E.C** **9.Missing**
Part IV: Fill only For Staged Urethroplasty Sugery Only; For the second surgery		
25	**Age at second presentation**	**_____months** **99.Missing**
26	**Date of Admision (for second) surgery)**	**DD/MM/YY_____E.C** **99. Misssing**
27	**Date at second surgery**	**DD/MM/YY_____** **99. Missing**
28	**Was Preoperative antibiotics given?**	**1. Yes** **2. No** **99.Missing**
29	**Operation Time**	**_____hrs** **99. missing**
30	**Was there any complications?**	**1.Yes** **2. No** **99. Missing**
31	**If yes for Q 29 What was the**	**1. Catheter slip**

	complication? (more than one answer is Possible)	**2. Urethrocutanous fistula** **3. Meatal stenosis** **4. Urethral stricture** **5. Urinary tract infection (UTI)** **6. Urethrocutanous fistula(UCF)** **7. Recurrent chordee** **8. Glans breakdown** **9. Wound Infection** **10. Bleeding** **11. Other(specify)_____** **99. Missing**
32	**Was post-operative antibiotics was given?**	**1. Yes** **2. No** **99. Missing**
33	**what type of antibiotics was given**	**1. Ceftriaxone** **2. Ampicillin and Gentamicin** **3. Cotrimoxazole PO** **4. Other(specify)_____** **99.Missing**
34	**Was the patient operated for the complication?**	**1. Yes** **2. No** **99. Missing**
35	**If the answer for Q34 is yes What was the procedure?**	**1. UCF Repair** **2. Meatoplasty** **3. Redo Urethroplasty** **4. Other(specify)_____** **99. Missing**
36	**When was the patient discharged?**	**DD/MM/YY _____E.C** **9.Missing**

ANNEX II: Conceptual Framework