

Folded Dorsal Dartos Flap for Prevention of Fistula after Snodgrass Procedure for Distal and Midshaft Hypospadias

RAAFAT ABD EL-LATIF ANANI, M.D.

The Department of General Surgery, Plastic and Reconstructive Surgery Unit, Faculty of Medicine, Zagazig University.

ABSTRACT

Since introduced by Snodgrass, tubularized incised plate (TIP) urethroplasty became a preferred technique for hypospadias repair. The procedure gives good functional results and cosmetic appearance with a fairly low rate of complications. However, urethrocutaneous fistula has been reported with various rates. The present study was designed to evaluate the importance of neourethral covering using vascularized folded dorsal Dartos flap for fistula prevention after TIP urethroplasty. It included 58 patients, aged 2 to 9 years (mean 4.25 years), of them, 51 had distal and 7 had midshaft hypospadias. All patients underwent standard tubularized incised plate (TIP) urethroplasty. This was followed by covering of the neourethra by vascularized longitudinal folded dorsal Dartos flap that was harvested and transposed to the ventral side by the buttonhole maneuver. Mean follow-up was 23 (6-47) months. All patients had good functional and cosmetic results with straight penis and vertical slit shaped meatus at the tip of the penis. Two patients (3.4%) developed urethrocutaneous fistula. In 6 patients (10.3%), temporary meatal stenosis occurred and was solved by dilation and corticosteroid ointment application. The buttonholed well-vascularized folded dorsal Dartos flap represents a good choice for fistula prevention after TIP urethroplasty for distal and midshaft hypospadias.

INTRODUCTION

Use of the Snodgrass technique has gained wide acceptance for the correction of hypospadias because of its good cosmetics, low complication rate, and reliability in creating a vertically oriented meatus as in a normal circumcised penis [1]. Fistula formation presents the most common complication that ranged from 2%-20% [2-5]. Many authors have described different procedures to prevent this complication [6-11]. The author presents his experience using the longitudinal folded dorsal Dartos flap as a neourethral covering layer for decreasing the rate of urethrocutaneous fistula after Snodgrass procedure for distal and midshaft hypospadias repair.

PATIENTS AND METHODS

From October 2002 till January 2007, 58 patients, aged 2 to 9 years (mean 4.25 years), underwent hypospadias repair using Snodgrass procedure. Fifty one patients had distal and 7 had midshaft hypospadias. All patients had a well-developed urethral plate. The technique used was the standard tubularized incised plate urethroplasty, which was followed by neourethral covering by longitudinal folded dorsal Dartos flap as a method to prevent fistula formation.

Surgical technique:

The operation was performed under general anesthesia and 4X-loupe magnification. An indwelling catheter with 8-10Fr was passed through the hypospadiac meatus to be used as a stent. A penile tourniquet was applied at its root in the form of a soft elastic rubber band. Thereafter, a 4/0 silk stay suture was placed through the glans for traction. Then, deepithelization of the preputial skin of both inner and outer layers was done starting from proximal to distal preserving the subcutaneous tissue and leaving a cuff of inner layer of 4mm width all around distal to the coronal sulcus. Thereafter, penile degloving was completed at two planes, the superficial one is between the dorsal Dartos tissue and skin and second is between the tunica albuginea and deep surface of Dartos tissue creating a well vascularized dorsal Dartos flap in continuity with the deepithelized prepuce with its pedicle at the root of the penis. Then, a hole was made at the base of the flap to prepare it for ventral transposition (Fig. 1). Performance of an artificial erection to check penile curvature was done. Orthoplasty was performed, if needed, by dorsal tunica albuginea plication (4-0 monofilament polypropylene sutures). The urethral plate was separated from the glans wings with two

parallel longitudinal incisions. These incisions were made very deep, up to the tips of the corpora cavernosa to enable better mobility of the wings. The urethral plate was incised in midline from the tip of the penis to the meatus (Fig. 2). Then, tubularization of urethral plate was performed around the stent without tension with a one-layer subepithelial running 6-0 polygalactin suture (Fig. 3). The long Dartos flap with a completely preserved blood supply was then transposed to the ventral side by the buttonhole maneuver (Fig. 4). The distal part of the flap was folded upon itself in 2 layers and then sutured to the deep aspect of glans wings around the neomeatus as well as to the atretic two pillars of spongiosum around the whole neourethra. The proximal part is kept without folding and sutured to the Buck's fascia covering the corpora cavernosa up to the normally developed urethra with laterally based sutures. Usually, the distal 4 millimeters of the preputal subcutaneous tissue is trimmed to be sure of optimal vascularity of the distal part of the flap. The neomeatus was fashioned widely to prevent subsequent meatal stenosis. This method allows the neourethral suture line to be covered with a well-vascularized on-lay Dartos flap, which supports the neourethra like spongiosal tissue (Fig. 5). The glans wings were approximated in one layer over the flap without tension with several interrupted 6-0 polygalactin sutures. Then, the penile skin was redraped over the penis and sutured to the preputal cuff like in circumcision (Fig. 6). Then, dressing was applied with the penis in upright position to minimize postoperative edema. The placed urethral catheter was left as a stent as well as for bladder drainage and removed on the 10th day after surgery. Topical 0.05% betamethasone cream was applied twice daily around the neomeatus to prevent excessive scarring and subsequent stenosis. The neourethra was calibrated at 1,2 and 3 months after surgery. The patients with meatal stenosis were treated by periodic dilatation and topical 0.05% betamethasone cream twice daily for 3 months.

