

# Buck's Fascia in Addition to Dartos Fascia is an Effective Intermediate Layer in Repair of Hypospadias

SULOCHANA DAHAL<sup>1</sup>, BIBHUSHIT MAHAT<sup>2</sup>, NADIR HUSSAIN<sup>3</sup>, MUHAMMAD SALEEM<sup>1</sup>, UBAID-UR-RAHMAN<sup>4</sup>

<sup>1,4</sup>Department of Pediatric Surgery, Children's Hospital & University of Child Health Sciences, Lahore, Pakistan

<sup>2</sup>Department of Urology, Lahore General Hospital, Lahore, Pakistan

<sup>3</sup>Department of Urology, Sheikh Zayed Hospital, Lahore, Pakistan

Correspondence to: Sulochana Dahal, Email [drsulochanadahal@gmail.com](mailto:drsulochanadahal@gmail.com), Cell: +977-9841533627

## ABSTRACT

**Background:** Being a common congenital urogenital disorder, hypospadias is mostly treated by Snodgrass urethroplasty; urethrocutaneous fistula is the most frequent complication.

**Objective:** To assess the outcomes of Snodgrass Urethroplasty when Buck's (external spermatic) fascia was used with Dartos fascia to interpose between the neourethra and skin and to compare the results when only Dartos fascia was applied.

**Study Design:** Prospective comparative study

**Place and Duration of Study:** Department of Pediatric Surgery, Children's Hospital & Institute of Child Health, Lahore Pakistan from 1<sup>st</sup> September 2018 to 31<sup>st</sup> August 2019

**Methodology:** Seventy four patients who were randomly divided into two groups. Group 1 who underwent Snodgrass urethroplasty with dartos fascia as intermediate layer; while both dartos & buck's fascia was used in Group 2. Post-operative results were compared in terms of urethrocutaneous fistula, meatal stenosis and wound dehiscence.

**Results:** Eleven patients with urethrocutaneous fistula, the rate of urethrocutaneous fistula was significantly less in the Buck's and Dartos group [2(5.4%) versus 9(4.3%) in the dartos only group;  $p=0.022$ ]. 4 patients presented with meatal stenosis; 3 (8.1%) from dartos group and 1 (2.7%) from dartos and buck's group. 5 patients presented with Wound dehiscence; 4 (10.8%) from control group and 1 (2.7%) from experimental group, both of which were not statistically significant ( $p$ -value 0.304 and 0.165 respectively).

**Conclusion:** The use of Buck's Fascia in addition to Dartos Fascia as an interpositional layer in hypospadias repair bears immense role in the prevention of the most common complication i.e. urethrocutaneous fistula.

**Keywords:** Buck's fascia, Dartos fascia, Hypospadias, Urethrocutaneous fistula

## INTRODUCTION

Hypospadias is a congenital defect in the formation of the urethra in males; this results from the inadequate union of the urethral folds at the posterior/ventral penile surface during urogenital development in the fetus resulting in a short urethra.<sup>1</sup> Its prevalence ranges from 0.5-8 per 1000 live births.<sup>2</sup> Surgery is its only treatment modality. Most surgeons prefer tubularized Incised plate (Snodgrass) urethroplasty for repair of hypospadias.<sup>3</sup> Urethrocutaneous fistula remains a significant complication despite advances in surgical techniques.<sup>4,5</sup>

Techniques of interposition of vascularized tissue in between the skin and neourethra have been proposed and explained which help prevent post-operative urethrocutaneous fistula such as flap from the preputial foreskins, tunica vaginalis, dartos fascia, external spermatic or buck fascia and spongiosum.<sup>6</sup> Dartos fascia is commonly used to bridge the neourethra. Bucks' Fascia is a significant layer which can be used to cover the neo-urethra because of its easy access/mobilization, tensile strength, restoration of normal anatomy and preservation of vascularity.<sup>4</sup>

## MATERIALS AND METHODS

This prospective and comparative study was carried out from 1<sup>st</sup> September 2018 to 31<sup>st</sup> August 2019 at the Department of Pediatric Surgery, Children's Hospital and University of Health Sciences, Lahore, Pakistan. After Approval from the Ethical Committee, Patients fulfilling the inclusion criteria were selected and the Study was conducted. Patients of pediatric age group and with primary mid or distal Penile Hypospadias were included in the study. However, patients with previously failed hypospadias repair, chordee  $>20^\circ$ , active UTI and immunocompromised patients were excluded. A total of 74 patients were selected and randomly divided into two groups using non-probability, purposive sampling. Group 1 included patients who underwent Snodgrass urethroplasty with dartos fascia as interposing layer while group 2 included those who had both dartos and buck's fascia as the intermediate layer.

