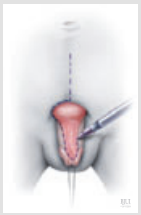
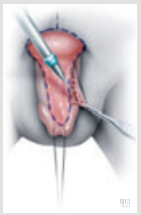
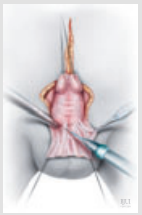
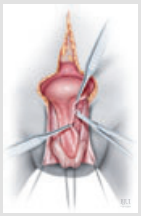
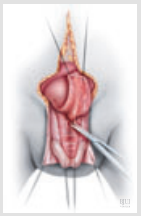
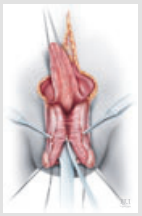
BJUI BJU INTERNATIONAL

Surgery Illustrated – Surgical Atlas
Penile Disassembly

Michael Mitchell
Pediatric Urology, Milwaukee, WI, USA

ILLUSTRATIONS by STEPHAN SPITZER, www.spitzer-illustration.com

PLANNING AND PREPARATION

The technique of complete penile disassembly for epispadias (CPDE) repair is applicable for reconstruction of the male genitalia for the entire spectrum of the epispadias/exstrophy complex (SEEC) including many of the atypical forms as well. The dissection in this technique also provides excellent access to the pelvic diaphragm and bladder neck permitting proper positioning of the bladder neck and proximal urethra within the pelvis and pelvic diaphragm. CPDE is also useful in re-do and salvage reconstructions in the same patient group. Patients in the more severe end of the SEEC will require osteotomies at the time of CPDE and bladder closure. Ideally, the patients are repaired in the first week after birth. The patients are positioned supine with circumferential preparation from the xyphoid to the toes, if osteotomies are anticipated. This permits bladder closure and CPDE in one preparation and draping in patients at the more severe end of the SEEC.

SPECIFIC EQUIPMENT/MATERIALS

1. Dennis Brown, Lone Star® (CooperSurgical Inc., Trumbull, CT, USA) or similar ring retractor.
2. Colorado tungsten tip for electrocautery and/or the PlasmaBlade® (sharp tip; Peak Surgical Inc., Palo Alto, CA, USA)
3. Monofilament absorbable suture (7–0, 6–0,5–0 polyglyconate, 6–0 rapid absorbable gut, no. 1, 3–0, 5–0, 6–0 polydiaxonone)
4. A surgical kit analogous to that used for hypospadias repair and ureteric re-implantation. The kit should provide adequate instrumentation with appropriate adjustment for patient age.

JOURNAL COMPILATION © 2010 BJU INTERNATIONAL | 106, 136–149 | doi:10.1111/j.1464-410X.2010.09404.x

SURGICAL STEPS

The exstrophy and penopubic patients with significant diastasis of the symphasis should first have anterior iliac osteotomies at the time of epispadias repair or primary exstrophy closure.

Figure 1

The surgical incision.

Mark the entire urethral 'plate', which is actually the top surface of a wedge of tissue. The top surface is urethral epithelium; the underside is a wedge of spongiosa tissue that becomes quite robust proximally as it is contiguous with the bulb, which is always below the pelvic diaphragm. The blood supply comes from the posterior bladder neck. Therefore, never divide the plate.

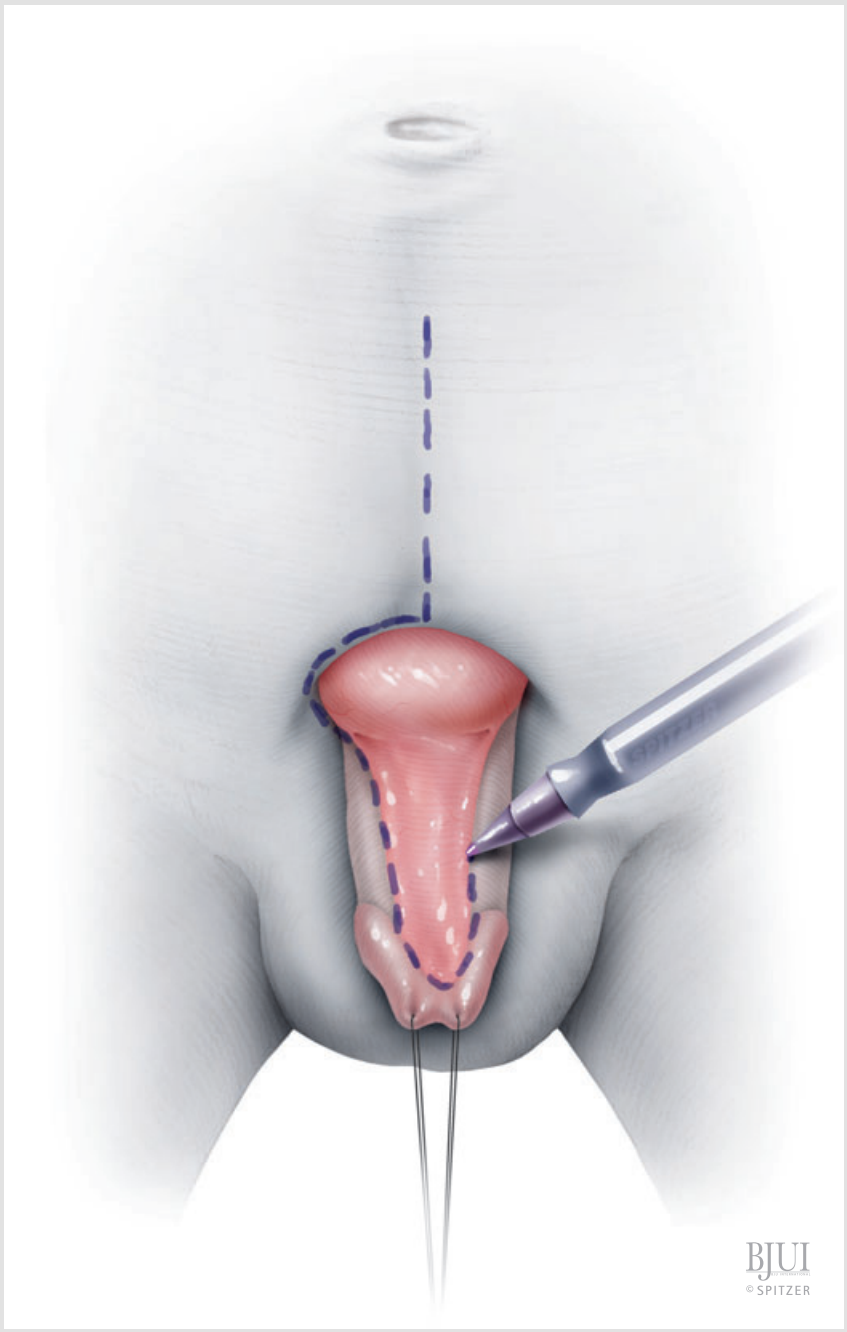


Figure 2

Dissection is initiated along the lateral aspect of the urethral plate. Medial to this line there is no Buck's fascia and dissection is between the tunica albuginia of the corpora cavernosa (CC) and the corpus spongiosum (CS) on the ventral aspect of the urethral plate. However, lateral to this line the dissection is in the dartos fascia above Buck's fascia. The deep dorsal vessels are in Buck's fascia and protected, the superficial vessels should be carefully preserved with the skin.

