

The Role of Vascularized Dorsal Subcutaneous Flap for Decreasing Fistula Formation Following Hypospadias Repair: A Preliminary Experience

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Abstract

Objective: To evaluate the value of covering the neourethra using vascularized dorsal subcutaneous flap in order to decrease urethrocutaneous fistula in hypospadias repair.

Patients and Methods: This is a retrospective study of 130 children (aged 1-14 years) who had different types of hypospadias and underwent different types of repair between August 2004 and December 2006 at King Hussein Medical Center. The study sample includes 66 children with distal penile hypospadias, 28 children with midshaft, 8 children with proximal hypospadias, of which 3 underwent first stage repair, 20 children with urethrocutaneous fistula, and 8 with complete failure of previous repair. Longitudinal vascularized dorsal subcutaneous flap was harvested from the excessive dorsal preputal and penile hypospadiac skin, and then used in all cases as a covering for different types of urethral repair in double breasting Byar's flap fashion which sutured to the glans wings around the neomeatus and to the corpora adjacent to the neourethra using 7/0 and 6/0 polyglactin sutures, resulting in complete covering of the neourethra with well-vascularized dorsal subcutaneous flap. Tubularized Incised Plate (TIP) repair was used in the majority of cases, known as Snodgrass repair, while Mathieu repair and urethrocutaneous fistula repair were done in the rest of cases. The chordee was corrected when present, and the glans closure was finalized in 2 layers. Most cases performed were over urethral stent, and in few complicated cases sialastic foley catheter and suprapubic cystocath for urinary diversion were used.

Results: In monitoring results during the follow-up period, which extended over 18 months with a median of 6 months, the operations were successful. Three children had urethrocutaneous fistula, of which 2 had previous repair, and one had complete failure. Eight children had meatal stenosis which responded to dilatation in 6 children and meatoplasty in 2 children.

Conclusion: We suggest that in hypospadias surgery, covering of the neourethra with well-vascularized dorsal or adjacent subcutaneous flap should be part of the procedure. It decreases urethrocutaneous fistula formation especially if the careful harvesting technique is utilized.

Keywords: dorsal subcutaneous flap, urethrocutaneous fistula, hypospadias repair, tubularized incised plate.

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Introduction

Urethrocutaneous fistula formation is still the most common complication after hypospadias repair.¹⁻⁴ Although recent advances in the surgical procedures of hypospadias repair have reduced the rate of urethrocutaneous fistula formation, it remains a real complication of hypospadias surgery, especially if the neourethra is too long or in case of re-operations. Several procedures have been described to avoid the occurrence of such a complication by using additional layer of closure between the neourethra and skin, such as tunica vaginalis blanket method, de-epithelialized skin flaps, local subcutaneous tissue, dartos and fibrin sealant.⁵⁻¹⁰ In this study, we review our experience in hypospadias surgery with the utilization of the vascularized dorsal subcutaneous flap covering the neourethra in order to decrease the rate of urethrocutaneous fistula.

Patients and Methods

In this study, we reviewed 130 children (aged 1-14 years) who had different types of hypospadias and underwent different types of repair between August 2004 and December 2006 at King Hussein Medical Center. This sample includes 66 children with distal penile hypospadias, 28 children with midshaft, 8 with proximal hypospadias, of which 3 underwent first stage repair, 20 children with urethrocutaneous fistula of which few had previous multiple operations, and 8 children with complete failure of previous repair. All patients underwent the procedure under general anesthesia supplemented by caudal anesthesia. A stay suture (5/0 polypropylene) is placed through the glans for traction to facilitate penile degloving (Figures 1-3). Topical epinephrine 1/100,000 was used in all patients; the haemostatic effect lasts throughout the procedure and allows for better visualization during penile degloving, especially when preparing the glans wings before glans closure. Tubularized Incised Plate (TIP) repair was used in the majority of cases, known as Snodgrass repair, while Mathieu repair and urethrocutaneous fistula repair were done in the

