SINGLE STAGE HYPOSPADIAS REPAIR IN PRIMARY CASES AND THEIR PATIENT RELATED OUTCOMES–TERTIARY CARE CENTER EXPERIENCE

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ABSTRACT

Objective: *This study aims to study whether hypospadias repair in primary cases can be done in a single stage. We present patients' perspective and their outcomes in 268 primary hypospadias cases among which around 90% of patients (n=240) had their hypospadias surgery after recommended age of repair (18 months). All primary cases were managed in a single stage.* ***Material & Methods:*** *From January 2010 – December 2019, 377 patients were included and outcomes were documented. Patients with prior hypospadias with complications (n=48), chordee without hypospadias (n=16), isolated penile torsion (n=12), and 33 patients who were lost to follow-up were excluded. The age at surgery, location of the meatus, chordee, associated anomalies, techniques used for correction, postoperative complications with overall success rate and patient related outcomes were evaluated.* ***Results:*** *After orthoplasty, distal hypospadias was seen in 59% (n=158), middle in 22.8 % (n=61) & proximal in 13.1% (n=35) patients. Fourteen patients (5.2%) had penoscrotal transposition. Chordee was present in 71.2% (n=192) cases. Urethral closure was done using TIP alone in 18 cases, TIP, and spongioplasty (n=233). The success rate of one-stage surgery was 73.5% in our series which correlated with PRO with high significance.* ***Conclusion:*** *The rate of complications increased with the length of urethral tube reconstruction. Hypospadias fistula was the most common, followed by glanular dehiscence. The use of the TIP in primary repairs, spongioplasty & additional buffering layers reduced the complication rates. Patients can have acceptable residual chordee and torsion and their surgical results correlated well with patient related outcomes(PRO).*

Key words: *Primary hypospadias, fistula, chordee, hypospadias.*

ABSTRAK

Tujuan: *Penelitian ini bertujuan untuk mempelajari apakah perbaikan hipospadia pada kasus primer dapat dilakukan dalam satu tahap. Kami menyajikan perspektif pasien, 268 kasus hipospadia primer di antaranya sekitar 90% pasien (n=240) menjalani operasi hipospadia setelah usia perbaikan yang direkomendasikan (18 bulan). Semua kasus primer dikelola dalam satu tahap.* ***Bahan & Cara:*** *Januari 2010 – Desember 2019, 377 pasien diperiksa dan hasilnya didokumentasikan. Pasien dengan hipospadia sebelumnya dengan komplikasi (n=48), chordee tanpa hipospadia (n=16), torsi penis terisolasi (n=12), dan 33 pasien yang absen dieksklusi. Usia saat operasi, lokasi meatus, chordee, anomali terkait, teknik yang digunakan untuk koreksi, komplikasi pasca operasi dengan tingkat keberhasilan keseluruhan dan hasil terkait pasien dievaluasi.****Hasil:*** *Setelah ortoplasti, hipospadia distal terlihat pada 59% (n=158), tengah pada 22.8% (n=61) & proksimal pada 13.1% (n=35) pasien. Empat belas pasien (5.2%) mengalami transposisi penoskrotal. Chordee hadir dalam 71.2% (n = 192) kasus. Penutupan uretra dilakukan dengan menggunakan TIP saja pada 18 kasus, TIP, dan spongioplasti (n=233). Tingkat keberhasilan operasi satu tahap adalah 73.5% dalam seri kami yang berkorelasi dengan PRO dengan signifikansi tinggi.* ***Simpulan:*** *Tingkat komplikasi meningkat dengan lamanya rekonstruksi tabung uretra. Fistula hipospadia adalah yang paling umum, diikuti oleh dehiscence glanular. Penggunaan TIP dalam perbaikan primer, spongioplasti & lapisan penyangga tambahan mengurangi tingkat komplikasi. Pasien dapat memiliki chordee residual dan torsi yang dapat diterima dan hasil bedah mereka berkorelasi baik dengan hasil terkait pasien (PRO).*

Kata Knnci: *Hipospadia primer, fistula, chordee, hipospadia.*

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INTRODUCTION

Hypospadias is one of the most common congenital anomalies occurring in approximately 1:250 newborns or roughly 1 out of 125 live male births.[1] It is one of the challenging problems in urologic surgery.[2] The condition comprises proximal displacement of the urethral opening, the curvature

of the penis and a dorsally hooded foreskin. The surgeon strives to create a normal penis that is aesthetically acceptable with minimum complications.