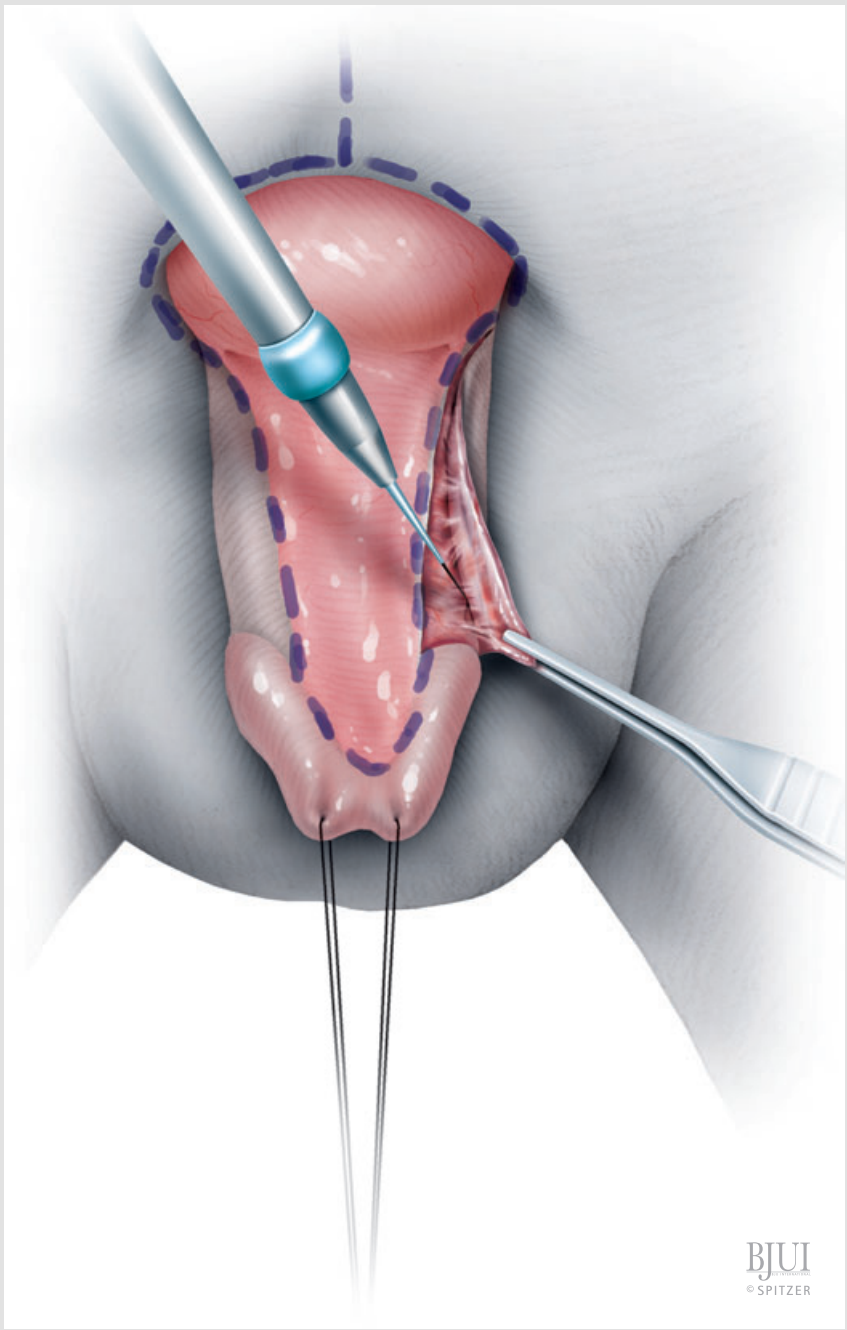


Figure 3

Dissect the ventral skin from the penis continuing in the dartos plane. Note: that where the CC separate proximally, the CS becomes more obvious particularly in patients with a wide symphaseal diastasis. The CS extends to the bulb under the pelvic diaphragm. Therefore, deep dissection on the ventrum in the midline between the diverging CC must be done carefully.

