

A New Technique for Correction of Distal Penile Hypospadias

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Abstract: The major aims of correction of hypospadias include construction of a neourethra, removal of the chordee, and reduction of the probability of postoperative fistulization. Here, we describe a new technique that can be easily used in cases with subcoronal distal penile hypospadias (even those with chordee) for the construction of the urethra using meatus-based transverse flaps. This new technique was used in 10 patients (mean age, 4.6 years). There were no complications such as fistula formation, chordee recurrence, hematoma formation, or flap necrosis during the follow-up period (mean follow-up period, 13.4 months). We believe that this surgical technique can be used in cases with chordee, carries a low risk of fistula formation, has the advantage of the use of richly vascular flaps for construction of the urethra, and yields a better cosmetic result. Hence, it can safely be used for surgical correction of distal hypospadias.

Key Words: hypospadias, meatal flap, chordee

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Hypospadias is a congenital anomaly of the urethral meatus in which the urethral opening is located more proximally on the ventral aspect of the penile shaft than at the tip of the glans penis. In the embryo, the urethra develops from the cloacae on the urethral plate of the anterior genital tubercle and is formed by proximal-to-distal fusion of the genital fold. Interruption of this fusion process at any stage causes the meatus to open more proximally, thereby leading to hypospadias.¹ Owing to the various anatomic types and characteristics of hypospadias, various techniques for its correction have been described in the literature. The main aims of these surgical techniques are to move the urethra to the tip of the glans penis, to correct chordee, and to have a better postoperative cosmetic result. However, the postoperative risks of chordee recurrence and fistula formation should be minimized while attempting to achieve these aims. The surgical techniques used for the correction of hypospadias include meatus-based flaps,² preputial island flaps,^{3,4} skin and mucosal grafts,^{5,6} methods for construction of a new urethra using adjacent tissues,⁷ and urethra extension.⁸ Urethra extension and meatus-based flaps are commonly used to treat cases of distal hypospadias with chordee, whereas techniques for construction of a new urethra using the adjacent tissues such as tubularized incised plate urethroplasty are used in cases with distal hypospadias without chordee. Fistula formation is the most important problem

associated with all techniques for hypospadias correction and has a prevalence of 5% to 23%.⁹ The factors that lead to fistula formation include infection, use of tissues with poor blood supply, use of fibrotic or thin skin, distal stenosis, and superimposition of the skin suture line on the urethra suture line.⁶ In this study, we describe a new surgical technique that minimizes the risk of fistula formation in cases with subcoronal hypospadias.

PATIENTS AND METHODS

Ten children (age, 4–6 years; mean age, 4.6 years) with distal penile hypospadias were operated upon using our new technique. None of these patients had undergone any surgery previously. All of them were white Caucasians and had subcoronal hypospadias in the distal one-third of the penis. Two of the patients had superficial chordee of 30 degrees.

The Surgical Technique

Under general anesthesia, 2 flaps were shaped from the transverse area on both sides of the meatus and parallel to the corona (Fig. 1A). The flaps were as long as the estimated length of the urethral defect. The flaps were removed from the tunica albuginea by gentle dissection (Fig. 1B). In cases where chordee was present, a circular incision was performed: as the prepuce was abraded up to the proximal end, the entire chordee was cleared. The presence of chordee was checked for by artificial erection. A triangular glanular flap was raised at the tip of the glans as described by Mustarde in 1965.⁴ A tunnel was then opened to the corona at the tip of the glans to form a neourethra in the glans. A silicon catheter with an appropriate diameter was inserted through the tunnel, placed in the urethra, and guided towards the bladder. The flaps were then sutured with 6–0 nylon over-and-over sutures, approaching the midline bilaterally around the catheter to form a tube (Fig. 1C). The flaps were then slid over the catheter using the sutures at the distal end of the reconstructed urethra, passed through the glans, and sutured to the tip of the glans (Fig. 1D). The ventral preputial tissue was then sutured to the glans so as to completely cover the neourethra (Fig. 1E). The foreskin was left intact if the family wished it to be preserved. In some cases, a skin web could be observed at the penoscrotal junction owing to ventral skin sliding (Fig. 2A). In such cases, we used a small Z-plasty at the penoscrotal junction to avoid pseudotension (Fig. 2B). Adequate hydration was provided postoperatively, and the urinary catheter was removed on day 5, after which the patient was allowed to urinate. The patients were followed up for 10 to 18 months (mean follow-up duration, 13.4 months).

