

Original Article

Effectiveness of Ventral Dartos Flap as the second layer in Distal and Mid-Penile Hypospadias Repair.

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Abstract

Background: Various methods have been used to reconstruct mid-penile hypospadias; still, massive failure rates and leading complications have been indicated. The present study observes the effectiveness of a technique using a well-vascularized dartos flap as a second layer in distal and mid-penile hypospadias repair.

Methodology: This is a cross-sectional study conducted between 2017-2019. A total of 110 male children with hypospadias were operated on. The children with mid-penile or slightly more proximal hypospadias, with or without ventral chordae and with the intact prepuce, were included in the study. Outcome measures comprised of surgical results with the absence of any serious side effects, decent flow, meat stenosis, fistula and dehiscence of glans.

Results: The median follow-up duration was 12 months. There were 72 cases of mid penile hypospadias (66.7%), and in 36 cases (33.3%), the meatus was slightly more dorsal. The age of the patients ranged from 1.1 to 11 years, with a mean age of 3.52 ± 2.74 years. Surgery was successful in 105 (95.5%) cases. Four patients presented with meatal stenosis and one with meatal stenosis plus fistula, more than 2 months after surgery. Meatal stenosis was managed by meatoplasty, and in the case of a urethral fistula, the patient was re-operated after at least 6 months.

Conclusion: Ventral dartos flap is a safe, effective method with less adverse effect and less time-consuming in patients with distal and mid-penile hypospadias.

Keywords

Pediatric, Hypospadias, Ventral Dartos Flap, Meatal Stenosis, Urethrocutaneous Fistula, Distal Hypospadias, Mid-Penile Hypospadias.



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Introduction

One of the most common congenital conditions is hypospadias. When the proper development of the urethral plate is hampered, it results in the unusual opening of the external meatus at the ventral aspect of the penis¹. Duplay, in 1874 has put forward a novel technique for urethral reconstruction²; since then, there have been many procedures described for hypospadias repair³. Snodgrass, in 1994 has prescribed a technique for hypospadias repair of all varieties⁴⁻⁶. Since then, it has been the most widely used surgical technique used for hypospadias repair. Regardless of its favourable results, it has some adverse effects of hypospadias surgery, and the Snodgrass technique, especially the most troublesome and distressful of all, is urethrocutaneous fistula formation. To avoid complications, the newly formed urethra is covered with a second protective layer of dartos⁷. However, various methods of harvesting dartos flap have been described to reduce the chances of fistula formation⁸⁻¹². Harvesting the dartos from the dorsal and ventral aspects of the penis is the two most common surgical methods used⁷. Dorsal dartos flap for the second layer is a recognized practice used worldwide due to its acceptable results. On the other hand, harvesting dorsal dartos can damage the vascularity of the skin and carries some adverse effects¹³⁻¹⁵.

A new novel technique described by Furness in this method, the dartos flap, is taken from the ventral part of the penis and used to cover the newly formed urethra¹⁶. This study evaluates the complication and outcome of ventral dartos flap for the second layer inpatient who underwent Snodgrass repair for distal and mid penile hypospadias. As ventral dartos flap will not only save time, it's easy effective and has fewer disadvantages. Very limited data is available on Ventral dartos flap as a second layer, and this will be the first study from Pakistan, which will provide a platform for future studies.

Methodology

A total of 110 male children with hypospadias were included in this cross-sectional study. The age of the patients was from 6 months to 18 years. The inclusion criteria were children with mid-penile or distal penile hypospadias without ventral chordae. Recurrent cases were not included in this study as they will hamper our result as an already operated case or a redo case has a lower success rate than a virgin case. All surgeries were performed between 2017 and 2019. The study was conducted as per the declaration of Helsinki guidelines, and ethical approval was obtained from Institutional Ethics Committee. The Ethical Review Committee approved the study and the committee's Reference No. 89-URO-102019.

All the patients who were enrolled in the study were first examined in the outpatient clinic without any sedation or anesthesia. All possible complications and outcomes were explained to the patient, and the procedure was described in detail to the patient parents or guardian.

Data were analyzed in SPSS version 20. Demographic parameters of patients were assessed by descriptive statistics using frequencies, mean and standard deviation. Fisher exact tests were applied between two categorical variables with the level of significance of 0.05.