RESULTS

Mean follow-up was 23 (6-47) 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 (Figs. 7,8). Two patients (3.4%) developed urethrocutaneous fistula at the original hypospadiac meatal site.

The 2 cases were of the distal penile type. They were treated by two layers repair of the fistula and

a third intervening layer of local Dartos flap 6 months after the first surgery. Both patients did well without subsequent complications. The neourethra was calibrated at 1,2 and 3 months postoperatively. Meatal stenosis occurred in 6 patients (10.3%). These cases were treated successfully by periodic urethral dilation during a 3-month period with application of topical 0.05% betamethasone cream twice daily. Neither infection nor permanent urethral stricture occurred. The complicated cases were the early patients of the series. No complications developed in the late cases.

DISCUSSION

Tubularized incised plate (TIP) urethroplasty described by Snodgrass presents the method of choice in the treatment of distal and midshaft hypospadias with minimal complication rates [1]. Urethrocutaneous fistula is the most common complication. The highest reported rate of fistula with this technique was 20% [4]. Interposition of well-vascularized tissue between the penile skin and the neourethra is essential for its prevention. Different tissues and techniques have been described to solve this problem. Retik and Borer [6] described covering the neourethra with asymmetrical rotational, subcutaneous Dartos flaps harvested from the dorsal preputal and shaft skin. They reported a fistula rate of 3.2%. However, harvesting of the flap in this way was accompanied by penile rotation which has been reported to be as high as 90.7% [11]. Yerkes et al. [7] have used a Y-to-I wrap of spongiosum for neourethral reinforcement with a fistula rate of 0%. Although the spongiosal tissue provides good anatomic coverage of the neourethra, but its usage is limited, especially in midshaft hypospadias where the spongiosal tissue is fibrotic distal to the meatus and its use can cause ventral penile curvature. Ventral-based Dartos flaps also have been used for the urethral covering with a fistula rate of 8.3% [8]. 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. Tunica vaginalis flap has been reported as a reinforcing layer of the neourethra [9]. Although the fistula rate was zero, however, it is more suitable for proximal hypospadias and it needs more dissection in the scrotum. Sozibur and Snodgrass [10] used a dorsal Dartos pedicle flap obtained from the dorsal prepuce, buttonholed and transposed to the ventrum for additional covering of the neourethra. However, they reported complications in 14% of patients.



Fig. (1): The longitudinal dorsal Dartos flap is completely harvested with its pedicle at the root of the penis. The window at the base of the flap is created (tip of the instrument).

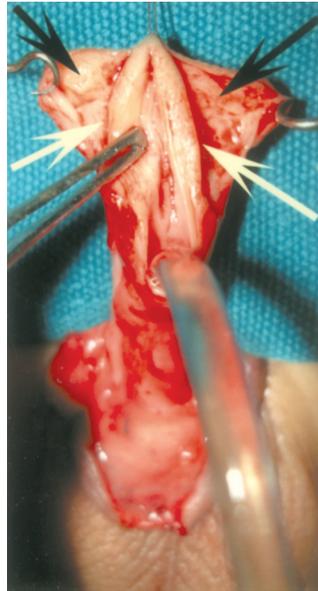


Fig. (2): The urethral plate is separated from the glans wings by two lateral incisions (white arrows). The glanular wings are prepared (black arrows). The urethral plate is incised in midline from the tip of the penis to the meatus (tip of the instrument).

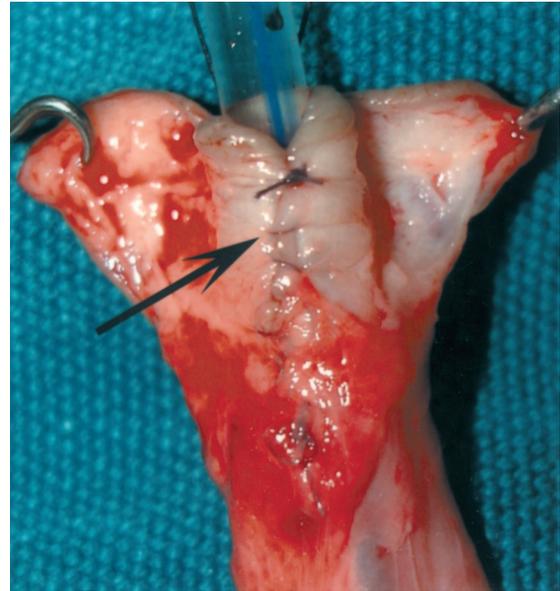


Fig. (3): The urethral plate is tubularized around 10Fr. catheter with subepithelial running sutures (arrow).



