

The Outcome of Single Stage Hypospadias Repairs: A Single Institutional Study

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Surgical correction of hypospadias repair is an ultimate challenge in urethral reconstruction surgery. The aim of our study was to analyze different techniques of urethral reconstruction in hypospadias surgery and their outcomes in a single institute.

We prospectively evaluated 45 patients undergoing urethral reconstruction for hypospadias of different types at B and B Hospital, Gwarko, Lalitpur, Nepal, from January 2008 till December 2012. Case records containing different variables concerning preoperative status, operative details, complications and immediate outcome were recorded for each patient.

We prospectively evaluated 45 patients who underwent urethral reconstruction for different types of hypospadias repair. Out of 45 patients 8 patients have concomitant congenital anomalies in the form of inguinal hernia and cryptorchidism. Complete success after first attempt urethroplasty was 43.44% and the rest had either urethrocutaneous fistula (33.33%) or complete failure (6.66%) requiring complete revision. Snodgrass procedure was the commonly performed reconstruction (77.77%) in both fresh and revision cases followed by (Transverse Preputial Island Flap Repair) TPIFR procedure (11.11%) and MAGPI (Meatal Advancement and Glanuloplasty) repair (8.88%) and Duckett procedure (4.44%). Snodgrass was the commonly performed procedure with promising outcome in our centre.

Apart from good surgical dexterity and in depth knowledge of different surgical technique, meticulous planning and dedication is equally crucial for the optimum outcome of the procedure. We found that Snodgrass reconstruction has relatively good outcome in both fresh and revision cases.

Keywords: hypospadias, Snodgrass, urethrocutaneous fistula.

Hypospadias is a common condition with an incidence of 3.2 per 1000 live birth¹ and 50% of them being of distal penile type.² Apart from good surgical dexterity and in depth knowledge of different surgical technique, meticulous planning and dedication is equally crucial for the optimum outcome of the procedure. There have been conceptual changes in hypopadias management starting from amputation of penis distal to urethral opening till the current era of two stages reconstruction.

Hypospadias is defined as a incomplete virilization of the genital tubercle leading to an ectopic opening of the urethra on the ventral aspect of the penis, anywhere from the glans to the perineum with or without ventral curvature and a ventral prepuceal defect. Surgery is the only modality of the treatment. The aim of surgery is to achieve a straight penis, with the meatus at the tip, uninterrupted urinary flow, good cosmesis, and self-confidence of the child. Principles of repair involve straightening of penis (orthoplasty), creating a slit like meatus at the tip of the penis (urethroplasty and meatoplasty), making the glans conical looking (glanuloplasty) and proper skin coverage.

Among the choice of procedures for distal hypospadias are plate preservation procedures like incised plate urethroplasty, glans approximation procedures, and MAGPI whereas for proximal hypospadias is extended application of incised plate urethroplasty, various flap, and graft urethroplasties in one or two stages. Technically all flaps have a better

blood supply than the grafts. The results are better with flap urethroplasties than grafts.³ The timing of surgery is chosen after considering milestones of development, size of penis, child response to surgery, anesthesia risk, and toilet training. The infant develops good tolerance to surgery and anesthesia by the age of 6 months. The penile length at 1 year is on an average 0.8 cm less than at preschool age. The child is well aware about his genitalia and toilet training by the age of 18 months. So the most suitable age for operation of hypospadias is between 6 and 18 months. Another opportunity is at 3-4 years if the previous optimal age is missed.⁴

Preoperative examination includes measurement of the size of the penis, shape of the glans, location and size of the meatus, urethral plate for its development, width and length, severity of hypospadias, length of hypoplastic urethra, chordee and its severity, size of dorsal hood, shape of the scrotum, and associated anomalies like undescended testis, inguinal hernia or penile torsion. Other congenital anomalies associated with severe hypospadias are pelvi ureteric junction obstruction, vesicoureteric reflux, renal agenesis, persistent Mullerian structures and intersex disorders, undescended testis and inguinal hernia with or without hydrocele.¹

According to the location of meatus the hypospadias is divided in to anterior (glanular and subcoronal 50%), middle (Distal penile, mid-shaft, and proximal penile 30%) and posterior (Penoscrotal, scrotal and perineal 20%).²

