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Redo hypospadias repair by a single surgeon after failed hypospadias surgeries: Experience from a developing country

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Abstract

Background: Hypospadias surgeries are often complicated with fistulas, meatal stenosis and disruptions. We report our series of redo surgeries for failed primary repairs.

Methods: We prospectively observed all the redo hypospadias repairs done by the principal author between 2013 and 2017. Thiersch-Duplay urethroplasty was done if the urethral plate was adequately wide and intact; tubularized incised plate (TIP) urethroplasty was performed if the urethral plate was intact but, narrower than 8 mm; 2 stage procedures were done with oral mucosal graft (OMG) if the urethral plate was deficient or scarred with significant chordee.

Result: There was a total of 31 patients. Age ranged from 18 months to 15 years (mean 8.05 ±4.27 years). Sixteen (51.61%) patients underwent only one surgery, 10 (32.26%) patients underwent 2 surgeries, 2 patients (6.45%) underwent 3 surgeries, and 3 patients (9.68%) underwent 4 surgeries prior to presenting to us before our redo surgeries. We had performed TIP urethroplasty in 16 (51.61%) patients, meatal based flap urethroplasty in 12 (38.71%), OMG followed by urethroplasty in 2 (6.45%), and repair of urethra-cutaneous (UC) fistula in 1 (3.23%) patient. Ten (32.26%) Complications occurred in 8 (25.80%) patients. Unsuccessful repair was noted in 03 (9.67%) patients (UC fistula 1, glans dehiscence with UC fistula 1, and glans dehiscence 1).

Conclusion: Thiersch-Duplay and TIP repair can be successfully performed in redo Hypospadias surgeries with acceptable complication rate. OMG graft can be reserved for cases with gross scarring of the urethral plate.

Keywords: Failed hypospadias repair; Tubularized incised plate urethroplasty; Thiersch-Duplay; Outcome

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Introduction

Hypospadias is one the most common abnormalities in children with an incidence of one in every 250 live births. Unfortunately,

unlike some other congenital anomalies, the results of hypospadias repair are not always successful and failed hypospadias repair is a problem worldwide. In spite of the use of evolving new techniques, newly available fine and better suture materials, and use of

magnification; hypospadias surgeons worldwide still encounter failures that need reoperations. The most common complications include fistula, meatal or urethral stenosis, recurrent chordee, glans dehiscence, complete or partial breakdown of repair, urethral stricture or diverticulum, penile skin deficiency, hairy urethra and abnormal penile skin configuration [1]. Although some stricture or stenosis respond to dilatation and some fistulas can heal spontaneously; patients with larger fistulas, dense stricture, or partial or complete dehiscence require reoperations. The principles of reoperation remain identical to those of primary repair; however, redo hypospadias repair can sometimes be challenging because of scarring and deficiency of penile skin [2]. The aim of this study is to present the results of our experience of redo hypospadias repair in the context of a developing country.

Methods

We prospectively kept records of all types of redo hypospadias repairs performed by the principal author between 2013 and 2017 (total 5 years) in the department of Pediatric Surgery, Chittagong Medical College Hospital, Chattogram, Bangladesh. The time interval from the last failed repair to the redo surgery was longer than 6 months in all cases, to allow adequate time for the wound to heal. The type of redo repair was decided on the basis of type of defect, location of meatus, presence and number of fistulas, quality of urethral plate, severity of scarring and chordee. Thiersch-Duplay urethroplasty was done if the urethral plate was adequately wide and intact; tubularized incised plate (TIP) urethroplasty was performed if the urethral plate was intact but, narrower than 8 mm; 2 stage procedure was done with oral mucosal graft (OMG) if the urethral plate was deficient or scarred with significant chordee. All hypospadias repairs were done with 3 layers of tissue. The second layer coverage was applied based on availability of local tissue, and dartos, penile fascial flaps or spongioplasty was used. Tunica vaginalis (TV) flap was applied for more

