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Original Research Article

Outcome of standard tabularized incised plate urethroplasty repair using dartos flap and tunica vaginalis flap in of hypospadias cases

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ABSTRACT

Background: Hypospadias, with prevalence of 1 per 300 live births, is a congenital malformation caused by incomplete fusion of urethral folds, in which the meatal orifice opens on the inferior surface of the penis. The commonest complication of hypospadias surgery is fistula formation which requires re-operation. Several techniques of providing vascularised soft tissue cover to neourethra have been described. They include de-epithelized skin, corpus spongiosum, dartos fascia and tunica vaginalis. The purpose of our study was to compare outcomes of standard tubularised incised plate urethroplasty (TIP) repair using dartos flap and TVF in of hypospadias cases.
Methods: This study was carried out in the Department of Surgery (Paediatric Surgery Division) of Pt. JNM Medical College and associated Dr. BRAM Hospital, Raipur in patients diagnosed to had distal, mid penile and proximal penile type of hypospadias. The study was carried out during the period from February 2016 to September 2017. Total no of cases studied was 55. All admitted patients for primary Snodgrass repair were randomized into two groups by Simple Random method to avoid selection bias. Group A of 27 patients were prospectively selected for repair using TVF for soft tissue cover. Group B of 28 Patients, comparable in age and type of hypospadias, who underwent TIP repair using dartos flap as soft tissue cover. Descriptive statistics were employed to characterize the data.
Results: Patients were from 1 year to 13 years of age at time of surgery for hypospadias. Mean age being 4.69+3.15. There was almost equal number of patients in both groups of flap. Both groups were comparable in terms of age and type of hypospadias. Overall, dartos flap group had significantly higher rate of urethrocutaneous fistula formation than tunica vaginalis flap. In TVF group only one patient (3.7%) developed skin necrosis while in Dartos group 5 patients (17.86%) developed skin necrosis. Both TVF group and Dartos group had one patient with residual torsion.
Conclusions: In present study we have noted higher rate of fistula formation and skin necrosis in dartos flap group as compared to tunica vaginalis. Tunica vaginalis flap definitely have an edge over preputial dartos flap and we would recommend its use as waterproofing second layer in hypospadias cases.

Keywords: Dartos flap, Hypospadias, Tubularised incised plate urethroplasty, Tunica vaginalis flap

INTRODUCTION

Hypospadias, with prevalence of 1 per 300 live births, is a congenital malformation caused by incomplete fusion of urethral folds, in which the meatal orifice opens on the inferior surface of the penis.[1,2] Snodgrass described the tubularised incised plate (TIP) urethroplasty technique in 1994. Many vascularised flaps such as dartos flap and tunica vaginalis flap (TVF) were introduced to overcome the concerns of vascularity of the repaired site.

Complications in the form of meatal stenosis, urethral stricture, urethrocutaneous fistula (UCF) and urethral diverticulum continue to occur in spite of the several advancements in urethroplasty techniques.[3]

The commonest complication of hypospadias surgery is fistula formation which requires re-operation. Several techniques of providing vascularised soft tissue cover to neourethra have been described. They include de-epithelized skin, corpus spongiosum, dartos fascia and tunica vaginalis.[4-7] Both dartos fascia and tunica vaginalis provide robust cover to the urethra and act as a barrier between the sutures lines.

Dartos fascia harvested from the dorsal penile skin, is most frequently used. Harvesting dartos fascia may be difficult for beginners as it requires precise and skilful dissection to raise the dartos flap without damaging the intrinsic blood supply to the outer skin. This outer skin when transposed ventrally to provide skin cover may consequently devitalise leading to skin necrosis. The tunica vaginalis flap has sound vascularity, as it has a separate blood supply and does not depend on the vascularity of penile skin, unlike the dartos fascia.

The choice between the two flaps depends more on surgeon's choice and experience rather than scientific evidence. Use of TVF has been suggested as an additional vascularised cover in TIP urethroplasty and is effective in reducing the UCF rates. The purpose of present study was to compare outcome of standard tubularised incised plate urethroplasty (TIP) repair using dartos flap and TVF in of hypospadias cases.

