

The role of tunica vaginalis flap in staged repair of severe hypospadias: experience in a tertiary care hospital

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ABSTRACT

Background: Hypospadias is one of the most common congenital abnormalities of the genitourinary tract in males. Its surgery has evolved with more than 150 procedures. Urethrocutaneous fistula continues to be most common complications regardless of location of meatus, procedure performed and experience of surgeon. Every effort goes to prevention of these complications. The surgical repair of hypospadias is done in two stages in a selected group of patients with severe anomaly. The first stage (stage I) procedure consists of correction of penile shaft curvature and second stage (stage II) repair involves the creation of a neourethra. This neourethra needs a cover of an intermediate layer in order to have good functional and cosmetic results. Aim of this study was to evaluate effectiveness of tunica vaginalis flap covering different hypospadias procedures with inference of significant decrease of urethra-cutaneous fistula rate.

Methods: In this prospective study, we have managed 30 patients with severe hypospadias by staged repair from January, 2019 to December, 2023 at Department of Paediatric Surgery, BIRDEM General Hospital. In stage I, chordee correction was done by dividing the urethral plate and covering the penile shaft with dorsal prepuce flaps. In stage II, a neourethra was created and covered with tunica vaginalis flap through the same incision. An indwelling catheter was kept for 14 days.

Results: Twenty six (86.6%) patients had good functional and cosmetic outcome. One (3.3%) patient developed urethrocutaneous fistula which needed correction later. External meatus was at subglanular level in 3 (10%) patients which was well accepted by guardian.

Conclusion: Staged repair of severe hypospadias is valuable in selected group of patients and tunica vaginalis flap is an excellent intermediate layer to cover the neourethra to prevent fistula and contracture.

Key words: Hypospadias; Chordee; Neourethra; Tunica vaginalis flap.

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INTRODUCTION

Hypospadias is one of the most common congenital anomalies occurring in approximately 1 of 200 to 1 of 300 live births.¹ It is usually accompanied by a band of

fibrous tissue extending from the abnormal meatus to the glans and this band shortens the ventral aspect of penile shaft and results in the downward curvature (chordee). Hypospadias repair continues to be a

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demanding form of surgical expression with considerable artistic latitude. It has evolved with more than 150 procedures described for surgical correction of a single anomaly.² In hypospadias where the chordee is severe many surgeons have elected to proceed with a planned two-stage procedure to minimize complications and improve the outcome.^{3,4,5,6} The staged repair of hypospadias is essentially consist of two stages where in stage I repair involve the complete straightening of penile shaft and in stage II neourethra is created by rolling out ventral penile shaft skin. This neourethra always need a cover of intermediate layer for good functional and cosmetic results. However, there are not enough reports in literature regarding the choice of intermediate layer for covering the neourethra.⁷ There are various available options of different flaps or free grafts to be used as an intermediate layer but tunica vaginalis flap is more frequently used because of its inherent advantages over others.^{8,9,10,11} In this study, we are presenting our experience of using tunica vaginalis flap as an intermediate layer for cover of neourethra in second stage repair of 30 patients of severe chordee with hypospadias.

METHODS

In this prospective study, data analysis of 30 patients of hypospadias with severe chordee was done regarding the functional outcome, fistula rate and cosmesis. These patients were managed by staged repair over a period of 5 years between January, 2019 to December, 2023 at Department of Paediatric Surgery, BIRDEM General

Hospital. The meatal location before correction of the chordee was mid penile in six, proximal penile in ten, penoscrotal in nine and scrotal in five (Fig.1). Patients age at stage I repair ranged from 1 year to 13 years (mean 4.3 years). Stage II was performed after a minimum of 6 months from the first stage (6 month to 2 years) of repair. The neourethra was covered by tunica vaginalis flap in all patients. Hypospadias with bilateral undescended testes or disorder of sexual development were not included in this study.

