

Original Research Article

Complex hypospadias reconstruction: Ulaan Baatar technique revisited

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ABSTRACT

Background: Complex hypospadias repair is a challenging issue for the urologists. In Ulaan Baatar technique a distal neourethral tube along with glans is reconstructed in first stage with formation of a controlled fistula between neourethral tube and native urethra proximally. Later in second stage the fistula is closed by traditional technique. Therefore glans and distal urethral tube are not being manipulated during second stage repair and thus it has better cosmetic outcomes.

Methods: We reviewed the records of 33 different patients with proximal hypospadias who had undergone Ulaan Baatar repair in last 3 years. 21 patients had multiple previous attempts of hypospadias repair and 12 were primary (naïve) cases with proximal hypospadias.

Results: Mean follow up was 18.5 months after first stage and 12.4 months after the second stage. The mean age was 14.1 years (ranged 8 to 22 years). Mean time between stage I and stage II was 8 months (range 6-9 months). None of the patients developed fistula, glans dehiscence, meatal stenosis or diverticula formation. All patients had satisfactory cosmetic appearance of glans, distal meatus and shaft.

Conclusions: The Ulaan Baatar technique is very safe and effective technique with better cosmetic outcomes and least complication rates. Also the vascularized tunica vaginalis flaps may be used for construction of urethral lumen in complex hypospadias cases when local penile skin is deficient.

Keywords: Proximal hypospadias, Redo hypospadias, Tunica vaginalis flap, BMG urethroplasty

INTRODUCTION

Proximal hypospadias remains the most challenging condition to be surgically corrected. Despite many innovations and progress in the field of hypospadias surgery, nothing has been proved to be best till the present date. Although single stage procedure have been described by many authorities but due to high complication rates many urologist prefers to do it in a step wise fashion.¹⁻⁴

In patients with complications after failed hypospadias repair, usually taking down the previous urethroplasty

and creating a new urethra which requires more than one stage, is necessary.⁵

The classical two stage procedure includes penile degloving, chordee correction and placement of oral mucosa or penile skin flap between native urethra and glans tip. Second stage includes tubularization of the previously transposed graft/flap along with glanuloplasty to construct complete urethra with meatal opening at the tip of glans. In this approach the glans penis is operated twice, first when glans wing opened to accommodate the graft/flap and second when glanuloplasty is done. As a result cosmetic outcomes might be inferior when glans is

being operated twice.⁶ Several studies reported the complication rate of $\geq 50\%$.^{7,8}

In order to prevent complication and improve cosmetic outcomes we have adopted the Ulaan Baatar technique for complex hypospadias. The complex hypospadias is defined as a naïve/redo proximal hypospadias cases. This unique procedure was first introduced by Dewan in 2004 and it was later modified by Jayanthi in 2017.^{6,9} In this technique, chordee correction, formation of complete neo urethral tube distally along with glanuloplasty is done as a part of first stage surgery (Figure 1H and 2C). A small gap (controlled fistula) is left between proximal native urethra and distal neourethra which will be tubularized later in second stage surgery (Figure 3). It has advantage of glans being operated in a single stage and hence better cosmetic results.

Through this study we are sharing our clinical experience regarding management of proximal hypospadias (primary or redo) by utilizing the principle of Ulaan Baatar technique. And also the use of tunica vaginalis flap for reconstruction of urethral lumen in case where penile skin is deficient.

METHODS

In this retrospective study, we reviewed the records of 33 different patients with proximal hypospadias who had undergone Ulaan Baatar repair between January 2016 to December 2019 in our institute, NRS Medical College and Hospital, West Bengal, India. The mean age was 14.1 years, ranged from 8 years to 22 years.

Patients who fulfilled the study criteria were included in the study and those with associated history of other genito-urinary anomalies. And those requiring preoperative hormonal treatment were excluded from the study.

Informed consent was taken from all patients and/or his family, to become a part of this study.

