



A study of use of Tunica Vaginalis flap in anterior urethral reconstruction

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Introduction

Hypospadias is the most common congenital anomaly of penis [1]. Surgical correction of proximal hypospadias is a technically challenging. Such surgeries are associated with maximum number of failures and results in cripples. Reoperation of failed childhood hypospadias repair is seriously bothersome and is surgeon's nightmares because of lack of abundant penile and prepuce skin for urethroplasty and penile shaft coverage. Among the various complications of childhood hypospadias repair, partial disruption with urethrocutaneous fistula & complete disruption with pan urethral strictures and urethrocutaneous fistula are most frustrating problem for urologists. But there is no best single technique to repair.

By using a water-tight second layer during reoperation, incidence of urethrocutaneous fistula recurrence can be reduced. Tunica vaginalis flap is used to provide robust cover to neourethra. It also provides a barrier between suture lines. It has a different blood supply from internal spermatic fascia & not depends on penile skin vascularity.

Long segment penile urethral strictures with urethrocutaneous fistula following childhood

hypospadias repair are again a difficult surgical task. Most of times there is tissue shortage to cover such a long narrowed urethral segments. These type of strictures are associated with complications most of the time. Tunica vaginalis flap has a definitive role in stage II repair of such pan urethral strictures to prevent urethrocutaneous fistula and for penile cosmesis.

Aim of the study

To assess the efficacy and results of tunica vaginalis flap as an interposing layer in reoperative hypospadias complications like long segment anterior urethral strictures and urethrocutaneous fistulas.

Methodology

Study Design: Prospective study

Duration: January 2015 to May 2017

Institute: Government Kanyakumari Medical College, Nagercoil.

Patient Selection

Inclusion Criteria

1. Patients with post childhood hypospadias repair urethrocutaneous fistula.

2. Patients with post hypospadias repair long segment penile urethral stricture for which stage I Johanson's urethroplasty was already done.
3. Patients greater than 13 years of age.

Exclusion Criteria

1. Cases with previous scrotal surgery (Hydrocele repair or orchidopexy)
2. Cases requiring salvage perineal urethrostomy
3. Cases with perineal urethro cutaneous fistula

Pre-operative variables

- Age
- Duration of symptoms
- Uroflowmetry
- AUG
- Cystoscopy
- Previous history of open or endoscopic urethral surgery and dilatation
- Review of previous operative records
 - Type of Hypospadias
 - Type of initial procedure in childhood
 - Number of fistulae and associated strictures
 - Follow up

Operative technique

For post hypospadias urethrocutaneous fistula, initially urethra was distended with povidone iodine to identify the number of fistulas. The tract is traced to the retubularized urethra and fistulous tract removed. Fistula closed with inverting sutures & reinforced with tunica vaginalis flap. Testis was delivered by a separate scrotal incision and tunica vaginalis flap was harvested which was in turn transferred through a subcutaneous tunnel to fistula site.

TVF was harvested by incising near testicular inferior pole and tongue of parietal layer of TVF developed with due care to prevent ductus deferens and spermatic vessels injury. We must achieve perfect hemostasis and replace testis in to hemiscrotum. Serosal surface of TVF placed over neourethra as interposing layer. 4-0 absorbable

tacking stitches done to fix flap to Bucks fascia. Scrotal hemostasis should be achieved.

For long penile urethra stricture, second stage was done at least 6 months following stage I repair, two asymmetric vertical incisions placed on penile skin on side of the plate and tubularisation done over 16-F silicone urethral catheter by 4-0 polyglactin sutures. An interposing layer of tunica vaginalis was drawn onto neourethra and fixed.

Post-operative - Follow up

- UC fistula closure alone - 10th POD – catheter removal
- Staged repair - 21st POD - catheter removal after performing peri-catheter study
- Follow up at 3, 6 & 12 months - Uroflowmetry and if needed AUG and cystoscopy

Parameters assessed include

Immediate complications

- Wound infection
- Scrotal haematoma
- Presence of Leak
- Splaying
- Delayed complication
 - Meatal stenosis.
 - Failure leading to urethrocutaneous fistula and
 - Re-operation

Results

Study group

Age distribution:-

A total of 12 cases (15 to 35 years) of reoperative hypospadias were included.