Surgical technique

All patients were operated under general anesthesia with caudal block. A circular incision was made a few millimeter proximal to coronal level around the penile shaft. The fibrous urethral plate was transected and hypoplastic corpus spongiosum was excised upto the level of normal urethra surrounded by normal spongiosum. Straightening of the penile shaft was confirmed by Gittes test. In four patients with remarkable ventral bending, dorsal placcation was done. Then the dorsal prepuce was divided into two equal halves (Byar's flaps) and rotated ventrally to cover the penile shaft (Fig. 2). A small midline incision was made into glanular urethra and a portion of prepucial flap was put into place to widen the glanular groove. An indwelling catheter was put in place into neomeatus which was shifted proximally and compressive dressing was done. Postoperative medication included antibiotics (inj.ceftriaxone, amikacin, cefixime) and analgesics (diclofenac sodium suppositories, ibufen). The catheter was removed after 5 days.



Figure 1. (a) Scrotal hypospadias (b) Mid Penile hypospadias (c) Severe chordee

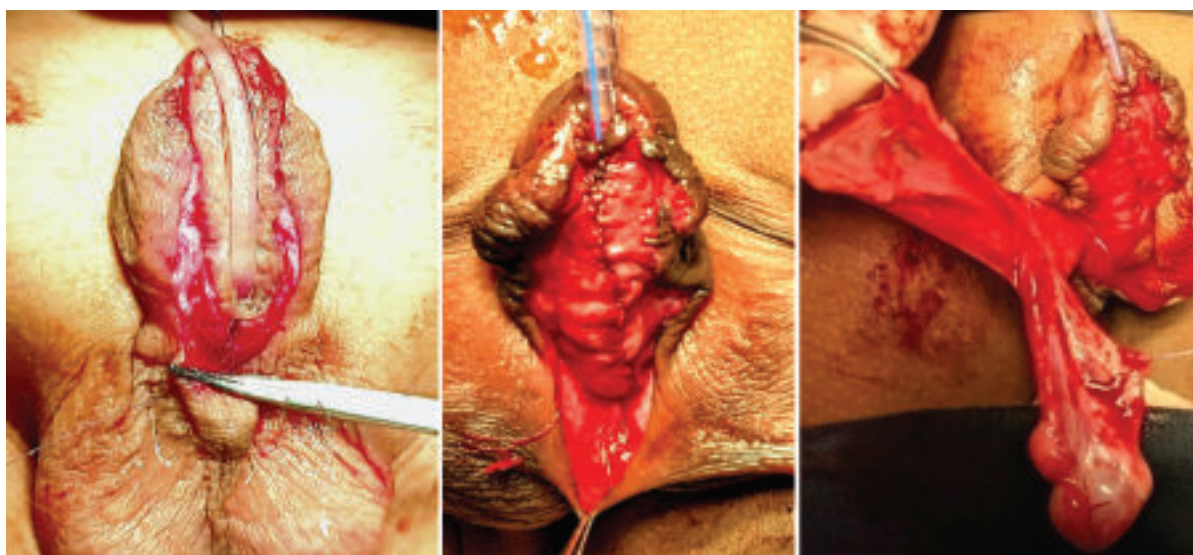


Figure 2. (a) After orthoplasty

(b,c) follow up after 6 months

Stage II repair: The neourethra was created from the strip of ventral skin by making a 'U' shaped incision and this strip was tubularized over 8 or 10 French Gauge catheters with 6-0 vicryl suture from the level of external meatus upto glans. However, in 3 patients neourethra was created only upto subglanular level due to flat glans. A second layer of interrupted sutures were applied over the neourethra. Then one testicle was brought out through the same incision as for creating neourethra.

The tunica vaginalis was incised and configured as a flap. This flap was then transferred over the neourethra. The penile shaft skin was closed (Fig. 3). The related testicle was fixed to scrotal dartos with 4-0 vicryl suture. The scrotal incision was closed. Post operatively antibiotics (i.e, ceftriaxone and amikacin) were given for 7 days. The dressing was changed on 5th postoperative day. An indwelling catheter was kept in situ for 14 days. No suprapubic diversion was done.



(a,b) Neourethra was created by making a 'U' shaped incision

(c) Harvesting TV flap

Figure 3. Stage II hypospadias repair



(d) Anchoring the TV flap

(e) after completion of surgery

(f) frontal view after 6 month

Figure 3. Stage II hypospadias repair**RESULTS**

Out of 30 hypospadias, 80% was posterior (proximal 33%, penoscrotal 30%, scrotal 17%) and 20% was mid shaft variety (Table I).

