



Bladder diverticulum accompanied by abdominal pain: a case description

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Introduction

Bladder diverticula are protrusions of the bladder urothelium and mucosa via muscle fibers of the bladder wall, the muscularis propria, which results in a thin-walled structure connected to the bladder lumen that empties poorly during micturition (1). Bladder diverticulum is a relatively common disease in clinical practice. Retrograde cystography computed tomography (CT) can accurately diagnose bladder diverticulum and clearly show its size, location, shape, and opening (2). If there are no complications or no special symptoms in bladder diverticulum, the diagnosis needs to be made through relevant examinations such as urography, B-ultrasound, and CT as illustrated in the present case.

Case presentation

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

A 95-year-old man was admitted to the hospital due to subcutaneous ecchymosis of the lower limbs. His past

medical history included hypertension, atherosclerosis, coronary artery disease, abdominal aortic aneurysm, internal iliac artery aneurysm, chronic renal insufficiency, thyroid adenoma, and benign prostatic hyperplasia. After admission to the hospital, he was arranged to receive blood tests and bone marrow aspiration. The laboratory report showed that the platelet count was less than $100 \times 10^9/L$. Coagulation function tests showed an activated partial thromboplastin time of 56.2 s, a fibrinogen level of 1.48 g/L, and a D-dimer level $>20 \mu\text{g/mL}$. Vascular ultrasound did not indicate any thrombus in the bilateral lower limbs but did show a hypoechoic mass in the muscle layer of the left lateral thigh, which was considered likely to be a hematoma. Abdominal CT revealed a bladder diverticulum on the right side of the bladder, as shown in *Figure 1*. Three months after admission, a palpable lower abdominal mass was found on physical examination, which caused extreme pain when pressed. The patient was lethargic but aroused by vigorous stimuli. As there was a decrease in urine output, a triple-lumen indwelling urinary catheter was inserted due to suspicion of urinary retention. The abdominal mass then dwindled gradually after catheter insertion. Examination of his urine showed many leukocytes and red blood cells, and thus saline bladder irrigation was administered each day, with the urinary catheter being changed every 4 weeks. Five months after admission, the patient complained of abdominal tenderness in the middle and upper abdomen

[visual analogue scale (VAS) =2]. The liver and spleen were not palpable. Blood investigations revealed the amylase level to be 178 U/L (normal range, 25–125 U/L) and the lipase level to be 726.4 U/L (normal range, 0–60 U/L). Abdominal CT indicated the gallbladder (Figure 2A) was 8.6×3.2 cm² in size and had no palpable stones and that the parameters is morphologically normal, uniform in density, and there is no peripancreatic exudate (Figure 2B). Hence, the possibility of cholecystitis and pancreatitis were excluded. Anti-infection and rehydration treatment was

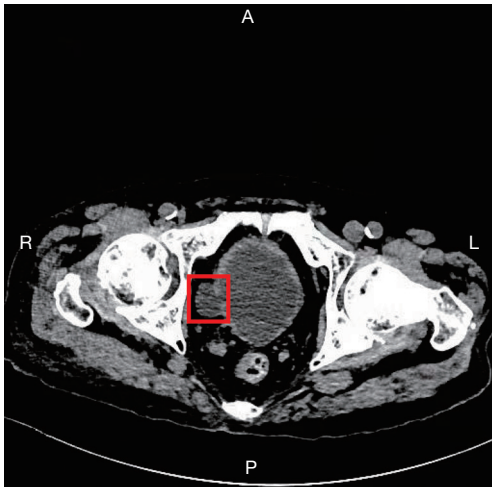


Figure 1 Abdominal computed tomography. Bladder diverticulum on the right side of the bladder (marked by the red square).

performed, and subcutaneous injection of octreotide acetate was administered. The next day, the patient complained of increased pain in the right side of the abdomen (VAS =5). Due to the advanced age and complexity of the patient, multidisciplinary-joint consultation (MDJC) was performed. After the consultation, the gastroenterologist ruled out a diagnosis of hepatobiliary, pancreatic, or splenic disease based on the abdominal CT examination. The vascular surgeon suspected that the abdominal pain was related to the patient's abdominal aortic aneurysm, but this suspicion could not be confirmed because the patient refused operation. A radiologist and urologist were subsequently consulted. A CT scan was then performed to determine the abnormalities, which revealed that the end of the urinary catheter had been left in a bladder diverticulum (Figure 3). The catheter was then immediately removed and reinserted, after which the patient reported that the pain had disappeared (VAS =0).

Discussion

Bladder diverticula are uncommon in the urinary tract. There are two types of bladder diverticula: congenital and acquired. Congenital bladder diverticula are relatively rare (3). Acquired bladder diverticula are most often caused by a block in the bladder outlet, which results in increased intravesical pressure in the bladder (4). The inner lining of the bladder (epithelium) then bulges outward through the defect in its

