ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES SCHOOL OF MEDICINE DEPARTMENT OF SURGERY

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TITLE PAGE

Comparative Outcome Analysis of Single Vs. Staged Proximal Hypospadias Repair in Children Treated at Tikur Anbessa Specialized Hospital and Menilik II Hospital from 2010 To 2020 G.C

A THESIS TO BE SUBMITTED TO DEPARTMENT OF SURGERY, COLLEGE OF HEALTH SCIENCES, ADDIS ABABA UNIVERSITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR SPECIALITY CERTIFICATE IN PEDIATRICS SURGERY.

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DECLARATION

This is to certify that the thesis entitled “Comparative Outcome Analysis of Single Vs. Staged Proximal Hypospadias Repair in Children Treated at Tikur Anbessa Specialized Hospital and Menilik II Hospital from 2010 To 2020 G.C”; submitted as partial fulfilment of specialty in Pediatrics Surgery, Addis Ababa University, is a record of my original work and has not been submitted to any other institution for any purpose. The references used for this thesis proposal are properly cited and the assistance I received has been duly acknowledged.

_____ _____

Name of the candidate Date

APPROVAL OF THESIS FOR DEFENSE

I hereby certify that I have supervised, read and evaluated this thesis titled “Comparative Outcome Analysis of Single Vs. Staged Proximal Hypospadias Repair in Children Treated at Tikur Anbessa Specialized Hospital and Menilik II Hospital from 2010 To 2020 G.C” by Dr. Samuel Kefiyalew under my guidance I recommended the thesis for oral defence.

Advisor’s name	Signature	Date
_____	_____	_____

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LIST OF ACRONYMS

TIP	Tubularized Incised Plate
TD	Thiersch Duplay
OIF	Onlay Island Flap
TVPF	Transverse Ventral Preputial Flap
TIP	Tubularized Incised Plate
MRN	Medical Record Number

Abstract

Introduction: Long-term surveillance show proximal hypospadias repair has a higher complication rate (50% to 68%) than distal hypospadias repair (5% to 10%). In present study, we aim to identify and compare the complication rate between single stage hypospadias repair and staged hypospadias repair.

Methods: A retrospective chart review study of boys undergoing proximal hypospadias repair between January 2010 and December 2020 G.C. in Tikur Anbessa specialized and Comprehensive Hospital and its affiliate Menilik Comprehensive Hospital. Pearson Chi-square and logistic regression analyses were performed to assess associations and effect size, respectively.

Results: A total of 75 patients were included, with a median age at surgery of 36.0 months. Forty-six in single stage group (Long tubularized incised late (TIP**)** 30, Transverse Ventral Preputial Flap (TVPF) 15, and Onlay Island Flap (OIF) 1) and 29 in staged group (staged preputial island flap 27, and staged preputial graft 2). The overall complication rate was 70.6% (53/75 patients), 32/46 (69.6%) single stage repair, and 21/29 (72.4%) staged repair. There was a significant preference toward staged hypospadias repair in last 4 years of the study period. Reoperation for glans dehiscence was significantly higher in the staged group (31.0% vs. 4.3%, P = 0.002). Overall complication rate and urethrocutaneous fistula (UCF) were significantly higher in TVPF when compared with Long TIP, 93.3% vs. 56.7% and 73.3% vs. 26.7%, respectively.

Conclusion: We found a high complication rate for both single stage and two stage repairs. Higher complication rate in our report warrants further investigation and risk identification to achieve satisfactory outcomes.

Key words: proximal hypospadias, single vs. staged repair, sub-Saharan Africa, resource-limited setting

CHAPTER 1: INTRODUCTION

1.1 Background

Hypospadias is the commonest congenital anomaly of penis affecting 0.4–8.2 of 1000 live male babies (1,2). It results from abortive development of ventral penile tissues leading to the classical appearance of a dorsally hooded foreskin, proximal urethral meatus, and ventral penile curvature (3–5).