This article deals primarily with the avoidance and management of the immediate and long-term complications of hypospadias surgery. We analyzed our experience with its success rates, complications, and patient related outcomes (PRO).

OBJECTIVE

This study aims to study whether hypospadias repair in primary cases can be done in a single stage. We present patients' perspective and their outcomes in 268 primary hypospadias cases among which around 90% of patients (n=240) had their hypospadias surgery after recommended age of repair (18 months). All primary cases were managed in a single stage.

MATERIAL & METHODS

Patients (n=377) who attended the department of urology from January 2010-December 2019 were used to obtain the required information. Patients with prior hypospadias surgery with complications (secondary hypospadias, n=68), chordee without hypospadias, and isolated penile torsion (n=15) cases were excluded from this study to evaluate 268 cases of primary hypospadias only. Clinical examination included genitalia and spine examination. Basic investigations include blood biochemistry and ultrasound KUB.

The age at surgery, type of hypospadias at presentation, associated anomalies, surgical techniques, and associated outcomes including complications and success rate were studied. Hypospadias was classified into anterior/distal (glanular, coronal, and subcoronal), middle (distal penile, midshaft and proximal penile), and proximal/posterior (penoscrotal, scrotal, and perineal) after chordee correction. Follow-up protocol included clinical examination and voiding stream at 6 weeks and 3 months.

The patients were randomized into two groups: General anesthesia (GA) in distal hypospadias and GA with dorsal penile nerve block in mid and proximal hypospadias patients respectively. In all cases with chordee, as a first step, degloving of the penis was done up to the penopubic and penoscrotal junction. Chordee was assessed

Figure 1. Steps of hypospadias repair. (a) Identification of meatus (b) placement of tourniquet (c) Hypoplastic urethra (d) Marking of incision (e) Measurement of width of urethral plate (f) Penile degloving (g) Urethral mobilization (h) Chordee assessment- Gittes' test (i) Ventral corporotomy (in cases of significant chordee) (j) Development of Glans wings (k) TIP (Tubularised incised plate) (l) Snodgraft (if urethral plate inadequate) (m) Urethral closure- first layer and dissected corpus spongiosum (n) Spongioplasty (o) Glansplasty (p) Completed closure and prepucioplasty

using the Gittes test and was corrected using dorsal midline plication (5-0 prolene suture) and/or ventral transverse corporotomies. The suture material included was vicryl 4-0 for urethral tube reconstruction. The width of urethral plate was gauged in each case using the calibre of the proximal urethra. The width of urethral plate (in mm) was equal to proximal urethral diameter in Fr. plus 2mm was added for suturing. An infant feeding tube or Silastic tube was used for urethral stenting. Various steps during surgery are shown in Fig 1.

Surgical outcomes as per complications that needed surgical intervention and patient-related outcomes (PRO) were measured using HOPE (Hypospadias Objective Penile Evaluation) criteria.[5] Five variables included the position of the meatus, the shape of the meatus, shape of glans, shape of the skin, penile axis torsion, and curvature of the penile skin. These variables were assessed and grouped into 6 questions each with a reference score. The maximum score was 10 and the minimum was one in each category.

The combined score ranged from 6 to 60. Cut-off of 6-23 was taken for severe abnormalities; 24-41 for moderately abnormal and were considered negative outcomes and score between 42-54 for mildly abnormal and more than 54 were classified as good/ satisfactory results as reported by patients.
Hypospadias Objective Penile Evaluation (HOPE) - Elements of objectivity HOPE-score.

1. Standardized photographs (5 views)
2. Anonymous patients
3. Independent assessment by panel
4. Standards of "normal" penile appearance
5. Degree of abnormality
6. Reference pictures

RESULTS

Age and distribution of the patients: Among 268 patients, 137 cases belonged to the age group of 0-10 years of age and 131 cases were more than 10 years. Associated features: Among 268 patients, 71.6% (n=192) patients had associated chordee, 4.8% (n=13) patients had meatal stenosis, Glans tilt in 1.8% patients (n=5), deviation of median raphe 21.26% (n=57) patients and torsion was present in 6.7%. 18 patients with meatal stenosis presented with overflow incontinence. In addition, patients who received only general anesthesia required more postoperative analgesia as compared to patients who received penile dorsal nerve block. Meatus position and associated anomalies were UDT, inguinal hernias, Horseshoe kidney & varicocele in 15 cases (4.16%).