Results

From 2018 to 2019, a total of 109 patients with hypospadias presented at our pediatric urology clinic that fulfilled the criteria and was included in our study to undergo surgical repair. The median follow-up was 11 months. There were 72 cases of mid penile hypospadias (66.1%) and 37 patients of distal penile hypospadias.

In cases (33.9%), the meatus was slightly more dorsal. The age of the patients ranged from 1.1 to 11 years, with a mean age of 3.52 ± 2.74 years (Table 1).

Table 1: Attributes of patients in the study.

Variables	n=109	
Age of patients (years)	3.52±2.74	
Median follow-up	11 months	
Site of meatus	Mid-penile	72(66.1)
	Distal-penile	37(33.9)
Complications	Fistulas+ Meatal Stenosis	2(0.9)
	Meatal Stenosis	4(3.7)

Continuous variables are shown as mean ± standard deviation; categorical variables are summarized as numbers (%)

Surgery was successful in 105 (95.5%) cases. None of the repairs failed during the first month after surgery. Four patients presented with meatal stenosis and one with meatal stenosis plus fistula, more than 2 months after surgery. There was no association between types of complication and hypospadias ($p=0.600$) (Table 2). Meatal stenosis was managed by meatoplasty, and in the case of a urethral fistula, the patient was re-operated after at least 6 months.

Table 2: Association of complications with hypospadias.

Complications	Distal penile hypospadias	Mid-penile hypospadias	p-value
Fistulas + Meatal Stenosis	1(50.0)	1(50.0)	0.600
Meatal Stenosis	1(25.0)	3(75.0)	

$p < 0.05$ is considered significant.

All patients attended the first follow-up visits (on days 5 and 15 after surgery and 1-2 years after surgery). Seventy percent of patients followed up in the study until 1 year after surgery, and after that, only thirty-five percent of patients followed until the end of 2nd year. No cases of meatal retraction, urethral stricture, or acquired urethral diverticulum occurred.

Discussion

The outcomes of Snodgrass hypospadias repair for distal and mid penile hypospadias is around 90%¹⁶⁻¹⁸. However, the results of proximal hypospadias repair carry much larger complications and slightly less satisfactory results, with some studies show an adverse effect of around 30-68%¹⁹⁻²². In the case of Snodgrass repair, the proximal hypospadias repair doesn't carry as positive results as compared to distal and mid-penile with higher complications and fistula rate of 21%²³ hypotheses for this complication is a long rigid urethral plate, as the caliber of the urethral plate increases the complication rate and fistula chances decrease²³. Follow-up is very necessary for hypospadias as the longer the follow-up, the more chances there are to encounter problems²⁴⁻²⁶. To decrease the

incidence of the fistula is well established that the newly formed urethra should be covered by the second layer of dartos^{27, 28}.

Several methods were described to cover the urethra with dartos²⁹⁻³². Snodgrass himself put forward the method of dartos flap covering from the dorsal aspect of the penis in 1994. The dorsal dartos flap is considered the conventional technique with issues like increased operating time, penile curvature defect, and damage to skin vascularity. Due to this reason, Furness recommended a technique to reduce this complication. Furness advised a method to use a ventral dartos flap with a success rate of 98.2%¹⁶.

With the advancing of surgery, the cosmetic outcome also becomes a factor for hypospadias repair. In that case, the ventral dartos flap produces better cosmetic results. With advancement or enhancement of surgical technique, the outcome of surgery in term of complication have improved. In our study, we have found only one fistula occurrence, and four meatal stenoses were there. We hypothesize that we use the Snodgrass technique in which the urethra is incised in the center for future re-epithelialization. The urethral caliber is increased, which reduces the chances of narrowing and fistula formation. Secondly, the well-vascularized second layer of dartos supports the urethra furthermore. In our study, all the cases were omitted from the extreme chordae that included sacrificing the urethral plate as correction of chordae will require an extra procedure and may need corporotomy with dartos flap or tunica flap.