Materials and Methods

Different techniques of hypospadias repair were applied in 45 patients between 18 months to 86 months of age over last 3 years (January 2008- December 2012). All the cases included in the study were hypopadias of all types. Surgery was performed under general anaesthesia with or without tourniquet application at the base of penis. Operative procedure essentially varied according to the type of the procedure undertaken which involved - degloving of the penis with preservation of urethral plate in fresh cases, adequate mobilization of glans wings, midline incision of the urethral plate in most of the cases followed by tubularization and subsequent covering of repair with vascularized preprepuccial fascial flap mobilized from inner prepuce in most of the cases. Urethral tubularization was performed with 6-0 PDS (Polydioxanone) or Polyglycolic acid

(Vicryl) interrupted suture. For the first three years we were using Vicryl late for last two years we started using PDS instead of Vicryl. Infant feeding tube no. 6-8 or 8 French foley's in some were used as splint and for urinary diversion. The dressing was removed on fourth postoperative day and wound was dressed every alternate day.

All patients were discharged on tenth postoperative day after catheter removal. Flow of the urine was observed wound was left opened. Patient was called in the follow up clinic 1 week later for assessment of urinary flow and to see any early complications and urethral calibration. In case patient requires further intervention then we tend to call him after 6 months. Those who recovered well with satisfactory outcome we tend to see him after 3 months advising them to report in case of any concerns.

Results

Hypospadias Types	Number	Chordee	Undescended testes	Inguinal hernial	Meatal stenosis
Glanular	8	3	2		6
Coronal	9	2		2	2
Subcoronal	4	2			2
Distal penile	8	2			2
Mid penile	8	3	1	1	2
Proximal penile	5	1			
Penoscrotal	3	1	1	1	
Total	45	14	4	4	14

Table 1: Hyhpospadias and concomitant congenital anomalies

We had 45 patients who underwent urethral reconstruction over last five years. Eight patients were of Glandular type and three had associated chordee. Two patients had associated undescended testes and 6 had meatal stenosis in association (**Table 1**). Orchidofunicolysis followed by orchidopexy was performed in the same setting.

Nine patients with coronal hypospadias had chordee in two cases. We had 4 subcoronal hypospadias and 2 of them had associated chordee. Out of 8 distal penile hypospadias 2 had chordee and 2 had meatal stenosis. Eight patients with mid penile hypospadias had chordee in three patients 1 had associated undescended testes and 1 has concomitant inguinal hernia. Those concomitant disorders were surgically corrected in the same setting. Proximal hypospadias were found in 5 cases and one had associated chordee. We did had penoscrotal hypospadias in 3 cases. One had associated chordee, inguinal hernia and undescended testes in same patient.

Fourteen patients (31.11%) percent of the patients had concomittant chordee. Four patients (8.88%) had associated undescended testes and so did the inguinal hernia. Meatal stenosis was found in 14 patients (31.11%).

Out of 45 patients, 4 patients (8.88%) underwent (MAGPI) urethroplasty and two patients(4.44%) underwent urethroplasty with Duckett's technique. Five patients (11.11%) underwent TPIFR urethroplasty. The maximum number i.e., 34 patients (75.55%) underwent Snodgrass urethroplasty (**Table 2, 3**).

Out of 4 patients who underwent MAGPI urethral only one was the complete success. Two patients developed urethrocutaneous fistula requiring surgical correction after 6 months of primary surgery. One patient developed meatal stenosis that required regular meatal dilatation. MAGPI is the favourable procedure for the glandular and coronal hypospadias. Over all success rate in the first setting is only 25%. Out of 34 patients who underwent Snodgrass urethral reconstruction 22 patients (64.70%) had successful outcome in first attempt however, 9 patients (26.47%) developed urethrocutaneous fistula. Fistula was repaired after six months of primary reconstruction. Success rate of Snodgrass after first attempt was 64.70% and we had to do complete revision urethroplasty in only one patient (2.94%). Snodgrass was found to be the procedure with highest success rate in our study.

