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EVALUATION OF THE USE OF DORSAL DARTOS FLAP FOR THE PREVENTION OF FISTULA AFTER SNODGRASS REPAIR OF HYPOSPADIAS

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Abstract

The Snodgrass technique or the tubularized incised plate (TIP) repair is considered as excellent option for treatment of distal and mid-shaft hypospadias. Urethro-cutaneous fistula remains the most frustrating complication of hypospadias repair. After performing a tubularized incised plate (TIP) repair, the incidence of fistulae is reported to be up to 17% of cases.

This study aimed to evaluate the use of dorsal dartos flap for the prevention of fistula formation after Snodgrass repair for distal hypospadias.

The current study included 35 patients aged 2-6 years during the period between February 2013 to January 2016. All the patients had distal hypospadias and underwent Snodgrass or TIP repair. The neo-urethra was covered by dorsal preputial interpositional flap transposed ventrally via a button hole maneuver as a method to prevent fistula formation. Patients were followed up and their complications were assessed based on the patients' medical records.

The procedure was completed successfully in all patients, with no intraoperative complications. All patients had good functional results with straight penis and vertical slit shaped meatus at the tip of the glans. Thirty four (97.14%) patients had no evidence of fistula development. One patient only (2.8%) developed fistula. Meatal stenosis occurred in 3 patients (8.5%).

In conclusion, the neo-urethral covering with well-vascularized dartos flap, harvested dorsally and button holed at its base for ventral transposition, represents a good choice for fistula prevention after Snodgrass repair.

Introduction

The Snodgrass or the tubularized incised plate (TIP) technique is considered as excellent option for treatment of distal and mid-shaft hypospadias. This is because it is versatile, easy to do and has a good cosmetic outcome, with a vertically orientated meatus, as in a normal circumcised penis[1]. One of the commonest complications of Snodgrass repair is fistula formation[2-4]. Urethro-cutaneous fistula remains the most frustrating complication of hypospadias repair, with a frequency of 5–23%[5,6]. It was noted that the more proximal the hypospadiac orifice the greater is the rate of post-operative urethro-cutaneous fistula formation[7]. Why fistulae do or do not develop is not well known. However, deficiencies in local growth factors in hypospadiac skin might contribute to the high rate of healing complications after hypospadias surgery[8]. Some mechanical factors could be responsible for poor healing after hypospadias repair, like epithelial interposition between the edges of the newly formed urethra, a high intraurethral pressure secondary to meatal stenosis, or an obstructed catheter resulting in the disruption of the suture line, urinary leakage and fistula formation[9]. Other factors that may contribute to fistula formation include local ischaemia[9]. Ischaemic changes can result from inadequate blood supply to the hypospadiac penile skin, extensive

dissection, aggressive tissue manipulation, prolonged use of a tourniquet on the penis, massive postoperative edema, large hematoma with a pressure effect and a tight dressing[9,10]. In an attempt to reduce the chance of fistula formation and the need for redo surgery, many strategies have been proposed, such as the use of optical magnification during surgery, fine suture material, soft-tissue interposition, small-caliber stents, antibiotics, and new surgical approaches[7].

The aim of the present study is to evaluate the use of dorsal dartos flap for the prevention of fistula formation after Snodgrass repair for distal hypospadias.

Patients and method

The current study included 35 patients aged 2-6 years during the period between February 2013 to January 2016. All the patients had distal hypospadias. Twenty boys had glandular hypospadias, and 15 had coronal type (diagram I). The patients had undergone Snodgrass or TIP (Tubularized Incised Plate) repair. All the patients had a well-developed urethral plate. The neo–urethra was covered by dorsal preputial interpositional flaps transposed ventrally via a button hole maneuver as a method to prevent fistula formation. Circumcised boys and those with previous hypospadias repair were excluded from the study. Patients were followed up and their complications were assessed based on the patients' medical records. The follow up was continuous for one month or longer depending on the appearance of complications and it was focusing on healing problems particularly the rate of fistula formation and repair breakdown.