Children who had severe chordae intra-operatively that required the sacrifice of the urethral plate were also excluded as in those cases, we may require to do a two-stage repair or a graft repair, and the efficacy of the ventral dartos layer cannot be measure properly as there will be other factors that can hamper the outcome of surgery. All procedures were done under general anesthesia; after anesthesia, the patient was re-examined and defected was noted; the caudal block was applied on the patients to reduce the post-operative pain. After preparing the skin with pyodine sterile draping was done, and stay suture is placed on the level of glans for better control of penis, sterile marker is used to mark the incision. A stay suture with 4/0 polypropylene was taken on the glans. Artificial erection with the help of tourniquet and sterile saline injection into the corpora is done to see the true presence of chorde after degloving of penile skin with the help of circumcision incision, and the urethral plate is taken into the incision with parallel incisions are drawn. The skin of the penis degloving is usually done from the distal penile shaft to the root of the penis. To create a neo urethral plate, an incision is made in the center of the urethral plate in TIP (Snodgrass) fashion; this will help increase the size of the urethral lumen. A feeding tube of 6 Fr is passed into the urethral

opening, and the tube is passed to the bladder and confirmed by extracting the urine. An incision is made on either side of the urethral plate, keeping in mind that the urethral plate should be of adequate width so that it can be closed around the feeding tube in a tension-free manner; the urethral plate is repaired by 7/0 Vicryl suture in interrupted fashion to avoid any breakage in anastomosis. Glans wings are made, and the plane is created between the corpus spongiosum and corpus cavernosum at 3 and 9 o'clock positions. The size of the urethral plate is measured, the ventral dartos flap is harvested, and care is taken not to damage the blood supply; the second layer covers the whole urethral plate to avoid the complication of the urethral fistula. Care is taken that the urethral plate is not stitched with glans during Glanuloplasty.

Glanuloplasty is done by using a 6/0 Vicryl suture. Skin approximation is made by using 6/0 Vicryl suture in interrupted method, the glans stitch anchors the feeding tube, and aseptic dressing is applied. The catheter is anchored to the abdominal wall to avoid and pressure to the newly formed urethra. The patient is advised not to make unnecessary movements and keep on painkillers like ibuprofen and Paracetamol. To avoid bladder spasm, oxybutynin is used. One single dose of antibiotic is given according to body weight empirically.

If everything goes uneventful, the patient is discharged and call for a post-operative visit on the 5th operative day. During the visit, the patient's dressing is removed, the feeding tube is taken out, and the patient is asked to void before going home. The follow-up schedule is 1 week, 2 weeks, 1 month, 3 months, 6 months, and yearly. The only Outcome measure is no complication with a good stream. Since 96% of the cases were treated successfully with no complications with a good functional stream.

Our study found less than 1% of fistula rate and meatal stenosis of less than 3%. The fistula was associated with meatal stenosis; maybe the meatal stenosis was the cause of distal obstruction and

helps in fistula formation. Savanalle et al. found out that ventral dartos flap has an advantage in reducing the fistula formation³³ compared to that study in our study, we have less fistula rate. Jia et al. have compared the ventral dartos and dorsal dartos flap in mid and distal penile hypospadias. They came to show better results in ventral dartos in terms of adverse effects and added advantage ventral dartos because it reduces the mean operating time⁷. However, in our study, we didn't take operating time into account; if we talk about complications, we have reduced fistula and meatal stenosis than them. Jia et al. have the added advantage of having two groups, one with dorsal dartos flap and one with ventral dartos flap, which in our study we can't be able to do⁷. The dorsal dartos flap has an issue with penile rotation, which is around 5-10%. We don't have any issues with penile rotation in our follow up same was reported Jia et al. study. There was no ventral skin necrosis in our study, which is another benefit of the ventral flap and is a known issue in the dorsal flap⁷.

Compared to other studies, we notice a lower fistula rate, meatal stenosis and no case of glans dehiscence. In terms of limitations, we are aware that it is a single-center study with a follow-up of 6 months to 2 years. As some studies have done previously, we didn't use operative time of surgery as few studies have included. Despite all that, we came to know that ventral dartos flap has advantages and minimal adverse effects. As data limitations on this topic, our study will encourage others for future larger studies.

Conclusion

Our results show that Ventral dartos flap as a second layer in distal and mid-penile hypospadias is a workable and sound technique. This method is cognate with an approximately 4% complication rate in this study. To conclude, this research offers an easy-to-learn novel technique for repairing distal and mid-penile hypospadias using a ventral dart flap with excellent short and long-term efficiency.

Conflicts of Interest

The authors have declared that no competing interests exist.

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