Surgical technique

Stage I

First step involved the placement of stay suture with 5-zero polypropylene at the glans for traction purpose. Penile degloving was done by the help of sub coronal circumferential incision. In re-operative cases the scarred urethra was excised from the corporal bodies. These steps aided in penile straightening in almost all 21 re-operative cases. In primary cases (naïve cases) the urethral plate was transected and mobilized from the corporal body to correct severe chordee. The proximally transposed meatus was fixed to surrounding corpora with 5-zero PDS suture. Residual curvature of $<30\%$ after artificial erection was corrected by midline dorsal plication of tunica at the point of maximum bending with 6-0

polypropylene suture. It avoids the potential of neurovascular bundle (NVB) damage and decreases the chances of potential postoperative hematoma.¹⁰ Residual curvature $>30\%$ was managed by multiple corporal incisions in its ventral part at the point of greatest curvature (Figure 1B). No graft was used for correction of chordee. Next, the buccal mucosa graft/lingual mucosal graft were harvested by another team (Figure 1C). The glans wings were formed by splitting it ventrally. The harvested graft laid down over the corpora and stretched between native meatus to the glans tip and 3 rows of quilting done using 5-zero polyglactin sutures (Figure 1D). In redo cases, tunica vaginalis mobilized and sutured with dorsally placed graft, using polydioxanone 5-0 suture, to create tubularized distal neourethra (Figure 2B). Whereas in case of primary (naïve) cases the transverse inner preputial flap mobilized (Duckett principle).¹¹ (Figure 1E) and sutured with dorsal graft to make a distal tube (Figure 1F and G).¹² Meatus was constructed and glanuloplasty performed with 6-0 polydioxanone. A silicon stent (of size 6 to 12 French depending upon the age) placed into the newly formed meatus on the glans where it traversed the reconstructed neo urethra, exiting through its proximal opening (Figure 1H and 2C) and it was left in situ for 21 days. A Foley's catheter is placed through proximal native meatus into the bladder and left in situ for 12-14 days. So at the end of this procedure the penile curvature is corrected, glanuloplasty performed, neo-meatus created at the glans tip, distal penile neo-urethra constructed and controlled fistula created between proximal end of neo-urethra and proximal native meatus (Figure 1H and 2C). A non-adhesive dressing was done in all cases to prevent flap hypermobility due to stent. The dressing was usually removed on 5th postoperative day. A low dose antibiotic was given to all patients till catheter removal.

We preferred gradual up gradation of anterior urethral stent until a target lumen according to age had been achieved, before undergoing second stage surgery. It also prevented any stricture formation in distal neo-urethra.

Stage II

Second stage was done after 6 to 9 month of first stage surgery. Initially 5-zero polypropylene sutures placed at the glans for traction purpose. There was a gap of average 11 mm between proximal meatus and proximal end of distal neo-urethra. An elliptical incision (Figure 3) was made around the two openings, penile skin at the incision site mobilized and tubularised over a silicone catheter (6-12 French according to the age) that was placed through glans tip up to bladder. It was done by single continuous sub epithelial stitches with 6-0 polydioxanone suture. Dartos flap mobilized and placed as an intermediate layer. Peno-scrotal transposition, if present, was corrected. A non-adhesive dressing was done in all cases which were removed on 5th postoperative day. The silicon catheter was removed after 10-14 days. A low dose antibiotic was given to all patients till catheter removal