Out of 2 cases who underwent Duckett urethral reconstruction one developed urethrocutaneous fistula which was successfully repaired after six month of procedure. In second case there was complete dehiscence which was later successfully repaired with revision Snodgrass urethroplasty.

Out of 5 cases that underwent TPIFR urethral reconstruction only one had successful out come after the first attempt. Three patients developed urethrocutaneous

Technique\ Hypospadias	Glanular	Coronal	Subcoronal	D. penile	M. Penile	P. Penile	Penoscrotal	Total
MAGPI	3	1						4
SNODGRASS	5	6	4	5	6	4	2	34
DUCKETT				2				2
TPIFR				1	1	1	2	5
Total	8	9	4	8	7	5	4	45

Table 2: Urethral reconstruction in various types of Hypospadias

Technique of repair	FISTULA	DEHISCENCE	MEATAL STENOSIS	SUCCESS
MAGPI	2		1	1(25%)
SNODGRASS	9(26.47%)	1(2.94%)	2(5.88%)	22 (64.70%)
DUKETT	1	1		NIL
TPIFR	3	1		1(20%)
TOTAL	15 (33.33%)	3(6.66%)	3(6.66%)	9

Table 3: Types of repair and outcome after first attempt urethroplasty

fistula and in rest of one there was complete failure and had to do revision urethroplasty subsequently. Both revisions were done as Snodgrass procedure. One had successful outcome after second revision urethroplasty however another developed urethrocutaneous fistula which was successfully closed after six month. In our series Snodgrass was found to be the procedure with significant success in previously failed cases as well.

Snodgrass was the commonly performed procedure in our center. Primary Snodgrass was carried out in 34 patients (75.55%) however, in total this procedure was carried out in (34+3) 37 subjects (82.22%) which includes revision urethroplasty later in completely dehiscence cases.

Snodgrass urethroplasty and successful outcome

A patient with abnormal ventral urethral opening, a typical case of mid penile hypospadias. Proper tissue mobilization was undertaken and prepuccial fascia was brought down for interposition on top of neo urethra. A stent was left in situ for two weeks post reconstruction. A picture taken after a month of reconstruction **Figure 1**.



Figure 1: Snodgrass urethroplasty and Successful Outcome



Figure 2: Post urethroplasty urethrocutaneous fistula and it's closure with multilayered skin flap technique

A typical case of Urethrocutaneous fistula after previous hypospadias repair is shown in the above pictures. A proper mobilization of penile skin flap was undertaken and the lining of the fistulous track was excised then was in two layers with 6-0 vicryl making sure that the suture lines are not in the same plane. Finally the skin was approximate with stent in situ (**Figure 2**).

Discussion

The reported incidence of complications range from 6 to 30%, varying with the severity of the hypospadias.^{2,5} Complications depend on the type of hypospadias, surgical technique, size of the penis, age of the child, and experience of the operating surgeon.

Plate preservation procedures like tubularized incised plate (TIP); Snodgrass is the procedure of choice in both proximal and distal hypospadias. Fistula and flap necrosis rates are lower and the surgery more convenient with the Snodgrass urethroplasty, with better cosmetic outcome than Mathieu repair.⁶ In general unless immediate exploration is indicated for bleeding, infection or debridement, reoperation for complication should not be

done before 6 months of initial surgery.⁷

Common acute complications of urethral reconstruction for hypospadias are Bleeding, hematoma and edema. These complications should be minimal with good haemostasis and meticulous dissection during the procedure. Wound infection and improper tissue mobilization leading into wound dehiscence, skin necrosis and flap necrosis are next common complications which many a times leading into complete failure of the procedure requiring revision surgery on later date. Coliforms and Staphylococcus were the most commonly grown pathogens and were sensitive to cephalosporin and aminoglycoside. Preoperative perimeatal swabs could help dictate antibiotic therapy in patients awaiting hypospadias repair.⁸

Fistula formation is most common and is often at the coronal level in tubularization urethroplasty and at the site of anastomosis in flap urethroplasty. Incidence of fistula varies from 0 to 23%.⁹⁻¹⁰ Incidence of fistula is less in urethral plate preservation procedures like TIP and onlay flap as compared to inner prepuce flap and tube urethroplasty.¹¹ The causes of fistulae remain unknown although it is likely that

local infection, local ischemia and an inadequate procedure, poor tissue healing, and distal obstruction due to meatal stenosis/encrustation. Anatomical factor like severity of hypospadias and satisfaction of surgeon after surgery has significant impact on the outcome of surgery.