rest of the cases. The chordee was corrected in 9 patients using Nesbit technique at the dorsal aspect of the penis with preservation of the urethral plate. Urethral repair was accomplished using 7/0 and 6/0 polyglactin sutures starting from proximally to distally with inverted manner to get all epithelium into the new urethral lumen without tension (Figure 4). We found that the best way of harvesting the flap is that by starting at the dorsal region of a normal penile skin below the hypospadiac prepuce because the dissection of subcutaneous tissue is easy and can be continued easily and distally resulting in a redundant and well-vascularized dorsal subcutaneous flap. The meticulous harvesting technique of the flap and redundancy make it suitable nearly for all types of hypospadias repair. The flap is transposed to the ventral aspect either as a buttonhole or as double breasting Byar's flap fashion in most cases to avoid penile rotation. The flap was sutured to the glans wings around the neomeatus and to the corpora adjacent to the neourethra using 7/0 and 6/0 polyglactin sutures, resulting in a complete and symmetrical covering of the neourethra (Figures 5-7). The glans closure was finalized in 2 layers using 5/0 monofilament absorbable sutures deep in the glans without tension on the vascularized flap and neourethra, then 7/0 polyglactin sutures for the skin (Figures 8-10). The majority of cases were performed over an 8 to 10Fr urethral stent, and in few complicated cases, sialastic foley catheter 8 to 10Fr and suprapubic cystocath for urinary diversion were used which were removed after 7-10 days. Antibiotics were used as intravenous dose of cephalosporin pre-operatively then in an oral form post operatively until removal of stents and catheters. Butterfly gauze dressing with antibiotic ointment was used in all cases for 3 days. Oxybutynin and other spasmolytics were not used routinely. Most patients were operated as day case and some patients were discharged next day. Few complicated cases remained inpatients until the removal of all stents within 7-10 days.

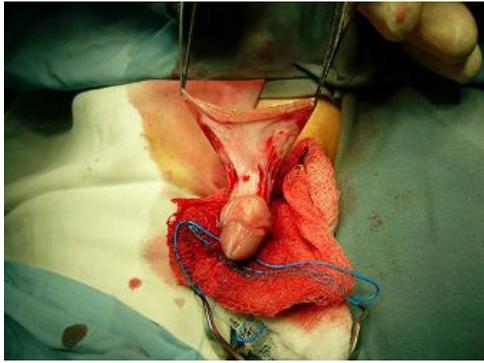


Figure 1



Figure 2



Figure 3

Figures (1-3): Demonstrating the penile degloving and hemostasis.



Figure 4

Figure (4): Tubularization of neo-urethra over stent.



Figure 5



Figure 6



Figure 7

Figures (5 -7): Demonstrating the covering of the neo-urethra with the vascularized dorsal subcutaneous flap.



Figure 8

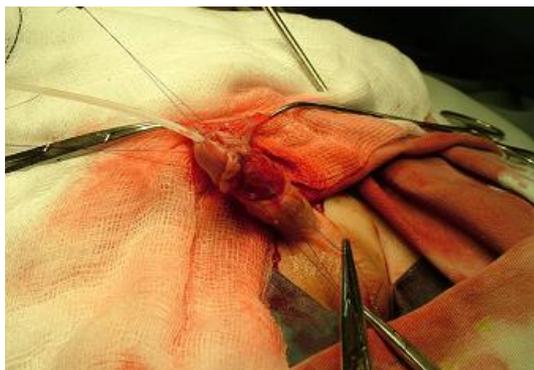


Figure 9



Figure 10

Figures (8-10): Demonstrating the glans and skin closure.

Results

During the follow-up period, which lasted for about 18 months with the mean of 6 months, the monitored results proved successful. We observed 2 types of complications: formation of urethrocutaneous fistula and meatal stenosis. Three children (3.9%) had urethrocutaneous fistula, of which 2 had previous complex repair, and one had complete failure due to bad skin vascularity from his first stage. Eight children (6%) had meatal stenosis which responded to dilatation in 6 children and meatoplasty in 2 children. All patients are voiding with acceptable straight stream through a slit-like vertical meatus without any other complications and with a final good cosmetic result.

