

## Use of Bipedicled Dorsal Penile Flap With Z Release Incision: A New Option in Redo Hypospadias Surgery



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<b>OBJECTIVE</b>	To solve the challenge in redo hypospadias surgery, we tried to use a bipedicled dorsal penile flap with a Z release incision in failed hypospadias cases and reported the outcome.
<b>MATERIALS AND METHODS</b>	Thirty male children with 3 or 4 previous unsuccessful hypospadias surgeries were included in our study. Our technique was done after at least 6 months from the last surgery. A flap of the dorsal penile skin was preserved and the skin lateral to the flap was dissected on each side. A small opening was done in the dartos proximal to flap. The glans was withdrawn through this opening with a ventral transposition of the flap. Z-plasty was used to compensate for the deficient dorsal skin; the Z-plasty had 3 limbs and all were made of equal length.
<b>RESULTS</b>	The mean age of the patients was $5.4 \pm 1.8$ years and the mean follow-up was $2.1 \pm 0.7$ years. The technique was successful in 80%. Reoperation was required in 3 cases; all cases were managed using a 2-stage buccal mucosal graft. A small fistula at the coronal level developed in 2 cases but closed spontaneously within 1 month. All patients were voiding well and had a vertically oriented meatus at the tip of the glans and satisfactory cosmetic results.
<b>CONCLUSION</b>	Repair of failed hypospadias using a bipedicled dorsal penile skin flap with Z release incision is a safe and simple procedure offering high success rates. UROLOGY 106: 188–192, 2017. © 2017 Elsevier Inc.

In spite of the great evolution of hypospadiac surgery and advances in the techniques used, some hypospadias patients may suffer failure and require multiple surgeries.<sup>1-3</sup> Recurrent hypospadias is challenging for pediatric and reconstructive surgeons.<sup>3</sup> The main difficulty comes from the deficient penile skin that makes it inadequate for successful repair.<sup>4</sup> Several techniques were described to solve this problem, such as tubularized incised plate repair,<sup>5</sup> buccal mucosal graft,<sup>6,7</sup> or bladder mucosa graft.<sup>8</sup> Each of these techniques needs specific criteria and certain surgical skills. However, when the penile skin is available as a well-vascularized flap, it is considered the most convenient substitute to complete the neourethra.<sup>9,10</sup> So, we developed a simple technique using a bipedicled dorsal penile skin flap with Z-shape release incision to provide enough skin sufficient for neourethra formation and penile covering. In the present study, we describe the technique and summarize the outcome results.

### MATERIALS AND METHODS

Ethics committee approval was obtained. A total of 30 male children who underwent previous 3-4 unsuccessful hypospadias surgeries were included in the present study. Other inclusion criteria were presence of distal or midpenile hypospadias, presence of pliable, elastic and non-fibrotic dorsal penile skin. A minimum of 6 months was allowed to elapse following the last repair before performing our procedure to allow tissue healing and subsidence of the tissue edema. The degrees of ventral scarring as well as ventral curvature were not considered a contraindication for this procedure. Patients with scarred dorsal penile skin, those with a suprapubic scar from a previous intervention or in the early 6 months after the earlier operation, were excluded from the study.

### Operative Technique

Informed consent was obtained from the parents after explaining complete operative details and possible complications. Pre-operative androgen therapy was used in all cases. Re-examination under anesthesia is the initial important operative step to evaluate the penile skin and the degree of curvature if present. A traction suture of the glans (4/0 polyglactin) was placed and a circumcising incision line was marked (Fig. 1). The incision line was carried dorsally 4-8 mm from the coronal edge and was extended ventrally on each side of the urethral plate down to the site of the native urethral orifice. In case of patients presenting with a persistent complex fistula or a urethral stricture, the urethra distal to the native orifice was incised at first from the distal to the proximal and the urethral plate edges were trimmed. The next step was degloving the penis by creating a plane of dissection

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**Figure 1.** Two male children: the first child is 3 years with failed hypospadias repair 4 times before; The second is child 5 years with 2 distal penile fistulas after hypospadias repair 3 times before. Marking signs of the incisions in the penis and the planned Z release incision with an illustration of the Z incision principle are also shown. (Color version available online.)