Chart 1: Age wise distribution of cases

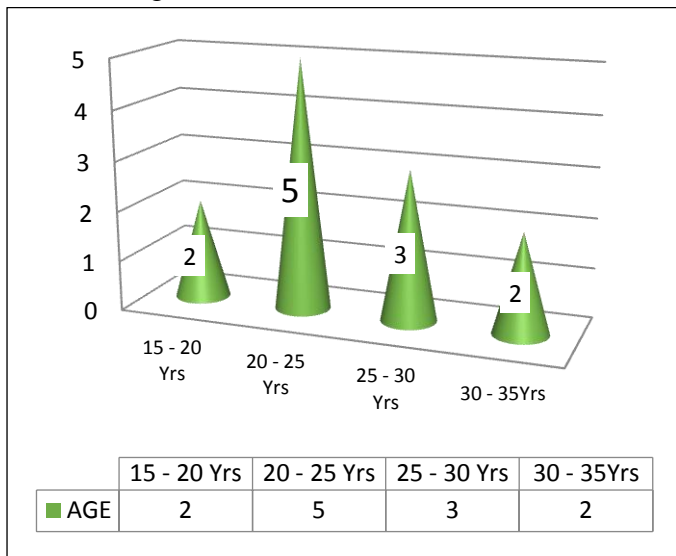


Table 1: Cases at presentation

Clinical Presentation	No. of cases	Percentage
Stricture with fistulae	8	66.67
UC fistula	4	33.33

Table 2: Initial procedure done for hypospadias

Initial Procedure done	Penoscrotal hypospadias	Proximal penile	Mid penile hypospadias	Total
Theirsch-duplay principle	0	1	5	6
Snodgrass TIP procedure	0	0	3	3
Inner preputial skin tubularisation	1	2		3
Total	1	3	8	12

The initial surgery done in all our cases are shown in the table above

Chart 2 - Initial Type Of Hypospadias

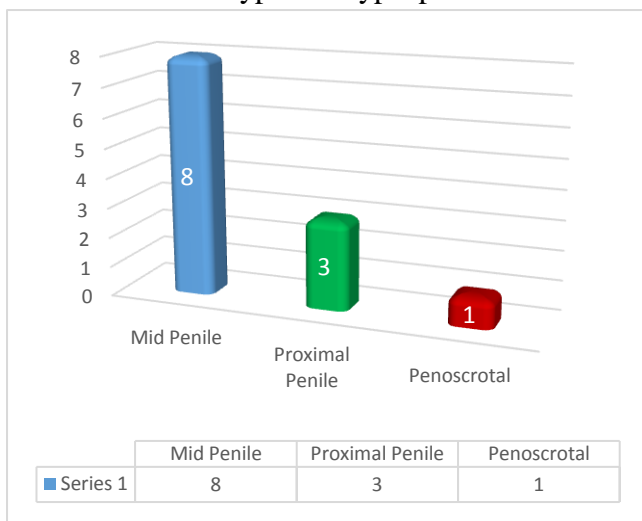
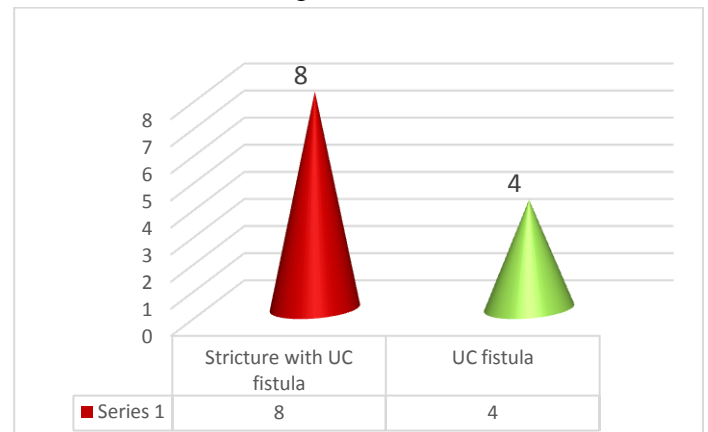


Chart 3 - Current Diagnosis



Total number of fistulae present in the patients is given below

Chart 4: Number of fistulae in patients

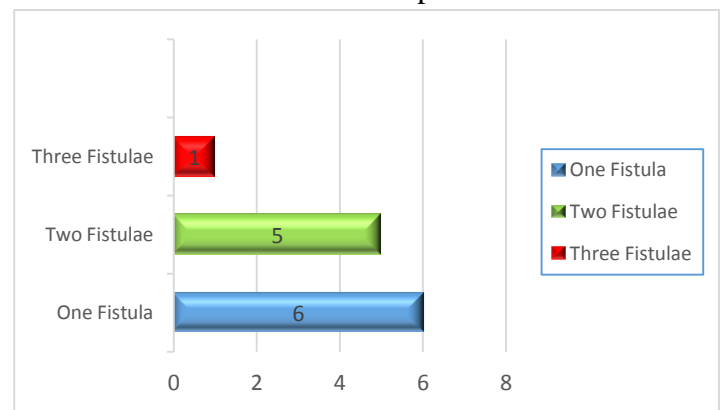


Table 3: Procedure done in patient at our centre.

