

Trauma and Reconstruction

Management of a Case of Severe Pelvic Fracture Related Bladder Trauma

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ARTICLE INFO

Article history:

Received 30 November 2014

Accepted 9 December 2014

Available online 5 January 2015

Keywords:

Bladder

Trauma

Urinary

Extravasation

Pelvic fracture

Lower urinary tract

ABSTRACT

A 62-year-old male was admitted after being struck by a bus. He sustained a severe pelvic fracture, sigmoid colon injury, and both intraperitoneal and extraperitoneal bladder injury. He underwent initial successful bladder repair. However, at 7 days post-operatively he manifested a leak from the repair and urine was evident coming from the pins of his pelvic external fixator. A repeat cystogram showed massive extravasation, which was managed by operative ligation of the lower ureters and placement of percutaneous nephrostomy tubes. He underwent ureteral reconstruction and colostomy reversal at 9 months. He has both bladder and bowel control.

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Introduction

Bladder rupture from external trauma is rare due to the surrounding bony pelvis. In contemporary series, bladder injury only occurs in 0.2% of trauma admissions,¹ translating to only a few injuries per year at most level I trauma centers. Blunt mechanism of injury is by far the most common cause of bladder injury and is almost always associated with pelvic fracture.² Bladder injuries are classified as either intraperitoneal (communicating with the peritoneal cavity) or extraperitoneal (confined to the space of Retzius). General guidelines are well established for management of straightforward bladder injuries.³ Intraperitoneal bladder injuries are repaired as soon as possible and extraperitoneal injuries are often managed non-operatively and allowed to heal by secondary intention with a catheter in place.

Given the rarity of bladder injuries, a consistent approach to the spectrum of injuries, beyond simple lacerations, has not been well established. Injury patterns that are challenging, involve situations such as bladder neck and prostate injury, concomitant rectal-sigmoid injury,⁴ and injuries with multiple or very large lacerations in the bladder.⁵ With advances in the care of trauma patients

with severe pelvic – abdominal injuries, patients with greater injury severity are more likely to survive, which will almost certainly translate into an increase number of cases of complicated bladder injuries. Treating surgeons need to be aware of strategies that can be successful in these very difficult cases.

We present this case, because it illustrates an unusual approach to a patient with a very complex bladder injury. Case presentations like this will expand the discussion about strategies, which can be used successfully in situations of severe genitourinary trauma.

Case presentation

Initial presentation

A 62-year-old homeless man was admitted to the University of Utah after being struck by a bus. He had severe multi-system trauma with an injury severity score of 43. The findings of gross hematuria and a pelvic fracture prompted a computed tomographic (CT) cystogram, which revealed complex pelvic fractures, active vascular extravasation in the left hemi-pelvis, an intraperitoneal bladder injury, and findings suggestive of bowel injury.

The patient was taken to the operating room and underwent percutaneous embolization of the left superior gluteal artery and laparotomy. Laparotomy revealed a lengthy full thickness rectosigmoid colon injury, which was resected leaving a stapled rectal stump.

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Inspection of the bladder revealed a 5 cm intraperitoneal laceration. This laceration was opened further and the inside of the bladder was inspected. Three extraperitoneal lacerations were found, including 2 small (about 2 cm long) full thickness lacerations; 1 under the symphysis pubis, and 1 posterior laceration above the trigone. In addition, there was a large curvilinear laceration starting at the left side bladder neck, which extended lateral and superior through the bladder, which measured 5 cm in length. These lacerations were all repaired with a single layer of absorbable suture from the inside of the bladder, in order to avoid opening the pelvic hematoma. The intraperitoneal laceration was closed in two layers.

The patient required several additional general and orthopedic surgeries including: diverting colostomy, closed reduction of the pelvis with placement of an external fixator, and posterior pelvic stabilization with screws. On post injury day 7, he was noted to be leaking what appeared to be urine from his external fixator pin sites. A cystogram revealed that his extraperitoneal bladder repair had failed and there was massive urinary extravasation (Fig. 1). Additionally, his scrotum was distended with urine leading to areas of pressure necrosis.

He was taken back to the operating room on post injury day 8 and the ureters were ligated just above the pelvic hematoma. He had percutaneous nephrostomy tubes placed shortly thereafter. This strategy immediately resolved his urine leak and he was eventually discharged from the hospital to a rehab facility at post injury day 25.

