SURGICAL OUTCOMES IN SECONDARY HYPOSPADIAS PATIENTS IN A TERTIARY CARE CENTRE – OVER A DECADE EXPERIENCE

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ABSTRACT

Objective: *The objective of this study is to analyze the surgical outcomes in secondary hypospadias patients over 10 years in a tertiary care center.* ***Material & Methods:*** *From January 2010 – December 2019, 68 patients with secondary hypospadias were managed in our department. The age at surgery, location of meatus at presentation, associated chordee, meatal stenosis, and fistula were noted. Techniques used for correction and postoperative complications with overall success rate were studied. Primary hypospadias cases (n=303) were excluded from this study.* ***Results:*** *Age varied from 6 months to 32 years (mean - 11.06 years). The most common presentation was dehiscence of repair with resultant hypospadias (n=43) and their meatal position was distal 44.1% (n=30) followed by middle in 14.7 % (n=10) & proximal in 4.4% (n=3) patients after orthoplasty. Chordee was present in 67.64% (n=46) cases. (<30^{O} in 50%, n=34; 30-60^{O} in 14.7%, n=10; >60^{O} in 2.9%, n=2). Also, 17.6% (n=12) patients had urethrocutaneous fistula(UCF) and 19.1% (n=13) patients had meatal stenosis. Urethral closure was done using tubularized incise plate (TIP) alone in 4.4% (n=3) cases, TIP and spongioplasty in 48.5% (n=33) cases. The urethral plate was augmented (Snodgraft) in 26 cases (inner prepuce, n=5 and BMG, n=21). Urethral reconstruction was staged in 10.3% (n=7) cases. Meatoplasty was done in 19.1 (n=13) cases and fistula closure was done in 17.6% (n=12) cases. The success rate in secondary cases was 79.2% in our series. Fourteen patients required revision surgeries of which 7 had UCF (Fistula repair), meatal stenosis (n=1, meatoplasty), Glanular dehiscence (n=5, Glanuloplasty and Meatoplasty), stricture (n=1, urethroplasty).* ***Conclusion:*** *Hypospadias surgery in secondary cases is difficult owing to fibrosis, loss of local tissue, and difficult dissection. Glanular dehiscence was most common followed by fistula in our series. We also reported the effectiveness of buffering layers and urethral augmentation in secondary cases but without statistical significance.*

Keywords: *Secondary hypospadias, urethrocutaneous fistula, chordee.*

ABSTRAK

Tujuan: *Menganalisis hasil bedah pada pasien hipospadia sekunder lebih dari 10 tahun di pusat perawatan tersier.* ***Bahan & Cara:*** *Januari 2010 – Desember 2019, 68 pasien dengan hipospadia sekunder ditangani di departemen kami. Usia saat operasi, lokasi meatus saat presentasi, chordee, stenosis meatus dan fistula dicatat. Teknik yang digunakan untuk koreksi dan komplikasi pasca operasi dengan tingkat keberhasilan keseluruhan. Kasus hipospadia primer (n=303) dikecualikan dari penelitian ini.* ***Hasil:*** *Usia bervariasi dari 6 bulan hingga 32 tahun (rerata 11.06 tahun). Presentasi yang paling umum adalah dehisensi perbaikan dengan hipospadia yang dihasilkan (n=43) dan posisi meatal distal 44.1% (n=30) tengah 14.7% (n=10) & proksimal pada 4.4% (n=3) pasien setelah ortoplasti. Chordee 67.64% (n=46) kasus. (<30^{O} pada 50%, n=34; 30-60^{O} pada 14.7%, n=10; >60^{O} pada 2.9%, n=2). Juga, 17.6% (n=12) pasien memiliki fistula uretrokutan (UCF) dan 19.1% (n=13) pasien memiliki stenosis meatus. Penutupan uretra dilakukan dengan menggunakan tubularise incise plate (TIP) pada 4.4% (n=3) kasus, TIP dan spongioplasty pada 48.5% (n=33) kasus. Pelat uretra ditambah (Snodgraft) pada 26 kasus (preputium bagian dalam, n=5 dan BMG, n=21). Rekonstruksi uretra dilakukan pada 10.3% (n=7) kasus. Meatoplasti dilakukan pada 19.1 (n=13) kasus dan penutupan fistula dilakukan pada 17.6% (n=12) kasus. Tingkat keberhasilan dalam kasus sekunder adalah 79.2% dalam seri kami. Empat belas pasien memerlukan operasi revisi yang 7 di antaranya memiliki UCF (Perbaikan fistula), stenosis meatus (n=1, meatoplasty), Glanular dehiscence (n=5, Glanuloplasty dan Meatoplasty), striktur (n=1, urethroplasty).* ***Simpulan:*** *Pembedahan hipospadia pada kasus sekunder sulit dilakukan karena fibrosis, hilangnya jaringan lokal dan sulitnya diseksi. Dehiscense glanular paling umum diikuti oleh fistula dalam seri kami. Kami juga melaporkan efektivitas lapisan penyangga dan augmentasi uretra pada kasus sekunder tetapi tanpa signifikansi statistic.*