Hypospadias has been classified on various ways based on ectopic location of the urethral meatus (6–9). Duckett argue that preoperative location of ectopic urethral meatus often overlooks posterior displacement of the meatus once chordea is released in patient with severe chordae (8,8). He proposed that the classification should be done after degloving (8,8). In 2004, Hadid published a summary of hypospadias classifications based on location of the ectopic meatus. The author recommends that 'surgeons conduct both a preoperative assessment based on the clinical site of the meatus and an intraoperative assessment based on the position of the meatus after straightening of the penis. Such a classification should help to standardize the description of different types of hypospadias and associated anomalies' (7). In 2012, Orkiszewski, found out that urethra distal to division of corpus spongiosum division is incomplete in structure, it lacks the spongiousum, stenotic and overlying skin is thinned out, and suggested that new classification of hypospadias based on the position of the division of corpus spongiosum in respect to the penile shaft and bony structures of the pelvis (4). So, he defined proximal hypospadias as division of corpus spongiousum below upper pubis (4). In general, there is no universally accepted method of classifying hypospadias or defining proximal hypospadias. Despite its drawbacks, some authors concur that classifying hypospadias using the external urethral opening is still simple and easily reproducible (3,10).

There is multiple surgical option for proximal hypospadias repair. Generally, they can be categorized as single stage and staged procedures. Perhaps the most important element in choosing the type of treatment is the degree of ventral curvature, along with the quality of the urethral plate and other parameter (11,12). Degree of Ventral curvature measured using a goniometer following penis degloving. Dorsal plication is typically used to correct VC<30°, however VC>30° necessitates more complex maneuvers (11–13). Using dorsal plication alone in patient with sever chordae predispose to recurrent penile curvature and shortening of penis (11,14,15). During single-stage operations, ventral curvature and ectopic meatus are

simultaneously corrected. In a two-stage procedure, the first stage mostly deals with chordae repair, and the second stage primarily deals with neourethra formation. The interval between the two procedures must be at least six months (5,11–13)**.**

Management of proximal hypospadias is associated with higher urethroplasty complication rate (50% to 68%) when compared with distal hypospadias repair (5% to 10%) (11). Although most these complications are identified in first year of life, longer follow up yields higher complication rate (16,17).

1.2 Statement of the problem

Objective for reconstruction of hypospadias is well established (18). Regardless of whether a single stage procedure or staged procedures are used, the aim is to make the penis straight enough to achieve satisfactory sexual function in the future, to enable voiding with good velocity and smooth flow, and from a cosmetic perspective, to achieve a conical glans with slit-like meatus at the tip (18).

After-repair complications such as fistula, recurrent/persistent chordea, meatal stenosis, urethral stricture, and glans dehiscence have a significant impact on quality of life (18). Recent studies have shown the actual outcome of children who undergone proximal hypospadias repair is worse than previously thought (14,18). The detection of a greater complication rate has been made possible by a longer follow-up time and honest reporting of the complications (hypospadias are as good). The present study aims to compare outcome of single and staged proximal hypospadias repair in children treated at TASH and Minilik II hospital from january 2010 to December 2020.

1.3 Literature review

According to recent studies, both single-stage and two-stage proximal hypospadias procedures had a greater overall complication risk. Mcnamar et al. discovered a 49% overall complication rate in 134 children who underwent staged proximal hypospadias surgery (19). Higher complication rate was also described by Stanasel et al. in children who underwent staged Transposed Preputial Skin Flaps for Proximal Hypospadias, which showed a 68% complication rate necessitating reoperation (20). In a comparative analysis of 35 children who underwent tubularized incised plate and 40 children who underwent onlay urethroplasty for penoscrotal hypospadias repair, respectively, Luis H. P. Braga et al. reported complication rates of 60%

and 45% (21). This result is comparable to complication rate reported with staged producers (19,20).