proximal defects when the second layer was not thick enough. A 6 or 8 French urethral stent was kept for 7 to 14 days depending on the severity of the hypospadias. A feeding tube was used for more distal defects which was sutured with glans by 4-0 proline with round body needle, and for more proximal defects a foley catheter was used. For more severe defects, a suprapubic catheter was kept for several days. All patients had a compressive penile dressing in place for 48 hours which was changed to a more loosely fitting dressing and kept for 7 days with change of dressing if it became soaked. Broad spectrum antibiotics were used in the perioperative period for at least 7 days as a traditional practice. Detailed penile characteristics before the surgery, operative details, post-operative follow ups were recorded. Patients were taught to perform post-operative dilatation at home with a feeding tube, tip of the eye ointment tube or urethral dilator with local anesthetic cream. All patients were followed up in the outpatient clinics and observed for urinary streams, development of complications. Follow up schedule was 2 weeks, 3 months, 6 months, one year and then yearly. Outcome were assessed by recording fistula formation, disruption of the neo-urethra, residual chordee, location of the neo-meatus, neo-meatal stenosis and overall cosmetic appearance. After re-do surgery unsuccessful or failed repair was defined when there was formation of fistula, disruption, neo-meatus more than 3mm proximal to the tip of the glans, and metal stenosis not responding to dilatation.

Results

There was a total of 31 patients. Age ranged from 18 months to 15 years (mean 8.05 ± 4.27 years). The median age was 6.3 years. Table 1 shows the numbers of initial type of hypospadias present at birth and meatal location during presentation to us. Chordee was present in 19 (61.29%) patients during the initial surgery. Associated abnormalities included meatal stenosis (2), high anorectal malformation with kyphosis (1), left undescended testis (1), penoscrotal

transposition (1) and micro penis (1). At the time of presentation to us, 29 (93.55%) patients

were diagnosed as failed urethroplasty, 2 (6.45%) with UC fistula.

Table 1: Type of hypospadias at birth and after failed repair during presentation to us.

Type of Hypospadias	Initial		During presentation to us	
	No	%	No	%
Penoscrotal	8	25.81%	1	3.23%
Proximal penile	9	29.03%	7	22.58%
Mid penile	4	12.90%	5	16.13%
Distal penile	4	12.90%	4	12.90%
Sub coronal	5	16.13%	9	29.03%
Glandular	1	3.23%	5	16.13%
Total	31	100.00%	31	100.00%

Three patients (9.68%) underwent 4 surgeries prior to presenting to us. However, 16 (51.61%) patients underwent only one surgery, 10 (32.26%) patients underwent 2 surgeries, and 2 patients (6.45%) underwent 3 surgeries before our redo surgeries.

Table 2: Penile characteristics during redo repair.

Penile characteristics	No	%
Residual chordee		
• No	20	64.52%
• Yes	11	35.48%
Urethral plate		
• Adequate	25	80.65%
• Bad	6	19.35%
Penile skin		
• Good	27	87.10%
• Adequate	2	6.45%
• Bad	2	6.45%
Fistula		
• No	18	58.06%
• Yes	13	41.94%
Location of fistula		
• Proximal	5	16.13%
• Distal penile	3	9.68%
• Mid penile	2	6.45%
• Two at distal penis, one at glans	1	3.23%
• Sub coronal	1	3.23%
• Two at distal penis, one sub coronal,	1	3.23%
Number of fistulas		
• 1	10	32.26%
• 2	2	6.45%
• 3	1	3.23%

Presence of Scar		
• Mild	28	90.32%
• Moderate	2	6.45%
• No	1	3.23%
Level of disruption		
• Glans	9	29.03%
• Proximal penile	7	22.58%
• No	6	19.35%
• Mid penile	3	9.68%
• Distal penile	2	6.45%
• Coronal	2	6.45%
• Sub coronal	1	3.23%
• Penoscrotal	1	3.23%

During per-operative evaluation for redo surgeries, residual chordee was present in 11 (35.48%) patients and 25 (80.64%) patients had adequate urethral plate. Penile skin was good in 27 (87.10%) patients. Thirteen (41.94%) patients had associated fistulas along with partial disruption of hypospadias repair. Table 2 summarize the penile characteristics during redo surgeries About half of the patients (16 patients, 51.61%) underwent TIP repair. In other cases, Thiersch-Duplay urethroplasty, OMG followed by urethroplasty or fistula repair was performed. Tunica vaginalis flap was used as a second layer in 17 (54.84%) patients. Table 3 summarizes the surgical procedures performed in the patients. Operating time ranged from 60-240 minutes (mean 151.29±50.07 minutes).

