


# A huge bladder diverticulum in an elderly: A case report

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## Abstract

An 81-year-old male patient presented to the department of gastroenterology with increasing lower abdominal pain for 2 years, aggravated with bloody stool for 1 month. Computed tomographic examination revealed a huge cyst ( $207 \times 93 \times 208 \text{mm}^3$ ) in the abdominal cavity, absence of bladder, thickening and strengthening of the rectal wall, and benign prostatic hyperplasia. Colonoscopy showed colon cancer and surgery was planned. Interestingly, after magnetic resonance imaging and cystography, we found colon cancer and a large bladder diverticulum rather than tumor metastasis or others. Severe bacteremia occurred in the elderly chronic obstructive pulmonary disease patient before operation. After careful consideration, we decided to take a large risk and combined urology and gastrointestinal surgery professionals to carry out bladder diverticulectomy, cystostomy, radical resection of rectal carcinoma, and so on. Fortunately, the patient recovered well after the operation. In addition to the common tumor metastasis and cystadenoma, the abdominal mass should also be alert to the rare bladder diverticulum, which eventually leads to diagnostic confusion. Multidisciplinary diagnosis and treatment has become an important treatment for complex diseases.

## Keywords

Bladder diverticulum, abdominal mass, bladder diverticulectomy, colon cancer

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## Introduction

Cystic mass of abdominal cavity includes oophoritic cyst, ovarian serous tumor,<sup>1</sup> appendiceal mucocoele, appendix mucinous tumor,<sup>2</sup> bladder diverticulum,<sup>3–5</sup> inflammatory mass, hematoma, abscess, and so on. It is either benign or malignant. Bladder diverticulum is a herniation of the mucosa lacking a muscle layer, which results in a loss of contractility and urine stasis in the diverticulum.<sup>6</sup> The congenital diverticulum is caused by the defect of bladder muscle development in embryonic stage, and there is no lower urinary tract obstruction. The incidence of it is reported to be 1.7% in children.<sup>7</sup> Outlet obstruction is almost always present in the acquired bladder diverticula. Although they are frequently small and asymptomatic and require no treatment, some may cause lower urinary tract symptoms (LUTS), hematuria, infection,<sup>8</sup> stone formation, or malignant neoplastic change.<sup>9</sup> In this case, an elderly patient came to the hospital with bloody stool. In addition, we found colon cancer combined with bladder diverticulum, and serious urinary tract infection (UTI). We took a big risk to operate on the patient, and the prognosis was excellent.

## Case report

An 81-year-old male, who is a smoker for 50 years with COPD (chronic obstructive pulmonary disease), presented to our gastroenterology department with abdominal pain, bloody stool, peritonitis, frequent urination, urgent urination, incomplete voiding, intermittent hematuria, and recurrent UTIs. Examination after hospitalization revealed suspicious mass and tenderness in the lower abdomen.

Significant laboratory values included a normal serum creatinine and  $241/\mu\text{L}$  red blood cells and  $261/\mu\text{L}$  white

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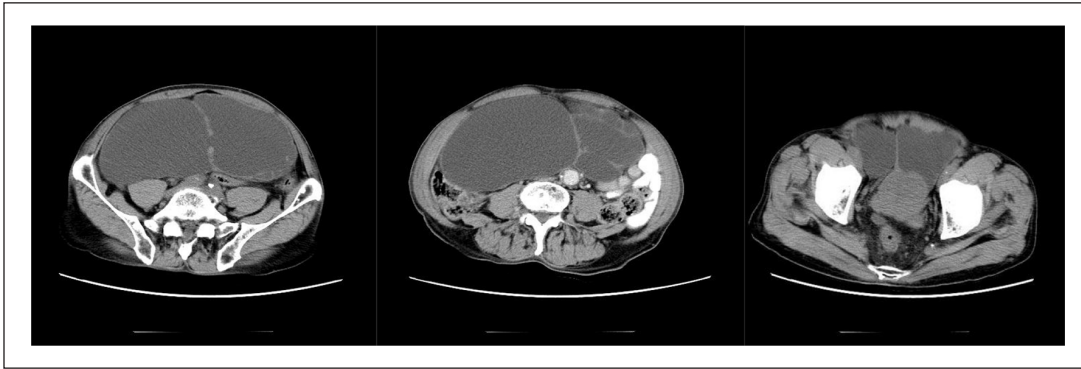
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**Figure 1.** CT scan revealing giant cystic mass (septum) in the abdominal cavity (about  $207 \times 93 \times 208 \text{ mm}^3$ ), the wall and septum of the capsule were slightly strengthened, and the density of liquid components in the capsule was even, benign prostatic hyperplasia, thickening and strengthening of the upper rectal wall, with multiple lymph nodes.