Other acute complications include meatal encrustation, bladder spasms, inadvertent stent removal and penile erections. Meatal encrustations can be prevented by use of urethral stents and treated with maintaining local hygiene, application of local hydrogen peroxide, and application of ophthalmic ointment tube well inside the meatus. Bladder spasms are treated with appropriate urinary diversion, repositioning of the catheter, systemic, and rarely with local intravesical anticholinergic drugs. Penile erections are common in the postoperative period. They can cause local hematoma and predisposes to infection and subsequent devascularization. These are best treated with sedation and use of ketoconazole in adults.

Multistage procedures is favoured in cases of crippled hypospadias or multiple attempted cases and, in proximal hypospadias when the urethral plate cannot be preserved. Bracka reported better cosmetic results using two-stage procedures in his series with the fistulas in 5.7% and strictures in 7% of the cases.¹² Using skin to replace the urethra raises some concerns as it exposes to a higher risk of stricture and provides poorly compliant neourethra. Buccal mucosa seems to provide better long-term results as shown

by Barbagli et al in his series, buccal mucosa grafts provided 81% of success in one-stage procedures and 82.3% in multistage procedures, while penile skin grafts 80% and 50%, respectively.¹³

Most of the studies⁶ have reported encouraging results in terms of short operative time, overall low complication rate and good functional and cosmetic result. Our mean operating time was 90 minutes. We had two cases of penoscrotal hypospadias whom we attempted two stages reconstruction. We harvested buccal mucosa and had planned to tabularized in the second session that will be after six months of first stage. They are yet to be reconstructed as a second stage.

Our complication rates were found to be higher than contemporary series. The urethrocutaneous fistula occurred in 15 (33.33%) patients as compared to 0-7% reported by other studies.^{6,14,15} The overall re-operation rate in the present series was 6.66% excluding fistula and meatal stenosis, which is still significantly higher to other series.¹⁶

Meatal stenosis could possibly be explained by inadequate mobilization of glans wings and closure under tension. Dehiscence and flap necrosis in 3 patients (6.66%) probably due to ischemia of the flap or interposed tissue and tight dressing. We do agree such a significant number in our series and other authors have not encountered this problem but most of it occurred in the initial period of the study. It was most probably due to doing reconstruction without interposed tissue leaving too much redundant skin and once we started interposing tissue and

excising the extra skin this problem has been significantly reduced. With the initial experiences with other techniques apart from Snodgrass, we had significant complications and had higher failure rate. Nearly about two years later of our study then we started performing more and more Snodgrass procedure with satisfactory outcome. For the initial four years of our study period we used to use non absorbable polyglycolic acid (Vicryl) for the inner tubularization and for the subsequent layers we used to use chromic catgut. In order to further minimize complication rate then we started using PDS in our centre in the final year of our study period and we found that the infection rate and subsequent fistula formation was found to be satisfactorily lower.

We genuinely recommend adopting well vascularized interposing tissue over the neo urethra and usage of proper suture materials. Moreover, usage of magnifying loops during the procedure and usage of proper silicone urethral stent at the end of the procedure is highly recommended. It is also wise to get stick with the same procedure to reconstruct a particular type of hypospadias repair to get knack with the technique and this will lead one to get optimum outcome in the due course of time.

Conclusions

Hypospadias surgery remains very challenging, with a significant rate of complications even in the best hands. Fistula is the commonest complication in hypospadias repair, but healing is spontaneous in some cases provided there is

no distal obstruction however, many of them require secondary intervention. Complication rate is higher in severe hypospadias and graft procedures and less in childhood surgery and plate preservation procedures. Meticulous tissue dissection, lesser usage of diathermy and preferably a bipolar along with well vascular preserved interposing flap and proper usage of suture materials are very crucial for the successful outcome.

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