Table 3: Procedures for redo hypospadias repair.

Type of Redo repair	No	%
• TIPU	16	51.61%
• Thiersch-Duplay urethroplasty	12	38.71%
• OMG followed by urethroplasty	2	6.45%
• Fistula repair	1	3.23%
Chordee correction		
• No	22	70.97%
• Yes	9	29.03%
Tunica vaginalis flap		
• No	14	45.16%
• Yes	17	54.84%
SPC	3	9.68%

Ten (32.26%) post-operative complications developed in 8 (25.80%) patients (Table 4). UC fistula developed in 2 patients, one at proximal penis and the other at penoscrotal junction. Wound infection occurred in 2 patients; one ultimately developed proximal UC fistula and glans dehiscence and the other was complicated with scrotal abscess. Scrotal abscess developed in 2 patients and 2 patients developed orchitis; all of which responded to drainage and/or antibiotics. One patient developed glans dehiscence at 3rd post-operative day and one patient was lost from follow up. No patient developed complete disruption of repair. However, in 2 patients the final outcome was cosmetically less acceptable with disfigurement, in one patient neo-meatus was 5 mm proximal to tip of glans and in another patient, glans became flat after repair. In three patients there were residual chordee.

Table 4: Post-operative complications.

Complications	No	%
UC Fistula	1	3.23%
Meatal stenosis	1	3.23%
Glans dehiscence with proximal UC fistula	1	3.23%
Glans dehiscence	1	3.23%
Orchitis	2	6.45%
Scrotal abscess	2	6.45%
Wound infection	2	6.45%
Total	10	32.26%

Discussion

The most important goals of hypospadias repair are to construct a straight penis with a urethral meatus at the tip of the glans, an adequate caliber neo-urethra with a straight urinary stream and achievement of sexual function when mature [3]. However, these goals cannot always be achieved even after repeated surgeries [4]. Surgeries for failed hypospadias repair can be extremely challenging because of the lack of available penile skin, urethral plate, adequate blood supply and presence of scarring and residual chordee [4,5]. Although, the principles of redo surgeries remain the same as primary surgery; redo surgeries involve three key steps; such as, correction of residual chordee, replacement of the defective urethra using either local tissues or free grafts and reconstruction of the ventral aspect of the penis (ventral radius), which includes meatoplasty, glanuloplasty, spongioplasty and shaft skin cover [6]. There has been limited number of studies addressing the problems and techniques of redo hypospadias surgeries in contrast to the robust literature on primary repair. Initial examination of the patient usually guides the decision on which type of repair can be targeted to correct the defects, however, many a times decisions need to be modified per operatively. Several factors determine the type of repair. The quality and suitability of the urethral plate is considered to be the most important deciding characteristic (Elic, Tireli and Sander, 2007). Other factors are the amount and location of scarring, the availability and quality of penile skin, and acquaintance of the surgeon of a

particular type of repair [2]. Commonly practiced surgical techniques for redo surgeries after failed repair includes simple closure, one-stage procedures (TIP urethroplasties, Mathieu flips-flaps, onlay flaps, tubularized preputial flaps) or multistage procedures with penile skin or buccal mucosal graft [4]. However, disagreement exists over the best type of repair for UC fistula in this difficult population of patients. We have performed TIP repair (51.61%) whenever the urethral plate was less than 8 mm and not grossly scarred. TIP urethroplasty has become the preferred technique for both primary and redo hypospadias repairs [7,8]. Hayashi *et al.* showed that in the absence of preputial skin TIP urethroplasty was the ideal option for redo repair. Since almost all the patients in our society undergo circumcision along with hypospadias repair, preputial skin was not available in our setting for redo surgeries [9]. Borer *et al* and El-Sherbiny *et al* also reported good results with TIP urethroplasty in 25 and 30 patients respectively of re-operative TIP surgery [7,10]. Snodgrass and Lorenzo reported that previous incision of the urethral plate was not a contraindication in cases in which the plate appeared supple. However, TIP repair should be avoided if the urethral plate had been resected or is obviously scarred. Elic *et al* suggested that, the complication rate increases if the urethral plate has been previously incised in the midline and a third redo of TIP urethroplasty should be avoided [11]. In the presence of a scarred urethral plate, the single faced onlay preputial flap or paramental flaps have been described as excellent alternatives.