In all, there were no complications such as fistula, urethral stenosis, chordee recurrence, and hematoma during the follow-up period (Fig. 3). There was no recurrence or persistence of chordee in patients who had undergone chordee correction. All patients had a satisfactory and acceptable postoperative cosmetic result (Fig. 4).

DISCUSSION

Hypospadias is a common congenital anomaly with a prevalence of 1 in 300 male births.¹ The most common site for hypospadias is the distal penis.⁶ In hypospadias cases, the common complication of fistula can be prevented by constructing a new urethra using richly vascular tissues. The most important cause of fistula formation in the new urethras prepared from the grafts is the

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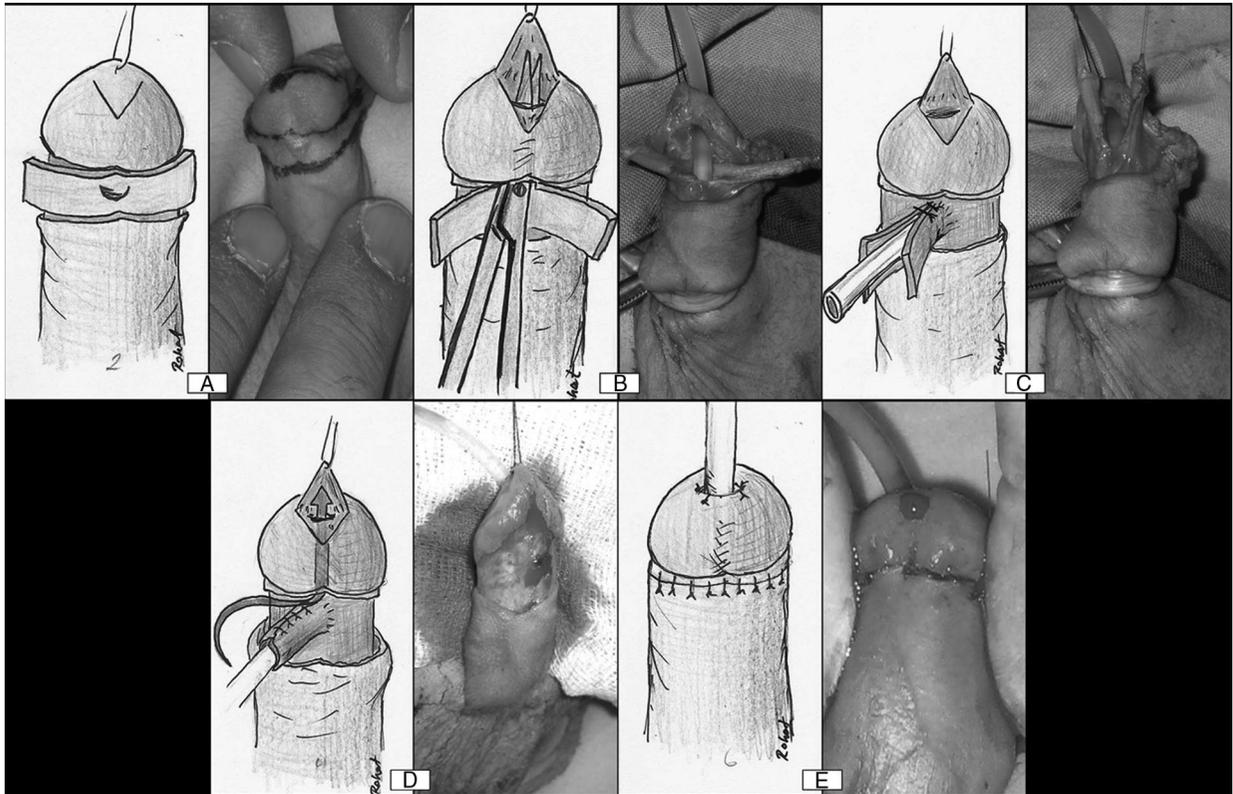


FIGURE 1. Surgical technique, during the operation and schematic presentation. A, Planning meatal-based flaps, (B) removal of flaps from the tunica albuginea and planning triangular glanular flap, (C) suturing meatal-based flaps to each other around the tube, (D) guiding the neourethra through the tunnel in the glans and suturing it to the triangular glanular flap, and (E) closing the flap donor area by advancing the skin on the penile shaft distally.