There is ongoing debate about the best way to correct proximal hypospadias with severe VC, whether in a single or staged repair (22). Haytham Badawy and Ahmed Fahmy examined published literature on proximal hypospadias from 2002 to 2012 and discovered a complication rate of 8%-61.5% and 15%-70% for single stage and staged hypospadias repair, respectively (23). The re-operative rate was also comparable between the two procedures; however, the child is subjected to more surgery in the multi-stage procedure than in the single-stage operation (23). Christopher J. Long et al. compared single stage procedures such as the Thiersch Duplay (TD), Onlay Island Flap (OF), Interposition Island Tube (IT), Long Tubularized Incised Plate (LTIP), and staged Byar's flap. They concluded that there was no statistically significant difference in total complication rate, despite the fact that children in the single stage group were more likely to present with two or more complications than those in the staged group (24). On the other hand, there are emerging evidences which shows significantly higher complication rate with single stage techniques. In single institution review, Pippi Salle JL et al. found a significantly higher complication rate in 80 boys who had single stage repair (52.1% to 61.4%) when compared to 60 boys who had staged repair (38.3%)(22). In their systemic analysis and meta-analysis published in 2022, Ramesh Babu and V.V.S. Chandrasekharam were able to compare the outcomes of single stage (foreskin pedicled tube) versus two stage (foreskin free graft & foreskin pedicled flap) repair. The authors showed that a single stage procedure has a significantly higher complication rate (14).

1.4 Significance of study

This will be the first study of its kind in Sub-Saharan Africa. We hypothesize that our institution's total complication rate is higher than that reported in the literature, and that boys who underwent single stage repair have a higher reoperation rate than boys who underwent staged proximal hypospadias repair.

Proximal hypospadias, due to its inherent and technical challenges during repair, can be considered a separate entity from its distal variant. The outcome of patients who are more seriously afflicted are artificially inflated by the mixed outcome reports of proximal hypospadias, which is at the worst end of the hypospadias spectrum, and distal hypospadias, which normally has good outcomes. Therefore, a separate report for this group of patients will show the true burden of the complication.

Detecting the complications require more effort and in depth follow up. Some complication tends to occur a year after surgery, while the other occur within first few months of surgery. Thus, longer follow up required. This additional emphasis on proximal hypospadias assists surgeons in assessing their outcome, further analyzing, and managing factors influencing the outcome. Similarly, hypospadias cripple can be eliminated by systematically reducing overall hypospadias complications.

CHAPTER 2: OBJECTIVES

2.1 General Objective

1. To evaluate and compare the outcomes of single and staged proximal hypospadias repair in boys treated at Tikur Anbessa Specialized Hospital and Menilik II Hospital between 2010 and 2020 G.C.

2.2 Specific objective

1. To assess the outcome of single-stage proximal hypospadias repair.
2. To assess the outcome of staged proximal hypospadias repair.
3. To evaluate the association between complication rate and type of repair.

CHAPTER 3: METHODS

A retrospective chart review study was undertaken of all boys undergoing a proximal hypospadias repair between January 2010 and December 2020 G.C in Tikur Anbessa specialized and Comprehensive Hospital and its affiliate Menilik Comprehensive Hospital. Proximal hypospadias was defined as meatal location in the proximal penile, penoscrotal, scrotal, and perineal areas after degloving. Complication was defined as condition requiring reoperation under general anesthesia or spinal anesthesia after the last surgery.

Lists of patient with proximal hypospadias were identified through the operative pediatric surgery logbook at both hospitals**.** From the logbook list, 114 charts were retrieved from the card room. The medical records of these boys were screened to determine which patients had undergone proximal hypospadias repair and at least had two years of follow-up after the last surgery. Seventy-five patients fulfilled the inclusion criteria. Patients who had their primary repair at other hospitals were excluded.

Data on patients' age, location of the meatus, degree of ventral curvature (VC), testosterone administration, associated anomalies, type of repair, length of follow-up, and complications was collected. We checked if the documented complication during follow-up was identical to the intraoperative documentation during reoperation. If there was a difference, we would take the intraoperative documentation.