Since we could not use preputial flaps, we performed OMG in 2 patients in whom the urethral plate was grossly scarred and there was extensive chordee. We performed Thiersch-Duplay in 12 patients. We also performed the glandular closure in a conical fashion after wider and deeper dissection of glandular wings to get a vertical slit meatus rather than a transverse slit as described earlier [12]. Mathieu flip flap procedures are practiced by some especially in cases of short defect with adequate ventral skin [5]. We do not perform Mathieu procedure for primary repair and in this series no patient underwent Mathieu repair. Simmons et al reported that staged redo urethroplasty for large or multiple-small fistulae using OMG was better than dorsal transposition flap and flip flap procedures [5]. However, Shehata et al advocated the use of single faced preputial flap rather than buccal graft or skin grafts. [8] One of our patients had history of skin graft taken from elbow after failed attempt of OMG in whom we performed TIP urethroplasty with good result. We used preoperative testosterone in only one patient of proximal hypospadias who had a small penis. Testosterone had been used frequently for smaller penis by many authors. However, the benefits of use of preoperative testosterone is not conclusive. The prevalence of recurrent chordee is 9-32% in literature and 11(35.48%) patients of our series had recurrent chordee [1]. However, the degree of chordee was not severe except in 2 patients who underwent OMG and TIP repair could be done in 6 patients and the other 3 underwent Thiersch-Duplay urethroplasty. Infection is feared more during redo surgeries. However, earlier studies had showed that infection is not significantly increased in redo hypospadias surgeries than the primary repairs and it has been suggested that former surgeries did not deprive the local tissue from its blood supply [8]. Infection occurred in five (16.12%) patients: two wound infection, two scrotal abscess and one patient developed orchitis. Most studies documented a higher complication rate for redo surgeries. Nguyen and Snodgrass reported a 23% complication rate in their 31 patients (mostly with only one previous repair

and a distal shaft meatus) [13]. Shanberg et al reported 15% complications in their 13 patients and Yang et al reported 25% complications in their 28 patients [14] Shehata et al had 20.6% complications; Eliçevik et al had overall complications of 26 % in 100 redo-surgery cases, with 18 % fistula rate; and Patel et al. had 54.4% fistula rate using split onlay skin flap salvage [4]. Several studies documented a fistula rate ranging between 7 to 20 % in redo midpenile hypospadias surgeries [8]. orer et al. reported a fistula rate of 20% in 25 redo surgeries for coronal or sub coronal hypospadias [7]. Snodgrass and Lorenzo reported on 15 patients who underwent revision surgeries for complete or partial dehiscence and they had a 20% complication rate [15]. We had 32.26% overall complications in 8 (25.80%) patients. However, only 3 (9.68%) patients had failed redo repair in the form of UC fistula and glans dehiscence. Infection was managed with antibiotics, meatal stenosis in a patient responded to dilatation for about a year, bad cosmetic appearance in two patients had been accepted by the families. Many different and complex procedures are described for redo hypospadias surgeries such as, Mathieu flip flap, tubularized free grafts, pedicled flaps, onlay flaps and others. However, these procedures have a long learning curve, and many general pediatric surgeons in the developing countries are not acquainted with these procedures. On the other hand, in most of the developing countries, hypospadias surgeries are usually done by general pediatric surgeons. This study shows that simple procedures such as Thiersch-Duplay or TIP urethroplasty can be successfully performed in redo cases with acceptable complication rates such as, UC fistula and meatal stenosis. Factors important to successful repairs have been previously described by many authors. Careful examination of skin to assess for adequate vascularity, thickness and mobility, limited operative tissue handling, minimum use of electrocautery and use of optical magnification are considered to be of paramount importance by all. Marrocco et al commented from their 10- years- experience that multiple factors

influence the final result, but the most important factor is the surgeon's own experience and knowledge of different techniques and delicate tissue handling [16]. Our results showed that appropriate selection of procedure according to the merit of the local tissue can bring acceptable result in redo hypospadias repair.

Conclusion

Redo hypospadias repair is often a difficult and challenging procedure. However, acceptable results with minimal complications can be achieved if the principles of hypospadias repair are followed and appropriate procedures are selected. Thiersch-Duplay or TIP repair can be successfully done in most cases, however, OMG is needed in select cases with scarred urethral plate.

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