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The outcome of patients with Hypospadias Post Chordectomy and Urethroplasty based on Hose Score at Dr. Moewardi Regional General Hospital during the period 2018-2022

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ABSTRACT

Background and Objectives. Hypospadias is the second most prevalent congenital anomaly that impacts the male external genitalia. The main objective of hypospadias surgical correction is to align the penis and create a meatus, to provide a visual resemblance to either a circumcised or uncircumcised penis. The surgical treatment of penile curvature is often performed in two steps which involves chordectomy or urethroplasty.

Materials and Methods. The study was conducted in the Pediatric Surgery Subdivision of Dr. Moewardi Regional General Hospital in Surakarta from January 1st, 2018, to December 1st, 2022. The study employed a retrospective descriptive approach. The acquired data were analyzed using the GMS score classification and evaluated using the HOSE score system. The data underwent a univariate test using SPSS software, and the analysis findings were subsequently interpreted.

Results. The researcher obtained 103 valid data points without any missing values detected. The patients' ages ranged from 1 to 18 years. The GMS values varied between 4 to 10, with a mean score of 7.02. The lowest reported HOSE score was 8, while the highest score was 16, resulting in an average HOSE score of 12.11. From all the data collected, the total number of patients with a GMS score of high risk (6 or more) was 69 (67%), while those with a low-risk score (less than 6) amounted to 34 patients (33%).

Conclusions. The majority of overall HOSE scores fell within the range of <14 (indicating abnormal anatomy), with 71 patients (68.9%), while the range of scores 14-16 (indicating normal anatomy) comprised 32 patients (31.1%).

Keywords: Hypospadias, Chordectomy, Urethroplasty, GMS score, HOSE score

Abbreviations:

HOSE : Hypospadias Objective Scoring Evaluation

GMS : Glans–Urethral Meatus–Shaft

BDMP : Birth Defects Monitoring Program

INTRODUCTION

Hypospadias is a congenital anatomical abnormality in males when the urethral opening is located in an atypical position [1]. After cryptorchidism, this congenital disorder is the second most frequently observed condition affecting external genitalia. It occurs in approximately 1 in every 200-300 male births [2]. Hypospadias can be categorized into three severity levels based on the urethral meatus's anatomical location: anterior hypospadias, middle/intermediate hypospadias, and posterior hypospadias [3].

The Birth Defects Monitoring Program (BDMP) conducted by Paulozzi found that the prevalence of hypospadias in 23 European nations between 2001 and 2010 was 18.61 per 10,000 newborns [4]. The prevalence of this condition in Asia varies from 0.6 to 69 cases per 10,000 births [2]. However, the precise occurrence rate of hypospadias in Indonesia is unknown. 53 patients had treatment at Rumah Sakit Sanglah Denpasar Bali from January 2009 to April 2012. However, a mere 27 of these individuals possessed comprehensive medical records. Between 2010 and 2012,

there were a total of 120 documented instances of hypospadias in the region of Central Java [5,6]. From 2015 to 2020, a study conducted at Dr. Moewardi Regional General Hospital in Surakarta documented 103 instances. The age group with the highest diagnostic rate was 1-5 years, and 24.3% had additional congenital disabilities [7].

The diagnosis of hypospadias can be made soon after birth. Key characteristics include a groove on the glans and dorsal hood, but in almost all cases, the hood is incomplete ventrally. Additionally, the urethral meatus is usually located in an abnormal position. If the baby has a complete foreskin, hypospadias may become evident after circumcision. The main goal of hypospadias surgical correction is to straighten the penis with an adequate calibre meatus to achieve an appearance resembling either a circumcised or uncircumcised penis while ensuring satisfactory cosmetic outcomes.

Surgical correction is the primary treatment for proximal hypospadias. In cases of proximal, penoscrotal, and scrotal hypospadias with chordee, patients usually undergo a two-stage repair with initial surgery consisting of chordectomy (penile straightening by excising chordee) and urethroplasty (creating a new urethra). Surgery is recommended when the patient is between 6 and 18 months old to limit psychological stress and behavioral issues observed in patients treated later in life. The older the age, the higher the complication rate after surgery. Immediately after surgery, edema and tiny blood spots often occur. Some cases of bleeding may require a return to the operating room. Infections are rare. Over time, the development of urethrocutaneous fistula becomes a significant issue. However, the occurrence of these fistulas is significantly reduced when surgery is conducted in a single stage. Additional problems encompass meatal stenosis, urethral stricture, urethral diverticulum, and erectile dysfunction [8]. This study evaluates the results of individuals with hypospadias after undergoing chordectomy and urethroplasty at Dr. Moewardi Regional General Hospital between January 1st, 2018, and December 1st, 2022.