Fig. (4): The well vascularized Dartos flap is transposed to the ventral aspect of the penis through the created window by the buttonhole maneuver. Notice the broad distal part (arrow).

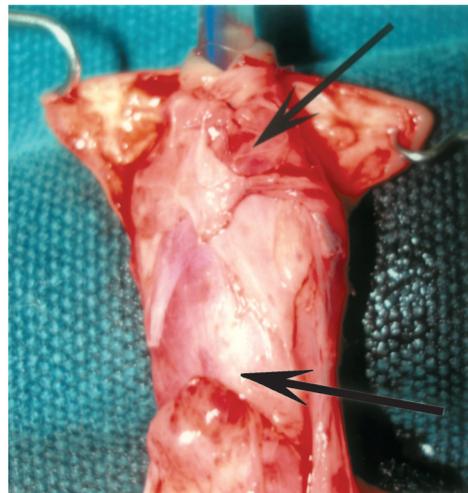


Fig. (5): The broad distal part of the flap is folded and fixed to the glans wings around the neomeatus (black arrow). The proximal part is fixed to Buck's fascia up to the normally developed urethra (white arrow). Well-vascularized tissue completely covers the neourethra.



Fig. (6): Reconstruction of the glans and penile body skin.



Fig. (7): The neomeatus vertically oriented as a slit at the tip of the glans without stenosis.



Fig. (8): Good cosmetic appearance of the penis with well formed urine stream.

The dorsal hypospadiac skin is always well developed. Flaps harvested from dorsal skin are abundant, well vascularized and follow the axial course of blood vessels in the best possible way. The crucial point in the technique involves harvesting of the dorsal Dartos flap. We did it under magnification to avoid any minute injury to the flap. Also, we started the deepithelization of the prepuce proximally at the normal penile skin just below the hypospadiac prepuce and continued distally up to the border between the outer and the inner preputal layers. We agree with Djordjevic et al. [12] that dissection of subcutaneous tissue in this direction is easy. Deepithelization in the opposite direction, distal to proximal, is more difficult and could result in a thin and reduced flap with a damaged blood supply. In this method, a redundant dorsal Dartos flap with completely preserved vascularity is created. Also, trimming of the last 4 millimeter of the flap ensures the vascularity of the important distal part of the flap that will cover the neourethra. The modification added in our technique is folding of the distal part of the flap that covers the neourethra. The distal part of the flap is always broad enough to be longitudinally folded upon itself forming 2 layers. So, the neourethra is covered with 2 layers of Dartos tissue rather than 1 layer as in Snodgrass technique [10]. Our technique is different from that of Kamal [11]. He completely divided the flap longitudinally and then transposed it ventrally around the penis to form 2 layers of Dartos tissue over the neourethra. However, dividing the flap in this way will narrow the pedicle and this may jeopardize the vascularity of the flap. In our technique the flap is buttonholed rather than split, so, the vascularity of the flap is thought to be better.

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 midshaft hypospadias repairs with a well-developed urethral plate. Also, penile rotation is avoided because of the longitudinal orientation of the flap. Use of this flap in our patients achieved very good outcomes, compared with other reports [6-13]. Deep dissection of the glans wings is recommended to obtain their good mobility for later closure. Incisions should be directly vertical to prevent injury of the penile arteries, which run into the glans lateroventrally. There was no case in which covering of the urethra and glans closure was not possible.

The complications in this series occurred in the early cases. With more experience and improvement

of learning curve, these complications did not occur any more.

The meatal stenosis reported in this series (10.3%) is comparable to other series using Snodgrass technique for hypospadias repair that has been reported to be ranging from 3% to 17% [3,4,5,12,13]. Fashioning of a wide neomeatus is the key for prevention of meatal stenosis. Also, regular calibration of the meatus and urethra is important for early discovery of stenosis and dilatation in the proper time. We agree with Elbakry [14] that regular calibration of the urethra is an integral part of the Snodgrass technique for the previously mentioned reasons. The application of corticosteroid cream may have a role in the prevention and treatment of meatal stenosis as reported by others [15].

Conclusion:

The neourethral covering with longitudinally folded, well-vascularized Dartos flap, harvested dorsally and buttonholed at its base for ventral transposition, represents a good choice for fistula prevention. Harvesting the flap under magnification with meticulous dissection is essential for preservation of the vascularity of the flap. Deepithelization of the prepuce from proximal to distal is recommended. Trimming of the distal 4 millimeters of the flap to discard this part of equivocal vascularity should be done. Topical application of corticosteroid cream around the neomeatus as well as postoperative regular calibration of the urethra is important for prevention and treatment of meatal stenosis.

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