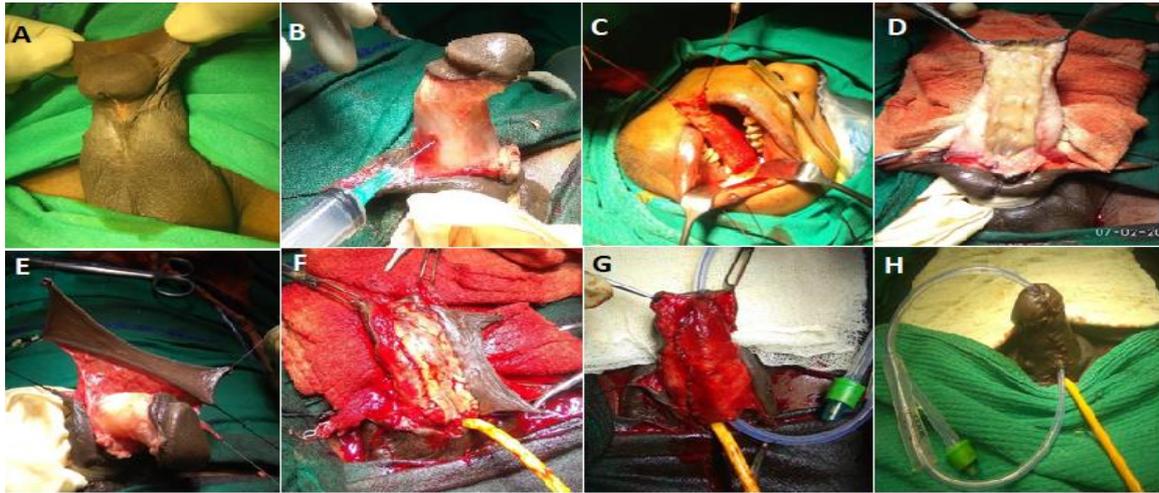


Figure 1: (A) Naïve case of peno-scrotal hypospadias with ventral chordee, (B) penile degloving and artificial erection during chordee correction, (C) harvesting of buccal mucosal graft, (D) buccal mucosal graft quilted over ventral penile surface to form ventral part of neo-urethra, (E) mobilization of transverse inner preputial flap, (F) and (G) mobilized inner preputial flap is placed as on lay to complete urethral tubularization, and (H) distal neo-urethra and glans reconstructed with urethral stent in situ, proximally there is a controlled fistula.

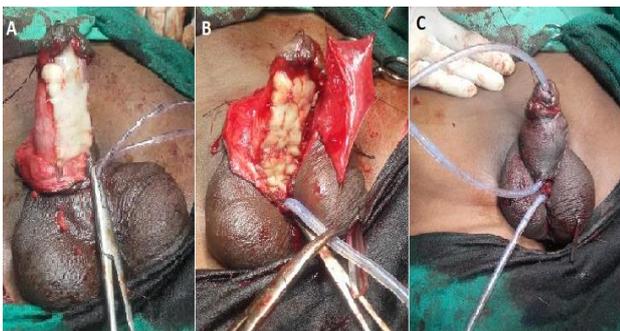


Figure 2: (A) Another case where buccal mucosal graft quilted over ventral penile surface to form ventral part of neo-urethra; (B) mobilized tunica vaginalis flap to form ventral part of neo-urethra; and (C) distal neo-urethra and glans reconstructed with urethral stent in situ, proximally there is a controlled fistula.



Figure 3: Demonstration of controlled fistula in a patient with previous history of first stage Ulaan Baatar repair; patient later underwent closure of this fistula in second stage surgery.

Ethical approval

Approval was obtained from the institutional ethics committee at N. R. S. Medical College and Hospital.

Statistical analysis

For statistical analysis, qualitative data was summarized using percentage and quantitative data was summarized using mean.

RESULTS

33 patients underwent Ulaan Baatar surgery between years 2016-2019. The mean age was 14.1, ranged from 8 years to 22 years. Majority of the patients were in 11–15 years age group.

Table 1: Age group.

S. no.	Age group	Number of patients
1	6–10	10
2	11–15	12
3	16–20	6
4	21–25	5

Out of 33 patients, 21 patients had a previous history of failed attempts of hypospadias repair and 12 patients had primary (naïve) proximal hypospadias. Previous failed surgery includes, chordee correction in all 21 patients along with Byars flap in 9, preputial flap in 9 and tubularized incised plate (TIP) in 3 of them. All these secondary hypospadias patients had severely scarred urethral tissue with single/multiple large fistulas and/or urethral strictures.

The meatal opening was at penoscrotal junction in 27 patients and at mid scrotum in 6 patients. 6 patients had scrotal transposition. Glans has been disfigured in all 21 patients in whom previous surgery has been attempted.

Table 2: Patient type.

Patient type	Type of previous repair	Number of patients	Total
Previously operated	Byars flap	9	21
	Preputial flap	9	
	TIP repair	3	
Naïve patients			12

Table 3: Position of meatal opening.

Position of meatal opening	Number of patients
Penoscrotal	27
Mid scrotum	6

Mean follow up was 18.5 months (range 9-36 months) after first stage and 12.4 months (3-29 months) after second stage.

As all re-operative hypospadias cases (21) had chordee correction done in past, there was only scarred urethral tissue that was responsible for residual chordee in those cases. Chordee correction was performed by excising scarred urethral tissue in all re-operative cases (previously reconstructed urethra could not be salvaged), urethral plate transection along with dorsal plication in 6 patients, and multiple ventral corporal incisions (without grafting) in rest 6 patients. Dorsal part of neo-urethra was constructed by BMG graft in 24 patients, lingual mucosal graft in rest 9 patients. Ventral part of neo-urethra was constructed by TV flap in 21 patients (redo cases) and by transverse inner preputial flap (primary cases) in 12 patients. Glanuloplasty was performed by classical glans splitting technique in all patients.

