Functional medicine

An unusual case of intra-peritoneal bladder rupture

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\textbf{Introduction}

Bladder rupture is classified into 5 categories from least to most severe: contusion which is an incomplete mucosal tear, subserosal/intraperitoneal, extra-peritoneal and combined. Causes include traumatic (82%), iatrogenic (14%), intoxication (causing overdistension) (2%) or spontaneous (1%).\textsuperscript{4,5} Iatrogenic causes typically include pelvic, abdominal, urethral or vaginal procedures rather than Foley catheters or continuous bladder irrigation (CBI). Intra-peritoneal bladder rupture makes up 25% of cases while extra-peritoneal or a mix of the two make up the remaining 75% of cases. Intra-peritoneal rupture always requires surgery, compared to extra-peritoneal which can be treated conservatively, with close evaluation for signs of instability and escalation.

\textbf{Case}

An 85 year old man was admitted to the hospital with acute respiratory failure. He had a past medical history of CAD on Plavix, BPH s/p TURP in 2015, and HTN. Upon admission to the ICU he was intubated and a Foley catheter was placed. Three days later he discharged from the ICU to inpatient. His Foley was removed in the ICU, draining clear urine at the time. On arrival to the inpatient floor there was frank blood in his urine. Later into the day he started to complain of burning pain on urination, and clots developed, warranting a Urology consult. Urology inserted a three-way Foley catheter and began CBI on high speed. The catheter continued to require manual irrigation to clear blood clots. Every hour the patient would develop severe pain and require the nurse to manually irrigate the catheter, which would improve the pain temporarily. By the following day, the patient was in severe persistent pain and a CT abdomen/pelvis was ordered. The CT scan showed a perforation in the right supero-lateral margin of the bladder that had a clot blocking the opening (Fig. 1). There was extravasation of urine/blood into the peritoneum and tracking distally up into the retroperitoneum. The renal system was compressed and ureters dilated distally, with an enlarged prostate shown. Fig. 1 shows the coronal CT.

The patient then proceeded to the first surgery, cystoscopy with cystogram (Fig. 2). The cystoscopy showed prostatic bleeding with many clots, which were evacuated, and a prostate that was bleeding requiring fulguration. The perforation was seen but was filled by a large clot. After these measures were taken, no active bleeding was found and a 3-way Foley was a-traumatically inserted. Urology wanted to treat the perforation conservatively at first, because his Plavix had only been held 2 days prior for the cardiac catheterization. The patient\'s CBI was discontinued once the perforation was noted on CT scan, but a 3-way catheter was kept in place for small bolus manual irrigation as needed.

The next day, the patient developed fever of 100.7, chills and leukocytosis of 11.4 warranting surgery. He was given platelets and then was taken to surgery #2 which was under general anesthesia and an abdominal incision was made involving a general surgeon. The patient\'s CBI was discontinued once the perforation was noted on CT scan, but a 3-way catheter was kept in place for small bolus manual irrigation as needed.

The next day, the patient developed fever of 100.7, chills and leukocytosis of 11.4 warranting surgery. He was given platelets and then was taken to surgery #2 which was under general anesthesia and an abdominal incision was made involving a general surgeon. The patient had extensive adhesions due to prior abdominal surgeries, which required lysis before proceeding to the bladder. The clot was noted in the opening of the perforation, removed, and the hole was closed. The patient was closed and taken to the ICU once again for care. He recovered well, and required no further surgeries or CBI.

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Discussion

Complications of bladder rupture can be life threatening, therefore rupture must be considered when evaluating patients presenting with evidence of free fluid in the abdomen, abdominal pain and hematuria.\(^2\)

The patient in this case had a prior history of BPH and therefore had a chronically obstructed urinary history. His CT demonstrated signs of persistently enlarged prostate causing chronic obstruction with dilated distal ureters and a compressed renal system. Chronic obstruction can predispose patients to complications of chronic obstruction, such as reflux, hydronephrosis, bladder wall thinning, distension and bladder diverticula. An enlarged and previously resected prostate can cause friability of tissue and therefore a bleeding diathesis.\(^3\) Removal of the Foley through narrowed prostatic urethra could have caused the bleeding that instigated the hematuria and clotting.

Being aware of bladder diverticula and other weakening defects in the bladder wall can help with early diagnosis of rupture. Thinning of the bladder wall due to chronic obstruction can decrease the wall integrity, increasing susceptibility injury. Increased pressure and distension can also lead to diverticula. This leaves only a thin layer of epithelium, susceptible to puncture by Foley catheter or rupture during increased pressure, for example CBI. Overall despite this possibility, it is unrealistic to rule out bladder wall defects or diverticula in every patient before catheterization or CBI. Although, awareness of these possibilities in a patient with known BPH and long term obstruction can solidify a diagnosis earlier on of bladder rupture.

This patient did not have massive or hemodynamically unstable bladder rupture. A blood clot managed to fill the rupture site and therefore bleeding was not continuous or excessive. This patient was an exception to the rule that intraperitoneal bladder rupture requires immediate surgery because he had other circumstances that impeded immediate surgery and his case did not initially progress to the point of necessitating immediate surgery upon diagnosis of the rupture. The classic triad of intra-peritoneal bladder rupture was not fulfilled, which is symptoms of abdominal pain, urinary ascites, and distension.\(^1\)

In conclusion, this patient demonstrated a case of intra-peritoneal bladder rupture caused by a culmination of complications secondary to prostatic bleeding, clot formation, CBI and a history of chronic BPH. Urologists and health care professionals alike need to recognize the risks and complications that come with clot formation in urine and the use of CBI, especially bladder rupture. Prior history of chronic BPH has implications and complications that need to be considered when hematuria with blood clots arise and urologic procedures are performed. This case is presented to highlight the importance of surveillance of hematuria with presence of clots, as well as the importance of regulated control of CBI. Bladder rupture, although uncommonly present without trauma, is still possible and should be considered on the differential diagnosis for any patients with CBI or blood clots in urine. Despite the lack of acute abdomen or urinary ascites, this patient demonstrated sub-massive bladder rupture and proved you do not need all known criteria to meet the diagnosis of intra-peritoneal rupture.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.eucr.2018.09.005.

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