Table 1. Clinical presentation with associated anomalies.

No.	According to Snodgrass classification	Frequency	Percent
1.	Distal	158	59.0
2.	Middle	61	22.8
3.	Proximal	35	13.1
4.	Penoscrotal Transposition	14	5.2
	Degree of penoscrotal transposition	Major: 9 Minor: 5	
	Total	268	100.0
	Other associations	No of cases	Management
5.	Undescended testis	6	Orchidopexy Laparoscopic- 4 Inguinal-2
6.	Inguinal hernias	3	Herniotomy
7.	Bilateral megaureter	1	Bilateral ureteric reimplantation
8.	Right Lower limb hypertrophy, right back lipoma	1	--
9.	Right-hand extra finger left eye squint	1	--
10.	Horseshoe Kidney	1	--
11.	Left varicocele with testicular hypotrophy	1	Micro varicocelectomy
12.	Right hydrocele	1	Herniotomy
	Total	15	

Urethral augmentation and prepucioplasty: 4.5% of patients had urethral plate augmentation, 3 patients had urethral tube reconstruction using preputial Onlay flap, and the rest 6 patients with bad urethral plates had urethral closure with only TIP. In addition, 47 patients had prepucioplasty along with hypospadias repair

Table 2. Chordee correction techniques.

No.	Chordee correction technique	Frequency	Percentage
1.	No Chordee	76	28.36
2.	Penile Degloving +/- Byars flap (for correction of ventrally short skin)	36	13.43
3.	Penile Degloving and Urethral Mobilization	63	23.51
4.	Penile Degloving, Urethral Mobilization, and Dorsal Plication	21	7.83
5.	Penile Degloving, Urethral Mobilization, and Ventral Corporotomy	55	20.51
6.	Penile Degloving, Urethral Mobilization, Ventral Corporotomy, and Dorsal Plication	17	6.34
	Total	268	100.0

Table 3. Types of closure.

No.	Types of procedure		Frequency	Percent
1.	TIP		18	6.7
2.	TIP And Spongioplasty		221	82.4
3.	Preputial Island Onlay Flap		3	1.1
4.	TIP and Snodgraft		12	4.5
5.	Penoscrotal transposition			
	Glenn-Anderson (In Penoscrotal)		9	3.4
	Heineke-Mikulicz (Penoscrotal)		5	1.9
	Buffering layer*			
6.	Ventral and Dorsal Dartos		61	22.8
7.	Ventral Dartos and TVF		43	16.0
	Prepucioplasty			
8.	Prepucioplasty		47	17.5
	Urethral Plate			
	Adequate	Inadequate		
9.	247		21	
	Augmentation/ reconstruction in Inadequate Urethral plate			
10.	Snodgraft	Inner prepuce	7	2.6
		BMG	5	1.86
11.	Preputial Onlay Flap		3	1.11
12.	TIP		6	2.23

*Ventral dartos in all cases

Table 4. Complications

No.	Complications		Present	Percentage (in %)
1.	Glans dehiscence		23	8.6
2.	Fistula		33	12.3
3.	Meatal stenosis		5	1.9
4.	Stricture		8	2.99
5.	Retrusive meatus		1	0.4
6.	Residual Chordee		$0\text{-}10^0$: 33	12.3
			$10\text{-}30^0$: 3	1.1
7.	Torsion		$0\text{-}10^0$: 9	3.4
			$>10^0$: 1	0.4
8.	Prepucioplasty (n=7/47)	Preputial dehiscence	5	1.86
		Phimosis	2	0.74

Table 5. Success Rates.