Table I. Distribution of types of hypospadias

Distribution of hypospadias	n = 30	(%)
Mid penile	6	20
Proximal penile	10	33.33
Penoscrotal	9	30
Scrotal	5	16.6

All patients were discharged after removal of indwelling catheter and followed up in out-patient department on weekly interval for 1 month and then monthly for 6 months. The maximum follow-up is upto 3 years. The neourethra was calibrated with a urethral sound regularly in all patients' upto first two to three follow-up visits.

Table II. Outcome of stage II hypospadias repair

Consequence	n=30	%
Good functional and cosmetic repair	26	86.6
Urethrocuteaneous fistula	01	3.3
Subglanular external urethral meatus	03	10

Overall 86.6% of patients had successful functional and cosmetic repair. One (3.3%) patient had developed urethrocuteaneous fistula which needed repair after 6 months. External meatus was at subglanular level in 3 (10%) patients but it was well accepted by the patient's guardian.

DISCUSSION

The choice of technique in repair of hypospadias largely depends on the components of this anomaly namely urethral plate size, presence or absence of chordee, size of phallus, location of meatus and to some extent the experience of the surgeon. The primary goal in management is to straighten the penile shaft and bring the external urinary meatus into glanular area. In patients where division of urethral plate become necessary to correct the chordee, the choice lies either between staging the procedure or other single option well described in literature. The two-stage correction of hypospadias is well established procedure and it suits most of the patients from penoscrotal to distal penile variety.⁶ The vascularized dorsal skin flap (Byar's flap) is available to cover the raw area created as a result of chordee correction in 1st stage and this skin is used to create neourethra in 2nd stage. In a recent 20 years review of primary severe hypospadias, the staged repair has been reported to have lower complication rate that is a 10% fistula/dehiscence and a 6% stricture/stenosis

rate but it has not commented on the use of intermediate layer between neourethra and penile skin sutures by different authors.⁷

In present study, we have managed 30 patients of severe hypospadias with two-stage repair and tunica vaginalis has been used as an intermediate layer to cover the neourethra. For staged repair of hypospadias, the different techniques have been described but the surgical concept of Thiersch and Duplay remains the same.^{4,5} The stage I repair involves the correction of chordee and using the dorsal prepuce flaps as cover for penile shaft. In this study, chordee correction was done by dividing the urethral plate and dorsal plication was needed in 4 (13.3%) patients and none of the patient required ventral corporal lengthening. It has also been observed in literature that curvature so severe to require ventral lengthening appears to be rare and there are chances of recurrence of chordee even after the ventral lengthening procedures.⁷

The stage II involves the creation of neourethra from the ventral penile shaft skin. In present study, this neourethra was covered with a tunica vaginalis flap. This flap is reported to have many advantages in the form of good vascularity, easy availability and not being affected by penile disorders. Snow used this flap for the first time in wrapping the neourethra with good results.⁷ Since then many authors have augmented the repairs of hypospadias and complex fistula by using this flap.^{9,12,13} The technique of harvesting the tunica vaginalis flap is simple but meticulous dissection is needed to avoid the injury to spermatic vessels, vas deference, epididymis or testis. This flap is then transferred over the neourethra either via same incision as per urethroplasty or by tunnel technique.¹³ In this present study flap is transferred via same incision.

Complications reported in hypospadias repair are fistula formation, stenosis, diverticulum formation and tunica vaginalis flap complications are scrotal haematoma or abscess in range of 2% to 4%.^{8,15} The commonest one is fistula formation and reported incidence varies as low as 3% to as high as 50%.^{7,16,17} In the present study, fistula occurred in 3.3% which is acceptable incidence. No scrotal haematoma or scrotal abscess occurred in the present study. Other reported complications like ascent of ipsilateral testis or penile torque¹⁸ have not been observed in our patients, but in 10% patients the

external urinary meatus could be achieved upto subglanular level. In patients where local anatomy does not favour extending the neourethra upto the glans a subglanular or coronal meatus is also acceptable by patients and their family but a pre-repair counseling with family is of utmost importance. Moreover, it is well established that the meatal position at the coronal or subglanular level can be functional and even considered normal.¹⁹ Limitations of the study were the number of patients included in this study was small with a short follow-up. A larger comparative study with other flap techniques done in a similar manner would provide stronger evidence in favor of the tunica vaginalis flap.