superficial to the Buck fascia. This technique is usually difficult because of adhesions and necessitates a meticulous dissection to avoid injury of the penile skin pedicle. Artificial erection was done; persistent ventral curvature (8 cases) was corrected using midline dorsal plication technique. The onlay flap was prepared from the dorsal penile skin. A rectangular piece of mid-dorsal penile skin flap was preserved and the skin lateral to the flap was dissected on each side from its dartos. The dissected skin laterally was then removed. Minimal proximal dissection was done to separate the proximal flap edge from the remaining dorsal penile skin. The flap width was about 12 mm. The length was determined according to the present urethral defect. A midline opening at the dartos proximal to the flap was done. Z-plasty release incision was done on the anterior aspect of the lower abdominal wall; the Z-plasty had 3 limbs and all were made of equal length and the flaps were created at an angle of 60° on each side. The central limb of the Z-plasty was created in the direction of the penis and thus parallel to the line of tension. The length of the central limb was determined according to the degree of the dorsal penile skin defect. Undermining of flaps will be necessary to allow better closure. The abdominal incision was closed by using 4/0 polyglactin (Fig. 2).

A stitch was made between the base of the dorsum of the penis and the penopubic subcutaneous tissues. The glans was withdrawn through this opening with a ventral transposition of the flap.

Then, a small strip of the urethral plate (about 3-mm width) was prepared to which the flap was sutured in its axial direction. The neourethral flap was sutured into place with interrupted 6/0 polyglactin sutures as an onlay island hypospadias repair with an extension of the flap slightly beyond the midglanular level. The glans was closed in the same manner as described by Elmoghazy et al.<sup>11</sup> The Z incision was closed using interrupted 6/0 polyglactin sutures (Fig. 3).

After the glans closure, a 10-Fr urethral catheter was placed. After the coverage of the penis and the abdominal incision site

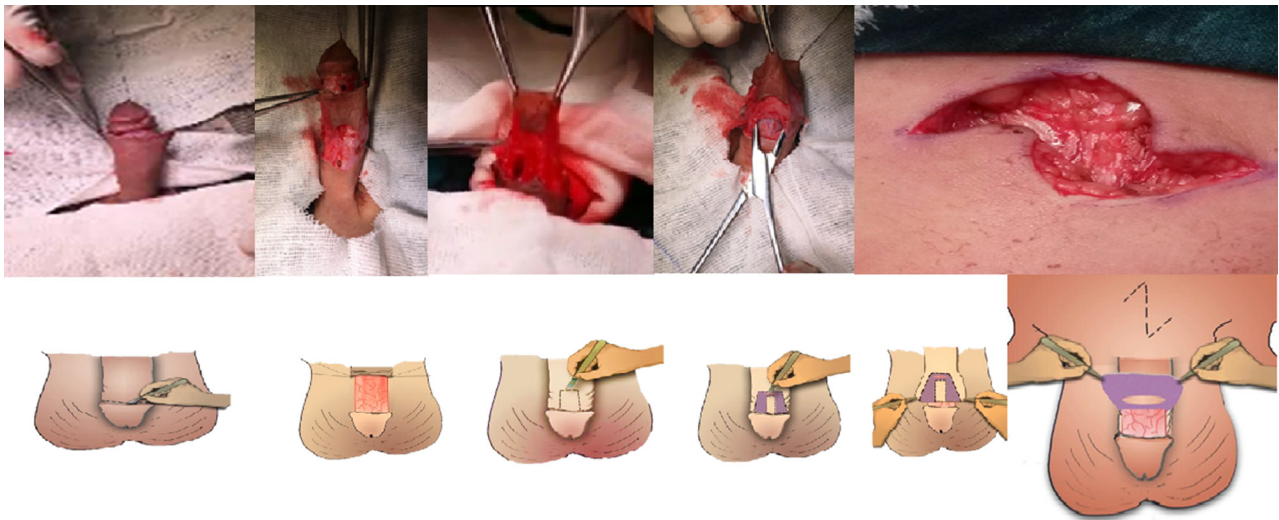
with compressive sterile dressing, the patient was observed for a few hours postoperatively and then discharged home.

During the postoperative follow-up, the dressing was removed on the third postoperative day. On the fifth postoperative day, the urethral catheter was removed. Evaluation criteria for the procedure included the presence or absence of hematoma, edema, infection or torsion, glans penis appearance, the general look of the genitalia and the abdominal incision site, and the ability of the child to perform an easy, painless micturition (Fig. 4).