Procedure	No. of cases	%
Two stage repair with TVF cover	8	66.67
Single stage repair with TVF cover	4	33.33

We performed the above procedures in the study group. All cases had tunica vaginalis flap interposed over the repair.

Image 1: Urethral Plate

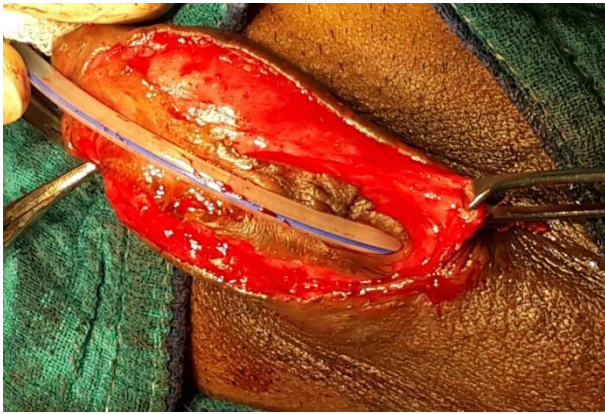


Image 2: Harvesting of tunica vaginalis flap



Image 3: Urethral plate Tubularisation

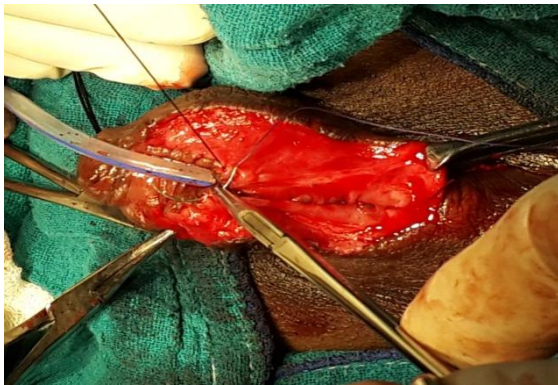


Image 4: Tunica vaginalis flap secured over the neo urethra



Image 5: Skin Cover



Image 6 - Pericatheter Study at POD 21



AUG demonstrating lack of extravasation of the contrast.