Detailed history was taken and Physical Examination performed followed by specific Investigations i.e. Urine routine examination & Urine culture/sensitivity and routine investigations for anesthetic fitness. Procedure was done under general

anesthesia and by consultant surgeons of the same expertise to avoid surgical bias. After placement in supine position and draping done, a stay suture with silk #1 was applied vertically at the glans. The root of penis was secured with a tourniquet so as to reduce bleeding. The urethral plate was marked after measuring the width of the tube. On the ventral aspect of the penis, a U-shaped incision was given extending from the hypospadiac urethral meatus, parallel to the urethral plate and ending at the glanular margin. An incision was made circumferentially at the sub-corona and the penile skin was degloved. Residual chordee (if any) was corrected by separating the bands along the penile shaft or by application of sutures by dorsal plication technique. A midline incision was given along the urethral plate and an appropriate caliber feeding tube (8-12Fr) was placed. The glanular wings were freed laterally. Previously placed feeding tube was bridged with the edges of the urethral plate using continuous sub-epithelial 5/0 or 6/0 Polydioxanone (PDS) sutures, commencing from the base of the hypospadiac meatus to the glans. A pedunculated subcutaneous dartos flap was dissected to cover the neo-urethral suture line with 6/0 PDS sutures. After approximation of the glans wings with 6/0 Polydioxanone suture, the penile skin was closed using Byar's flap with 6/0 vicryl suture.<sup>2,5,7</sup>

When applying Buck's fascia in addition to the Dartos layer, the important step was to identify and trace the Bucks' fascia over the spongiosum. This fascia represented the deficiency in Bucks' fascia and could be spotted as a "v"-shaped defect which was just lateral to corpus spongiosum. This fascia needed no dissection to be freed and was easily approximated in the midline to cover the neo-urethra. This suture was continued upto the glans. The penile skin was closed as a Byar's flap using 6-0 vicryl in an interrupted fashion with horizontal mattress sutures. Finally, a dressing was applied.<sup>4</sup> The data was entered and analyzed through SPSS-23.

## RESULTS

The mean age of the patients was  $5.51 \pm 2.11$  years with minimum and maximum ages of 2.6 and 11 years respectively. Among the 75 patients, 57 presented with distal penile hypospadias (77%) while 17 patients presented with mid-penile hypospadias (23%). Post-operatively, the patients were discharged on an average of

4.51±0.5 days with the minimum and maximum stay ranging in between 4 and 5 days respectively. When evaluating patients for their stay in the hospital post-operatively, the mean for patients in the Dartos fascia group was 4.43±0.5 days while the mean for patients in the Dartos and Buck's Fascia group was 4.59±0.49 days. As a whole, a total of 11 patients developed Urethrocutaneous fistula (14.8%), 4 had Meatal stenosis in 4 patients (5.4%) and 5 presented with Wound Dehiscence (6.75%). Out of 11 patients who presented with Urethrocutaneous fistula, 9 patients (24.32%) were from the Dartos Fascia alone group while 2 (5.4%) were from the Dartos and Buck's Fascia Alone group (p=0.022). All the patients with this complication presented after the 1<sup>st</sup> week of repair upon removal of the stent. These patients were kept on regular follow up and were scheduled for surgery after 3 months for the repair of the urethrocutaneous fistula (Table 1).

Among the 4 patients with meatal stenosis, 3 (8.1%) were from the Dartos Fascia group while only 1 (2.7%) was from the Dartos and Buck's Fascia group (p=0.304). Similarly, among the 5 patients with Wound Dehiscence, 4 (10.8%) patients were from the Dartos Fascia group while 1 (2.7%) was from the Dartos and Buck's Fascia group (p=0.165) [Table 2].

Table 1: Demographic characteristics

Variables	Dartos Alone	Dartos + Bucks
Mean age (years)	5.6±2.08	5.4 ± 2.16
Post-operative hospital stay (days)	4.43±0.5	4.59±0.49
Site of Hypospadias		
Distal Penile	28	29
Mid Penile	9	8

Table 2: Comparison of complications among Dartos alone and Dartos+Bucks fascia group

Variables	Dartos alone	Dartos+Bucks	P value
Urethrocutaneous Fistula	9 (24.32%)	2 (5.450%)	0.022
Meatal stenosis	3 (8.1%)	1 (2.7%)	0.304
Glans Dehiscence	4 (10.8%)	1 (2.7%)	0.165

**DISCUSSION**

With over 300 different techniques of hypospadias repair, there has not been a consensus regarding the most appropriate technique. This makes hypospadias repair one of the most challenging fields for surgeons as it encompasses frequent complications such as urethrocutaneous fistulae, wound dehiscence, meatal stenosis, urethral diverticulum, and urethral stricture, among many others. The most widely performed procedure is Snodgrass urethroplasty (Tubularized Incised Plate Urethroplasty). Urethrocutaneous fistula remains, by far, the most important and most common complication, with an incidence of up to 30–35%.<sup>4</sup> The main aetiologies behind a urethrocutaneous fistula are proposed to be ischemia, infection, poor wound healing, and insufficient surgical expertise. Various modifications have been adopted in order to reduce or prevent the formation of a fistula.<sup>8</sup>

Use of sub-epithelial inverted sutures, use of a fine blade for incision, and avoidance of tissue trauma as far as possible are some useful techniques that help prevent the formation of a fistula.<sup>3,8,9</sup> After analysing different articles, we found that one significant step in preventing fistula post-operatively is the application of an interposing intermediate layer surrounding the neo-urethra before closure of the skin; for example, tunica vaginalis wrap, dorsal preputial flap, double Dartos flap, and Buck's or external spermatic fascia (as in our study).