METHODS

This study was carried out in the Department of Surgery (Paediatric Surgery Division) of Pt. JNM Medical College and associated Dr. BRAM Hospital, Raipur (C.G.) in patient diagnosed to had distal, mid penile and proximal penile type of hypospadias. All patients coming to Paediatric Surgery OPD diagnosed with distal, mid penile and proximal hypospadias were included in this study. The study was carried out during the period from February 2016 to September 2017. Total no of cases studied was 55.

Inclusion criteria

- Patients admitted in the department of surgery (pediatric surgery division) and diagnosed to had hypospadias clinically (distal, mid penile and proximal penile)
- All those patients who were suitable for primary Snodgrass repair.
- Patients who were willing to participate in study and would be willing to submit to postoperative follow-up and evaluations
- Age group 12 months to 14 years of male patients.

Exclusion criteria

- Patients with only flap repair, redo cases and previous inguinoscrotal surgery i.e. hernia or hydrocele or orchidopexy were excluded.
- Patients with penoscrotal, scrotal and perineal type of hypospadias were excluded
- Patients with deep chordee requiring division of urethral plate were excluded and planned for two staged repairs

All admitted patients for primary Snodgrass repair were randomized into two groups by Simple Random method to avoid selection bias. Group A of 27 patients were prospectively selected for repair using TVF for soft tissue cover. Group B of 28 Patients, comparable in age and type of hypospadias, who underwent TIP repair using dartos flap as soft tissue cover. Patient with particular age group and type of hypospadias allotted in group A and next patient with similar age group and type of hypospadias allotted in group B. Patients were similar in terms of chordee present in both group and preoperative hormonal therapy given to rule out confounding factor. All surgeries were performed by same surgeon.

The demographic details of all patients were noted. Detailed history and physical examination were done in all patients and noted in case record sheet. Penile anthropometry was noted in case record sheet. All patients were explained about operative risk and postoperative complications. Informed and written consent was taken from all patients. All patients were kept nil by mouth for 6 hours before surgery. Enema application was given to all patients evening before surgery. Lower abdomen, genitalia and upper thighs were thoroughly scrubbed with betadine scrub night before surgery. Both the operative procedure was performed as per standard protocol. Patients were followed for 1 month postoperatively in ward and OPD. All postoperative complications were noted. Intravenous antibiotics were given for 3 days, followed by oral antibiotics. Dressing was done at 5th day. Catheter was removed at 10th day. Later the children were followed periodically. Descriptive statistics were employed to characterize the data. Chi square test was used for categorical data. Yates correction was applied. P value of <0.05 was considered statistically significant. The analysis was carried out using the Statistical Package for the Social Sciences (SPSS 12.0 version; SPSS, Inc., Chicago, IL, USA).

RESULTS

Patients were from 1 year to 13 years of age at time of surgery for hypospadias. Mean age being 4.690909 years with standard deviation was 3.151265. Most common age at time of surgery being 4 years. Median of distribution was 7 years (Table 1). There was almost equal number of patients in both groups of flap. Both groups were comparable in terms of age and type of hypospadias (Table 2).

Table 1: Age at time of surgery.

Age group	No. of patients	Percentage
<2 years	8	14.54%
2 - <4 years	17	30.9%
4 - <6 years	12	21.8%
6 - <8 years	6	10.9%
8 - <10 years	6	10.9%
10 - <12 years	4	7.27%
12 - <14 years	2	3.63%
Total	55	100%

Table 2: Age wise use of type of flaps.

Age group	Type of flap used	
	Dartos	TVF
<2 years	4	4
2 - <4 years	9	8
4 - <6 years	6	6
6 - <8 years	3	3
8 - <10 years	3	3
10 -<12 years	2	2
12 - <14 years	1	1

Table 3: Type of hypospadias.

Type of hypospadias	No. of patients
Distal	25
Mid penile	18
Proximal penile	12

Most common type of hypospadias being distal type of hypospadias (45.5%). Next common type of hypospadias being mid penile (32.7%) then proximal penile (21.8%) (Table 3).

Table 4: Urethrocutaneous fistula formation.