Image 7 Post Operative Day 30



Chart 5 - Current Procedure

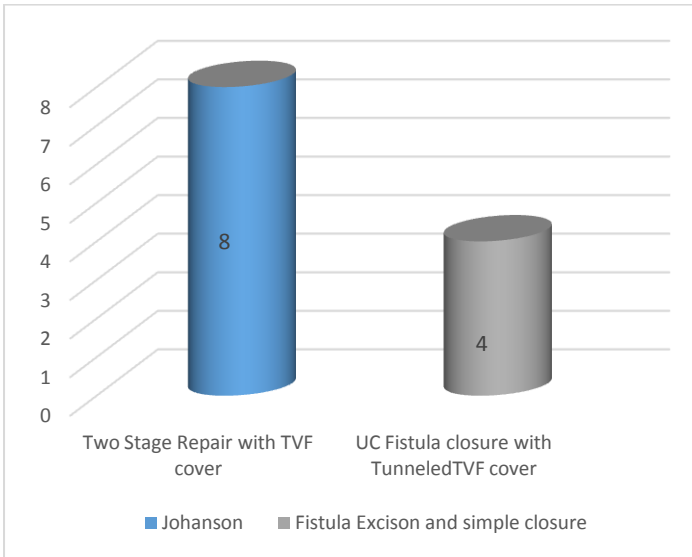


Chart 7 - Results

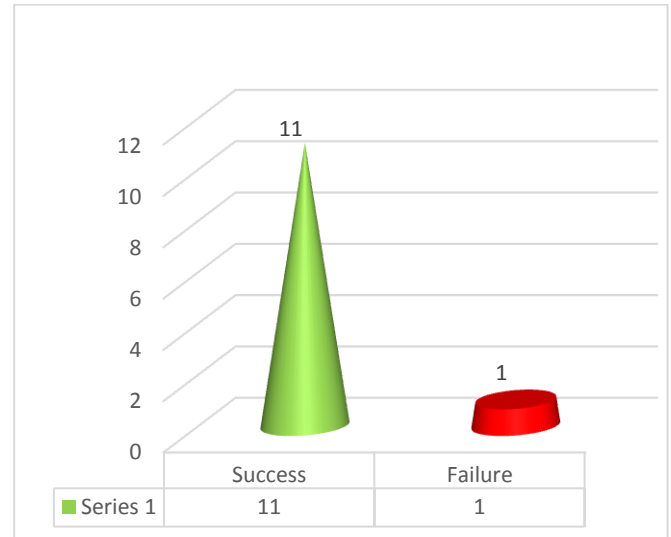


Chart 6: Flow chart showing patient surgeries and outcomes

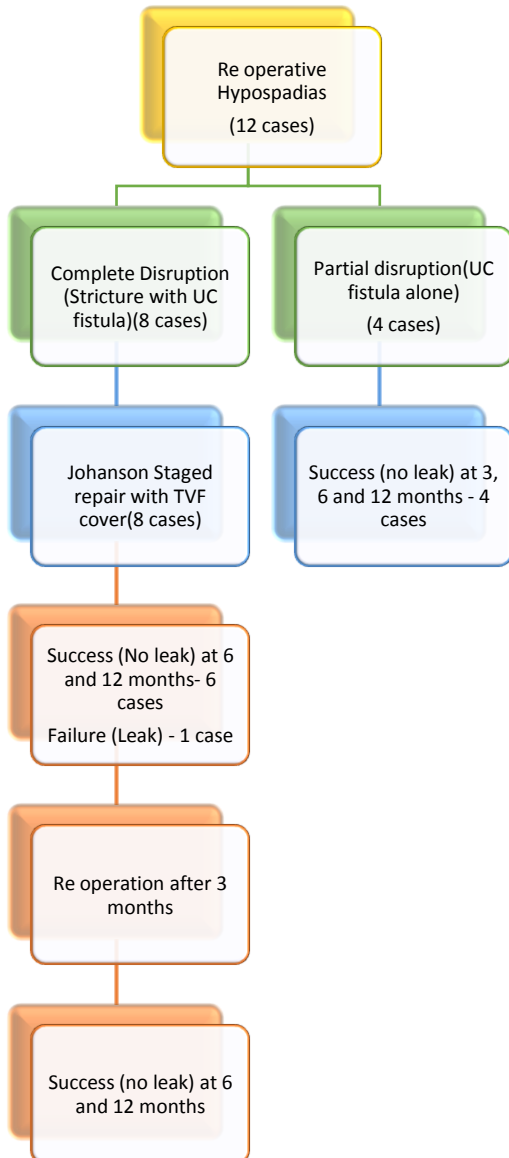


Chart 8: Complication of surgery in our study

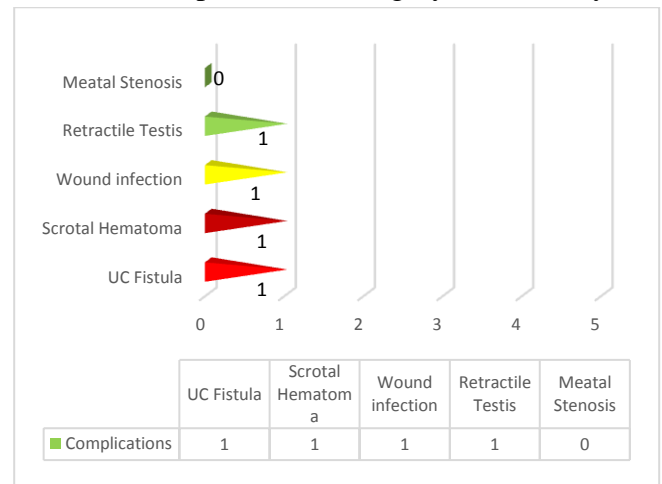
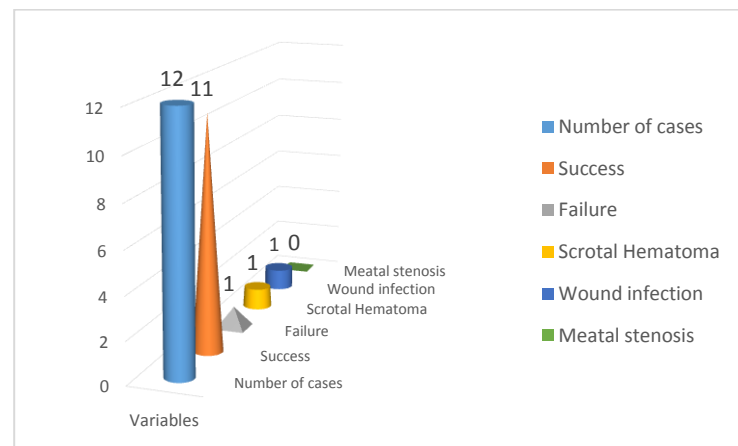