Kata Kunci: *Hipospadia sekunder, fistula uretrokutans, chordee.*

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INTRODUCTION

Hypospadias is one of the most common congenital anomalies occurring in roughly 1 out of 125 live male births (Paulozzi et al., 1997)[1] and is one of the most common & challenging problems in urologic surgery[2]. The condition is typically characterized by the proximal position of the urethral opening, curvature of the penis, and a dorsally hooded foreskin. Surgeon strives to create a "normal" penis that is acceptable aesthetically and functionally. This article deals primarily with the management of secondary hypospadias cases to minimize complications.

OBJECTIVE

The objective of this study is to analyze the surgical outcomes in secondary hypospadias patients over 10 Years in a tertiary care center.

MATERIAL & METHODS

Our study is a retrospective analytical study. The case selection for secondary hypospadias was done from the patients operated in our urology department from January 2010- December 2019 who had undergone at least one attempt of repair earlier. Primary cases were excluded. Total 68 patients were included in our study and their age at surgery, the position of meatus at presentation, fistula, chordee, quality of the urethral plate, meatal stenosis (Figure 1), surgical techniques (Figures 2 and 3), and outcomes including complications and success rate were studied. The data analysis was done using SPSS-25 software. Paired t-test and chi-square test were used to deduce the p-value.

Figure 1. (a) Adult hypospadias patient with urethrocutaneous fistula (b) Another adult hypospadias patient with urethrocutaneous fistula (c) Johanson stage-1 patient of secondary complex hypospadias patient (d) Meatal stenosis in redo hypospadias (e) Scrotal hypospadias in another adult patient (f) Meatal stenosis in secondary case (g) Skin bridge (h) Dehiscence of tube with proximal meatus.

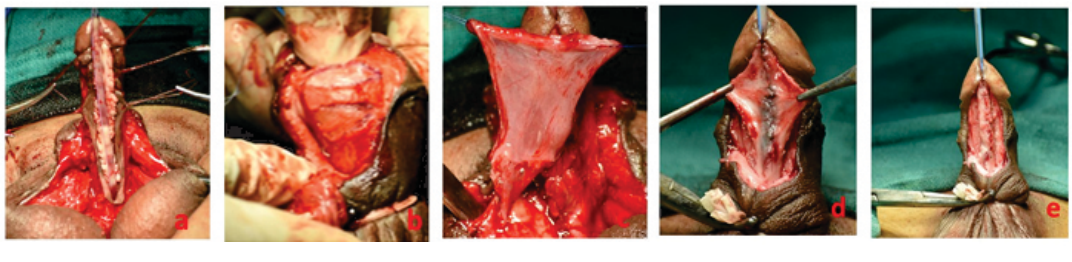

Figure 2. (a) BMG inlay (b) Ventral corporotomies (c) Blanket wrap of Tunica vaginalis flap (d,e) Spongioplasty.