Data entry and analysis were performed with SPSS version 25, and we used a p-value <0.05 for statistical significance. Relation between type of repair and outcome was determined using Pearson Chi-square. The magnitude of association was determined using bivariate binary logistic regression for variables with significant associations. Preoperative testosterone administration, technique of VC correction, and correction of associated anomalies were not included in bivariate and multivariate analyses due to the small sample size and significant missing data.

CHAPTER 4: RESULTS

More than half of the patients, 43 (57.3%), are from Addis Ababa, 25 (33.3%) from Oromia, 3 (4%) from Amhara region, 3 (4%) from Southern Nations, Nationalities, and Peoples region, and 1 (1.3%) from Dire Dawa. The median age at surgery was 36.0 months (IQ range of 21.0 months), with a median length of follow-up of 36.0 months (IQ range of 24 months). The native urethral meatus was at proximal penile, penoscrotal, scrotal, and perineal in 27, 41, 6, and 1, respectively. Degree of ventral curvature was recorded only in 70.7% of boys, and it was severe in 30 (40%), moderate to severe in 4 (5.3%), moderate in 13 (17%), and mild in 6 (8%). Repair was performed using long TIP in 30 (40%), transverse Ventral preputial flap in 15 (20%), onlay island flap (OIF) in 1 (1.3%), staged preputial flap in 27 (36%), and staged preputial flap in 2 (2.7%) (Table 1). Close to half of the repairs, 38 (50.7%), were performed in the first six years of study period (2010–2016) and 37 (49.3%) in the last four years.

Table 1: Demographics and Patient characteristics

	Long TIP	TVPF	OIF	Staged preputial flap	Staged preputial graft
Number of patients, n	30	15	1	27	2
Median age at surgery in months (IQ range)	36.0 (25)	36.0 (19)		42.0 (24)	31.5 (.)
Median follow-up in months (IQ range)	36.0 (18)	72.0(54)		27.0 (24)	24 (.)
Urethral Meatus, n (%)					
Proximal Penile	10(33.3)	6 (40)		10 (37)	1 (50)
Penoscrotal	17(56.7)	8 (60)	1(00)	14 (51.9)	1 (50)
Scrotal	3(10)	1 (6.7)		2 (7.4)	
Perineal				1 (3.7)	
Degree of VC, n (%)					

	Mild	6 (20)			
	Moderate	10 (33.3)		2 (7.4)	1 (50)
	Moderate to severe		3 (20)	1 (3.7)	
	Severe	7 (33.3)	4 (26.7)	18 (66.7)	1 (50)
	Not Documented	7 (33.3)	8(53.3) 1(00)	6 (22.2)	
Complications, n (%)		17 (56.7)	14 (93.3) 1 (100)	20 (74.1)	1 (50)
	Within 1st year	14(82.3)	12 (85.7) 1(00)	20 (100)	1 (100)
	After 1st year	3 (17.7)	2 (14.3)		

There was a significant change in trend toward staged hypospadias repair in boys operated on between 2017 and 2020 when compared with boys operated on between 2010 and 2016 (65.5% vs. 34.5%, P = 0.026). The odds of undergoing staged hypospadias repair were 2.9 times higher in boys operated between 2017 and 2020 than boys operated between 2010 and 2016, with 95% CI of 1.123 to 7.781 (p = 0.028).

The overall complication rate was 70.6% (53/75 patients), with complications being encountered in 32/46 (69.6%) single stage repair and 21/29 (72.4%) staged repair (Table 2). Most complications, 90.5% (48/53) occurred within the first year of operation. The most common complication was urethrocutaneous fistula being detected in 31/75 (41.3%) patients, followed by 12 (16%) failed repair/complete dehiscence, 11 (14.7%) glans dehiscence, 6 (8%) urethral stricture, 4 (5.3%) meatal stenosis, 3 (4%) recurrent/residual VC, 3 (4%) cosmetic/skin complications, and 1 (1.3%) torsion.