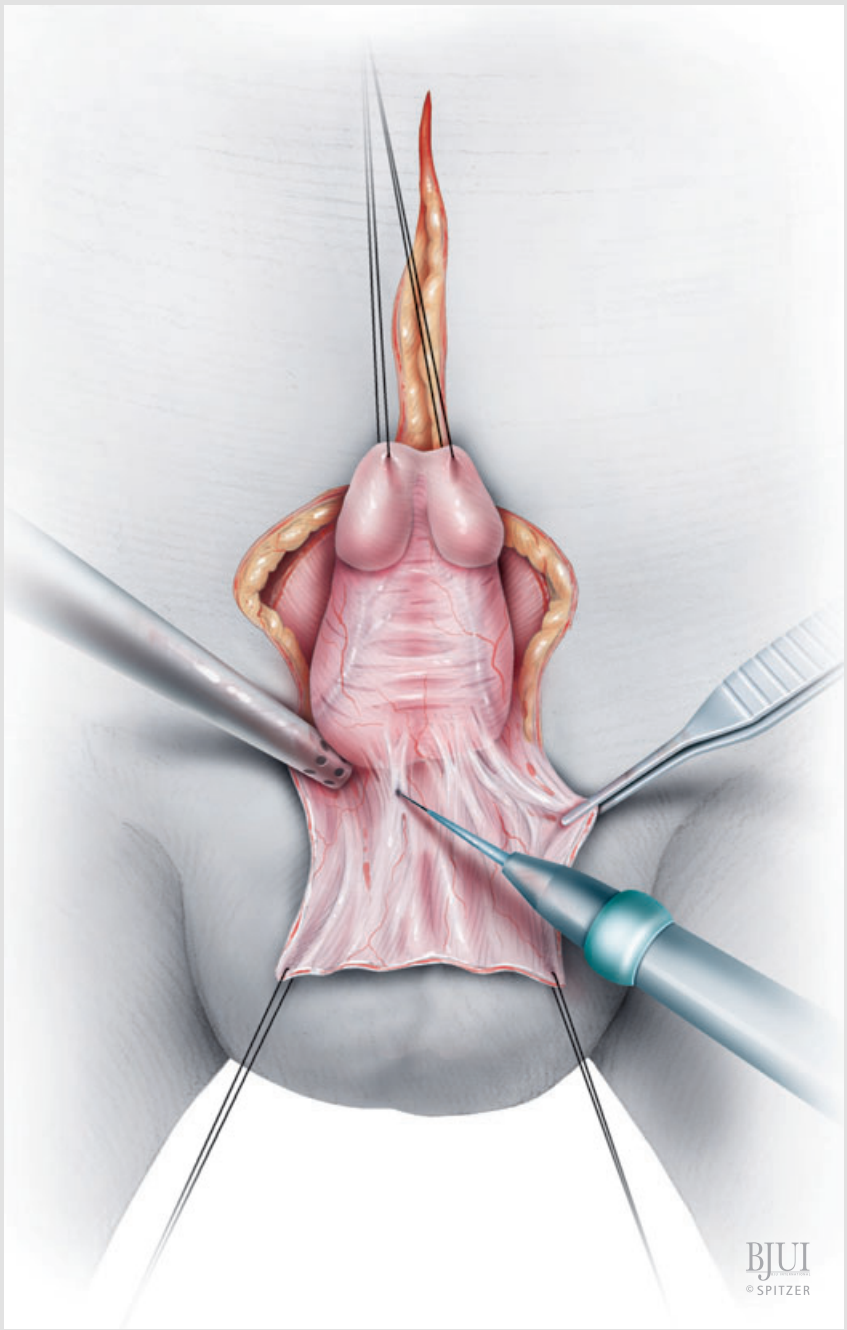


Figure 4

Dissect the lateral margins of the urethral plate (CS) from the CC, proximally. This dissection on the medial aspect of each CC is on the tunica albuginea and the CS, which is a wedge of vascular tissue in the midline under the urethral plate. The key move is starting the dissection proximally by following the plane along the tunica albuginea of the medial aspect of the CC from both the dorsal and ventral aspects.

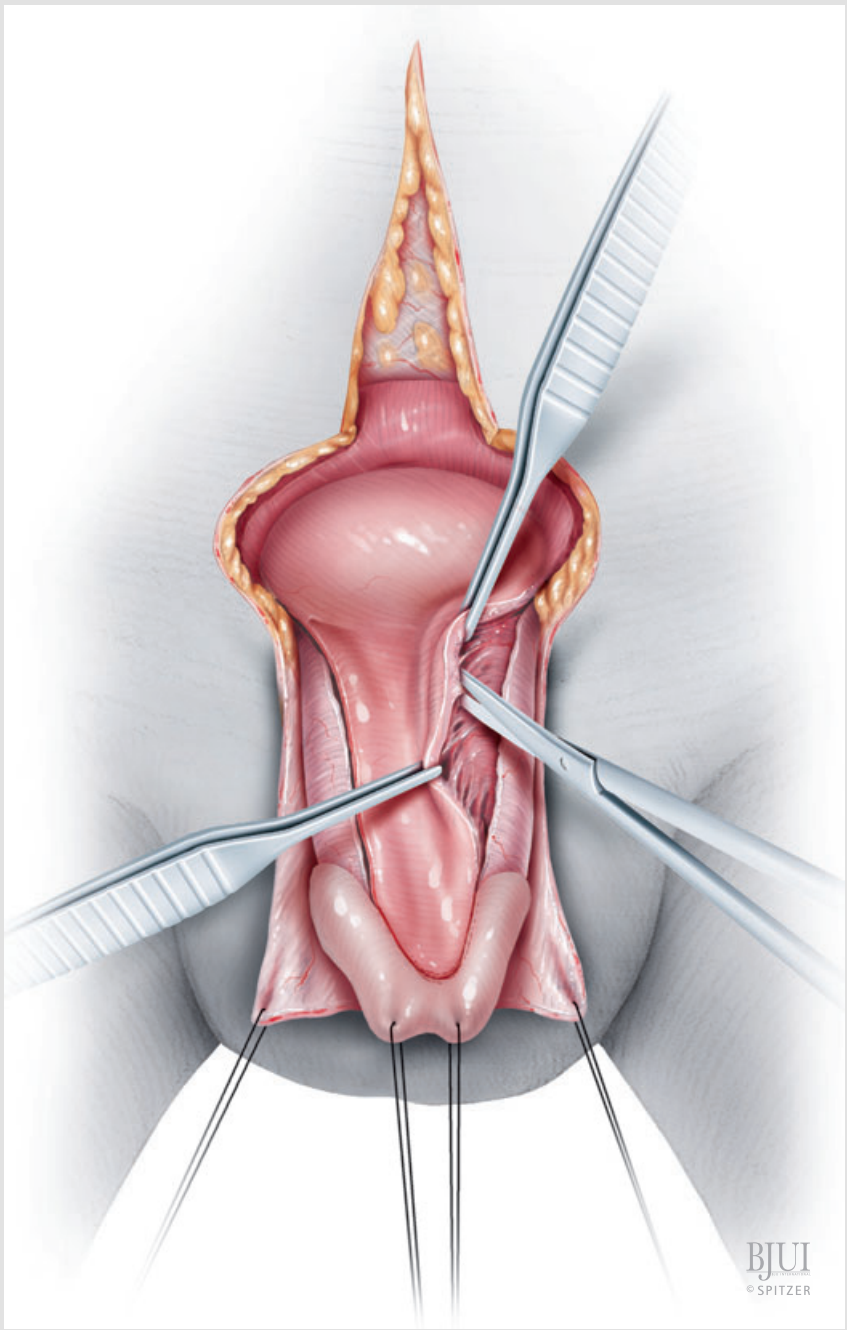


Figure 5

The spongiosa is separated from the cavernosa proximally, the dissection is easily extended distally with minimal bleeding. The glans halves are carefully kept with each CC. The blood supply of the glans halves comes via the paired dorsal bundles that always reside just lateral to the lateral edge of the urethral plate on the dorsolateral aspect of the epispadic penis.