MATERIALS AND METHODS

This study is conducted in the Pediatric Surgery Subdivision of Dr. Moewardi Regional General Hospital in Surakarta. The research will be conducted throughout 2024 by reviewing patient

medical records from January 1st, 2018, to December 1st, 2022. This study adopts an observational research design with a descriptive retrospective method. Data collection is performed using a total sampling technique. The subjects are hypospadias patients who were treated at Dr. Moewardi Regional General Hospital from January 1st, 2018, to December 1st, 2022, with a maximum age of 18 years, who underwent chordectomy and urethroplasty therapy, and are willing to participate in the study by signing informed consent. Subjects will be excluded if they were admitted due to trauma, have incomplete medical records, were discharged at their request, or are unwilling to participate in the study,

All collected data will be described based on the GMS (Glans-Urethral Meatus-Shaft) scoring classification (Table 1), and outcomes will be assessed using the HOSE (Hypospadias Objective Scoring Evaluation) scoring system (Figure 1). Subsequently, univariate analysis will be conducted using SPSS software, followed by interpretation of the analysis results. The data with scoring measurements will be compared with relevant previous literature.

Table 1. GMS Scoring Classification (Merriman et al., 2013)

Point	Score G (Glans)	Score M (Meatus)	Score S (shaft)
1	Glans size good size; healthy urethral plate, deeply grooved	Glanular	No chordee
2	Glans adequate size; adequate urethral plate, grooved	Sulcus corona	Mild Chordee (<30°)
3	Glans small in size; urethral plate narrow, some fibrosis or flat	Mid or distal shaft	Moderate Chordee (30° - 60°)
4	Glans very small; urethral plate indistinct, cery narrow or flat	Proximal shaft, penoscrotal	Severe Chordee (>60°)

***Total score ≤6: Low risk of hypospadias surgery complications**
***Total score >6: High risk of hypospadias surgery complications**

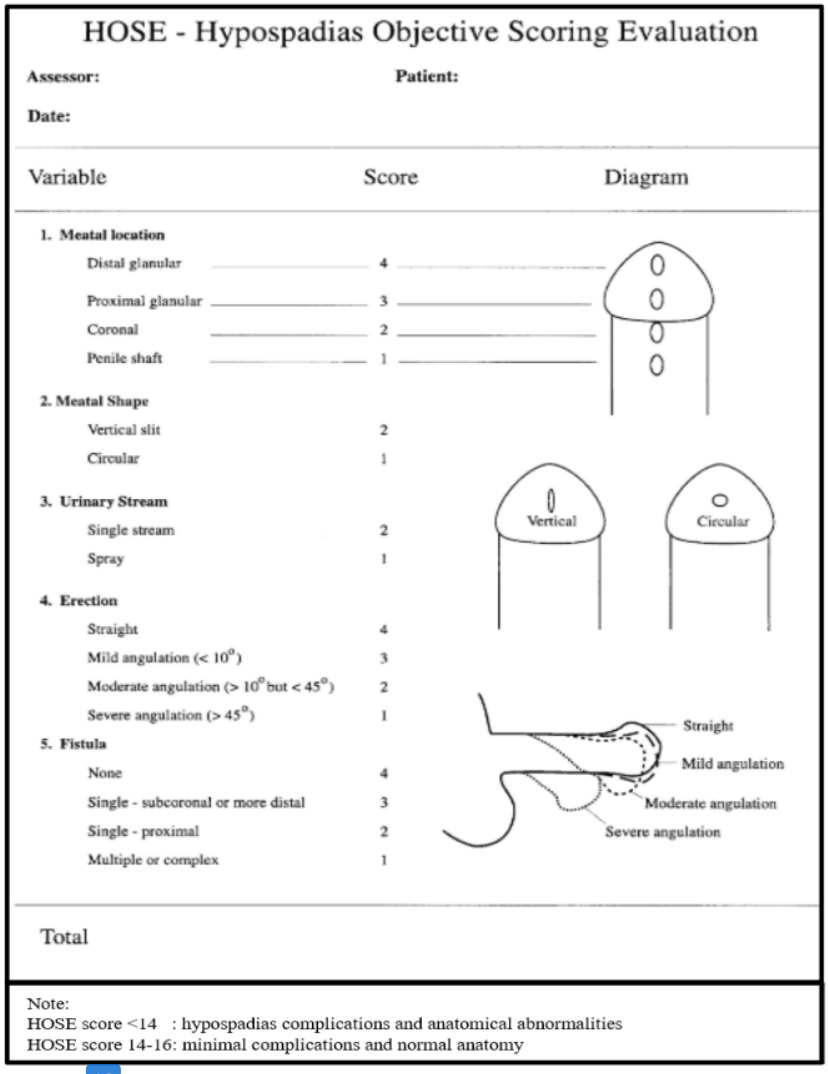

Figure 1. Hypospadias objective scoring evaluation/HOSE assessment score (Holland et al.,2001)