No.	Type of Hypospadias	Successful	Unsuccessful	Percentage of Failure
1.	Distal	122	36	22.78
2.	Middle	42	19	31.14
3.	Proximal	20	15	42.85
4.	Penoscrotal transposition	13	1	7.14
	No of complications (more than 1 complication in patients)	25 patients had only 1 complication		9.32
		44 patients had 2 complications		16.41
		2 patients had 3 complications		0.7
Total		197	71	26.5
		Success with chordee		
	Types of chordee	Successful	Unsuccessful	
5.	no chordee	61	15	19.73
6.	<30	91	29	24.16
7.	30-60	37	22	37.28
8.	>60	8	5	38.46

	Patient related outcomes (PRO)				
	PRO	n	percentage	Surgery outcomes	p-value
9.	Normal	55	20.5	Successful= 55 Unsuccessful = 00	P<0.05
10.	Mildly abnormal or normal	120	44.8	Successful=110 Unsuccessful =10	<0.005
11.	Moderately abnormal	88	32.83	successful = 32 Unsuccessful = 56	<0.005
12.	Severe abnormality	5	1.9	successful = 00 Unsuccessful = 5	<0.005

Success rate and patient-related outcomes: Success was defined as a functional urethra without fistula, stricture, or residual chordee and a glandular meatus with cosmetically acceptable genitalia. Secondary success after revision surgery in these patients reached up to 94.77%. (54 out of these 68 patients had successful revision). Rest 14 patients are still in our follow-up.

DISCUSSION

Most of the patients (n=137, 51.1%) belonged to the age group of 0-10 years, 91 (33.9%) belonged to the 10-20-year age group and 40 patients (14.9%) were more than 20 years of age at presentation. Patients who were operated on at or age below 1.5 years were only 10.4% (n=28) of the total cases which leave less psychological trauma and past painful memory. Most of the patients, 89.7% (n=240) presented to us after recommended age of repair of 18 months. Late presentation is due to lack of education, social awareness, medical facilities, and poverty. Almost 15 % (n=40) of patients presented to us after the age of 40 years. Many of the patients presented in the adolescent age group at the time of marriage. Similarly, Horst et al. and Manzoni et al.[6-7], also recommended age for surgery as 18 months due to the same reasons.

Among 268 patients, 71.6% (n=192) had associated chordee, 4.8% (n=13) had meatal stenosis, Glans tilt in 1.8% (n=5), deviation of median raphe 1.07% (n=4) and torsion in 6.7% (n=18) patients. Chordee was assessed after orthoplasty. One of the causes for chordee was ventrally short skin. In our study, 192 (71.6%) cases had chordee among which 120 cases (44.8%) had mild chordee i.e., $<30^0$, 59 patients (22%) had chordee between $30\text{-}60^0$, and 13 patients had severe chordee $>60^0$ (4.9%). Patients without chordee were 28.4% (n=76) at presentation.

Chordee correction procedures required penile degloving (PD) alone (n=21, 7.8%), Penile degloving (PD) and urethral mobilisation (UM) (n=63, 23.5%), PD, UM and dorsal plication (DP) (n=21, 7.8%), PD, UM, Ventral Corporotomy(VC) (n=55, 20.5%), and PD, UM, VC and DP (n=17, 6.3%). Ventrally short skin was corrected using Byar's flap in 13.43 % (n=36) patients. Ophthalmic blade helped to achieve chordee correction by 3 ventral corporotomies 5mm apart even in those with severe chordee ($>30^0$) and surgery in one-stage.

Most common type of hypospadias encountered was distal (n=158, 59%) followed by middle (n=61, 22.8%), proximal (n=35, 13.1%), and penoscrotal transposition (n=14, 5.2%). Out of these 14 cases, 9 had major and 5 had minor penoscrotal transposition.

In our study, undescended testis had the most common association with hypospadias (n=6, 2.04%) followed by inguinal hernias (n=3), hydrocele (n=1), Bilateral megaureter (n=1). Among these, 4 patients had laparoscopic orchidopexy, and 2 patients had inguinal orchidopexy. 4 patients had herniotomy for inguinal hernia and hydrocele. Patients with bilateral megaureter required bilateral ureteric reimplantation later. Other associations also included Right lower limb hypertrophy, right back lipoma, right-hand extra finger, left eye squint & Horseshoe kidney.

The urethral plate was healthy and adequate in 140 and 107 patients respectively and required no augmentation; however, the urethral plate was narrow and indistinct in 16 and 5 cases which required urethral augmentation with the help of Snodgraft in 12 cases and preputial island only flap in 3 cases. Rest 6 cases had TIP for their urethral closure. The length of the urethral tube reconstructed varied from 1 cm to 12.5 cm in these cases. Also, Prepucioplasty was done in 17.5 % (n=47) cases only in the age group of 0-5 years.