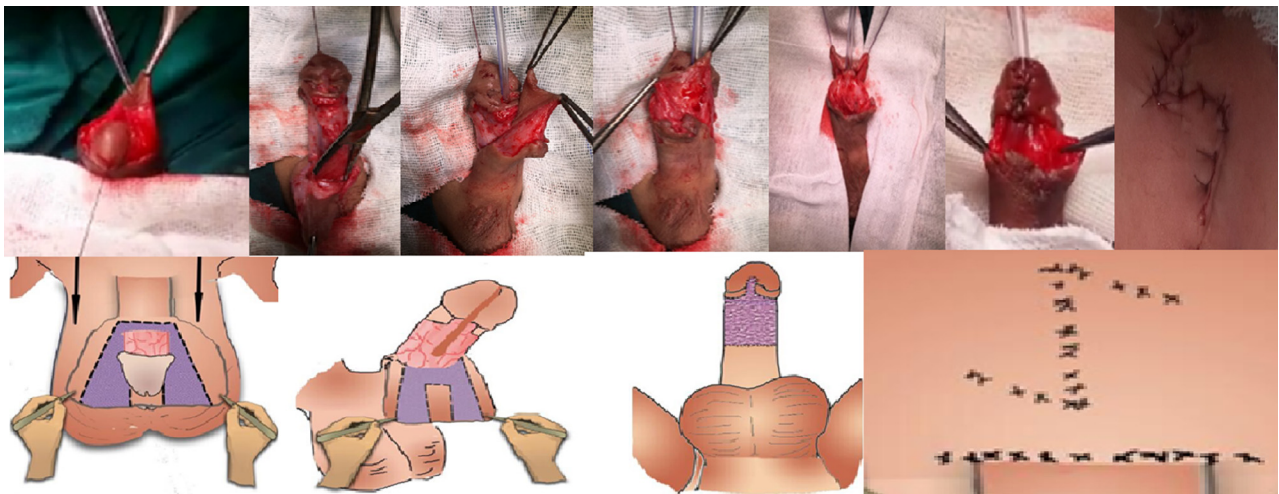
All patients were advised to return for follow-up at 2 weeks, 1-3 months, and every 6 months until 5 years later. During these visits, the children were assessed for the previously mentioned issues in addition to the cosmetic and functional outcomes.

## RESULTS

Between February 2008 and June 2016, 30 patients with failed hypospadias repair were included in a prospective nonrandomized cohort study to undergo our technique. The age of patients ranged from 2.5 to 10.0 years with a mean of  $5.4 \pm 1.8$  years. All patients had 3-4 previous failed attempts at hypospadias repairs and had different presentations; 15 of these boys presented with a complete failed repair (7 distal penile hypospadias and 8 midpenile hypospadias), 10 presented with persistent complex fistula and meatal stenosis (4 distal penile and 6 midpenile), and 5 presented with a urethral stricture and marked difficulty. The technique was successful in 24 patients (80%). Reoperation was required in 6 cases; all cases were managed using a 2-stage buccal mucosal graft. Edema was noted in 2 cases but subsided with medical treatment within 3 weeks. A small fistula at the coronal level developed in 2 cases



**Figure 2.** From left to right: (1) Incision line is carried dorsally 4-8 mm from the coronal edge. (2) Penile degloving. (3) The onlay flap is prepared from the dorsal penile skin. A rectangular piece of the mid-dorsal penile skin flap is preserved. The skin lateral to the flap is dissected on each side from its dartos. (4) Midline opening at the dartos proximal to the flap is done. (5) Z-Plasty release incision is done on the anterior aspect of the lower abdominal wall. (Color version available online.)



**Figure 3.** From left to right: (1) The glans is withdrawn through this opening with a ventral transposition of the flap. (2) The flap becomes ventral and facing the urethral plate of the penis in a vertical direction. (3) Anastomosis of the flap to the urethral plate in its axial vertical direction (prominent, thick, and vascular 2 flap pedicles). (4) A stitch is taken between the base of the dorsum of the penis and the penopubic subcutaneous tissues. (Color version available online.)

but closed spontaneously within 1 month. A persistent mild chordee was noted in 1 boy who required no further operations. None of these 30 patients developed hematoma, infection, flap ischemia, urethral diverticulum, or meatal stenosis. With a mean follow-up of  $2.1 \pm 0.7$  years (Table S1), all patients were voiding well and had a vertically oriented meatus at the tip of the glans and satisfactory cosmetic results for both parents and the physician. No complaint from the abdominal scar was obtained.