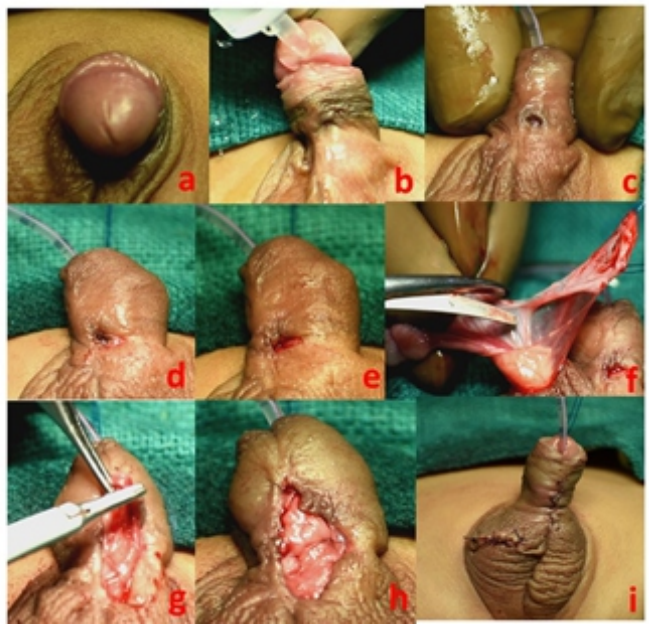

Figure 3. Failed hypospadias repair with urethrocutaneous fistula (a) Marking of previous stay suture with mild torsion (b) Visualisation of proximal and distal meatus (c) Cannulation of urethra (d) Mobilisation and trimming of proximal meatal skin for closure (e) Closure of urethra (f) Tunica vaginalis flap raised from right testis for blanket wrap (g) transposition of flap over urethra (h) appearance after tunica vaginalis (i) Closure of skin.

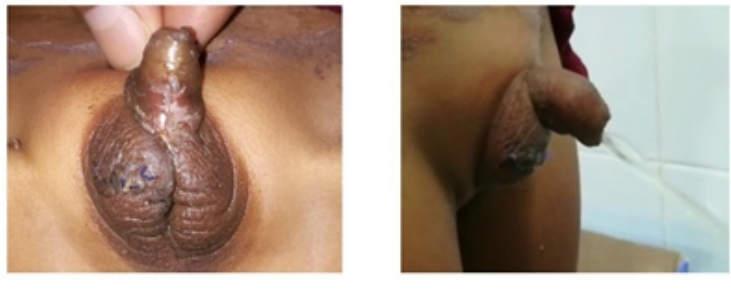

Figure 4. Follow-up of a case of UCF repair with TVF interposition as a barrier flap (Same patient as in Figure 3.

RESULTS

Among 68 cases, 45 patients belonged to the age group of 1-15 years of age and 23 cases were more than >15 years of age. The most common age group was 1-5 years (n= 21, 30.9%) (Table 1.). The distribution of patients based on meatal position is shown in Table 2.

Meatus position varied with distal being the most common meatal position (n=30, 44.1%) in secondary hypospadias cases with dehiscence of primary repair. In these patients, chordee was assessed by Gittes test after orthoplasty among which 22 patients (32.4%) had no chordee. The various techniques used for chordee correction are depicted in table 3. Three ventral corporotomies (4-6 mm) wide on the outer layer of tunica albuginea (Figure 2b) with the use of an ophthalmic knife helped to correct severe chordee.

Table 1. The patient age group.

Age in years	Frequency	Percent
1-5	21	30.9
5-10	13	19.1
10-15	11	16.2
15-20	10	14.7
20-30	12	17.6
>30	1	1.5
Total	68	

Table 2. The distribution of patients based on meatal position.

Dehiscence of repair with Hypospadiac meatus	Frequency	Percent
Distal	30	44.1
Middle	10	14.7
Proximal	3	4.4
Other secondary cases		
Fistula	12	17.6
Meatal stenosis	13	19.1
Chordee in degree		
No chordee	22	32.4
$<30^0$	34	50.0
30^0-60^0	10	14.7
$>60^0$	2	2.9
Urethral plate		
Healthy	25	36.8
Adequate	17	25.0
Narrow	16	23.5
Indistinct	10	14.7

The various methods used to close the urethral plate and buffering layer along with the quality of urethral plate are shown in Table 4. The urethral plate was healthy and adequate in 25 (36.8%) and 17 (25%) patients respectively and required no augmentation, however, the urethral plate was narrow and indistinct in 16 (23.5%) and 10 (14.7%) cases which required urethral augmentation with the help of Snodgraft. In these 26 cases, snodgraft technique was opted for which buccal mucosa and inner prepuce were used.