There was no significant difference in overall complications between single stage repair and staged hypospadias repair (Table 2). However, there was a significant glans dehiscence encountered in patients undergoing staged repair (P = 0.002). The odds of glans dehiscence occurring were 9.9 times higher in staged repair, with a 95% CI of 1.958 to 50.065 (P = 0.006).

Table 2: Type of proximal hypospadias repair with or without complications

	Single Stage Repair	Staged Repair	P Value
Total Complications, n (%)	32/46 (69.6)	21/29 (72.4)	0.80
UCF, n (%)	19/46 (43.1)	12/29 (41.4)	0.99
Failed Repair/Complete Dehiscence, n (%)	8/46 (17.4)	4/29 (13.8)	0.75
Glans Dehiscence, n (%)	2/46 (4.3)	9/29 (31.0)	0.002
Urethral Stricture, n (%)	2/46 (4.3)	4/29 (13.8)	0.19
Meatal stenosis	3/46 (6.5)	1/29 (3.4)	0.49
Recurrent/residual VC, n (%)	2/46 (4.3)	1/29 (3.4)	1
Torsion, n (%)		1/29 (3.4)	0.38
Urethral Diverticula	1/46 (2.2)		1
Skin Complications, n (%)	1/46 (2.2)	2/29 (4.0)	0.55

A statistically significant complication occurred in boys who underwent TVPF when compared with long TIP (93.3% vs. 56.7%, P = 0.016) (Table 3). The odds of developing complications were 10.7 times higher in the TVPF when compared with long TIP, with a 95% CI of 1.243 to 92.225 (P = 0.031). Among the complications, urethrocutaneous fistula was significantly higher in boys who underwent TVPF when compared to Long TIP (73.3% vs. 26.7%, P = 0.003). The odds of developing UCF were 7.562 times higher in TVPF, with a 95% CI of 1.862 to 30.715 (P = 0.005).

Table 3: TVPF vs Long TIP odds of complications

	TVPF	Long TIP	Adjusted Odds ratio and 95% CI	P Value
Total Complications, n (%)	14 (93.3%)	17 (56.7%)	10.7 (1.243, 92.225)	0.031
UCF, n (%)	11 (73.3%)	8 (26.7%)	7.5 (1.862, 30.715)	0.005

CHAPTER 5: DISCUSSION

Proximal hypospadias with severe chordae continue to be a surgical challenge for surgeons despite substantial advancements in the treatment of hypospadias and improved surgical outcomes in recent times. Surgical repair can be performed as either a single-stage or multistage procedure, with ongoing discussions regarding the merits of each approach (19,20,22,24). In the current study, single-stage repairs, such as TIP and OIF, were performed when chordae correction did not involve transection of the urethral plate, whereas staged procedures and TVPF were performed in patients who required urethral plate transection for the correction of severe chordae.

Worldwide, there is a statistically insignificant preference among plastic surgeons for staged repair of proximal hypospadias with severe chordae (25). However, there is significant variability among pediatric urologists in choosing the preferred method of correction of the chordae and proximal hypospadias (26). Tubularized incised plate urethroplasty and staged preputial flap urethroplasty were widely used in our study. When compared with the first 6 years of the study period, there was a significant change in the trend toward staged hypospadias repair in the last four years of the last study period, with almost half (49%) of the children operated on during the study period. Most TVPF were performed in the first 6 years of the study period, whereas TIP was performed at a relatively similar rate throughout the study period.

Recent studies have shown that the complication rates for proximal hypospadias repair are higher than those previously reported and are significantly different from those for distal hypospadias repairs (19,20,22,24). This is attributed to the severity of the phenotype of proximal hypospadias; as the meatus becomes more proximal, repair becomes more extensive, and the suture line becomes longer, which increases the complexity of the procedure and may lead to more tissue trauma and ischemia (27). The long constructed neourethra does not expand during voiding like a normal urethra would. Poiseuille's law states that the flow resistance in a cylinder is inversely proportional to the radius of the fourth power but proportional to the length of the tube. Accordingly, the longer the tube, the higher the chance of stricture development and/or failure of the repaired urethra to expand with voiding, which would increase resistance to urine flow and eventually result in fistula and/or urethral diverticulum formation. The intraluminal pressure can also be significantly affected by small changes in tube radius (18,28).