Chart 10 - OUR STUDY VARIABLES



Discussion

In spite of improvements in hypospadias surgical techniques, many patients present with failed repairs. Surgical repair of such failed repairs.

always a challenging undertaking. Most common complication of these failed previous surgeries is urethro cutaneous fistula. Many techniques suggested in these situations like repaired urethra buried in the scrotum², staged repair^{3,4}, overlapping denuded subcutaneous tissue⁴, adjacent local spongiosus tissues and rotating skin flaps⁵. Factors limiting successful outcome are dense scarring, reduced vascularity and lack of prepuce and sufficient penile shaft skin. Dorsal subcutaneous option is not available mostly because it is lost in previous surgeries. But many still continue to use the adjacent genital tissue like dartos as a covering layer.

Snow introduced the tunica vaginalis flap (parietal layer) to cover the neo-urethra^{6, 7}. The place of this flap in hypospadias surgery is more than that. It is also used for substitution urethroplasty successfully. The advantage in redo cases^{8, 9}– it has its vascular supply from outside source and not relies on vascularity of local genital tissues, which might be scarred or destroyed due to previous repairs. Flap can be developed of sufficient length of the pedicle to cover entire neo-urethra till the distal neo meatus. Dissection of

flap is not difficult. Only drawback is that if pedicle length is inadequate, it results in tethering of testis.

After initial hypospadias repair, urethral stricture may occur decades later. Perineal urethrostomy might be the only treatment option for such long segment urethral stricture. This stresses the importance of lifelong follow up in such situations to detect such complications at earliest state.

In our study we have assessed the effectiveness of tunica vaginitis flap in preventing urethro cutaneous fistula. We applied it as an interposing waterproof layer over the neo urethra either after closure of isolated fistula or after second stage repairs of the complete urethral disruption.

Our study has 91.67% success rate (no urine leak) and 8.33 % failure rate (urine leak). Our success rate was compared to other studies, which was from 71.4 % to 100%. (Mean was 93.1%)

We followed our case for 12 months. With every visit at 3rd, 6th and 12th month, none of our patient required AUG or uroflowmetry in the follow up.

The results of our study were comparable with other studies as shown in the table below.

Table 4: Comparing outcome of our study with other studies

Variables	SharmaN et al ¹⁰	Y.S Singh Kadian et al ¹¹	Landau EH et al ⁸	Xue WY et al ¹²	Routh JC et al ¹³	Ahmed M. Khairi et al ¹⁴	Our study
No. of patients	18	14	14	38	16	14	12
Success (No UC Fistula)	17 (94.4%)	13 (92.8%)	14	38	16	10 (71.4%)	11 (91.67%)
Failure (UC Fistula)	1 (5.5%)	1 (7%)	0	0	0	4 (29.6%)	1 (8.33%)
Complications	Scrotal Hematoma	0	1	0	0	0	1
	Wound Infection	0	0	0	0	0	1
	Meatal Stenosis	0	0	0	0	0	1
Follow up months	6	12	44	12	18	9	12

Limitation of our study

Small sample size (12) with short follow-up duration (12 months). Large, RCTs with long follow up period is essential to confirm our result and to assess the efficacy of tunica vaginalis flap in urethrocutaneous fistula prevention. However this may not be feasible as only a small subset of patients following hypospadias repair require a

reoperation and hence designing such a study may not be possible.

Conclusion

Tunica vaginalis flap reinforcement is an excellent and should always be in mind for reoperative hypospadias, especially when the local genital tissues appears to be scarred, tunica vaginalis flap

as a second layer provides a well vascularised cover for adequate healing. Because of its robust nature, minor disruption of neourethral suture site tend to heal without forming fistula if urethral repair is otherwise done meticulously

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