RESULTS

The investigation identified a total of 103 instances of hypospadias. The investigation identified a total of 103 cases of hypospadias. The researcher inputted all the data into the SPSS software and generated a reliable dataset comprising 103 cases without any instances of missing data identified. The study included participants ranging in age from one to 18 years old. The mean age of the participants was 7.84 years. The GMS values varied between 4 to 10, with a mean score of 7.02. The HOSE score ranged between 8 and 16, with a mean score of 12.11 (Table 2). Based on this study, a significant proportion of persons diagnosed with hypospadias fell within the age range of 1-6 years, constituting 47.6% of the total cases. Children between 7 and 12 comprised 36.9% of the cases, while adolescents between 13 and 18 accounted for 15.5% (Table 3). Most of the GMS scores, precisely 67%, were found to be above 6, which indicates a significant level of risk. In contrast, 33% of the patients obtained scores of 6 or lower (Table 4).

The HOSE score findings revealed that 19.4% of patients (n=20) had a distal glandular meatus position (score 4), 19.4% of patients (n=20) had a proximal glandular location (score 3), 14.6% of patients (n=15) had a coronal location (score 2), and 46.6% of patients (n=48) had a penile shaft site (scoring 1). The shape of the meatus in patients was classified as a vertical slit (scoring 2) in 66 patients (64.1%) and as circular (scoring 1) in 37 patients (35.9%). Among the entire patient population, 74 individuals (71.8%) exhibited a single-stream urine flow with a score of 2, while 29 patients (28.2%) had a spray-like urine flow with a score of 1. The study revealed that 54 patients (52.4%) experienced a straight erection, scoring 4. Additionally, 28 patients (27.2%) had a slight angulation of less than 10 degrees, scoring 3. Furthermore, 18 patients (17.5%) had moderate angulation ranging from 10 to 45 degrees, scoring 2. Lastly, three patients (2.9%) had a severe angulation exceeding 45 degrees, scoring 1. The study found that 45.6% of the patients had no fistula findings, scoring 4, whereas 43.7% had a single fistula placed subcoronally or farther distally, scoring 3. Additionally, ten patients had a single fistula located proximally (score 2), and only one had multiple or complicated fistulas (score 1). Regarding meatus location, the penile shaft was the most common location, observed in 48 patients (46.6%). The most frequent meatus shape was a vertical slit, found in 66 patients (64.1%). Single-stream urine flow was most commonly observed in 74 patients (71.8%). The majority of patients (54 patients, 52.4%) had a straight erection type. The most common fistula type was none, observed in 47 patients (45.6%). These findings are summarized in Table 4. The HOSE score ranges from 10 to 13, with the most significant total score. This number corresponds to abnormal anatomical results and accounts for 68.9% of the cases. On the other hand, a score of 14 to 16 indicates average anatomical results and represents 31.1% of the cases (Table 6). Additionally, ten patients had a single fistula located proximally (score 2), and only one had multiple or complicated fistulas (score 1). Regarding meatus location, the penile shaft was the most common location, observed in 48 patients (46.6%). The most frequent meatus shape was a vertical slit, found in 66 patients (64.1%). Single-stream urine flow was most commonly observed in 74 patients (71.8%). The majority of patients (54 patients, 52.4%) had a straight erection type. The most common fistula type was none, observed in 47 patients (45.6%). These findings are summarized in Table 4. The HOSE score ranges from 10 to 13, with the most significant total score. This number corresponds to abnormal anatomical results and accounts for 68.9% of the cases. On the other hand, a score of 14 to 16 indicates average anatomical results and represents 31.1% of the cases (Table 6).

Table 2. Mean, Minimum, and Maximum Values of Age, GMS Score, and HOSE Score

		Age	GMS Score	HOSE Score
Number of Measurements	Valid Data	103	103	103
	Missing Data	0	0	0
Mean Value		7,84 years old	7,02	12,11
Minimal Value		1 year old	4	8
Maximum Value		18 years old	10	16

Table 3. Profile of Hypospadias Patients' Age

Age Profile	Number	Percentage (%)
1-6 years old	49	47,6%
7-12 years old	38	36,9%
13-18 years old	16	15,5%

Table 4. Total GMS Score

Total GMS Score	Score	Number	Percentage (%)
	≤6 (*low risk*)	34	33%
	>6 (*high risk*)	69	67%

Table 5. HOSE Score

HOSE Score	1		2		3		4		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%
Meatus Location	48	46,6 %	15	14,6 %	20	19,4 %	20	19,4 %	103	100 %
Meatus Shape	37	35,9 %	66	64,1 %					103	100 %
Urine Stream	29	28,2 %	74	71,8 %					103	100 %
Erection	3	2,9%	18	17,5 %	28	27,2 %	54	52,4 %	103	100 %
Fistula	1	1%	10	9,7%	45	43,7 %	47	45,6 %	103	100 %