Surgical technique

The operation was performed under general anesthesia. A glandular stay suture was placed in the midline along the long axis of the penis, and used for traction. A tourniquet in the form of small caliber Foley's catheter was applied to the base of the penis to obtain a bloodless operative field and it was removed intermittently to refresh the penile vascularity. A circumferential, sub-coronal incision was started dorsally and extended ventrally to join the limbs of the U-shaped incision surrounding the hypospadiac meatus. The penis was degloved, with the creation of a well-vascularised subcutaneous dartos tissue flap extending proximally to the root of the penis. Then, de-epithelization of the preputial skin of both inner and outer layers was done starting from proximal to distal preserving the subcutaneous tissue forming a well vascularized flap and leaving a cuff of inner layer of 4mm width all around distal to the coronal sulcus. This preputial flap was continuous with the penile dartos flap. Then, a hole was made at the base of the flap to prepare it for ventral transposition. The urethral plate was then incised, starting from within the hypospadiac orifice to stop just proximal to the glans tip. The long dorsal dartos flap with a completely preserved blood supply was then transposed to the ventral side of the penis by the buttonhole maneuver i.e., by pulling up the glandular stay suture through the hole in the base of the flap. This was done before placing the urethral catheter. Then, a 6-8 F silicone type Foley's catheter was passed up to the bladder and its balloon inflated. The incised plate was then tabularized over the Foley's catheter with a one-layer running subepithelial suture (5–0 polyglactin). Tubularization of the plate was extended to the mid-glans only, to obtain a wide meatus, thus avoiding late meatal stenosis. The flap was then sutured to the glans wings over the neourethra and to the corpora cavernosa as a single layer completely covering the tubularized urethra and the site of the hypospadiac meatus thus creating a barrier layer. This method allows the neo-urethral suture line to be covered with a well vascularized on-lay dartos flap, which supports the neo-urethra like spongiosal tissue. Then, the

penile skin was repositioned over the penis and sutured to the preputial cuff like in circumcision. The catheter was secured to the glans by the initially placed stay suture to prevent excessive movement of the catheter and preventing any possibility of disruption of the repair. The penis was dressed in upright position to minimize postoperative penile edema. Patients were kept on oral antibiotics and were discharged home at day 2 following surgery. The catheter was removed at 10th day postoperatively. The patients were followed up for the next one month looking for complications namely fistulae.

The first follow-up visit was at 10 days after surgery for catheter removal and to evaluate the repair.

The evaluation included a local examination and visual assessment of the urine stream to detect any fistula formation. The second follow-up visit was 3 weeks later, and a detailed history was obtained, focusing mainly on the presence of a double stream or voiding from a fistula, and any other complications. The meatus was examined physically and any obviously stenotic meatus was calibrated. Further follow-up visits were planned after 1 month. Success was defined as healing with no fistula, with a normal-looking meatus at the tip of the penis, and with a normal voiding force and caliber.

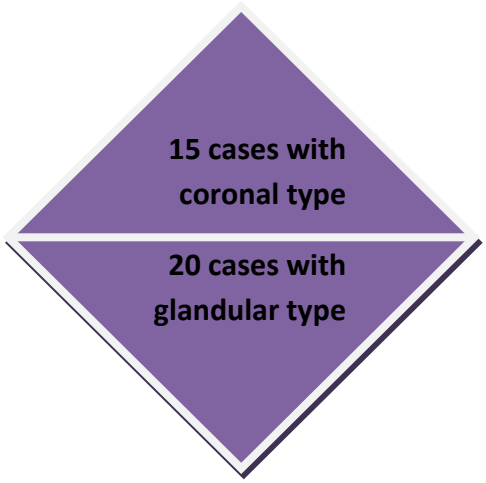

Diagram I: Types of hypospadias in this study

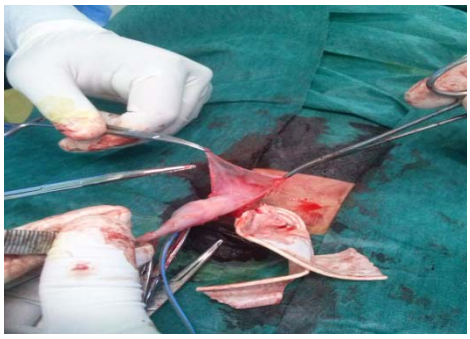

Figure 1: The longitudinal dorsal dartos flap is completely harvested with its pedicle at the root of the penis.

Figure 2: Doral dartos flap with well vascularized pedicle.

Figure 3: Well vascularized dorsal dartos flap

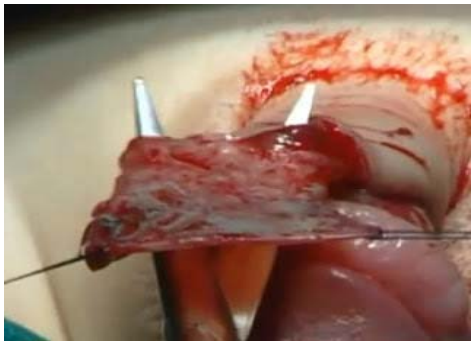

Figure 4: A hole is made at the base of the flap

Figure 5: Transposition of the flap over the new urethra.