Conclusion

Staged repair of severe hypospadias is valuable in selected group of patients and tunica vaginalis flap is an excellent intermediate layer to cover the neourethra to prevent fistula and contracture which gives good cosmetic and functional results.

Authors' contribution: MP planned the study. SA, AF collected data. MS did literature search and helped in data analysis. MP drafted the manuscript. ATMMC reviewed and contributed further to the article.

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REFERENCES

1. Baskin LS, Ebbers MB. Hypospadias: anatomy, etiology and technique. *J Pediatr Surg* 2006; 41:463-72.
2. Hodgson NB. History of hypospadias repair, *Reconstructive and plastic surgery of the external genitalia adult and pediatric*. WB Saunders Company; 1999. p. 16.
3. Bracka A. Hypospadias repair: the stage alternative. *Br J Urol* 1995; 76(Suppl. a. 3):31-41.
4. Greenfield SP, Sadler BT, Wan J. Two stage repair for severe hypospadias. *J Urol* 1993; 152:498-501.
5. Amukele SA, Stock JA, Hanna MK. Management and outcome of complex hypospadias repairs. *J Urol* 2005; 174:1540-3.
6. Arshad AR. Hypospadias repair: Byar's two stage operation revisited. *Br J Plast Surg* 2005; 58:481-6.
7. Castagnetti M, El-Ghoneimi A. Surgical management of primary severe hypospadias in children: systematic 20 years review. *J Urol* 2010; 184:1469-74.

8. Snow BW. Use of tunica vaginalis to prevent fistulas in hypospadias surgery. *J Urol* 1986; 138:861-3.
9. Nandoo YR. Role of tunica vaginalis interposition layer in hypospadias surgery. *Indian J Plast Surg* 2006; 39:15-6.
10. 9.Yamataka A, Ando K, Lane GJ, Miyano T. Pedicled external spermatic fascia flap for urethroplasty in hypospadias and closure of urethrocutaneous fistula. *J Pediatr Surg* 1998;33:1788-9.
11. Motiwala HG. Dartos flap: an aid to urethral reconstruction. *Br J Urol* 1993; 72:260-2.
12. Kadian YS, Rattan KN, Singh J, Singh M, Kajal P, Parihar P. Tunica vaginalis: an aid in hypospadias fistula repair: our experience of 14 cases. *Afr J Pediatr Surg* 2011; 8: 164-7.
13. Kirkali Z. Tunica vaginalis: an aid in hypospadias surgery. *Br J Urol* 1990; 65:530-2.
14. Routh JC, Walpeol JJ, Reinberg Y. Tunneled tunica vaginalis flap is an effective technique for recurrent urethrocutaneous fistulas following tubularised incised plate urethroplasty. *J Urol* 2006; 176:1578-81.
15. 14.Snow BW, Castwright PC, Unger K. Tunica vaginalis blanket wrap to prevent urethrocutaneous fistula: an 8 years experience. *J Urol* 1995; 153:472-3.
16. Horton CE, Devine CJ, Graham JK. Fistulas of the penile urethra. *Plast Reconstr Surg* 1980; 66:407-18.
17. 16.Retik AB, Baur SB, Mandell J, Peters CA, Colodry A, Atala A. Management of severe hypospadias with a 2-stage repair. *J Urol* 1994; 152:749-52.
18. Paltaras JG, Rushton HG. Penile torque after the use of tunica vaginalis blanket wrap as an aid in hypospadias repair. *J Urol* 1999; 161:934-5.
19. Fichtner J, Filipas D, Moltrie AM, Voges GE, Hohenfellner R. Analysis of meatal location in 500 men: wide variation questions need for meatal advancement in all pediatric anterior hypospadias cases. *J Urol* 1995; 154:833-4.