Table 6. Total HOSE Score

Total HOSE Score	Score	Number	Percentage (%)
	< 14 (Abnormal anatomical result)	71	68,9%
	14-16 (Normal anatomical result)	32	31,1%

DISCUSSION

The prevalence of hypospadias is estimated to be between 0.2 and 4.1 cases per 1000 live births [9, 10]. This condition, known as male genitourinary system disease, occurs when the embryonic urethral folds do not completely merge during the 7th to 14th weeks of pregnancy [9]. Hypospadias necessitates correcting anatomical, long-term functional, and esthetic issues [10].

Based on the research data, it is evident that there are 49 patients aged 1-6 years, 38 patients in the 7-12 year group, and 16 patients in the 13-18 year group. In this study, the average age of individuals identified with hypospadias was 7.84 years, which is lower than the average age of 9 years reported in earlier studies [11].

Hypospadias surgery is a complex and challenging technique. Several variables can impact the outcomes of hypospadias correction, and one of these variables is the age at which the repair is

performed. This study examined patients ranging in age from 1 to 18 years old. The survey conducted by Hussein et al. included patients who underwent first-stage surgery between the ages of 3 and 17 years old and second-stage repair between the ages of 4 and 18. The age of persons at the time of hypospadias correction, namely those aged 18 and below, is a significant factor that affects the success rates of the procedure. The cumulative success rates range from 37% to 77%. However, when a third repair stage is included, the success rates increase to over 95% [12].

A study conducted at Dr. Moewardi Surakarta Regional General Hospital revealed that 34 patients had GMS scores below 6, whereas 69 patients had scores of 6 or above. The GMS score offers a concise approach to quantifying the severity of hypospadias and is closely associated with the likelihood of surgical complications [13]. Merriman et al.'s study showed that patients with a GMS score of less than 6 had a surgical problem rate of 5.6%, while patients with a GMS score of 6 or more had a surgical complication rate of 25% [13]. Therefore, the study sample exhibited a significant incidence of surgical complications, affecting 69 out of 103 patients. According to a study conducted by Arlen et al., the average GMS total score was 7 ± 2.5 (G 2.1 ± 0.9, M 2.4 ± 1, S 2.4 ± 1). According to the study, 37 individuals, which accounts for 14.1% of the total, encountered 45 problems. A substantial correlation was found between the overall GMS score and the occurrence of the issues. Specifically, for each additional unit rise in the GMS score, the likelihood of experiencing a postoperative complication increased by a factor of 1.44 [14]. According to this research, the minimum GMS score is four, and the maximum score is 10, with an average total GMS score of 7.02. Consequently, this trial's participants had a significantly elevated chance of experiencing problems.

Hussein et al. mentioned in their study that knowing the HOSE score can be a reference for assessing the suitability of two-stage hypospadias repair for all types of hypospadias and yield diverse outcomes.

HOSE is a simple, non-invasive, inexpensive, and easy method to assess long-term outcomes of hypospadias objectively repair [12]. Thiry et al., in their study, mentioned that the HOSE

questionnaire was designed so that the minimum total score is 5, corresponding to the lowest score for each variable, up to a maximum total of 16, equivalent to the highest score for each variable. Results ≥14 are considered acceptable outcomes [15, 16].

Patient outcomes in this study showed the lowest HOSE score as 8, with the average HOSE score of 12.11, and the most common HOSE score in the range of 10-13, indicating unacceptable/abnormal anatomy in 71 patients. Meanwhile, the highest HOSE score was 16, and the range of standard/acceptable anatomical outcomes with scores of 14-16 was found in 32 patients.

CONCLUSION

Dr. Moewardi Surakarta Regional General Hospital recorded 103 people with hypospadias from 2018 to 2022. Most patients were between 1 and 6, with an average diagnostic age of 7.84. Based on the collected data, most patients (67%) had a GMS score of 6 or higher, which is classified as "high risk". On the other hand, 33% of patients had a score of less than 6, indicating "low risk". Every patient received chordectomy and urethroplasty surgeries, and their post-operative evaluation was conducted using the HOSE score. Among the HOSE scores, the majority, accounting for 68.9% (71 patients), were below 14, suggesting abnormal anatomy. On the other hand, 31.1% (32 patients) had scores ranging from 14 to 16, indicating average anatomical outcome.

CONFLICT OF INTEREST

None declared

AUTHOR'S CONTRIBUTIONS

Conceptualization, software, investigation, resources - Septriarta Parlindungan

Conceptualization, methodology, resources, data curation, supervision - Nunik Agustriani

Conceptualization, validation, resources, data curation, supervision - Widyanti Soewoto

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