

Trauma and Reconstruction

Repair of Vesicocutaneous and Urethrocutaneous Fistulae with Rectus Muscle Flap in a Bladder Exstrophy Patient



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ABSTRACT

Urinary continence can be achieved in up to 90% of patients with bladder exstrophy. However, select patients remain incontinent despite modern reconstruction. Repeat operations for continence combined with the congenital pelvic abnormalities of exstrophy put patients at risk for urinary fistula formation. We report the use of a rectus muscle flap in the repair of two concomitant vesicocutaneous and urethrocutaneous fistulae in a patient with classic bladder exstrophy.

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Introduction

Bladder exstrophy is a rare major birth defect characterized by poor development of lower abdominal and pelvic musculature, wide pubic diastasis, and anterior position of the bladder within the pelvis. Bladder exstrophy patients must undergo major urogenital reconstruction to achieve urinary continence, preserve renal function, and attain acceptable cosmesis. Although current literature reports continence rates ranging from 70% to 90%, a select group of patients remain incontinent despite modern reconstructive efforts.^{1,2} For those who fail primary exstrophy closure or bladder neck reconstruction (BNR), obtaining urinary continence is particularly challenging and may require bladder neck closure (BNC). Reoperations for continence combined with the developmental defects of exstrophy put patients at risk for urinary fistula formation. Pedicled muscle flaps, including gracilis or rectus muscle, may help prevent or repair fistula formation in this population. We report the use of rectus muscle flap in repair of two concomitant

vesicocutaneous and urethrocutaneous fistulae in a patient with classic bladder exstrophy.

Case presentation

A 30-year old Hispanic male with a history of classic bladder exstrophy closed as a child presented to the authors' institution for repair of a large vesicocutaneous fistula and a urethrocutaneous fistula. The patient had undergone newborn primary bladder repair without osteotomy at an outside institution with neourethra creation and pubic symphysis approximation with wire. This was complicated by wound dehiscence and bladder prolapse, subsequently repaired. He developed rectal prolapse and pubic symphysis separation at 2 years of age. This was repaired along with posterior iliac osteotomies. Epispadias repair at 3–4 years old was complicated by urethral stenosis. Around this time, the symphyseal wire eroded through the bladder neck necessitating operative removal. At 9 years of age, a urethrocutaneous fistula developed which was repaired. At age 11, he underwent ileal augmentation cystoplasty, appendicovesicostomy, and BNC. The patient suffered frequent UTIs, urethral and stomal incontinence, and bladder stones including a stone-related bladder rupture resulting in a large vesicocutaneous fistula.

Physical exam revealed a lower midline wound of exposed bladder and right lower quadrant stoma (Fig. 1). Urine was leaking

Abbreviations: BNC, bladder neck closure; BNT, bladder neck transection.

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Figure 1. Physical exam findings demonstrating right lower quadrant stoma (arrow), vesicocutaneous fistula (arrowhead), prior surgical scars and shortened phallus common in bladder exstrophy. The urethrocutaneous fistula is not shown.

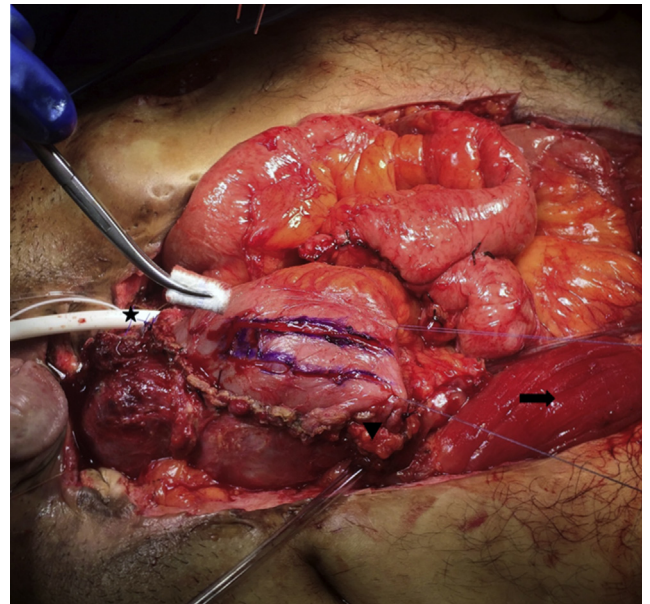


Figure 2. Intra-operative photo demonstrating pedicled rectus muscle flap (arrow) prior to rotation. Monti stoma with catheter (arrowhead) and suprapubic tube (star) visible inserting into repaired bladder.

from the ventral penile base. Serum creatinine was 1.1 mg/dL. CT abdomen and pelvis with contrast showed a horseshoe kidney with cortical scarring and no hydronephrosis. Contrast administration was consistent with a midline vesicocutaneous fistula. Cystoscopy was performed through the vesicocutaneous fistula, and demonstrated a ventral, proximal urethrocutaneous fistula and a non-patent appendicovesicostomy.