Table 4: Mean follow up duration.

Follow up (in months)	After first stage	After second stage
<6 months	3	4
6 months–1 year	6	9
1 year–2 years	14	12
2 years–3 years	10	8

Mean time between stage I and stage II was 8 months (range 6-9 months). The mean gap between proximal meatus and proximal opening of neo-urethra i.e. length of controlled fistula, was 11 mm (range 8-13 mm). Scrotal transposition was corrected in 6 of the patients. 6 patients developed urethral stricture in the proximal penile urethra and underwent buccal mucosal graft urethroplasty later. The reason may be due to postoperative wound infection after second stage surgery. This patient had history of hypospadias repair 3 times in the past at younger age and

got operated 4th time at the age of 22 years in our institute. None of our patient developed fistula, glans dehiscence, meatal stenosis or diverticula formation. All patients had satisfactory cosmetic appearance of glans, distal meatus and shaft.

DISCUSSION

Proximal hypospadias represents approximately one third of all penile defects. Proximal hypospadias with previous history of multiple failed attempts of surgery is a complex and challenging issue for urologists. Failed hypospadias include hypospadias recurrence, urethral fistula, urethral stricture, and chordee and glans dehiscence. There is no consensus among urologists regarding whether one stage or two stage repair is the optimal treatment for proximal hypospadias. However in severe primary or redo cases, two stage approaches has been known to be safe and effective with less complication and better cosmetic outcomes.¹³ Traditional two stage approach include penile degloving, chordee correction, glans splitting and application of oral mucosa or penile skin flap over urethral deficient area including glans. Tubularization of graft/flap along with glanuloplasty is being done in second stage. The downside of this approach is the glans being operated twice, first during glans splitting and second during glanuloplasty.

As a result cosmetic outcomes might be inferior when glans is being operated twice.⁶

The Ulaan Baatar technique was first described by Dewan et al in 2004 and it was later modified by Jayanthi in 2017.^{6,9} The main principle behind this technique is that a distal neourethral tube along with glans is reconstructed in first stage with formation of a controlled fistula between neo-urethral tube and native urethra proximally (Figure 1H and 2C). Later in second stage the fistula is closed by traditional technique. In this study the distal neourethral tube is formed by dorsal BMG/LMG and ventral on-lay tunica vaginalis/transverse inner preputial flap. In original study by Dewan, inner and outer preputial layers were separated, brought ventrally and tubularized to form distal neourethra whereas in Jayanthi's modification, island preputial skin flap was mobilized ventrally for tubularization. In spite of difference in technique of reconstruction of distal neourethral tube the principle behind was same and so the outcomes.

In primary (naïve) cases dorsally placed BMG/LMG graft was augmented ventrally with transverse inner preputial flap to make a complete urethral tube (Figure 1F and G). While redo cases were deficient of local tissue for reconstruction of urethra, so TV flap mobilized (Figure 2B) and stitched over the dorsally placed BMG/LMG to make a complete urethral tube. Here TV flap utilized for tubularization of urethra.^{14,15} Generally TV flap is used as an intermediate layer after tubularization or over ventral

side of corporal tissue before BMG/LMG graft placement.¹⁶⁻¹⁸ Javaad et al described the role of tunica vaginalis for substitution urethroplasty especially in reoperative hypospadias cases.¹⁴ Urothelialization of the tunica vaginalis occurs within months of surgery.¹⁴

Gradual up gradation of anterior urethral stent was performed after first stage surgery to attain a target urethral lumen and to prevent stricture formation in distal urethra prior to second stage surgery. One of our patient developed urethral stricture and underwent BMG urethroplasty later.

The limitations to this study include drawback owing to the methodological constraints of a retrospective analysis, the follow-up might be a little short that might affect the statistical accuracy, our study sample was relatively small and lastly, we reviewed only one technique in a single centre.

CONCLUSION

The Ulaan Baatar technique though unknown to many but it is very safe and effective technique for proximal hypospadias specially in cases who had previous multiple failed attempts of repair. The reconstruction of glans and distal urethral tubularization in first stage do not necessitate further handling of these tissue in second stage, hence it has better cosmetic outcomes with least complication rates. Also the vascularized tunica vaginalis flaps may be used for construction of urethral lumen in complex hypospadias cases when local penile skin is deficient.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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