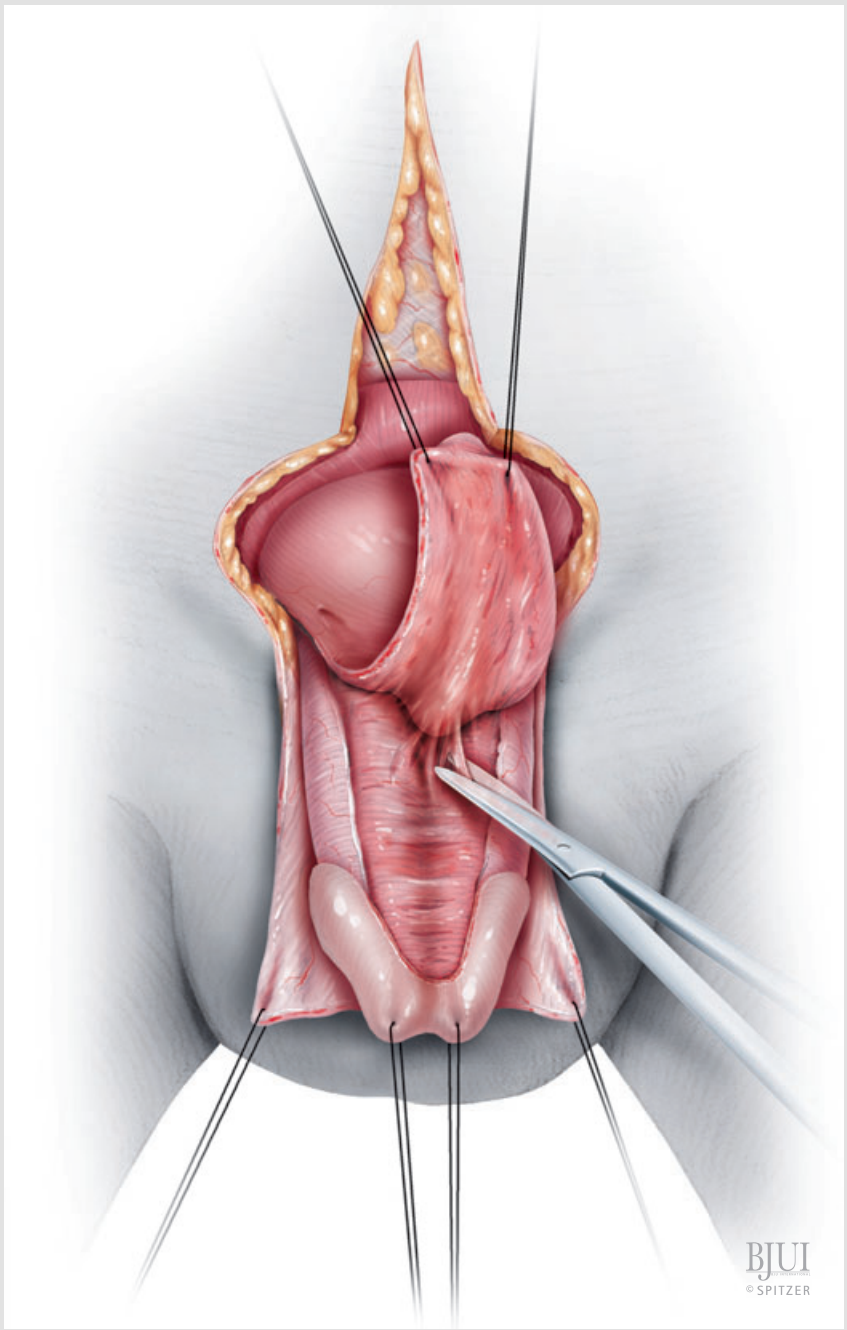


Figure 6

Complete separation of the corpora enables access to the urogenital diaphragm, which can be deeply incised on each side, lateral to the urethral 'plate' and medial to the CC. Note: do not drift to the midline in this process as the erectile tissue of the bulb always lies just caudal to the pelvic diaphragm in the midline. Entry into this structure causes bleeding and potentially jeopardizes the blood supply to the urethral plate/spongiosa complex.

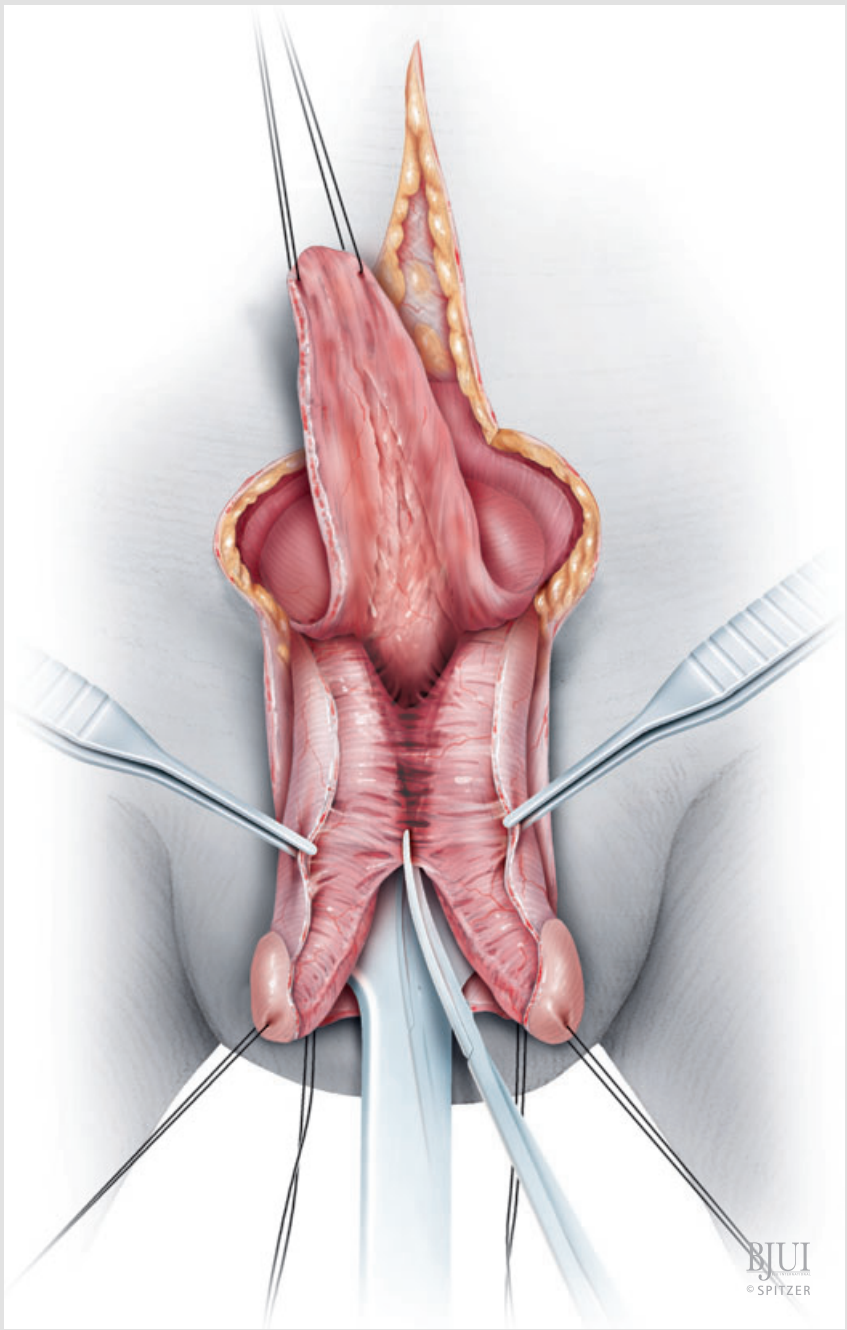


Figure 7

In most cases, except for the distal epispadias patients, proximal urethral lengthening is necessary.