FIGURE 2. A, Web view in the penoscrotal area at the end of hypospadias correction. B, Post-operative picture (after the z-plasty procedure).

problem of circulation.¹⁰ In the flip-flap technique used for the correction of distal penile hypospadias, the flap is prepared from proximal skin of the meatus and turned towards the tip of the glans distally to form a neourethra; thus, the pedicle remains under pressure, and the risk of fistula increases with the increase in the length of the flap.¹¹ Our technique does not involve folding and thus, there is no risk of any circulatory problem, which is associated with the flip-flap or other similar techniques.

The problem of superimposition of a tubular structure with the skin suture line is one of the most important problems associated with wound dehiscence between tubular structures and skin on the surface¹²⁻¹⁴; this is because circulatory problems and infection in the tubular structure may cause fluid leakage (between the tube and the skin) and fistula formation. In some techniques used for the correction of hypospadias, the new urethra is covered by lateral skin flaps, and the suture line of these flaps is superimposed on the new urethra. In the new technique described in this article, dehiscence, which may occur in the new urethra, can be tolerated by the skin that completely covers the urethra, thereby, wound healing is provided without the risk of fistula formation. The glans is one of the most important sites of fistulization. The above-mentioned reasons may lead to fistula formation, increased catheter pressure or circulatory problems in the glanular flaps covering the urethra, and dehiscence in techniques that cause superimposition of the skin suture line over the urethral suture line. The new technique presented in here bypasses the glans since the tunnel opening is situated in the glans. Recent articles have pointed out the importance of maneuvers that avoid the superimposition of the suture line of the penile skin over the neourethra.^{15,16} Scuderi's technique involves urethroplasty using

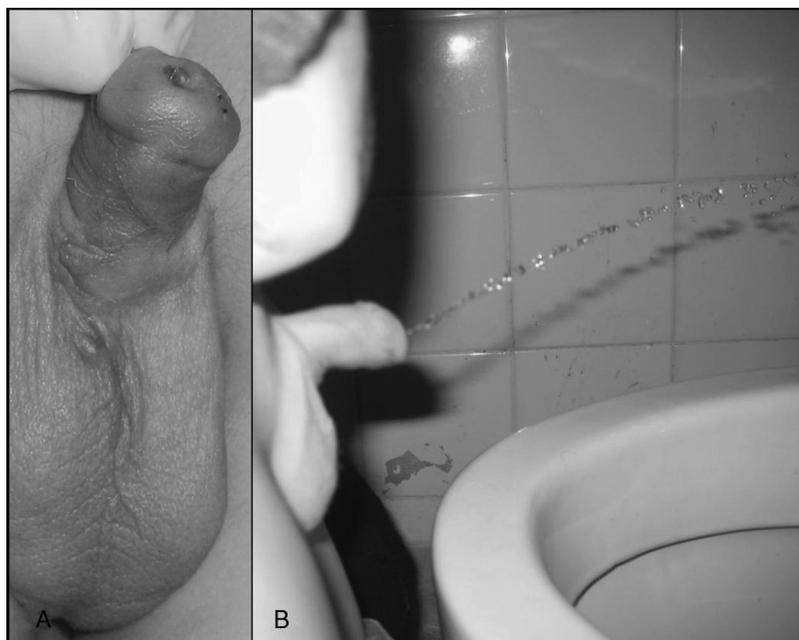


FIGURE 3. A, The patient's picture at two weeks post-operatively. B, Picture of the patient during micturition.