## COMMENT

The present study included a cohort of 30 patients with failed hypospadias repair 3-4 times who underwent repair

using a bipediced dorsal penile skin flap with Z release incision and showed that this technique had excellent results, with a 80% rate of successful repair and a low rate of minor complications (16%), all of which resolved spontaneously without treatment. With a mean follow-up of  $2.1 \pm 0.7$  years, the long-term results in terms of functional and cosmetic outcome were satisfactory. In contrast to other techniques, repair of failed hypospadias using bipediced dorsal penile skin as an onlay flap with Z release incision technique can provide a good choice for redo hypospadias cases.

We think that these results are due to several principals that were considered when developing this technique.

First, the flap was taken from the dorsal penile skin with a thick dartos. The flap was used in its axial direction with



**Figure 4.** From left to right: (1) Immediate postoperative ventral and lateral views for a completely covered penis without tension. (2) Ventral and dorsal views of the penis in the third postoperative day after dressing removal. (3) The remaining pictures show late postoperative after 2 years with different views for a straight penis with a cosmetically well glans, a wide vertical slit external meatus at the glans apex, good penile skin, and a scar from the Z incision. (Color version available online.)

its bipediced blood supply to ensure good vascularity of the flap, to allow for repair without tension, to generate a low risk of postoperative flap ischemia or sloughing, and to ensure successful anastomosis regardless of the degree of fibrosis.

Second, compensation for the deficient dorsal penile skin was achieved by Z relaxation incision at 60° angles. This incision provided a 75% increase in the length of the original line of tension.<sup>12</sup>

Third, a neourethra can be created using a well-vascularized flap, regardless of the degree of urethral plate fibrosis, in 1 stage with good cosmetic results as described previously by Elmoghazy et al.<sup>11</sup>

Fourth, the presence of 2 lateral pedicles with a thick dartos provides a bulky layer between the neourethra and the skin, acting as a second layer of reinforcement of the suture line of the neourethra.

Fifth, the stitch made between the base of the penile dorsum and the penopubic subcutaneous tissue straightened the penis and elevated it up. Also, glans closure using a stitch-by-stitch technique<sup>11</sup> improved the cosmetic outcome with a straight nonretracted penis.

Sixth, preoperative androgen treatment increased the penile length, the dartos thickness and vascularity, and the glans size. All these are favorable requisites for a successful operation with good cosmetic results.

I think early dressing removal added a benefit to the results as it allowed early wound exposure with rapid healing and lesser infection.

Any graft, whatever its nature (even buccal), needs a favorable bed for better take. This is doubtful with a scarred penis after repeated surgeries.

Different surgical techniques have been described, but none of them fits all patients with hypospadias; each procedure demands certain criteria to be properly selected. For example, a healthy urethral plate with no scarring is essential for a tubularized incised plate operation,<sup>13</sup> whereas

healthy, sufficient penile skin with no scarring is a prerequisite for penile skin flaps.<sup>14</sup> However, in the presence of marked ventral fibrosis, scarred urethral plate, scarred deficient ventral penile skin, and ventral curvature of >30°, buccal mucosal graft can be used.<sup>15</sup>

The oral mucosa is considered a good and ideal tissue for urethral substitution as it has favorable immunological criteria and wide availability.<sup>16</sup> Success is dependent mainly on the recipient site with harvesting the graft needs special skills. Complications with the use of buccal mucosa onlay graft in redo hypospadias surgery are 23%-27%.<sup>17</sup> Graft contracture with the meatus at the coronal level occurs in 12% of cases.<sup>18</sup> Also, the use of oral mucosal grafts is a 2-stage procedure with higher morbidity. In 2004, Snodgrass and Elmore, pioneers of 1-stage hypospadias surgery, reported the initial experience with 25 staged buccal graft (Bracka) urethroplasties after a failed hypospadias surgery. Of the 25 cases, 12% required a second grafting procedure before tubularization and 4 partial glans dehiscences occurred after tubularization, requiring reoperative glansplasty.<sup>19</sup>

Patel et al<sup>10</sup> reported their experience with penile skin flap for hypospadias reoperation using the technique called the split onlay skin flap for salvage hypospadias repairs with a fistula rate of 54.5% and 1 case with persistent ventral curvature. This technique is dependent on the presence of excess, pliable, and well-vascularized penile skin.

Limitations of this technique include a relatively longer follow-up, the need for more cases, and to be done by other surgeons to validate the results.

## CONCLUSION

Repair of failed hypospadias using a bipediced dorsal penile skin flap with Z release incision is a safe and simple procedure offering high success rates, low morbidity, and excellent long-term outcomes.

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## APPENDIX

### SUPPLEMENTARY DATA

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.urology.2017.04.044>.