Discussion

The recent advances in hypospadias surgery including the microsurgical techniques and fine

sutures reduced the complications of hypospadias repair. It is still difficult to repair hypospadias.^{11, 12} Complications are common after hypospadias repair, ranging from urethrocutaneous fistula formation to complete loss of the neourethra.¹³ The rate of urethrocutaneous fistula was reported to range from 0 to 45%.^{14, 15} Interposition of well-vascularized tissue between the neourethra and penile skin is mandatory to reduce the incidence of urethrocutaneous fistula.^{16, 17} Retik and Borer¹⁸ described covering the neourethra with asymmetric rotational subcutaneous dartos tissue flap harvested from the dorsal preputial and shaft skin. Yerkes et al.¹⁹ used a Y-to-I wrap of spongiosum for neourethral reinforcement, and Shanberg et al.²⁰ reported new modality for failed previous hypospadias repair including Tubularized Incised Plate (TIP) urethroplasty with lateral-based de-epithelialized flap. Snodgrass²¹ also used the dorsal dartos pedicle flap obtained from the dorsal prepuce, but buttonholed and transposed to the ventrum for additional coverage of the neourethra; however, he reported complications in 14% of his patients, mainly related to urethroplasty. We started to prepare onlay vascularized dorsal flap to support all types of neourethra. Flaps harvested from the dorsal hypospadiac penile skin are plenty and well-vascularized following the axial course of blood vessels in a meticulous way.²² This technique proved to have a better outcome in the present patients compared with results from other series.¹⁸⁻²¹ Accepted urethrocutaneous fistula rates in large hypospadias series are 2% to 14%.²³ In our study, we have urethrocutaneous fistula rate of about 4% and meatal stenosis of 6%, which are considered excellent if compared with our results in the past, prior the era of utilizing the new techniques mentioned in the text. We noticed fistula rate of about 25% in our previous repairs which could be due to the lack of experience in utilizing the new techniques and advances in hypospadias surgery like delicate instrumentations, fine sutures, urethral stents, deficient hemostasis, the routine bladder catheterization and prolonged hospitalization. Also, we didn't routinely cover the neourethra with any vascularized flap.

We started to do more work to minimize the fistula rate as well as the meatal stenosis after we have worked with pioneers in hypospadias surgery and reviewed a large number of series, so we can present better results in the future.

We suggest that covering the neourethra with well-vascularized dorsal subcutaneous flap after a careful harvesting technique represents an excellent option for decreasing urethrocutaneous fistula as reported by many series.²³⁻³⁰ In our study, we strongly recommend its use to cover the neourethra as part of any hypospadias repair.

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دور الطبقة تحت الجلد الظهرية للقضيب في تقليص نسبة الناسور الاحليلي – الجلدي بعد عملية ترميم الاحليل التحتي الخلقي عند الأطفال

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الملخص

يعتبر الاحليل التحتي الخلقي من أكثر التشوهات المعروفة للقضيب عند الأطفال وكذلك يعتبر الناسور الاحليلي –الجلدي من أهم المضاعفات بعد عمليات ترميم الاحليل، وبنسبة تصل الى 45% في بعض الحالات المعقدة منها.

الهدف: تهدف هذه الدراسة لايجاد دور الطبقة تحت الجلد الظهرية للقضيب في تقليص نسبة الناسور الاحليلي – الجلدي بعد عملية ترميم الاحليل التحتي الخلقي عند الأطفال. اجريت هذه الدراسة ما بين شهر 8 / 2004 – 12 / 2006 وتشمل 130 طفلاً للفئة العمرية (1-14) سنة بانواع مختلفة من الاحليل التحتي الخلقي. وفي جميع الحالات تم تغطية الاحليل بعد الترميم بالطبقة تحت الجلد الظهرية للقضيب والتي اصبحت تجري كعمليات يومية في الكثير من الحالات.

النتائج: أظهرت نتائج الدراسة خلال فترة المتابعة بان نسبة الناسور الاحليلي-البولي كانت حوالي 4% وهي نسبة ممتازة وتقترب من النسب العالمية في المراجع العلمية. نستنتج من هذه الدراسة بان تغطية الاحليل الجديد بعد ترميم الاحليل التحتي الخلقي بالطبقة تحت الجلد الظهرية للقضيب تساعد بنسبة عالية في تقليص نسبة الناسور الاحليلي-الجلدي. وكذلك نوصي بأن تكون جزءاً من اي عملية ترميم احليل تحتي خلقي وخاصة اذا تم فصل الطبقة تحت الجلد الظهرية للقضيب بدقة وعناية للحفاظ على التروية الدموية للوصول الى افضل النتائج.

الكلمات الدالة: الطبقة الظهرية تحت الجلد، الناسور الإحليلي – الجلدي، عملية ترميم الإحليل التحتي الخلقي، الصفيحة الأنبوبية المشقوق.