Subsequent management

Eventually, the patient was taken to the operating room for cystoscopy, cystogram, and antegrade pyelograms. These exams revealed that the bladder had healed, as well as the ligation of the ureters within the pelvis (Fig. 2). At 9 months after his injury, the patient underwent left ureteral neocystostomy with psoas hitch, and right side transuretero-ureterostomy, and colostomy takedown with colorectal reanastomosis. He also had resection of a portion of

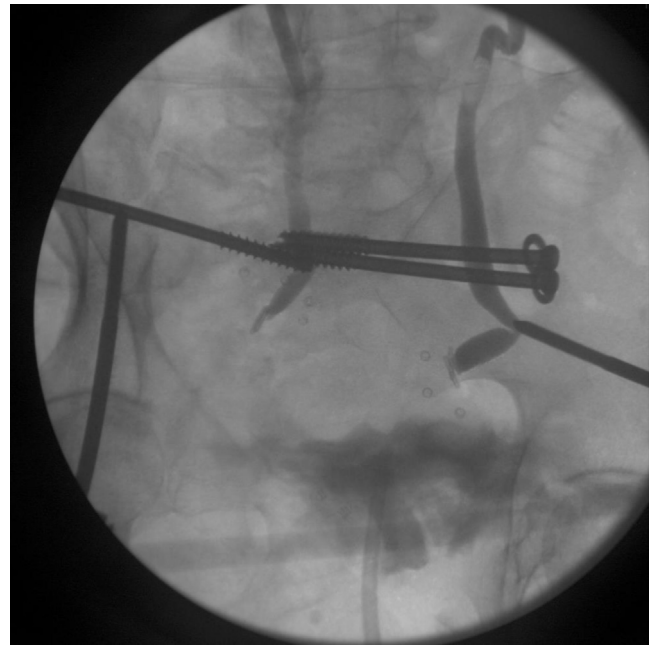


Figure 2. Antegrade nephrostograms showing the ligated ureters. The bladder was shown to have healed well on subsequent images.

the pubis that was impinging upon the right side of the bladder, but had not eroded into the bladder.

He healed well from this surgery, and the stents and catheter were removed at 3 weeks post operatively (Fig. 3). He has urinary frequency, but he is continent other than some leakage at night, which does not significantly impact his quality of life. He also has full bowel control. Subsequent ultrasounds of the kidneys have revealed no evidence of hydronephrosis or suspicion of breakdown of the bladder or ureteral repair.



Figure 1. A cystogram done at post injury day 7 showing massive extraperitoneal extravasation into the scrotum and pelvis.

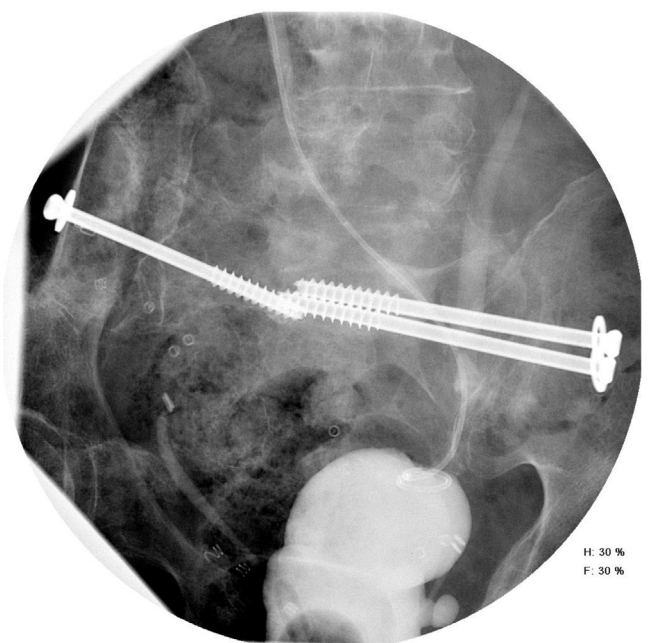


Figure 3. A cystogram done after ureteral reconstruction showing the left side ureteroneocystostomy with psoas hitch and the right side transuretero-ureterostomy.

Discussion

The combination of intraperitoneal and extraperitoneal bladder injuries is uncommon and is associated with a higher rate of death.¹ These types of injuries can occur with severe pelvic trauma and as patients with severe pelvic trauma have better survival, scenarios like the one presented in this case report will be more common. Other options for management would have been placement of percutaneous nephrostomy tubes alone. However, without distal obstruction of the ureters, percutaneous nephrostomy tubes rarely divert urine adequately. Given that the patient had necrosis of his scrotum from urinary extravasation, potential contamination of his pelvic hardware and a massive breakdown of his bladder repair, we felt the most definitive urinary diversion was needed. We were concerned about the patient's death in the short-term and development of chronic fistula and pelvic phlegmon – urinoma creating a more complex reconstructive scenario in the long-term.

Conclusion

Ligation of the ureters to control urinary extravasation is aggressive and unconventional, however, in this case it was essential to allow the bladder to heal. Subsequently, the ureters were successfully reconnected to the bladder and the patient has adequate bladder capacity and urinary control. In cases of severe

pelvic trauma, measures like this may be warranted to ultimately salvage the lower urinary tract.

Conflicts of interest

None of the authors have any conflicts of interest related to this publication.

Acknowledgments

Joe W. & Dorothy Dorsett Brown Foundation grant in reconstructive urology.

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