Besides, usual anatomic factors and technical factors, longer postoperative follow-up and honest reporting of complications have contributed to increased detection of complications in children undergoing proximal hypospadias repair (17,18).

According to recent literature from centers of excellence, the overall complication rate ranges from 13.9% to 68% (19,20,24,27). In 2009, Essam E. Moursy reported outcome of proximal hypospadias repair in 194 children using three different techniques; TIP, OIF, and two-stage repair, with mean follow-up of 32.9 months. The author found 13.9% overall complications and fistula being the commonest complications with 7.7% (27). Texas Children's Hospital's team reported their findings from an 11-year study involving 56 boys with a median follow-up of 34 months (20). The surgeons performed a two-stage repair with at least 6 months between the stages. The overall complication rate was 68%, defined as any additional procedure planned beyond the initial two-stage repair. Similarly, the Boston Children's group presented their results over a 20- year period for 134 boys who underwent staged repair for proximal hypospadias. They reported a complication rate of 49% at a median follow-up of 46 months (19). Pippi Salle and colleagues from Toronto conducted a study involving 140 boys with proximal hypospadias, comparing their outcomes with three different techniques: long tubularized incised plate (TIP), dorsal inlay graft, and staged repair for proximal hypospadias. At a mean follow-up period of 30-48 months, the complication rate was highest for the long single-stage TIP (53%) and lowest for the staged repair (32%) (22). In similar fashion, the group from Children's Hospital of Philadelphia presented their experience with 167 consecutive patients, of whom 86 underwent a single-staged repair and 81 a planned two-stage repair. The complication rate was higher for the single stage vs staged repair (62% vs 49%, P=0.11) (24). The complication rate of proximal hypospadias repair in this study was 70.6%, with single-stage repair having a slightly lower complication rate of 69.6% and staged repair having a higher rate of 72.4%. The most common complication was urethrocutaneous fistula. The discovery of a higher complication rate in our report warrants further investigation and risk identification to achieve satisfactory outcomes.

Glans dehiscence was significantly higher in our boys who underwent staged repair. Stanasel et al. reported 14% glans dehiscence in 56 patients who underwent staged transposed preputial skin flap (20). Similarly, Mcanamara reported a 14.2% glans dehiscence rate in 134 patients who underwent a staged preputial flap(19). Pippi Salle et al. performed a single center retrospective chart review of three different types of proximal hypospadias repair. They found a higher rate of glans dehiscence in 11.6% (7/60 patients) in two-stage repair (22). Christopher

J. Long compared 81 boys who underwent staged preputial flap (byars) against 86 boys who underwent single stage repair and found no difference in glans dehiscence rate (7% vs. 5%) (24). R. Karabulut et al. presented a systematic review of 71 articles. They found glans dehiscence was significantly high for proximal hypospadias (5%), two-stage hypospadias repairs (5%) and re-do hypospadias repair (8.75%) (29). Other possible reasons for glans dehiscences are small glans size, defined as glans diameter <14mm, and technical factors such as incomplete mobilization of glanular wing and interposition of intermediate layer high up under glans wings (30)**.**