Urethrocutaneous fistula	Dartos	TVF
Yes	12 (42.86%)	5 (17.86%)
No	16(57.14%)	22(82.14%)
Total	28(100%)	27(100%)

Chi square- 3.813, d.f.- 1, p value- <0.05

Overall, dartos flap group had significantly higher of urethrocutaneous fistula formation than tunica vaginalis flap (Table 4).

Table 5: Wound infection.

Type of flap	Infection			
	No	Mild	Moderate	Severe
TVF	21(77.78%)	5 (18.5%)	1 (3.7%)	0 (0%)
Dartos	14 (50%)	10 (35.7%)	3 (10.7%)	1 (3.57%)

Chi square- 5.05, d.f.- 1, p value- <0.05

In Dartos flap group, 35.7% patients developed mild infection (superficial skin discharge) which was managed by dressing and antibiotics as per culture sensitivity. 10.7% patient developed moderate wound infection (leading to partial wound dehiscence and ultimately urethrocutaneous fistula). 3.57% of patients developed severe wound infection (complete wound dehiscence ultimately leading to urethrocutaneous fistula formation).

In TVF group, 18.5% patients developed mild infection (superficial skin discharge) which was managed by dressing and antibiotics as per culture sensitivity. 3.7% patient developed moderate wound infection (leading to partial wound dehiscence and ultimately urethrocutaneous fistula) (Table 5).

Table 6: Skin necrosis.

Type of flap	Yes	No
TVF	1 (3.7%)	26(96.3%)
Dartos	5(17.86%)	23(82.14%)

Chi square- 2.833, d.f.- 1, p value- <0.05

In TVF group only one patient (3.7%) developed skin necrosis while in Dartos group 5 patients (17.86%) developed skin necrosis (Table 6).

Table 7: Wound dehiscence.

Type of flap	No	Mild	Partial	Complete
TVF	20 (74.1%)	5 (18.5%	1 (3.7%)	1 (3.7%)
Dartos	16 (57.1%)	7 (25%)	3 (10.7%)	2 (7.1%)

Chi square- 2.094, d.f.- 3, p value- >0.05

In Dartos flap group, 25% patients developed mild wound dehiscence (1-2 sutures) which was managed by dressing and antibiotics as per culture sensitivity. 10.7% patient developed partial wound dehiscence (leading to ultimately urethrocutaneous fistula). In 7.1% of patients developed complete wound dehiscence (ultimately leading to urethrocutaneous fistula formation). In TVF group, 18.5% patients developed mild wound dehiscence (1 -2 sutures) which was managed by dressing and antibiotics as per culture and sensitivity. In 3.7% patient developed partial wound dehiscence (ultimately leading to urethrocutaneous fistula). In 3.7% of patients developed complete wound dehiscence (ultimately leading to urethrocutaneous fistula) (Table 7).

Table 8: Residual chordee according to type of flap.

Type of flap	Yes	No
TVF	2	26
Dartos	2	25

Both Dartos group and TVF group had similar number of patients (2) with residual chordee (Table 8).

Table 9: Residual torsion.

Type of flap	Yes	No
TVF	1	26
Dartos	1	28

Both TVF group and Dartos group had one patient with residual torsion (Table 9).

DISCUSSION

Most patients who came to attend paediatric surgery OPD and underwent primary Snodgrass repair ranging from 1 year to 13 years. Four years being most common age. Mean age at time of surgery was 4.69±3.15 years. In study by Tabassi KT and Mohammadi S mean age was 9.93±4.4 years (range 1.5 to 18 years). In Dhua AK et al similar study patients aged 12-132 months included in study. Mean age in TVF group being 37 months (range: 12-132 months and in preputial Dartos flap group being 40 months (range 14-144 months). In another similar study mean age of 35 patients undergoing TIP urethroplasty and TVF is 6.63±3.4 years.[8-10]

Overall, dartos flap group had 42.86% rate of urethrocutaneous fistula formation and tunica vaginalis flap had 17.86% rate of urethrocutaneous fistula formation in the present study. All Patients with urethrocutaneous fistula were planned for second surgery. In Tabassi KT and Mohammadi S similar study showed 3 patient out of 29 patients (10.34%) developed fistula. (in TIP with TVF) In Dhua AK et al similar study showed that 3 patient out of 25 patients in dartos group developed fistula while in TVF group no fistula formation occur. In one study only 2 patients (5.71%) undergoing TIP with TVF develop fistula.[8-10] In the present study, UCF formation rate were higher than above comparable study because of the following reasons

- Higher infection rate
- Long learning curve in hypospadias surgery.[11]
- Lack of microscope, good quality fine instruments and suture materials.