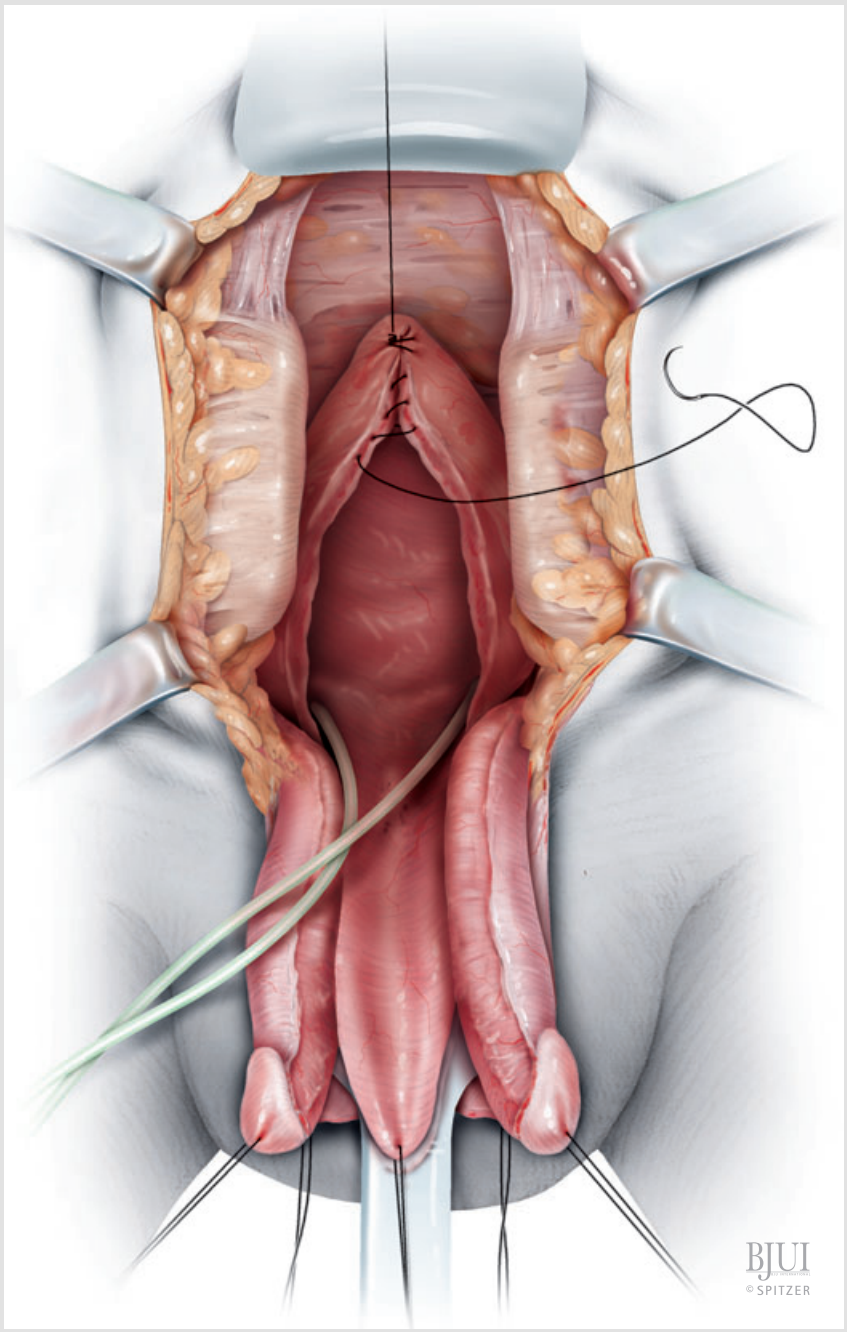


Figure 8

The proximal urethra is lengthened and tabularized in the exstrophy and penopubic epispadias patients creating a bladder neck and prostatic urethra. The urethral tubularization is extended to the distal end of the urethral 'plate' (two-layer closure with running 6–0 polyglyconate and 5–0 polydiaxonone). The proximal urethra just distal to the prostatic urethra should easily move caudally and reside in the pelvic diaphragm. The bladder and bladder neck should be deep in the pelvis.