blood cells on routine urinalysis. Urine culture showed mixed growth of various bacteria. A bacteremia occurred preoperatively with a fever of up to  $40^\circ\text{C}$ . Blood culture showed MRS (methicillin-resistant *Staphylococcus*). The body temperature dropped to normal after antibiotic treatment. Computed tomographic (CT) scan demonstrated giant cystic mass (septum) in the abdominal cavity (the maximum level is about  $207 \times 93 \times 208 \text{ mm}^3$ ), benign prostatic hyperplasia, thickening and strengthening of the upper rectal wall, with multiple lymph nodes (Figure 1). Colonoscopy showed colon cancer. Magnetic resonance imaging (MRI) revealed that the thickening of the upper rectal wall was associated with a greater likelihood of rectal cancer, a marked enlargement of the prostate (about  $56 \times 46 \times 73 \text{ mm}^3$  in size), a marked enlargement of the bladder, and a cystic shadow on the right side (Figure 2). Transurethral cystography revealed that on the right side of the pelvic cavity, a large cystic filling with contrast medium was seen, the edge was clear, and the lower part of the cyst was connected with the bladder. The left wall of the bladder was not smooth, small cystic filling was seen in the middle and upper part of the bladder, no intestine was seen (Figure 3). The patient underwent transvesical diverticulectomy, cystostomy, radical resection of colon cancer, lysis of abdominal adhesion, appendectomy, and abdominal washing drainage. After supine position, anesthesia, disinfection, and towel laying, through the median abdominal incision into the anterior space of the bladder, we opened the bladder, turned the diverticulum inside out, peeled off the diverticulum completely, sewed up, and made a fistula at the same time. Cystostomy revealed that the size of right diverticulum was about  $20 \times 12 \times 22 \text{ cm}^3$  and much clear urine exiting from the ostium of the diverticulum (about 600 mL). Then we opened the peritoneum, protected the incision, and carried out tumor resection. After that, patients underwent resection of rectal lesions, peripheral lymph node dissection, and incision suture. Histopathologic examination revealed a high differentiated adenocarcinoma of the rectum and one lymph node metastases (pT4N1M0). The bladder diverticulum was a glassy

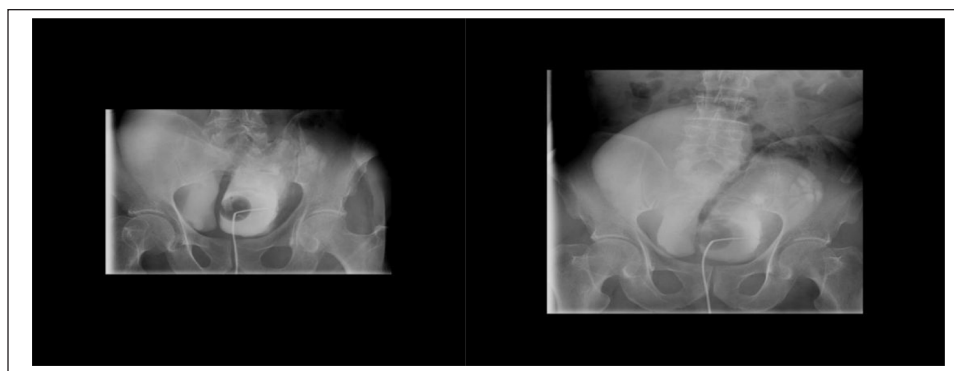
fibrous tissue, with congestion, bleeding, and inflammatory cell infiltration. No cancer was found at the root lymph nodes of inferior mesenteric artery and appendix.

