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CASE REPORT

Bladder perforation in augmentation cystoplasty during urodynamic investigation: A case report and review of the literature

Behfar Ehdaie [a], Matthew D. Mason [a,*], Mikel Gray [a], Craig A. Peters [a,b], Sean T. Corbett [a]

[a] *Department of Urology, University of Virginia, P.O. Box 800422, Charlottesville, VA 22908, USA*
[b] *Sheikh Zayed Institute for Pediatric Surgical Innovation, Div. of Surgical Innovation, Technology and Translation, Washington, D.C. 20010, USA*

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Abstract *Background:* Spontaneous bladder rupture is a known complication of augmentation cystoplasty. We report the second case of bladder rupture during filling cystometry many years after bladder augmentation and the first case occurring in a patient with an autoaugmentation cystoplasty. In addition, the management and outcome for a bladder perforation in an autoaugmentation cystoplasty will be discussed.
Case: A 20-year-old male with a history of an L4 myelomeningocele underwent an autoaugmentation cystoplasty for neurogenic bladder dysfunction and decreased bladder wall compliance five years previously. He self catheterized four times daily. During filling cystometry, detrusor pressure increased to 60 cm H_2O with 300 mL filling. Detrusor pressure then rapidly decreased to 20 cm H_2O without evidence of external leakage. The infusion was immediately stopped and X-ray showed intraperitoneal leakage of contrast material. Serial abdominal examination demonstrated worsening abdominal distension. Exploratory laparotomy revealed a 2 cm perforation within the autoaugment portion of the bladder.
Conclusion: An autoaugmentation cystoplasty improves bladder compliance and capacity with the use of native urothelial tissue. Although perforation after autoaugmentation has not been previously reported, caution must be used during urodynamic evaluation in patients with decreased bladder wall compliance and augmentation cystoplasty.

* Corresponding author. Tel.: +1 434 924 2225; fax: +1 434 243 6878.
E-mail addresses: Matthew_Mason@virginia.edu (M.D. Mason), mg5k@virginia.edu (M. Gray), crpeters@childrensnational.org (C.A. Peters), STC2U@virginia.edu (S.T. Corbett).

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Introduction

Where conservative measures fail, surgical intervention may be the only management for patients suffering from the sequelae of neurogenic bladder dysfunction. Augmentation cystoplasty effectively increases bladder storage volume and decreases intravesical storage pressure. Spontaneous bladder rupture is an unusual complication from augmentation cystoplasty with a reported incidence as high as 13% [1] and as low as 5% [2]. An exceedingly rare event is for the bladder perforation to occur during urodynamic testing. As to our knowledge, this has only been reported once before in the literature and specifically described a patient with an augmentation ileocystoplasty [3]. Because bladder rupture is associated with peritonitis, sepsis, and high mortality, clinical knowledge and prompt diagnosis based on physical exam findings are important for successful management. Also, knowing beforehand who may be at risk for rupture based on augment type, bladder neck surgery, and catheterizing patterns may guide decisions regarding frequency and aggressiveness of urodynamic examination. We report the first perforation of bladder during urodynamic testing after autoaugmentation five years previously. We also discuss our urodynamic findings, previously reported risk factors for rupture, and potential management plans for rupture during urodynamic testing.

Case

A 20-year-old male with a history of L4 myelomeningocele had undergone autoaugmentation cystoplasty at age 15 for neurogenic bladder dysfunction, decreased bladder wall compliance, and high grade right vesicoureteral reflux. After intravesical cross-trigonal reimplantation of the right ureter was performed, autoaugmentation was carried out by making a large horizontal myotomy across the entire dome of the bladder, improving bladder wall compliance without using an intestinal segment. The patient was followed annually with ultrasound and video urodynamics which showed normal kidneys, resolved reflux, and improved bladder capacity. The patient was instructed to catheterize every 4 h, but admitted that at times he would wait longer if he had not yet felt the urge to empty his bladder. The patient did not successfully complete written voiding journals, but had intermittently measured catheterization volumes up to 500 mL. At age 18, the patient was initiated on antibiotic prophylaxis for recurrent febrile UTIs. Urodynamic examination at this time showed deterioration of bladder wall compliance, for which the patient was managed medically with oxybutynin and glycopyrrolate. The patient was scheduled to return for repeat urodynamic testing in several months to assess the efficacy of medical management, but did not return for testing for 14 months (Fig. 1).

Urine culture obtained prior to urodynamic testing showed no growth. Fluoroscopic contrast material was infused into the patient's bladder via an 8 French urethral catheter at an average rate of 0.7 mL/s. Low bladder wall compliance was noted at 6.2 mL/cm H_2O during filling. The patient experienced a minimal desire to catheterize at 314 mL infused volume, corresponding to a detrusor pressure of 51 cm H_2O. The patient stated that with this minimal sensation he would normally postpone catheterization. Given this and his reported bladder capacity of 500 mL, filling was continued in attempt to reproduce the typical conditions his bladder experienced.

At an infused volume of 332 mL, detrusor pressure peaked at 65 cm H_2O and then subsequently decreased approximately 50 cm H_2O in 60 s. No urethral leakage of contrast material was observed. Fluoroscopy showed intraperitoneal extravasation of contrast material (Fig. 2).

Serial examination showed worsening abdominal distention and respiratory deterioration. The patient was initiated on broad spectrum antibiotics and taken for immediate surgical exploration and repair. Laparotomy was performed through an infraumbilical midline incision. A large amount of clear urine was found in the patient's peritoneal cavity and removed. The bladder was opened on its anterior surface and examined for any defect. A 2 cm perforation was found in the dome of the bladder, in the autoaugment segment (Fig. 3). The cystotomy was extended to the perforation, and the perforation and bladder closed in a single line with running 3-0 polyglactin suture, over which a second layer of interrupted 3-0 polyglactin suture was placed to imbricate the adjacent bladder tissue over the suture line. A closed suction drain was placed in the pelvis and a Foley catheter used to drain the bladder. The patient was able to be discharged from the hospital on the second postoperative day, with the pelvic drain removed and resumption of intermittent catheterization. Initial plans were made with the patient and family regarding future augmentation enterocystoplasty, but the patient has failed to follow up in Urology clinic since.

Discussion

Bladder rupture is a serious complication of augmentation and has a reported lifetime incidence of 5—13% [1,2]. With mortality rates as high as 25% [4], a high clinical suspicion is necessary for diagnosis and subsequent treatment. During urodynamic evaluation of our patient, bladder rupture was noted during filling cystometrogram by decrease of detrusor and intravesical pressure by over 50 cm H_2O in 60 s without urethral leakage of contrast material. Physical exam findings were significant for abdominal distention and symptomatic respiratory deterioration. These findings on urodynamics are highly suggestive of bladder rupture. To our knowledge, bladder rupture of an autoaugmented bladder during urodynamics has never been reported before, and any kind of bladder rupture during urodynamics has been described only once previously in the literature [3]. In that report, at 620 mL of filling, the patient noted having sudden onset bilateral shoulder pain and abdominal discomfort, common presenting symptoms for traumatic and spontaneous bladder rupture [4,5]. Bladder wall compliance was poor and the detrusor pressure reached 52 cm H_2O when intraperitoneal leakage was noted on cystography [3].

Surgical exploration is the treatment of choice for intraperitoneal bladder ruptures given the increased