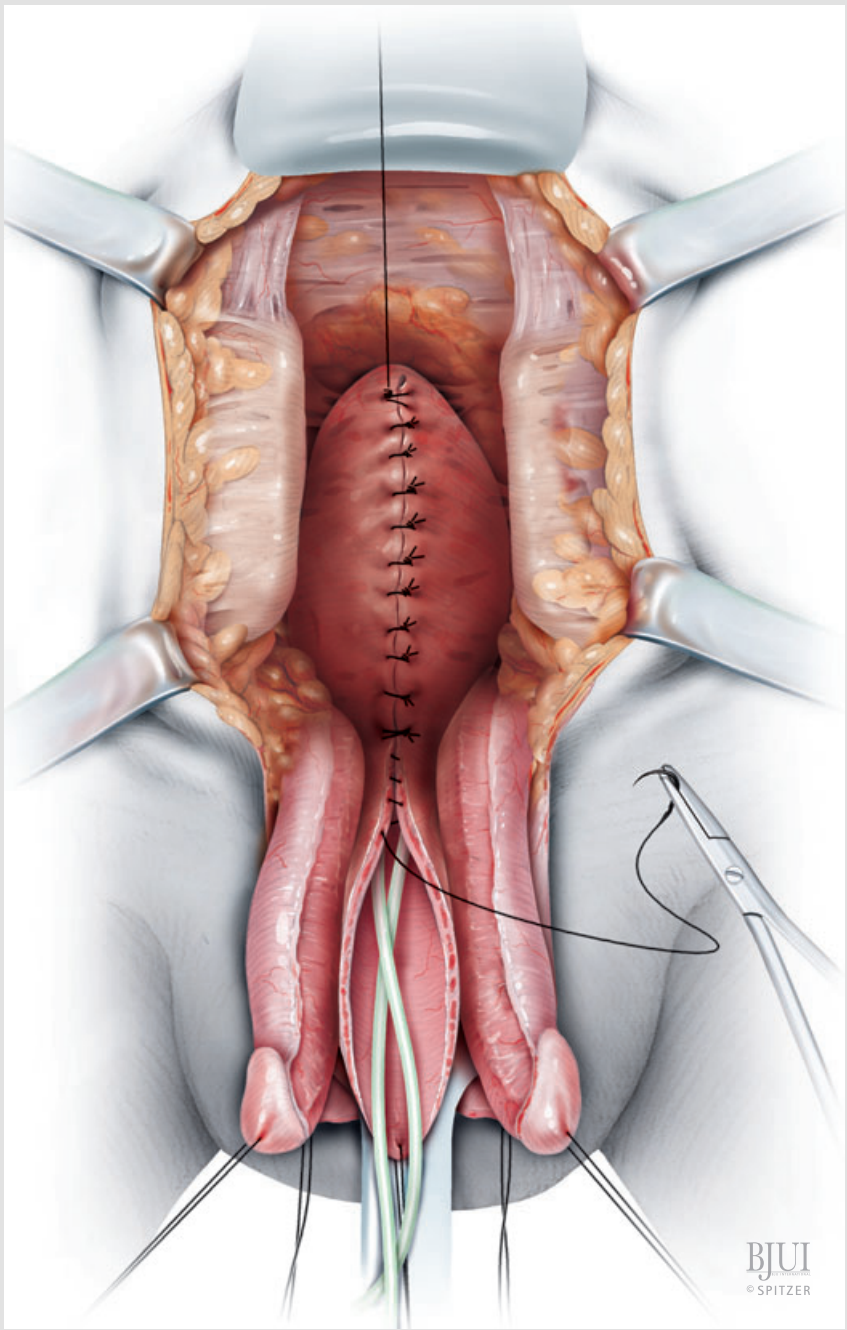


Figure 9

The bladder is drained with a suprapubic tube brought through the umbilicus. In the newborn patients with exstrophy paired 3 F ureteric catheters (umbilical a. catheters) are brought out through the new urethra. Note: the tubularization of the urethra is done over these two catheters. The symphasis is closed with two 'figure-of-eight' sutures of no. 1 polydiaxonone. Care must be taken at this point not to go too far lateral with these sutures and risk injury to the blood supply to the corpora and dorsal complex. There should be very little tension in this closure. The glans and CC should remain pink.

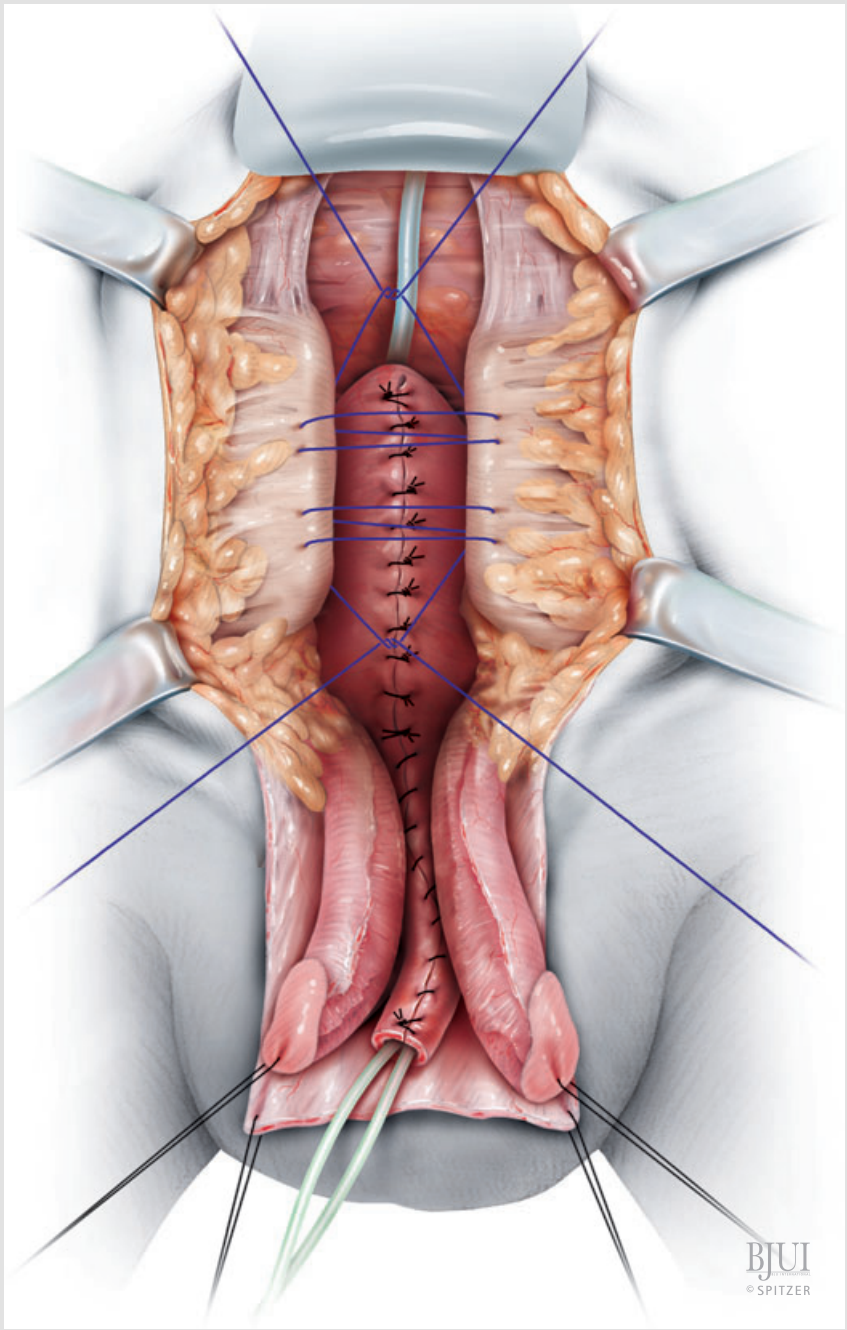


Figure 10

The penile closure is then initiated by approximating the CC on the dorsum by suturing the edge of Buck's fascia (where the lateral aspect of the urethral plate was dissected off the CC). This process rotates the corpora medially bringing any dorsal chordee medially, thus straightening the penis. Be careful, as the dorsal bundles are just lateral to the edge of Buck's fascia.

