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# To Compare the Outcomes of Dorsal Dartos Flap, Tunica Vaginalis Flap and Durham Smith De-Epithelialized Dartos Based Flap as Secondary Interposition Cover after Tubularized Incised Plate Urethroplasty in Reducing Post-Operative Complications

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## Abstract

***Background:*** Interposition flaps are mainstay in the success of hypospadias surgery because they lead to decrease in complications of hypospadias repair significantly especially urethrocutaneous fistula by buttressing the neo urethral suture line. Many interposition flaps have been tried with varying outcome results. Most commonly used interposition flaps are Tunica vaginalis flap and dorsal dartos flap however, recently interest have also researched in Durham smith de-epithelialized dartos based overlay flap. Though there are many publications comparing outcome of dorsal dartos and tunica vaginalis flap but hardly any study that has compared all three interposition flaps. So, we aimed to compare the outcomes of dorsal dartos flap (DF), tunica vaginalis flap (TVF) and Durham smith de-epithelialized dartos based overlay flap as interposition layer in TIP urethroplasty.

***Aim:*** To compare the outcomes of dorsal dartos flap (DF), tunica vaginalis flap (TVF) and Durham smith de-epithelialized dartos based flap as secondary interposition cover after Tubularized incised plate urethroplastyin reducing post-operative complication.

***Materials and Methods:*** A retrospective study was conducted in which case records of 78 patients who had undergone repair for distal and mid-penile hypospadias with minimal chordee and favorable anatomy by the Tubularized incised plate urethroplasty with interposition flap over 2 years (2017-2019) were reviewed. Patients were divided in three groups with 26 subjects in each group. Group A consisted of patients with dorsal dartos interposition flap, Group B comprised of patients with Tunica vaginalis interposition flap and Group C consisted of patients with Durham smith de-epithelialized dartos based overlay cover. Outcome variables noted were the complications including wound dehiscence, Urethrocutaneous fistula, Meatal stenosis, Penile torsion, skin necrosis and preputial edema. Statistical methods were applied to compare these complications in all three groups.

***Results:*** Total number of complications in group A were 11(42.3%) and most common complications were skin necrosis (n=7, 26.9%) and urethrocutaneous fistula (n=6, 23.1%). Total number of complications in group B were 7(26.9%) while Chordee and preputial edema (n=6, 23.1% each) were among the most common complications. 9(34.6%) patients developed

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complications in group C and most common complications were penile torsion (n=6, 23.1%) and urethrocutaneous fistula (n=4, 15.4%).

***Conclusion:*** We have seen in our study that TV flap is a good option as second cover with lesser complications especially in terms of fistula related complications while Durham smith onlay cover found to be equally better option as it showed no skin complications and other complications were almost comparable to TV flap cover.

**Keywords:** Hypospadias; Dartos flap(DF); Tunica vaginalis flap (TVF); Urethrocutaneous fistula (UCF); Tubularized incised plate urethroplasty(TIP).

## Introduction

Hypospadias is one of the common anomalies in boys. Many techniques of repair have been described.[1] The reported incidence of complications for hypospadias surgery by Snodgrass technique ranges from 0% to 53%.[2,3] Among all the complications, most common complication reported is urethrocutaneous fistula which forms >60% of all complications.[4] To decrease the rate of post-operative fistula complications many safety measures are undertaken including tissue handling, silicon catheter material, good quality suture material and several covering flap procedures as second vascular cover such as dorsal dartos, ventral de-epithelialized preputial dartos based cover or tunica vaginalis (TV) is known to minimize or avoid this complication.[5] This study aimed to compare the outcomes of dartos flap (DF), tunica vaginalis flap (TVF) and Durham smith de-epithelialized dartos based overlay flap1as secondary intermediate layerin TIP urethroplasty.

## Material and Methods

It is a retrospective study where we collected, analyzed and followed up the data of 78 patients who had undergone single stage hypospadias repair by the Tubularized incised plate (TIP) urethroplasty with interposition flap. The case records of all patients, who have undergone Tubularized incised plate urethroplasty repair with interposition flap like dorsal dartos flap, tunica vaginalis flap or smith flap which is durham smith de-epithelialized dartos based overlay cover, were reviewed.