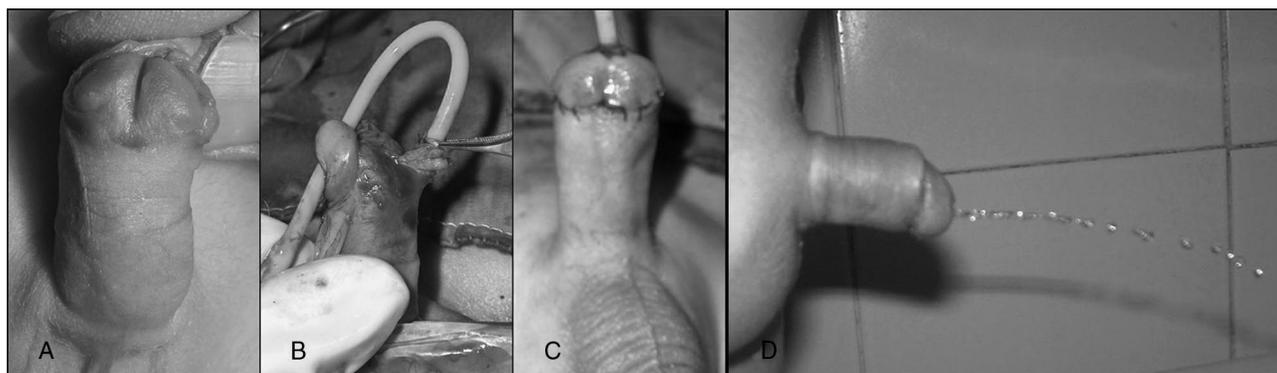


FIGURE 4. Peri-operative and post-operative pictures of a patient. A, Pre-operative picture of a patient with distal penile hypospadias. B, Guiding the meatal-based flaps sutured to each other through the tunnel in the glans. C, Picture of the penis after the operation. D, Picture of the patient during micturition at the third post-operative month.

a subcutaneous pedunculated preputial flap that is transposed ventrally by the passage of the glans through a buttonhole created on the dorsal side of the preputial skin. The neourethra is constructed by longitudinal suturing of the preputial flap that lies dorsally between the corporeal bodies.¹⁵ Roodsari et al (2006) presented their technique involving urethral advancement and glanuloplasty using a glanular V-flap.¹⁶ Neither of the above techniques involves superimposition of the suture line of the penile skin over the neourethra, and both these techniques are successful.

The most common anomaly accompanying hypospadias is the presence of chordee. Removal of the chordee is one of the most important stages in the correction of hypospadias. Mathieu technique and tubularized incised plate urethroplasty, a common technique used in patients with distal hypospadias, have some problems associated with the removal of chordee.⁶ The former was modified by Devine and Horton to overcome these challenges.^{5,15} In the latter, Snoodgrass attempted to correct the curvature by dorsal plication in hypospadias cases with minimal curvatures.⁷ However, in Snoodgrass's technique, long-term

postoperative chordee recurrence may be observed in cases in which urethra was reconstructed from fibrotic urethral plate.¹⁷ In our new technique, the penile skin over the tunica albuginea is abraded up to its proximal end, thereby enabling the detection and easy excision of the chordee in the penile shaft.

Another advantage of the present technique is that the foreskin is not used for construction of the new urethra. This is particularly important for families that wish the son's foreskin to be preserved, since this procedure ensures that the foreskin is left intact along with the correction of hypospadias.

It was Ballesteros¹⁸ who first suggested the thesis that urethra reconstruction can be performed with 2 meatal-based flaps as a method for hypospadias. In his manuscript, which was published in 1977, while describing his personal technique that he used on patients with balanic hypospadias, he has provided no information on the number of patients, on whom this technique was performed, the results, complications, whether or not a fistula was formed, its success on patients with kordi and its superiority against other techniques and disadvantages, and he has not visualized the patients

the technique was performed on. Nevertheless, he has reported that a wide urethra has been obtained, satisfactory aesthetic results have been obtained, and that the initial postoperative results for the use of this technique have been encouraging.

In conclusion, we believe that this new technique can be safely used in patients with subcoronal distal hypospadias, as it offers the following advantages: it can be used in cases with chordee, has a low risk of fistula, allows for the construction of the urethra using flaps with good vascularity, and has a better cosmetic result.

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