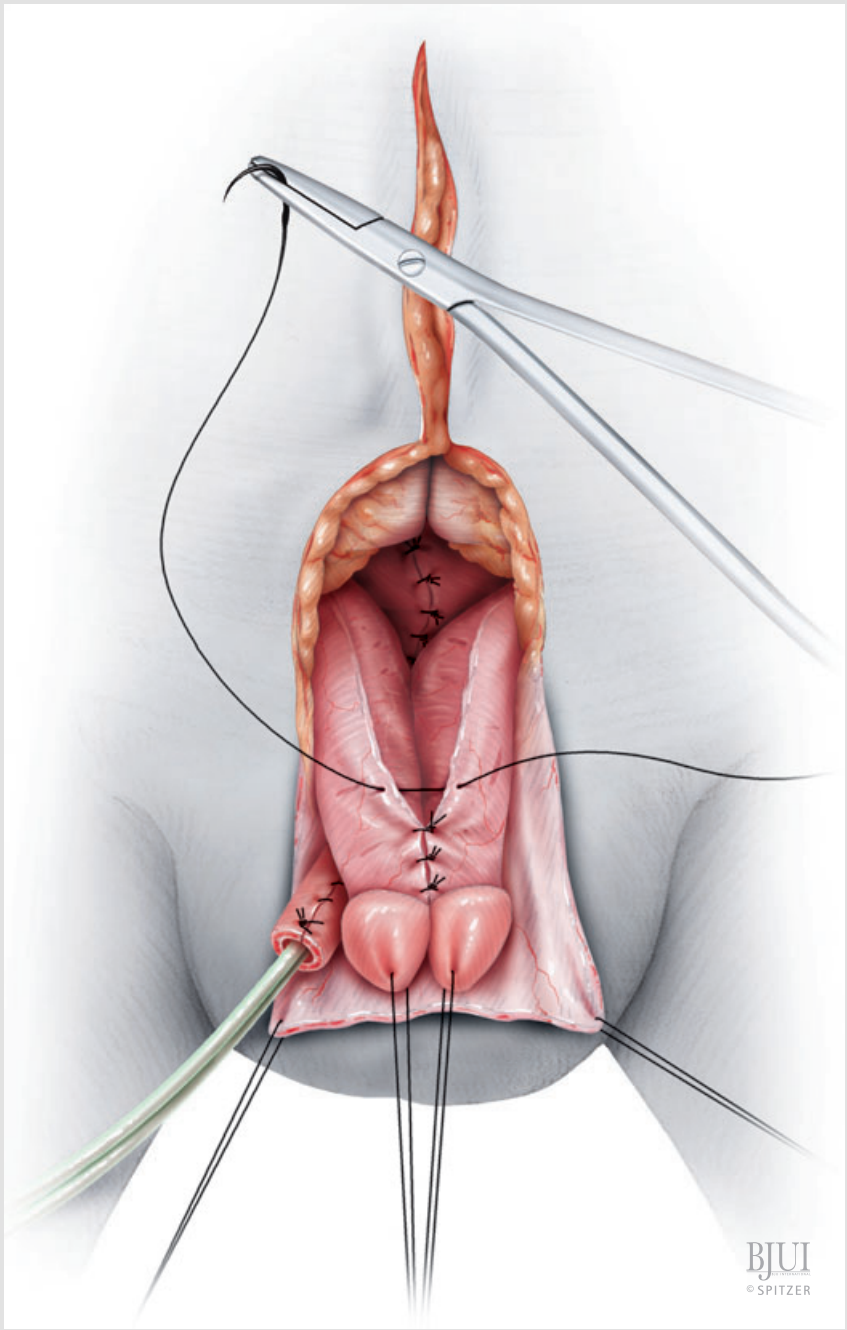


Figure 11

The urethra is now completely on the ventrum of the penis and can usually be brought between the glans halves distally. The glans is repaired and the new urethral meatus matured. Note: in the patients with exstrophy, with initial wide diastasis of the symphasis, the urethra may not reach the glans and should be brought through the ventral skin of the penis as far distally as possible.

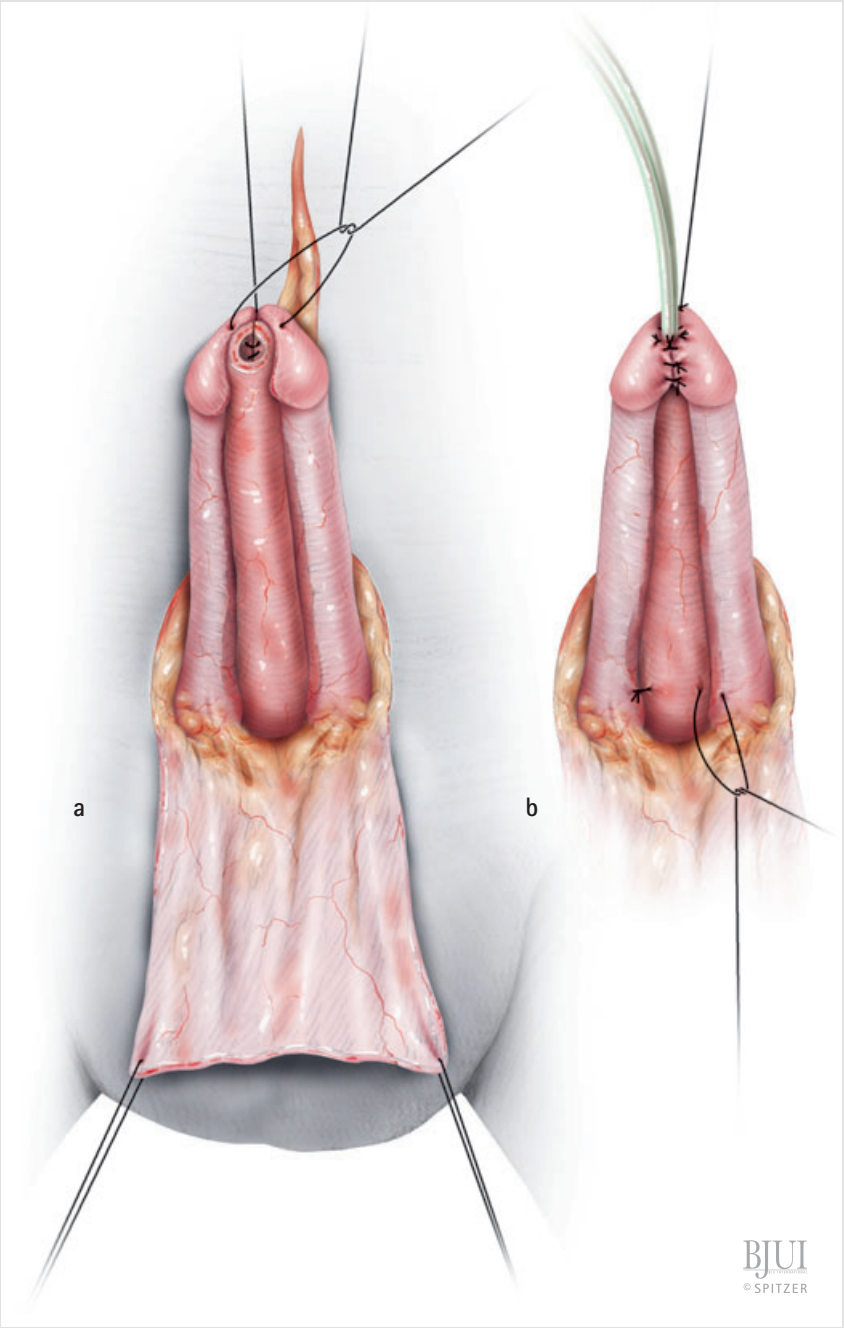
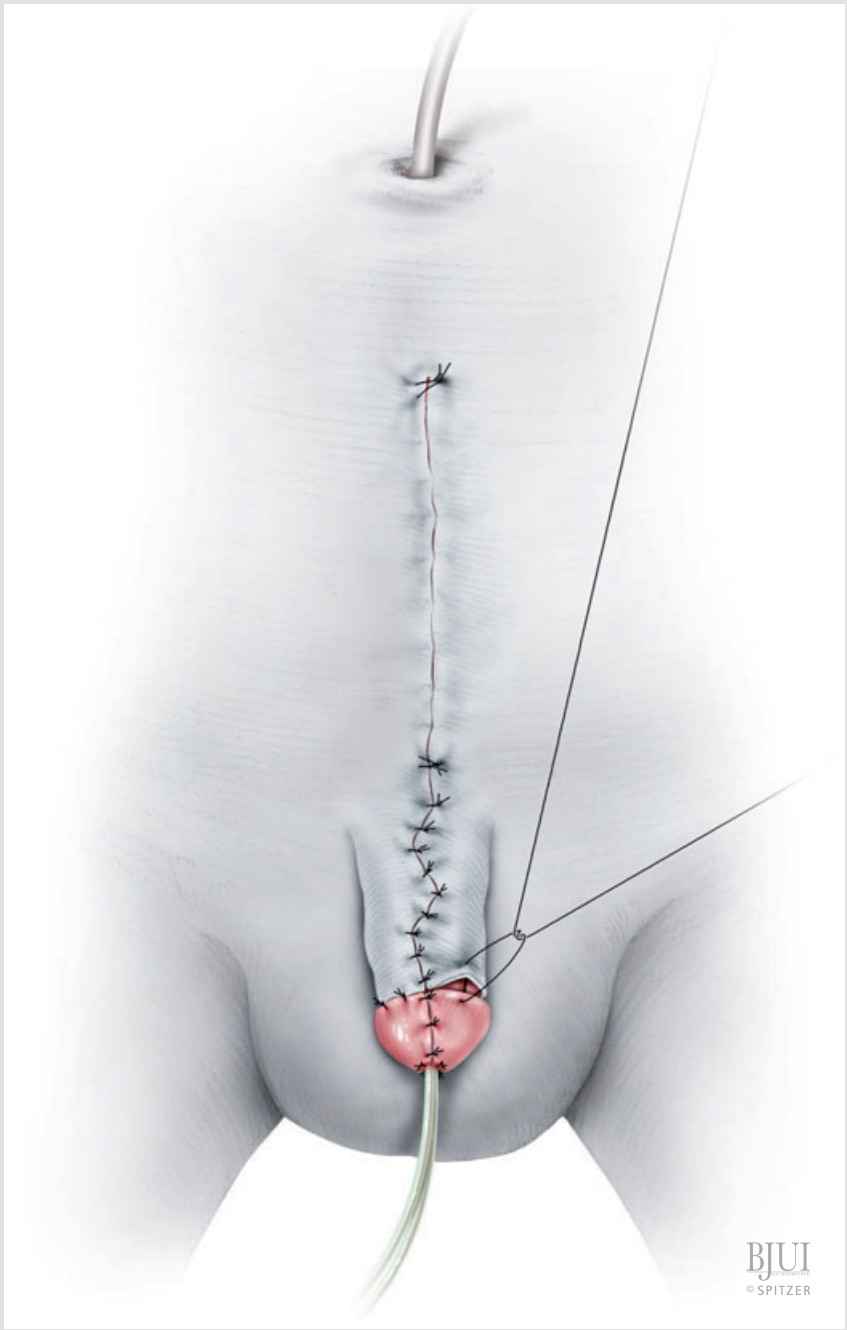