Two-stage urethroplasty was done in seven cases in severe complex cases. The first stage was Johanson, followed six months later by the second stage with or without urethral plate augmentation. Ventral dartos was used in the closure in all cases of the hypospadias repair. However, ventral dartos along with dorsal dartos was required in 10 cases (14.7%) and ventral dartos with TVF was used in 22 cases (32.4%). We could use dorsal dartos in patients with the available prepuce. Also, there was no morbidity to the testis with the use of TVF (Table 4.)

Table 3. The various techniques used for chordee correction.

The various technique	Frequency	Percent
No Chordee	22	32.4
Penile Degloving +/ - Byars flap (for correction of ventrally short skin)	6	8.8
Penile Degloving and Urethral Mobilization	19	27.9
Penile Degloving, Urethral Mobilization, and Dorsal Plication	5	7.4
Penile Degloving, Urethral Mobilization and Ventral Corporotomy	6	8.8
Penile Degloving, Urethral Mobilization, Ventral Corporotomy and Dorsal Plication	10	14.7

Table 4. The various methods with the quality of urethral plate.

Types of procedure		Frequency	Percent
Only TIP (tubularized incised plate)		3	4.4
TIP and spongioplasty		33	48.5
Fistula closure		12	17.6
Meatoplasty		13	19.1
Two-stage		7	10.3
Buffering layer			
Ventral and dorsal dartos		10	14.7
Ventral dartos and TVF (Tunica Vaginalis flap)		22	32.4
Urethral Plate			
Adequate		Inadequate	
42		26	38.2
Snodgraft was used for urethral plate augmentation			
Snodgraft	Inner prepuce	5	7.4
	BMG (Buccal Mucosal graft)	21	30.9

The outcome of success and failure based on type of hypospadias, degree of chordee, quality of urethral plate, and buffering layer along with their p-value are shown in Table 5.

Post operative complication in form of glans dehiscence, meatal stenosis, UCF, stricture etc. shown in Table 6. Total 14 cases had undergone additional procedures after secondary hypospadias repair as depicted in Table 7.

Table 6. The post operative complication.

Complications	Present	Percentage (%)
Glans dehiscence	8	11.8
Meatal Stenosis	2	2.9
Fistula	5	7.4
Stricture	1	1.5
Residual Chordee	$0\text{-}10^0$: 6	8.8
	$10\text{-}30^0$: 0	0
Torsion	$0\text{-}10^0$: 1	1.5
	$>10^0$: 0	

Table 5. The outcome of success and failure.

Outcome	Successful	Unsuccessful	Percentage success	P-value
Type of Hypospadias				
Distal	14	4	77.78	0.126
Middle	27	8	77.15	
Proximal	2	1	66.66	
Fistula	12	1	92.4	
Meatal stenosis	13	0	100	
Success rate	68	14	79.42	
Chordee				
No chordee	17	5	86.5	0.019
<30	30	4	88.24	
30-60	7	3	70	
>60	0	2	00	
Urethral plate				
Healthy	21	4	84	0.676
Adequate	14	3	82.4	
Narrow	11	5	68.75	
Indistinct	8	2	80	
Buffering layer				
Ventral dartos	30	6	83.33	0.256
Ventral and dorsal dartos	9	1	90	
Ventral dartos and TVF	15	7	68.19	

Table 7. The cases had undergone additional procedures.

Secondary complications	N*	Revision Surgery	Success	Failed	Revision surgery	Success
Urethrocutaneous fistula	7	Repair	5	2	Repair and TVF interposition	2
Meatal stenosis	1	Meatoplasty	1			
Glanular dehiscence	5	Glanuloplasty and Meatoplasty	5			
Stricture	1	BMG Onlay Urethroplasty	1			
Total	14		12			2

*Number of patients with complications.