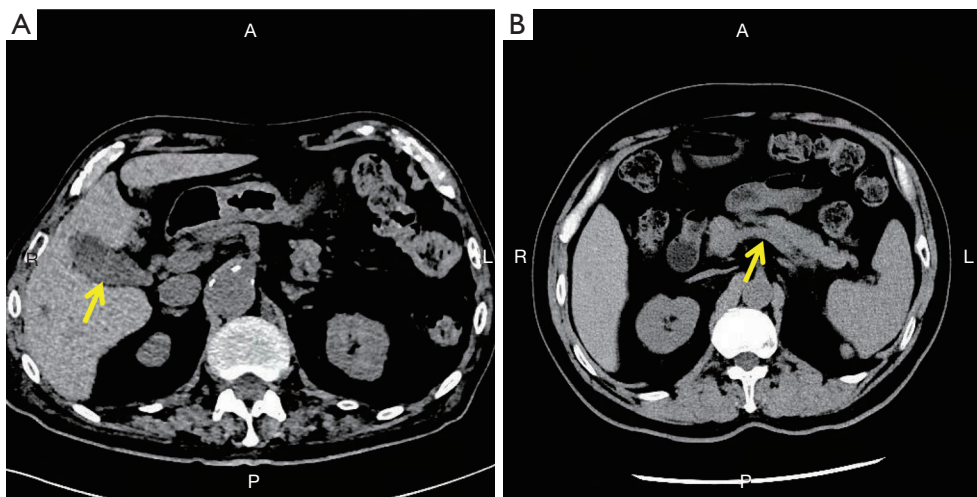


Figure 2 Abdominal computed tomography scans. (A) The gallbladder (marked by the yellow arrow) was 8.6×3.2 cm² in size, and there were no palpable stones in the gallbladder. (B) The pancreas (marked by the yellow arrow) is morphologically normal, uniform in density, and there is no peripancreatic exudate.

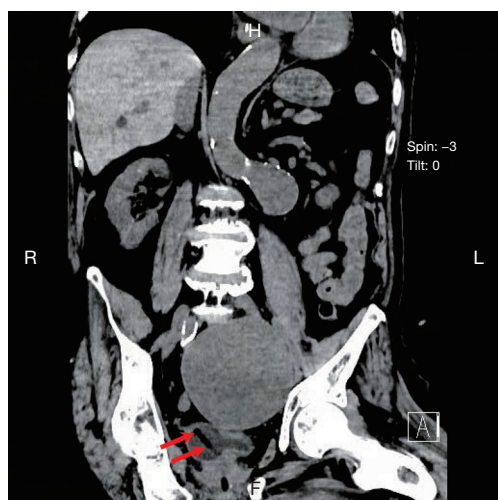


Figure 3 Abdominal computed tomography showed that the end of the urinary catheter (marked by the red arrows) was left in the bladder diverticulum.

muscular layer, forming a pouch-like structure. Bladder diverticula occur most commonly in people over 50 years of age (5). Usually, small bladder diverticula are asymptomatic and are incidentally detected during imaging investigations. Larger diverticula can be accompanied by various symptoms, such as urinary retention, urinary tract infection, hematuria, neoplasm formation, or even acute abdomen due to rupture (6). In other words, bladder diverticula and its complications can also cause abdominal pain.

Indwelling urinary catheters are common devices used in critically ill, older adult patients and are typically inserted and managed by nurses unless complications arise (7). Insertion of an indwelling urethral catheter is an invasive procedure that may cause pain or discomfort, especially in male patients. The male urethra is approximately 20 cm in length, forming two curves. It is richly innervated by sympathetic and parasympathetic nerves. Inserting a catheter may cause discomfort to the urethra due to irritation in the suprapubic area and bladder triangle. For the case presented here, bladder hypertension caused the possibility of urinary catheter insertion into the bladder diverticulum to increase. The urinary catheter was located within the bladder diverticulum after successful ureter placement. When the patient turned and moved, the pain increased due to the pulling of the bladder canal at the mouth of the diverticulum. Thus, when inserting a catheter for a patient with bladder diverticulum, the operator should be gentle

and monitor the patient's condition closely for any changes, especially in older adult patients with comorbidities. Among all the noninvasive imaging techniques, CT examination can provide detailed information about the size, location, shape, and opening of bladder diverticulum owing to its superior contrast resolution and lack of tissue superimposition (8). Thus, CT is useful in the diagnosis and management of bladder diverticulum. Such an imaging technique is suitable for older adult and frail patients or those with urethral strictures. As is evident from the case presented in this paper, appropriate knowledge and experience in catheter management can shorten the time to diagnosis of a medical condition. Emergent specialist input should be reserved for patients in whom basic measures are unsuccessful or in whom further harm or life-threatening complications are suspected. Among the treatment and management of bladder diverticula, a case of catheter placement in a bladder diverticulum is extremely rare, with only a few cases reported in the English-language literature.

In addition, the function of multiple organs in older adults gradually declines over time (9) and is accompanied by a decline in immune function (10) and cognitive ability (11). Treating older adults with many comorbidities requires a team-based approach to management, including allied health professionals, social work, and nursing (12). In this case, the cause of abdominal pain was first thought to be due to an abdominal aortic aneurysm, as abdominal, flank, or back pain is the most common symptom in symptomatic patients with an abdominal aortic aneurysm (13). Abdominal aortic aneurysm is a complex degenerative vascular disease (14) that usually develops slowly without noticeable symptoms. It is common in older adult men (15) and is associated with a high mortality rate because ruptured abdominal aortic aneurysms are often fatal (16). Sudden and severe pain in the abdomen may indicate rupture. However, surgery for an abdominal aortic aneurysm was refused. Therefore, a ruptured abdominal aortic aneurysm could not be ruled out as a cause of pain in this patient.

In conclusion, this case suggests that in patients with bladder diverticula who develop abdominal pain, consideration should be given to whether the indwelling catheter is improperly manipulated and can be investigated using CT examination.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <https://qims.amegroups.com/article/view/10.21037/qims-23-465/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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