The tubularized incised plate repair method is suitable for the treatment of distal and mid shaft penile hypospadias, as well as for certain more proximal cases where the ventral curvature can be straightened without transecting the plate and the incised plate is grossly supple (31). When it is necessary to transect the plate for ventral curvature correction or due to a poor and shallow plate, either a single stage or two stage urethroplasty may be considered as an alternative. In our series, the total complication rate and the rate of urethrocutaneous fistula (UCF) are significantly higher in the TVPF urethroplasty compared to the TIP urethroplasty. It is challenging to make a direct comparison between the two methods due to the heterogeneity of the literature and the fact that one involves preserving the native urethral plate while the other involves replacing the urethral plate with tubularized pedicled inner preputial skin. Sadegh et al. published a comparative study comparing duckett tube against modified bracka for proximal hypospadias and found 27% overall complication rate in 78 boys undergoing duckett tube repair (32). In 2018, S.P. Rynja et al. reported a 67% overall complication rate in children undergoing transverse preputial island tube for proximal hypospadias after following 12 patients for years (median 18 years). They found that, with 33%, fistula was the most common complication (33). A 2020 meta-analysis comparing single-stage pedicled tube (FPT) against two-stage repair in patients with proximal hypospadias found an overall complication rate of 42% in the single-stage pedicled tube group (14). In 2007, W Snodgrass and S Yucel reported a 37% overall complication rate in 36 children who underwent proximal TIP. The authors also found that performing urethroplasty in two layers improved the success rate of proximal TIP. Other authors have reported a higher complication (53%) rate for proximal TIP (22,34).

Most of complications in present study were diagnosed within first year of follow up. Snodgrass et al, found that 81% (110/125 patients) of urethroplasty complications were diagnosed within the first year after TIP for both proximal and distal hypospadias (16). The authors argue that optimal length/time for post-operative follow up cannot be determined

without additional reports addressing when UC are diagnosed. They also suggested that it is possible the time of detection of complication varies with type of procedures. In contrary, spinoit found only half (47.4%) of patient who required reoperation diagnosed within first year of surgery among 114 patients with urethroplasty complications following repair of both proximal and distal hypospadias (17). The authors emphasize the need for longer follow up to make early diagnosis of complication and intervention. Similarly, the study conducted by Grosos et al. examined the outcomes of the Duplay technique and found that 57% of complications were identified within the initial year of follow-up (35). The nature of these complications varied depending on the time of presentation, with fistulas being more prevalent during the first year, while urethral stenosis was more commonly observed beyond this specific time period. The authors postulated that the immature ventral plate exhibits differential growth patterns when compared to the adjacent penile tissue, which may result in tethering as individuals age. The latter two papers strongly suggested that <2 years of follow-up for boys undergoing proximal hypospadias repair is an inadequate time frame to accurately assess the outcomes. Despite variation in literatures on timing of occurrence of complications, a longer follow-up is more likely to identify more complications, consequently facilitating the prompt handling of such complications.

Limitations of our study encompass its retrospective nature and the myriad of well-known issues associated with this particular research strategy. The assessment of patient characteristics, such as meatal location and degree of ventral curvature, relied solely on the subjective description provided by surgeons; however, in the absence of standardized protocols, there exists the possibility of misclassification. Moreover, certain crucial data points pertaining to risk factors, including the number of layers of closure, the choice between running and interrupted suture lines for urethroplasty, as well as the selection of an intermediate layer, were regrettably not captured, especially during the initial phase of our inclusionary period. Given that this is a pediatric series, it is also conceivable that further complications could arise with long-term follow-up, particularly after the onset of puberty.

Despite the aforementioned limitations, we believe that this paper holds inherent value, as it presents intriguing observations derived from a resource-constrained environment, along with a candid and less-than-ideal assessment of the outcomes observed in a significant patient population treated at a prominent tertiary care center by multiple surgeons. Moreover, we maintain the conviction that we effectively identified the appropriate patients by meticulously narrowing down our selection according to our predetermined inclusion and exclusion criteria,

while ensuring the accuracy of the coding through a thorough examination of the medical charts.

Conclusion

Surgical management of proximal hypospadias remains a challenge in our setup. We reported a high complication rate for both single stage and two stage repairs. Glans dehiscence was more commonly seen after staged hypospadias repair. Among single staged repairs, TIP urethroplasty is associated with a better outcome when compared with TVPF repair. Most of the complications in our series occurred within the first year of surgery. More recently, there is a significant preference toward staged repair for patients requiring urethral plate transection. We hope this study provides a foundation for meaningful prospective studies of proximal hypospadias in resource-constrained settings.

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