DISCUSSION

Patient of secondary hypospadias present with various abnormalities which include the abnormal location of meatus, degree of chordee, reduced width of urethral plate, and the tilt of glans which makes its treatment complex surgical management. According to Kulkarni et.al., many controversies exist regarding the choice of procedure and the ideal operating age. A list of more than 200 different procedures is available for hypospadias repair. Secondary hypospadias repair increase the risk of recurrent fistula and stricture formation due to less vascularised ventral penile skin and deficient dartos tissue.[3]

Success was defined as a functional urethra without fistula, stricture, or residual chordee and a glandular meatus with cosmetically acceptable genitalia. Patients who had a successful outcome and did not require intervention were n=54 (79.4%) and who required intervention were n=14 (20.58%). It was slightly less as compared to a metanalysis study by Pfistermuller et al. in 2015 which was 23.3%.[4] Most common complication was glanular dehiscence (n=8, 11.8%) followed by post-hypospadias repair fistula (n=5, 7.4%), Meatal stenosis (n=2, 2.9%), stricture (n=1, 1.5%). In our study, the Fistula rate was significantly less when compared to the metanalysis study of Pfistermuller et al. which was 15.5%.

This can be attributed to aggressive use of buffering layer in proximal complex cases in fistula patients. Also, the most common complication was meatal stenosis in this metanalysis while it was glanular dehiscence in our study. Residual chordee was present in six which was $<10^0$ and cosmetically acceptable. In addition, one patient had torsion which was $<10^0$ and was acceptable to patients which didn't require any intervention. Thirteen patients which required meatoplasty for meatal stenosis had successful outcome.

According to Sultan M et.al., in patients with failed hypospadias repair BXO is an important factor to be ruled out. Before planning secondary hypospadias repair the urethral plate and fossa navicularis should be checked specially in patients with meatal stenosis, and total dehiscence.[5]

Complications were more common in proximal hypospadias cases in one out of three patients (33.33%) followed by middle and distal hypospadias in eight and four patients (22.85% and 22.22%) respectively. The success rate did not correlate with the meatus position in secondary cases, as p-value was not significant. It may be due to the low number of cases of secondary hypospadias with proximal meatus in our study. However, the degree of chordee correlated with the success rate and the p-value was significant (p-value = 0.019). Also, Urethral plate quality and use of buffering layer did not make statistically significant (p-value>0.05) differences in surgical outcomes.

However, in a study by Chung JW et al. fistula formation was statistically related to the location of hypospadias which was not present in our study.[6] As per Wu M et.al., they have used single stage technique using both pedicle spermatic fascia with buccal mucosa graft in six redo hypospadias cases with satisfactory outcome.[7] Simple closure of UCF was done in seven patients among whom five patients were successful. Two patients with fistula had successful fistula closure and TVF interposition as a barrier flap (Figure 4). Meatal stenosis (n=1) patient had meatoplasty.

In a study by Waterman et al. fistulas were successfully repaired in 72%, 67%, and 100% of patients after attempts 1 to 3, respectively while in our study, fistulas were successfully repaired in 71.4% and 100% in attempts 1 and 2 respectively.[8] Glanular dehiscence was present in five patients and had subsequent Glanuloplasty and meatoplasty. One patient had bulbar stricture for which BMG onlay urethroplasty was done. In a study by Spinoit et al. reoperation was needed in 114 patients (24.1%), of whom 54 (47.4%) underwent reoperation in the first year of follow-up and their success rate was comparable to this series.[9]

In a comparative study by Turkyilmaz Z et al., three different techniques namely - A ventral preputial onlay flap, a preputial tubular flap, and a full thickness skin tubular graft were used in 39 patients of secondary hypospadias. He has concluded that preputial tissue should be the first choice for redo cases.[10] According to Badawy H et.al., in their study total 31redo hypospadias after using staged graft repair, success rate was 72% and glandular dehiscence was the main complication.[11] The lowest complication was present in the most distal meatus in secondary hypospadias which is similar to our study results.

CONCLUSION

Hypospadias surgery in secondary cases is difficult owing to fibrosis, loss of local tissue and

difficult dissection. Glanular dehiscence was the most common complication in our series of secondary hypospadias repair followed by urethrocutaneous fistula. The use of the TIP with or without Spongioplasty and additional buffering layers in cases with long urethral tube helped to decrease the fistula rates. The surgical outcomes of secondary hypospadias correlated well with the degree of chordee with a significant p-value (<0.005) but had no statistically significant correlation with types of hypospadias, quality of urethral plate or use of buffering layer. However, the use of wide ventral coporotomy was vital to correct significant chordee in one stage.

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