
RESIDENT'S CORNER

Complete urethral disruption after motor vehicle crash without pelvic fracture

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Urethral injuries are rare among the pediatric population, and the majority occur after trauma. This is the case of an eight-year-old female with complete proximal urethral disruption and ruptured bladder neck without pelvic fracture after a motor vehicle crash. After the accident, her bladder neck was reapproximated and a

suprapubic tube was placed. Three months later, she underwent reconstruction for a bladder neck closure and appendicovesicostomy. In managing these patients, focus should first be directed at achieving a safe means of urinary drainage, and next to repair the lower urinary tract to maximize continence and minimize complications.

Key Words: appendicovesicostomy, trauma, bladder neck

Introduction

Urethral injuries among pediatric patients are rare, especially among females.¹ Review of the literature reveals that the majority of these injuries occur with pelvic fractures. Diagnosis may be achieved with retrograde urethrogram, CT cystogram, exam under anesthesia, or urethroscopy. For female patients, a majority may be diagnosed with a cystoscopy and exam under anesthesia.² Given the paucity of literature on the subject, guidelines are sparse, and management is controversial. Initial management must ensure adequate bladder drainage with a suprapubic tube or urethral realignment if possible.³ The goals of therapy are to prevent fistula formation, strictures, incontinence, and erectile dysfunction. The three management options include primary anastomotic repair, primary realignment, or delayed repair including urinary diversion. Surgeons must consider the stability of the patient if planning immediate repair of a urethral injury, as these injuries commonly occur in polytraumatized children. Other considerations include the risk of scar formation if postponing definitive repair, as well as the prospect of future

continence, which may be compromised if the injury extends into the bladder neck.

We present the case of an eight-year-old female patient with complete proximal urethral disruption and ruptured bladder neck and trigone without pelvic fracture after a motor vehicle crash (MVC).

Case report

An eight-year-old female presented to our level-one trauma center as a restrained rear seat passenger in a MVC in which the airbags deployed. She had positive loss of consciousness, with a Glasgow Coma Scale of 15 on arrival. Active venous bleeding from a large deep perineal laceration was noted. Her secondary exam was notable for right sided mandibular swelling, loose teeth, lower abdominal seatbelt sign with no distention or tenderness, in addition to the perineal bleeding. She had no significant medical history.

Per the patient's mother, the child needed to void, and they pulled over on the highway. The patient was wearing combat boots and sitting on her heel to suppress urinary urgency as they pulled the car over. She was wearing a seat belt and sitting in a booster seat. There was heavy rain and an oncoming car lost control and hit their parked vehicle.

After a physical exam, images obtained included chest x-ray, pelvis x-ray, CT head, CT c-spine, CT abdomen pelvis with intravenous contrast and delayed imaging. Injuries identified included a mandibular fracture and disruption at the base of the bladder in the

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region of the bladder neck with contrast extravasation into the perineum and left labia, Figure 1. There was also extravasation noted extra-peritoneally to the left of the bladder. There were no pelvic fractures identified on x-ray.

The patient remained hemodynamically stable, and was brought to the operating room by urology, general surgery, and gynecology. Initial exam under anesthesia revealed a patent urethral meatus, a laceration to the anterior vaginal wall, significant labial tissue disruption, disruption of the entire perineal body, and disruption of the anterior aspect of the anal sphincter complex, Figure 2.

Cystoscopy was attempted. The distal one centimeter of the urethra was intact, but the proximal urethra and bladder neck were obliterated and widely open, therefore an open exploration was performed. There was a four-centimeter laceration through the posterior bladder neck, which extended in a V-fashion along either side of the trigone. The ureters appeared to be uninvolved. The bleeding was cauterized, and Surgicel was placed along the left floor of the bladder. The floor of the bladder was then reapproximated and sutured to reconstruct the trigone and bilateral ureteral stents were placed given proximity to the laceration. The bladder neck was then approximated around a catheter through the bladder



Figure 1. Disruption at the base of the bladder in the region of the bladder neck with contrast extravasation.

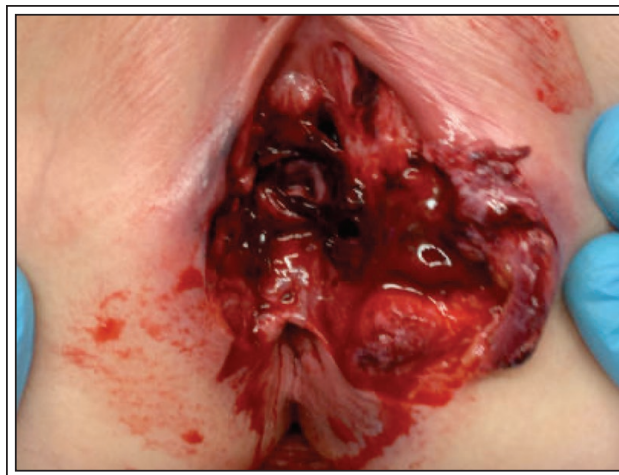


Figure 2. Exam under anesthesia revealed a urethral meatus, obliterated distal vaginal canal, and torn anal sphincter.

neck and distal urethra, and a suprapubic tube was also placed, Figure 3. Despite re-approximation of the bladder neck around a foley catheter, it was apparent there would still be urine leaking out of this opening, though we elected not to proceed with complete closure of the bladder neck at this time. Perineal, vulvar, and anal lacerations were repaired by the other surgical teams. A penrose drain was left in the perineal wound to assist with diversion of urinary leakage.