At our centre all these secondary interposition flaps are practiced for single stage hypospadias repair as per surgeon's preference. On case record review, those patients who underwent TIP repair with dorsal dartos interposition flapwere labelled as Group A. Group B comprised of patients with Tunica vaginalis interposition flap and Group C consisted of patients with Durham smith de-epithelialized dartos based overlay cover. Distal and mid-penile hypospadias with minimal chordee and favorable anatomy were included. Each group had 26 patients with similar distribution among the groups.

On review of the files post-operative findings including wound dehiscence, Urethrocutaneous fistula, Meatal stenosis, Penile torsion, skin necrosis and preputial edema were noted on post-operative day 10 at the time of removal of catheter. The outcome data points among the groups were tabulatedStatistical methods were applied to compare these complications in all three groups.

### *Operative Technique*

Patients in all the groups were those who had already undergone hypospadias repair by Tubularized incised plate (TIP) technique. We describe here briefly about this technique. Here in this technique urethral plate is preserved and an

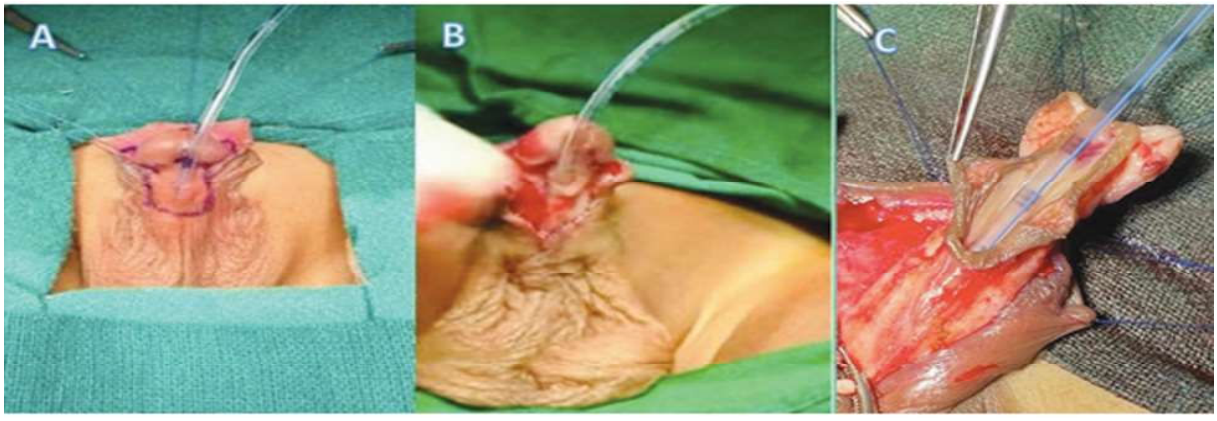



**Fig. 1:** Showing steps of Tubularized incised plate (TIP) technique.

inverted U-shaped incision is given encircling the meatus to the corona. After degloving, Gitte's test is done to evaluate the degree of chordee. Glans wings are raised. After an incision made over the urethral plate, and it isthen tubularized over an appropriate sized catheter using 6-0 vicryl subcuticular sutures. Second soft tissue cover is then used which was differed among the groups.(Fig. 1)



**Fig. 2**: Dorsal Dartos flap.



**Fig. 3:** Tunica Vaginalis Flap.

In group A, the dartos flap was used to provide soft tissue cover. It is harvested from the dorsal prepuce after careful dissection between the dartos and the skin. The dartos fascia is then mobilized ventrally over the ventral suture line and sutured using vicryl 6-0. (Fig. 2)

In group B, tunica vaginalis flap was used to provide soft tissue cover. In this procedure after degloving till the root of penis, testis is then delivered out. Tunica is incised near the lower pole and adequate length of TV flap is raised. This flap is then used to cover the entire length of suture line. (Fig. 3).

In group C, after urethral plate tabularization, the prepuce is split longitudinally on the dorsal surface as far as the coronal groove to create two lateral flaps.A strip of skin 3"2-4"8 mm wide is then de-epithelialized on one side to provide a raw surface of deep dermis.The medial edge of the shaved flap is brought across the urethroplasty tube, and sutured to fascial tissue beneath the other flap so that double breasting is done. (Fig.4).