The decision was made to pursue redo augmentation cystoplasty, BNC, and closure of his urinary fistulae with rectus muscle flap. The pediatric urology team began with a midline laparotomy and extensive lysis of adhesions. After developing the space of Retzius, the anterior bladder wall was incised from the dome down to the vesicocutaneous fistula. His previous stoma had closed off at the skin, but remained mobile through the fascia. Attempts to salvage this stoma were unsuccessful and it was dissected extravasically and discarded. The patient had undergone prior bilateral ureteral reimplantation. The bladder neck was densely adhered to the lateral sidewalls of the pelvis and was carefully dissected from the pubis leaving an adequate urethral stump for closing after transection. The bladder neck was closed in four layers including mucosal, muscularis, fibrin sealant, and a double layer of AlloDerm (LifeCell Corporation, Branchburg, New Jersey, USA).

A pedicled left rectus flap was mobilized, incising the anterior rectus fascia, dissecting the left rectus muscle circumferentially and transecting the muscle superiorly to allow for elevation in a superior to inferior fashion (Fig. 2). The vascular pedicle supplied inferiorly was preserved allowing muscle rotation down into the pelvis, covering both the bladder and transected urethra (Fig. 3). A Monti catheterizable channel was constructed and ileal bladder augmentation performed. The Monti channel was implanted extravasically using the serosal hammock technique. The fascia and skin were closed, leaving a right pelvis Jackson–Pratt drain, 5-French ureteral stents, 20-French Malecot suprapubic tube, and a 10-French Foley catheter in the continent stoma (Fig. 4). Post-operative course was uneventful and he was discharged on hospital day 9 with home nursing for wound management. His suprapubic tube was removed 4 weeks post-operatively. After 6 months,

the patient remained continent of urine with clean intermittent catheterization, overnight continuous drainage, and bladder irrigation twice daily.

Discussion

With modern management of exstrophy, including both modern staged and complete primary repairs, 50%–100% of patients achieve urinary continence after BNR.^{1–4} Greater rates of urinary



Figure 3. Intra-operative photo demonstrating pedicled rectus muscle flap (arrow) rotated into pelvis covering both the infero-anterior bladder and transected urethra. Monti stoma with catheter (arrowhead) and suprapubic tube (star) visible inserting into repaired bladder.

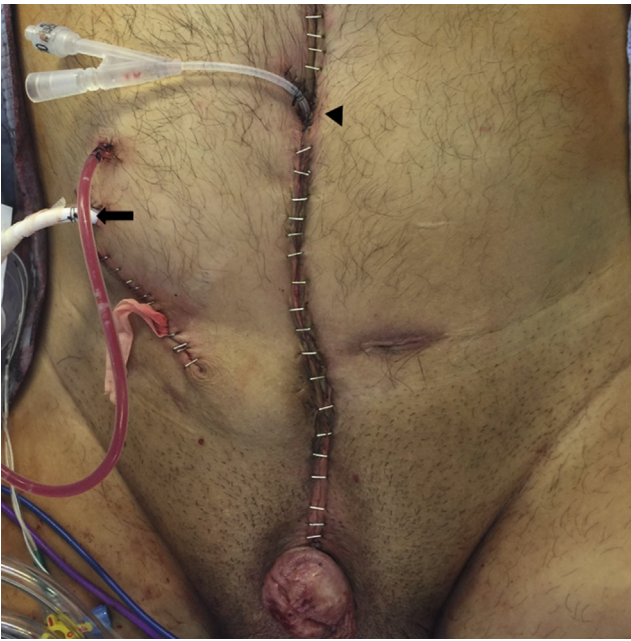


Figure 4. Post-operative photo demonstrating repaired midline fistula, newly created Monti stoma (arrowhead), and suprapubic tube (arrow).

continence are reached after additional continence procedures, including bladder augmentation and continent urinary diversion. BNC is generally reserved for patients who don't meet criteria for BNR or who failed BNR. Prior work has indicated that after failed primary repair, only 18% of patients achieve continence per urethra after BNR.⁵

While BNC may be considered a “last resort” procedure, it is generally safe with low rates of serious complications. Complications may be higher in the exstrophy population due to muscle and tissue compromise secondary to multiple surgical procedures involving the bladder neck. The greatest fear is bladder perforation due to high intravesical pressures in patients poorly compliant with self-catheterization or with an obstructed stoma.

Tissue interposition between the transected bladder neck and native urethra has been used as an adjunct to BNC to reduce risk of fistula or recanalization. Various methods have been used, including omentum, local tissues, acellular dermal matrix graft, peritoneum, abdominal pannus flaps, and pedicled muscle flaps (gracilis or rectus).

Here we describe use of rectus muscle flap for repair of failed BNC with a large vesicocutaneous fistula and urethrocutaneous fistula. To our knowledge, this is the first report of using a muscle flap not only as an adjunct to failed BNC with leakage per urethra but with concomitant coverage of the bladder as an adjunct to repair of communication between the bladder and penile skin.

Conclusion

As patients with congenital genitourinary conditions transition into adulthood, advancements in surgical techniques are needed to address functional and cosmetic complications. Here we demonstrate the feasibility of rectus muscle flaps for fistulae repair in adult exstrophy patients. With return of continence, our exstrophy patient may now pursue potential penile and cosmetic reconstruction.

Conflicts of interest

None.

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