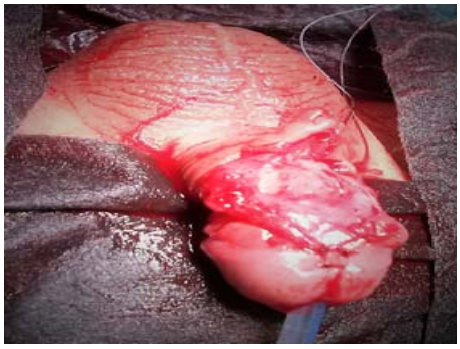

Figure 6: The flap covers the ventrally neourethra

Results

The procedure was completed successfully in all the patients with no intraoperative complications. Mean followup of patients was 4 months. All patients had good functional results with straight penis and vertical slit shaped meatus at the tip of the glans with cosmetically normal-looking circumcised penis. Thirty four (97.14%) patients had no evidence of fistula development. One patient only (2.8%) developed fistula which was identified at original hypospadiac meatal site. The fistula was repaired by redo procedure 7 months later. Meatal stenosis occurred in 3 patients (8.5%). These cases were treated successfully by periodic urethral dilation during a 1-month period. There was no evidence of infection or permanent urethral stricture. The results are summarized below (Diagram II).

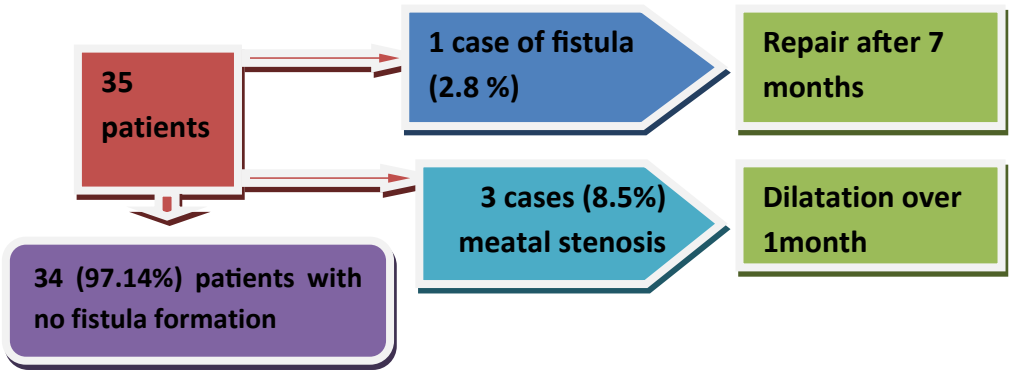

Diagram II: Summary of results of the study.

Discussion

The present study indicates that covering the newly developed urethra in a TIP hypospadias repair with a well vascularised fascial flap decreases the probability of fistula development. The highest reported rate of fistula with TIP repair was 20%[4]. Placement of well vascularized interposition tissue between the penile skin and the neo-urethra is essential for preventing a urethra-cutaneous fistula[9,11-13]. Without dartos flaps fistulae were reported in 15–29% of cases after TIP urethroplasty[14,15]. Different tissues and techniques have been described to solve the problem of urethra-cutaneous fistula. Retik and Borer[11] described covering the neo-urethra with asymmetrical rotational, subcutaneous dartos flaps harvested from the dorsal preputeal and penile shaft skin. They reported a fistula rate of 3.2%. However, harvesting of the flap in this way was accompanied by development of penile rotation which has been reported to be as high as 90.7%[16]. Ventrally harvested dartos flaps also have been used for the urethral covering with a fistula rate of 8.3%[17]. An important pitfall of this techniques that ventral skin can be poorly developed, so it is not available for creating sufficient ventral dartos flaps and this may be the cause of high fistula rate with this technique. Another technique for preventing fistula development is the use of tunica vaginalis flap to reinforce the neo-urethra[17]. Although the fistula rate with this technique was zero, however, it is more suitable for proximal hypospadias and it needs more dissection in the scrotum. Sozibur and Snodgrass[18] used a dorsal dartos pedicle flap obtained from the dorsal prepuce, buttonholed and transposed to the ventrum of the penis for additional covering of the neo-urethra. They reported complications in 14% of patients. Flaps that are harvested from dorsal skin are abundant, well vascularized and follow the axial course of blood vessels. The transposed flap completely covers the neourethra, giving additional support in fistula prevention. The flap's redundancy, excellent vascularity and always sufficient length make it very useful for distal and mid-shaft hypospadias repairs with a well-developed urethral plate.

Conclusion

The neo-urethral covering with well-vascularized dartos flap, harvested dorsally and buttonholed at its base for ventral transposition, represents a good choice for fistula prevention after Snodgrass repair for distal hypospadias.

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