## Discussion

Bladder diverticula may be acquired or congenital. Primary (congenital) bladder diverticula are believed to be due to a congenital weakness in the bladder wall musculature especially in the fibromuscular network near the urethral hiatus,<sup>10</sup> which is usually present during childhood,<sup>7</sup> and bear no risk for malignancy as opposed to the secondary acquired type.<sup>11</sup> Acquired diverticula are usually multiple. The much more common secondary (acquired) diverticula are believed to be the result of increased intravesical pressure caused by lower urinary tract obstruction, with up to 80% being attributed to benign prostatic hypertrophy (BPH).<sup>3-5,9</sup> Urethral strictures, carcinoma of the prostate or bladder, posterior urethral valves, and a neurogenic bladder (e.g. multiple sclerosis, meningomyelocele, Menke's syndrome, and hyperreflexia in elderly females) may also be responsible.<sup>9</sup> They are the result of bladder outlet obstruction due to anatomic, neuropathic, and iatrogenic reasons.<sup>12</sup> The most common presentation is recurrent UTIs secondary to urinary stasis in the diverticulum. Other presentations may include acute urinary retention, bladder stones, enuresis, voiding dysfunction, and possible bladder obstruction.<sup>6,13</sup> Diverticula can be detected by ultrasonography, CT, and MRI. Voiding cystourethrogram is a reliable method for identifying bladder diverticula which can be recognized by the relation between the ureteral orifice and mouth of the diverticulum and the size of the diverticulum during endoscopy. Some bladder diverticulum may turn to a poor cancer because the diagnosis is late and associated with early invasion, which results from the lack muscular fibers of the diverticulum.<sup>14</sup> The surgical options include open diverticulectomy (intra- or extravesical) and laparoscopic approach.<sup>10</sup> In our patients, we preferred open diverticulectomy, as the postoperative periods for patients who underwent extravesical surgery



**Figure 2.** MRI demonstrating a marked enlargement of the prostate (about  $56 \times 46 \times 73 \text{ mm}^3$  in size), a marked enlargement of the bladder, and a cystic shadow on the right side (considering the possibility of bladder diverticulum, further cystography is recommended.).



**Figure 3.** An voiding cystourethrography revealed that on the right side of the pelvic cavity, a large bladder diverticulum was seen, the edge was clear. Small bladder diverticulum was seen in the middle and upper part of the left bladder, no intestinal development was seen.

were comfortable. In summary, the doctors of gastroenterology and urology cooperated to operate on diverticulum and tumor, avoiding the spread of tumor and serious infection caused by diverticulum. Whether this huge abdominal mass causes intestinal tumor invasion or intestinal tumor

metastasis has led to the confusion. We presented a case of a bladder diverticulum in an adult who had a history of recurrent UTI. Through this case study, we found that BPH caused such a huge bladder diverticulum without canceration. In cases of recurrent UTIs and large abdominal mass,

the possibility of the presence of a bladder diverticulum should be kept in mind.

## Conclusion

When we next encounter with intestinal tumor and abdominal mass, we should think of the possibility of bladder diverticulum, which provide a new point of view for the diagnosis and treatment of the disease. Voiding cystourethrogram is helpful in making the diagnosis of bladder diverticula. We believe that the extravesical surgery is a safe, effective, and simple method in the treatment of bladder diverticula in adults. Multidisciplinary diagnosis and treatment has become an important treatment for complex diseases.

## Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Ethical approval

Our institution does not require ethical approval for reporting individual cases or case series.


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## Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

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