She was brought to the operating room three more times throughout her hospitalization to address the mandibular fracture, packing change of the perineal wound, and removal of the ureteral stents. She also underwent a diverting colostomy to assist in perineal wound healing.

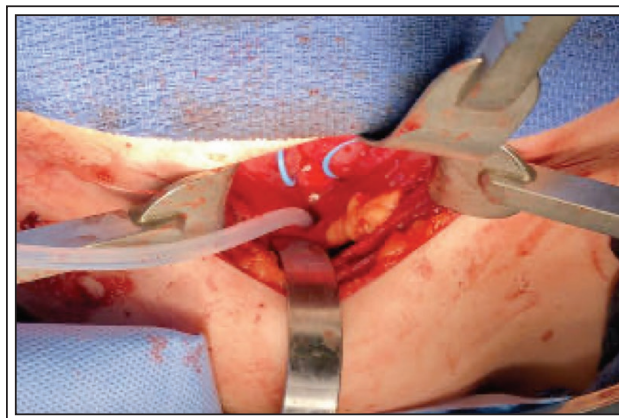


Figure 3. The bladder neck was then approximated around a catheter through the bladder neck after ureteral stents were placed.

About 1 month after the accident, she had the ureteral stents removed, and a cystogram was performed. The cystoscope was inserted into the vagina, and the catheter was visualized through an opening in the floor of the urethra. We were also able to visualize an open bladder neck around the foley catheter balloon. A cystogram was performed through the suprapubic tube, and the patient began leaking at the bladder neck after 200 mL was instilled.

Three months after the accident she returned for reconstruction. Throughout this time, she continued to leak urine around the foley catheter. She went to the operating room for a bladder neck closure, botulinum toxin injection into the bladder and pelvic floor, bilateral ureteral stent replacement, and appendicovesicostomy. General surgery also performed a colostomy take down. An appendicovesicostomy was constructed in standard fashion. The bladder neck was dissected circumferentially through prior scar, sutured closed, and protected using 4-ply SIS. The patient recovered without complication and was discharged home on postoperative day 7 in stable condition. She subsequently had her ureteral stents and her suprapubic tube removed after she was performing clean intermittent catheterization without difficulty.

Discussion

Urethral trauma in the pediatric population is rare and management is controversial. The literature mostly consists of case reports or small series, and guidelines have been difficult to establish. Essentially all of these patients have undergone severe trauma, and therefore the primary goal is to stabilize the patient, as their urinary tract injuries are often not immediately life threatening. The urologic focus is first directed at achieving a safe means of urinary drainage, and next to repair the lower urinary tract in such a way that minimizes complications.

Routh and Husmann analyzed continence outcomes in 12 pediatric patients (8 girls and 4 boys) with both urethral and bladder neck injuries, all after pelvic fractures. All patients had their injuries primarily repaired within 24 hours of injury. Notably, postoperatively none of the 12 patients gained full continence. All patients later received urethral bulking agents, however there was no long term improvement. Three boys received artificial urinary sphincters which all subsequently eroded, likely due to poor wound healing and de-vascularized traumatized tissue. Three girls underwent bladder neck reconstruction with fascial sling, and all three had some degree of improvement in incontinence. Ultimately five (40%)

of the patients underwent bladder neck closure and continent diversion. The authors conclude that bladder neck closure and continent diversion should be considered for girls with substantial traumatic urethral loss and for boys in whom primary repair fails.⁴

Black et al reported a large series evaluating initial presentation, diagnostic evaluation and treatment of 25 adult and pediatric female patients with urethral or bladder neck injuries, all with pelvic fracture.⁵ There were four patients who developed vesicovaginal fistulas, and notably three of these patients had bladder neck injury with urethral avulsion. In our case, the distal meatus was discontinuous from the proximal urethra and bladder neck, and the catheter was visualized in the anterior vagina. Both the low chance of regaining continence as well as the risk of fistula formation made bladder neck closure with appendicovesicostomy a reliable option. As in our patient, this procedure has demonstrated consistently successful results mainly for patients with a neurogenic bladder, and may serve as an adjunct to reconstruction in particularly severe cases.^{6,7}

Conclusion

Our patient had a severe urethral injury, including complete proximal urethral disruption and ruptured bladder neck. The severity of her injury limited reconstructive options; however the main goals were to achieve safe immediate bladder drainage and preserve continence, which was achieved with an initial suprapubic tube placement and delayed appendicovesicostomy. □

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