In Dartos flap group, 35.7% patients developed mild infection (superficial skin discharge) which was managed by dressing and antibiotics as per culture sensitivity. 10.7% patient developed moderate wound infection (leading to partial wound dehiscence and ultimately urethrocutaneous fistula). In 3.57% of patients developed severe wound infection (complete wound dehiscence ultimately leading to urethrocutaneous fistula formation). In TVF group, 18.5% patients developed mild infection (superficial skin discharge) which was managed by dressing and antibiotics as per culture sensitivity. In 3.7% patient developed moderate wound infection (leading to partial wound dehiscence and ultimately urethrocutaneous fistula). No patient developed severe wound infection. In Tabassi KT and Mohammadi S similar study showed 4 patients (TIP with TVF) out of 29 patients (13.79%) developed wound infection. One study showed that no wound infection. In Hamid R et al similar study showed 2 patients (5.71%) developed wound infection undergoing TIP with TVF.[8-10]

Infection can be a potential disaster to the repair and can be prevented by preoperative povidine iodine scrubbing, use of prophylactic antibiotics, use of antibiotic solution during surgery, avoidance of hematoma and local application of Mercurochrome.[11,12]

In TVF group only one patient (3.7%) developed skin necrosis while in Dartos group 5 patients (17.86%) developed skin necrosis. Using dartos flap may cause damage to the intrinsic blood supply to the outer skin leading to more necrosis rate. Since TVF does not depend on the skin, the ventral skin cover is never compromised. Two nearly similar studies showed no patient developed skin necrosis. In study by Dhua AK et al showed that 3 patients with skin necrosis managed conservatively in dartos flap group: none in TVF.[8-10]

In Dartos flap group, 25% patients developed mild wound dehiscence (1-2 sutures) which was managed by dressing and antibiotics as per culture sensitivity. 10.7% patient developed partial wound dehiscence (leading to ultimately urethrocutaneous fistula). In 7.1% of patients developed complete wound dehiscence (ultimately leading to urethrocutaneous fistula formation). In TVF group, 18.5% patients developed mild wound dehiscence (1-2 sutures) which was managed by dressing and antibiotics as per culture and sensitivity. In 3.7% patient developed partial wound dehiscence (ultimately leading to urethrocutaneous fistula). In 3.7% of patients developed complete wound dehiscence (ultimately leading to urethrocutaneous fistula). Infection, edema, hematoma, erections, diminished blood supply, weakened suture material, tension at suture line, and vigorous removal of dressing may lead to wound dehiscence.[13]

Good surgical technique, opposing the dartos fascia over the urethroplasty and averting the skin edges and proper postoperative management can prevent it. Resuturing of the raw area is not advisable. Devitalized, necrotic tissue requires removal regardless of etiology of breakdown before going for any surgical repair. In another similar study showed no wound dehiscence in any patient.[10,14]

In the current study, both Dartos group and TVF group had similar number of patients 2 with residual chordee and one patient with residual torsion. One similar study showed 1 patient with residual chordee out of 35 patients (2.81%) in TVF group.[10]

There are more chances of torsion in single dartos flap (mild glanular torsion 90.7% and moderate glanular torsion 9.3%) as compared to double dartos flap (0%). The problem arises due to inadequate mobilization of vascular pedicle and traction on the pedicle. This can be prevented by adequate mobilization of vascular

pedicle/dartos flap up to root of penis and proper adjustment of skin flaps during skin closure. Torsion of <30° does not require any corrective treatment.[15]

CONCLUSION

In present study author has noted higher rate of fistula formation and skin necrosis in dartos flap group as compared to tunica vaginalis. Tunica vaginalis flap definitely have an edge over preputial dartos flap and we would recommend its use as waterproofing second layer in hypospadias cases.

The results of current study represent peripheral tertiary center work in field of hypospadiology in India. Author would recommend large trial to statistically prove the hypothesis.

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