Figure 12

The redundant ventral skin is then used to cover the dorsum of the penis. Note: it is usually necessary to place slowly absorbable sutures (3–0, 4–0 polydiaxonone) at the base of the penis dorsally and ventrally to prevent the skin from migrating down the shaft during the healing phase. The skin closure is usually in two layers (deep 4–0 polyglactin 910 or 5–0 polydiaxonone and 6–0 gut sutures).



POSTOPERATIVE CARE

1. Dermabond® (Ethicon Inc., Somerville, NJ, USA) is applied to the incisions then thin DuoDerm® (ConvaTec, Skillman, NJ, USA) is applied as a 'sandwich dressing' (one layer dorsally and one ventrally sticking to each other on the side of the penis).
2. Patient is kept on oral antibiotics while the tubes are in place.
3. If the patient had osteotomies, he is placed in a spika cast for 4 weeks. If no osteotomies are performed, no special restrictions of activity are given.
4. The ureteric/urethral stints are removed one at a time starting 5 days after surgery. The suprapubic tube is not removed until the patient is voiding to completion. Usually after the spika is removed. If the patient cannot empty completely, clean intermittent catheterization with a 6 F catheter is initiated until voiding is complete.

FROM SURGEON TO SURGEON

Actually the dissection of the penis is easier in the more severe cases of epispadias associated with the more severe end of the exstrophy spectrum. Unfortunately, reconstruction in these patients is more difficult because of the shortening of the corpora and urethral plate. However, it has been my experience that some of the more 'distal' appearing epispadias defects require complete disassembly to achieve both the optimal cosmetic and functional results. Often the bladder neck is involved when not initially anticipated. All epispadias in girls and the majority in boys are associated with bladder neck and proximal urethral abnormality (short and wide open). It is for this reason that we treat most of the boys with proximal epispadias and all girls (if diagnosed) as early as possible, i.e. the first week of life. This enables early repair of the bladder neck and potentiates bladder cycling which promotes healthy bladder development.

It is very helpful to use × 3 loop magnification with expanded field. The use of the Colorado® tip cautery (very fine tungsten tip; Colorado Biomedical Corp., Evergreen, CO, USA) or the plasma blade (fine tip) reduces tissue thermal injury and provides very effective haemostasis.

The anatomy of patients with SEEC is very constant, just varying in severity. Atypical exstrophy cases are very different (i.e. not in the SEEC) and can present any of a broad spectrum of problems and unique anatomies. It is within this group (atypical exstrophy) and the most severe cases of the cloacal exstrophy end of the exstrophy spectrum that the real challenges of penile reconstruction surface. In the latter, the penis is already disassembled but the challenge amounts to reconstruction of a bifid pubic tubercle. In the atypical group, anything can happen and not infrequently this includes challenging reconstruction in a patient with absent or partially developed corpora.

In general, I believe the rule of Hendren applies well to these patients: 'The most common mistake a surgeon can make is not doing enough'.

Correspondence: Michael Mitchell, Pediatric Urology, 999 N 92nd St, Suite 330, Milwaukee, WI 53226, USA.
e-mail: MEMitchell2@chw.org

Abbreviations: **CPDE**, complete penile disassembly for epispadias; **SEEC**, spectrum of the epispadias/exstrophy complex; **CC**, corpora cavernosa; **CS**, corpus spongiosum.