Only TIP and meatal advancement and glanuloplasty were used for distal hypospadias (glanular, coronal, sub-coronal, distal penile) in 18 cases. However, most of the middle and proximal hypospadias (233 cases) required TIP with spongioplasty in Penoscrotal transposition required Glenn-Anderson and Heineke-Mikulicz procedure in 9 and 5 cases respectively.

Ventral dartos was used in the closure in all cases. However, ventral dartos along with dorsal dartos was required in 61 cases (22.8%) and ventral dartos with tunica vaginalis flap (TVF) in 43 cases (16%) was used to provide an additional cover in proximal hypospadias cases to protect the reconstructed long urethral tube.

Success was defined as a functional urethra without fistula, stricture, or residual chordee and a glandular meatus with cosmetically acceptable genitalia. Patients were followed up at regular intervals at 1 and 6 months for patient related outcomes and success rates.

Patients who required intervention were n=71 (26.5%) and distal hypospadias had the least complication rate of 22.78% (n=36) followed by middle (n=19, 31.14%) and proximal hypospadias (n=15, 42.85%) and included post-hypospadias repair fistula, stricture, glanular dehiscence and meatal stenosis. Besides, one patient with penoscrotal transposition who had wound dehiscence was managed conservatively. Those patients who had preputial dehiscence (n=5, 10.2%) and phimosis (n=2, 4.25%) had subsequent circumcision.

The surgical repair of primary hypospadias in childhood may result in late postoperative complications involving the external urinary meatus (stenosis and retrusive meatus), the urethra

(stricture, fistula, and diverticulum), the corpora cavernosa (penile curvature, torsion, or deformity), the preputial skin, or the genitalia These complications may involve a single compartment of the male genitalia (urethra, corpora cavernosa, glans, or penile or scrotal skin), or a combination of them. The main causes of these late surgical complications are poorly executed procedures, postoperative infection, wound dehiscence, urine extravasation, hematoma, or ischemia or necrosis of transplanted tissues.

However, hypospadias repair may also fail many years after achieving successful functional and cosmetic results by primary repair, and an urethral stricture may develop decades after the initial hypospadias surgery.

The factors influencing complication rate were the quality of the urethral plate, chordee, and length of urethral tube reconstruction. In our series, the most common complication which required prospective surgical repair was fistula in 12.3% of cases (n=33) followed by glanular dehiscence in 8.6% (n=23). The fistula was dealt with by layered closure. The age at fistula closure does not affect success rates.[8] The stricture was reported in 3% (n=8) patients and had subsequent urethroplasty. However, Snodgrass reported stricture in 6.5% of patients[9] but his series only had proximal hypospadias repairs and these complications were only found in the patients who had urethral mobilization but such linkage was not found in our study. Also, meatal stenosis was present in 1.9% (n=5) patients which required dorsal meatotomy. Other complications included residual chordee of $0\text{-}10^0$ and $10\text{-}30^0$ in 33 and 3 patients respectively and these patients didn't opt for surgical intervention and had acceptable curvature. Similarly, torsion of $0\text{-}10^0$ and $>10^0$ was present in 9 and 1 patients. They also had acceptable torsion and didn't need further intervention. Retrusive meatus was documented in only 1 patient in follow-up.

Two patients despite unsuccessful correction had satisfactory normal outcomes while nine patients can be accounted for persistent psychological trauma associated with disease and its associated corrective surgery. This success rate correlated with PRO (p-value <0.005). However, discordance was present in 13 patients out of 182 patients who were deemed successful as per surgery but not according to their PRO. Similarly, 31 patients out of 86 were somehow satisfied as per their outcomes which were deemed unsuccessful and required revision surgery. This cohort mainly included cases of preputial or glanular dehiscence.

CONCLUSION

All primary hypospadias cases can be managed in one stage. Complications after hypospadias repairs are common, with fistula being the most common, followed by meatal stenosis. The use of the TVF in primary and secondary repairs helped to decrease the fistula rate. We also reported the effectiveness of ventral corporotomies in patients with severe chordee ($>30^0$) for its correction and management of such cases in one stage. Mobilization of 'Y' shape bifurcated corpus spongiosum and closure in midline (spongioplasty) helped to achieve urethra-matching proximal urethra in strength and thickness. Spongioplasty also prevents diverticula formation. In addition, PRO's have significant concordance with the surgery results and the p-value was significant.

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