**Fig. 4:** Showing Durham smith de-epithelialized dartos based overlay flap and final result after double breasting.

## Results

Patients were divided in three groups based upon the procedures performed viz. Dartos flap, Tunica vaginalis flap or Durham smith de-epithelialized flap after urethroplasty by Tubularized incised plate technique. Each group had 26 patients each. Results of each group is summarised in table 1.1.

Group A had median age of 4.2 years while 4.8 years for Group B and 4.4 years for Group C. 23 patientsin group A had distal-penile hypospadias, while 3 patients had mid-penile hypospadias. In group B, 18 patients had distal-penile hypospadias, while 8 patients had mid-penile hypospadias. In group C, 22 patients had distal-penile hypospadias, while 4 patients had mid-penile hypospadias. Chordee was present in 11 patients, 13 patients and 9 patients respectively in Group A, B and C.

In group A, after successful repair of hypospadias with Dartos flap as secondary soft tissue cover, urethrocutaneous fistula was seen in 6 patients (23.1%) while it is seen in 2 patients (7.6%) after TV flap repair in group B and in 4 patients (15.4%) in group C. Skin necrosis was seen in 7 patients (26.9%) in group A while 3 patients (11.5%) developed skin necrosis in group B but no patient developed skin necrosis in group C. Preputial edema was developed in 11 patients (42.3%) in Group A while it was seen among 6 patients (23.1%) in group B and 7 patients (26.9%) developed skin necrosis in group C.Wound dehiscence including all layers was seen among 3 patients (11.5%) in group.

A while it was observed in only 1 patient (3.8%) in group B and group C. Meatal stenosis was seen among 3 patients (11.5%) in group A while it was seen in only 1 patient (3.8%) in group B and group C. Outcome analysis is tabulated in Table 1 and depicted with Bar diagram in (Fig. 5.)

**Table 1**

| | Group A (26) | Group B (26) | Group C (26) |
|---|---|---|---|
| Mean age (yrs.) | 4.2 | 4.8 | 4.4 |
| Variety Distal | 23 (88.5%) | 18 (69.2%) | 22 (84.6%) |
| Mid-penile | 3 (11.5%) | 8 (30.8%) | 4 (15.4%) |
| Total Number of Complications | 11 (42.3%) | 7 (26.9%) | 9 (34.6%) |
| Chordee | 4 (15.4%) | 6 (23.1%) | 5 (19.2%) |
| Penile Torsion | 3 (11.5%) | 2 (7.6%) | 6 (23.1%) |
| Wound Dehiscence | 2 (7.6%) | 1 (3.8%) | 1 (3.8%) |
| UC Fistula | 6 (23.1%) | 2 (7.6%) | 4 (15.4%) |
| Skin Necrosis | 7 (26.9%) | 3 (11.5%) | 0 (0%) |
| Meatal Stenosis | 3 (11.5%) | 1 (3.8%) | 1 (3.8%) |
| Preputial edema | 11(42.3%) | 6 (23.1%) | 7 (26.9%) |