We observed that Buck's fascia is only partially deficient over the hypospadiac corpus spongiosum and can be utilised in coverage of the neo-urethra. It is present in almost all cases and does not necessitate extensive dissection. In routine hypospadias repairs, Buck's fascia is given the least attention, whereas in our study, we consider it to be the most important layer, owing to its extensive vascularity and tensile strength. Hence, we used this fascia as an interpositional layer in addition to the Dartos fascia to cover the neo-urethra, and it proved to be very effective in preventing the common complication of urethrocutaneous fistula.

Our results show that out of a total of 11 patients who presented with UCF post-operatively, 9 patients were from the dartos fascia group while only 2 patients belonged to the Dartos and Buck's Fascia group, which was statistically significant. On the other hand, the rates of occurrence of MS and WD were not statistically significant when compared between the two groups. These complications did not bear any relation to the type of tissue used as an intermediate layer during repair. Among the patients with meatal stenosis, 3 of the patients were treated with Meatal dilatation while 1 patient required meatoplasty.

The main etiology of the wound dehiscence was poor hygiene and infection of the wound and was not related to the type of interpositional tissue used during repair. These patients did not receive proper wound care and dressing as advised. This led to infection of the wound and glans edges leading to disruption of the sutures, ultimately causing disruption and dehiscence of the wound. These patients were kept on regular follow up and scheduled for surgery after 3 to 6 months.

The pilot study which used Buck's fascia for repair of hypospadias was conducted by Yamataka et al<sup>10</sup> in 1998. They used Buck's fascia in 3 patients with hypospadias and none of them presented with any urethrocutaneous fistula or other complications. A similar study conducted by Seo et al<sup>6</sup> in 2015 used different interpositional tissues during repair of hypospadias and applied Buck's fascia in 84 cases. Their study analysis revealed a 3.1% incidence of urethrocutaneous fistula rate when Buck's and Dartos fascia was used as an interpositional tissue while the incidence rose to 21.4% when only Dartos fascia was interposed. This result is very similar to the one we conducted at our setup.

A comparative analysis of hypospadias repair using either dartos fascia or Buck's with dartos fascia was conducted in India by Baba et al<sup>4</sup> in 2017. They revealed a total urethrocutaneous fistula rate of 2.5% when Buck's fascia was used while an incidence of 12.5% when it was not incorporated into the repair. The comparison of rates of urethrocutaneous fistula between the test and control groups bore a significant statistical difference.<sup>11</sup>

**CONCLUSION**

The use of Buck's fascia in addition to Darto's fascia as an interpositional layer in hypospadias repair plays an immense role in the prevention of the most common complication, i.e., urethrocutaneous fistula. This could be a useful variation in the modern practice of repairing hypospadias.

**REFERENCES**

- Choi DS, Lee JW, Yang JD, Chung HY, Cho BC, Byun JS, et al. Correction of problematic hypospadias with Dartos fascia-reinforced flap and slanted incision of fistula. Arch Plast Surg 2013; 40, 766-72. 87
- Tokgoz H, Tetik G, Yalcinkaya S, Yildiz A, Savas M. Urethroplasty using a turnover flap for correction of problematic urethrocutaneous fistula: a case report. World J Plast Surg 2017;6(2):230-232.
- Elsayed ER, Zayed AM, El Sayed D, El Adl M. Interposition of dartos flaps to prevent fistula after tubularized incised-plate repair of hypospadias. Arab J Urol 2011; 9: 123-6.
- Baba AA, Wani SA, Bhat NA, Mufti GN, Lone TN, Nazir S. Buck's fascia repair with glanuloplasty in hypospadias surgery: a simple approach with excellent outcome. J Pediatr Urol 2017; 13: E1-5.
- Ochi T, Seo S, Yazaki Y, Okawada M, Doi T, Miyano G, et al. Traction-assisted dissection with soft tissue coverage is effective for repairing recurrent urethrocutaneous fistula following hypospadias surgery. Pediatr Surg Int 2015; 31: 203-7.
- Seo S, Ochi T, Yazaki Y, Okawada M, Doi T, Miyano G, Koga H, Lane GJ, Yamataka A. Soft tissue interposition is effective for protecting the neourethra during hypospadias surgery and preventing postoperative urethrocutaneous fistula: a single surgeon's experience of 243 cases. Pediatr Surg Int 2015, 31, 297-303.
- Hayashi Y, Kojima YJJOU. Current concepts in hypospadias surgery. 2008; 15: 651-64.
- Hadidi A. Hypospadias surgery. In: Hadidi AA (ed.) An illustrated guide. Verlag, Springer, 2004.
- Hadidi A. Classification of hypospadias. In: Hadidi AA, ed. Hypospadias surgery: an illustrated guide. 1<sup>st</sup> ed. Verlag, Springer, 2004.
- 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.
- Basavaraju M, Balaji DK. Choosing an ideal vascular cover for snodgrass repair. Urol Ann 2017; 9: 348-52.