Trauma and reconstruction

Delayed diagnosis of atraumatic urinary bladder rupture

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ABSTRACT
Spontaneous rupture of the urinary bladder (SRUB) is a very rare and often missed diagnosis. While the clinical presentation is often non-specific, SRUB is associated with a high mortality rate and therefore warrants swift diagnosis in order to avoid delay in management. Herein, we present a case of SRUB with multiple etiological factors and temporal association with phosphate enema administration.

Introduction

Spontaneous rupture of the urinary bladder (SRUB) is extremely rare and the nonspecific clinical presentation can lead to delay in diagnosis. In contrast to traumatic bladder injury, which is typically associated with pelvic fracture or surgical instrumentation, SRUB is thought to be idiopathic, and few case reports document causes ranging from vaginal delivery and binge alcohol use to enema administration and malignancy. Pathophysiologically, SRUB is most often associated with intraperitoneal urine leakage and possible peritoneal reabsorption of urea and creatinine, further obfuscating expected laboratory values. It is imperative to rule out SRUB with appropriate imaging or direct visualization to decrease mortality, which has been established to be as high as 80%.

We present a case of a 72-year-old male presenting to our emergency department after experiencing weeks-long severe constipation, subsequently requiring urgent hemodialysis for acute kidney injury and found to be in sepsis secondary to what was later diagnosed as peritonitis secondary to SRUB.

Case presentation

A 72-year-old male with a medical history of hypertension, and stage 3 chronic kidney disease who presented after several weeks of worsening abdominal discomfort, constipation, and worsening oral intake.

In our emergency department, the patient was somnolent and comatose, tachycardic and lab tests were remarkable for white blood cell count 27.7, potassium 7.0 mmol/L, metabolic acidosis CO₂ 11mmol/L, and AKI with BUN 174 mg/dL and creatinine (Cr) 15.4 mg/dL. Microscopic urinalysis positive for >150 RBC and WBC per high power field with few bacteria. CT of the abdomen and pelvis (Figs. 1 and 2) revealed multiple fluid collections and gas throughout the abdomen as well as pockets adjacent to the superior and posterior walls of the urinary bladder. Upon further investigation, the patient had received a fleet enema several days prior to presentation. Surgical consultation was obtained for suspected intestinal rupture in the setting of recent gastrointestinal manipulation. Given that CT was negative for rupture or definitive source of fluid collections, surgical exploration was deferred in the setting of severe AKI and sepsis. The patient was initially managed conservatively with interventional radiology guided fluid drainage, broad spectrum antibiotics, and emergent hemodialysis.

On day 3 of admission, further ascitic analysis revealed a fluid Cr of 7 mg/dL (Serum Cr 7 mg/dL), and bacterial culture positive for E. coli with a resistance pattern consistent with that of the urine culture. With increasing concern for urinary bladder rupture, a CT cystogram was obtained (Fig. 3) which confirmed bladder rupture with a defect in the posterior-superior aspect of the urinary bladder and intraperitoneal spillage of contrast.

Open repair of the urinary bladder with urology and exploratory laparotomy with general surgery on day 4 of admission revealed two intestinal abscesses, significant inflammation of the distal sigmoid near the rectosigmoid junction without evidence of perforation or diverticulitis, and secondary inflammation of the appendix and most of the

Abbreviations: AKI, acute kidney injury; BUN, blood urea nitrogen; Cr, creatinine; CT, computed tomography; RBC, red blood cell; SRUB, spontaneous rupture of the urinary bladder; WBC, white blood cell.
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viscera. Colorectal surgery was consulted for intraoperative flexible sigmoidoscopy and found inflamed and thickened sigmoid colon without obvious perforation. General surgery performed drainage of abscesses, prophylactic appendectomy, and diverting sigmoid colostomy.

Postoperative course was complicated by vasodilatory shock requiring vasopressors in the intensive care unit (ICU). Ultimately, he was weaned off of vasopressors, completed antimicrobial therapy, achieved renal recovery without requiring further renal replacement therapy, and was discharged on day 10 of hospitalization to an inpatient acute rehabilitation facility. Patient returned on POD 20 with sepsis secondary to UTI and intra-abdominal fluid collection from prior bladder leak. After stabilization with IV antibiotics, the patient was discharged with a foley catheter and recovered without further complications.

Discussion

Urinary bladder rupture is often associated with blunt trauma or iatrogenic causes. On the other hand, SRUB is exceedingly rare and, in the absence of concrete guidelines, diagnostic and treatment recommendations are primarily based on the location of rupture. SRUB most often occurs at the dome or posterior portion of the bladder, which are the weakest and least supported portions of the bladder. The clinical presentation of SRUB may be non-specific and has been associated with abdominopelvic pain, elevated serum creatinine, and urinary ascites.

Due to the infrequency of SRUB, there are limited literature reviews or case reports and no reliable estimates of true incidence. Diagnostic delays are common and associated with a mortality rate as high as 80%. Reported cases of SRUB can be separated into two, often overlapping causes: increased intravesical pressure and weakened urinary bladder wall. Increased intravesical pressure has been reported with vaginal delivery or chronic urinary retention. Bladder wall weakening and rupture have been associated with radiation, malignancy, diabetes, inflammation, and infection.

Our patient presented with elevated serum Cr and potassium, consistent with AKI and warranting emergent dialysis. Ascitic fluid analysis on day 3 of hospitalization revealed Cr of 7 mg/dL, consistent with serum Cr. This decreased suspicion for urinary ascites, which is typically associated with urine to serum Cr ratio of 30–100:1. However, given the patient’s history of chronic kidney disease and likely peritoneal Cr reabsorption, this value was of little significance. Ultimately, suspicion for SRUB increased after urine and ascitic fluid cultures were positive for *E. coli* with the same resistance patterns. At this time, CT cystography was performed and the bladder rupture was appropriately identified and managed surgically.

In retrospect, there are multiple possible risk factors for SRUB in our patient, including a temporal association with phosphate enema administration prior to presentation. In our review of the literature, there is only one case of bladder rupture following enema administration. In addition, ongoing severe constipation and *E. coli* cystitis may have contributed to urinary retention and bladder wall inflammation, respectively.

Conclusion

Spontaneous bladder rupture is rare and initial diagnostic evaluation
may often be inconclusive or indicative of other disorders. Due to peritoneal reabsorption, urinary ascites may be inconsistent with expected urine creatinine level. Accordingly, definitive diagnosis is often delayed and, in some cases, may not be discovered until laparoscopic examination. Even in the setting of acute kidney injury, CT cystogram is a valuable early diagnostic tool that may improve recognition and therefore outcomes in these patients.

Declaration of competing interest

None to report.

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