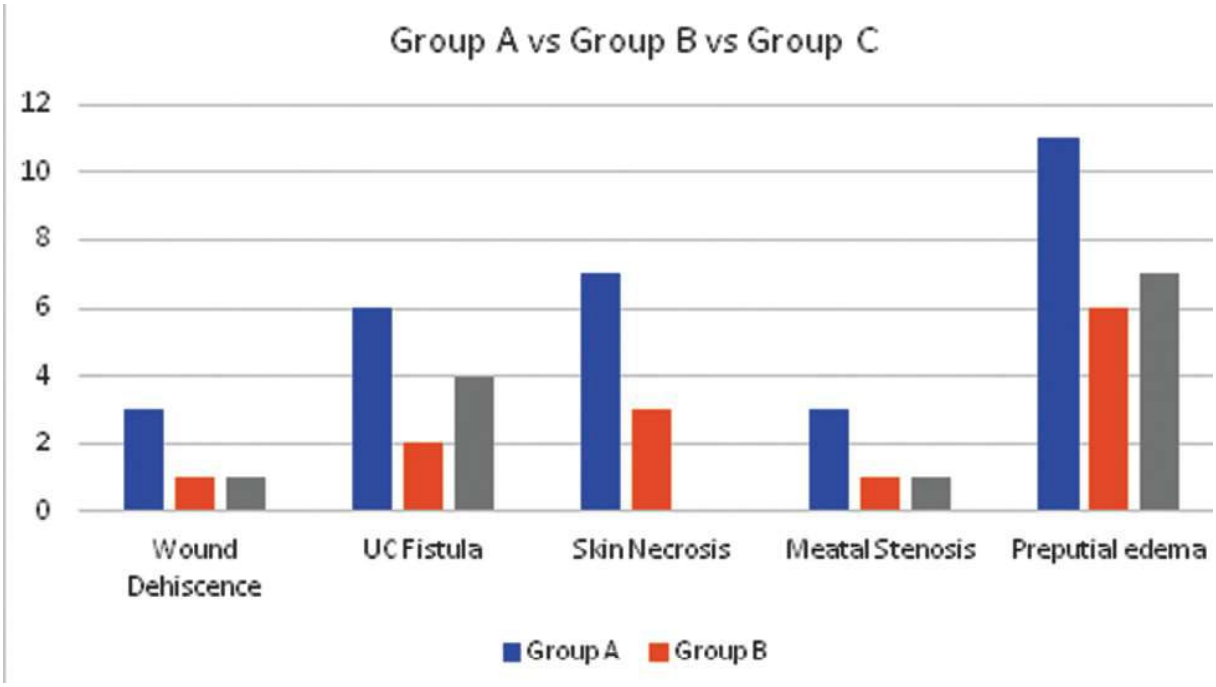



**Fig. 5:** Showing outcome analysis among patients in respective groups.

## Discussion

Hypospadias surgery is always evolving and no single procedure is considered perfect. In the present study, we reviewed 78 patients where interposition flaps like dorsal dartos, tunica vaginalis orde-epithelialized dartos based overlay cover were used. In our study we recorded fistula rate of 26.9% among dorsal dartos group and 7.6% in tunica vaginalis group. Similar studies like Yogender et al.[6] reported 9% fistula rate and Shankar et al.[7] reported fistula rate of 11% in tunica vaginalis flap group. Dhua et al.[8] and Chatterjee et al.[9] reported 0% fistula rate with TVF group while 12% and 15-20% with dartos flap group. They have concluded that TIP with TVF could be the good option in a primary single stage repair of hypospadias. No similar study was found that compared outcome of Durham smith de-epithelialized dartos based

overlay cover after primary repair. Studies like Mohajerzadeh et al.[10] shows urethrocutaneous fistula rate of 41% after second stage Durham smith repair was carried out on 17 patients. In TVF group only 3.8% patients developed meatal stenosis which is better than Kamyar et al.[11] that reported 14% meatal stenosis.

In our study superficial skin necrosis is seen in 26.9% patients in Dartos flap group while 11.5% patients in TVF group. Similar studies like Jiwan et al.[12] reported 30% skin necrosis in dartos group and 0% in tunica vaginalis flap group. No patient developed skin necrosis in group C. Although skin necrosis was inconsequential in the long run, it did cause anxiety and distress to the families and invited more hospital visits.

Wound dehiscence including dehiscence of glans penis was seen in 11.5% among patients in group A and 3.8% in group B and C. Other similar studies like Moosa ZY[13] shows no wound dehiscence in both groups while Dhua et al.[8] reported wound dehiscence in single patient in TVF group but no dehiscence was reported among patients in Dartos flap group. In our study we reported preputial edema among 42.3% patients in group A and 23.1% patients in group B while 26.9% patients in group C. No similar studies found that compared preputial edema but we recorded higher incidence of preputial edema among patients belonged to Dartos flap group.

Both tunica vaginal flap and Durham smith de-epithelialized dartos based overlay coverhad good outcome but we have seen that TVF group patients had low incidence of urethrocutaneous fistula and meatal stenosis.

### *Limitations*

Although there could be lots of factors that might affect the outcome of hypospadias surgery, especially the wide variability in technical aspects of surgery and complexity for individual cases, additional large sample size, well-designed studies need to be conducted for optimal comparisons between these two flap techniques.

## Conclusion

We have seen in our study that TV flap is a good option as second cover with lesser complications especially in terms of fistula related complications but Durham smith de-epithelialized dartos based overlay coverfound to be equally better option as it showed no skin complications and other complications were almost comparable to TV flap cover.

***Source of Support:*** Nil

***Conflict of Interest:*** None declared.

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