



# Spontaneous rupture of the urinary bladder: A rare case report

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## ABSTRACT

Spontaneous rupture of the bladder (SRUB) is an extremely rare emergency that can be misdiagnosed due to its non-specific clinical presentation, leading to patient death. This study aimed to summarize SRUB's clinical features, diagnosis, and treatment through our case. We report a case of a 39-year-old female with preoperative peritonitis and peritoneal effusion diagnosis. We performed an emergency laparoscopic surgery and found she had a ruptured bladder. She was treated with laparoscopic rupture repair and suprapubic cystostomy. She recovered well, was discharged after seven days, and had the cystostomy tube removed after five weeks.

## 1. Introduction

Spontaneous bladder rupture (SRUB) is usually a life-threatening condition. SRUB's incidence is extremely low, approximately 1 in 126,000 [1]. Unfortunately, SRUB's diagnosis and treatment are often delayed or even missed, with most cases identified during cesarean surgery. Surgical treatment is generally recommended to treat SRUB [2]. However, conservative treatment with indwelling catheters can achieve good results in selected cases [3].

We report a rare case of a young woman preoperatively diagnosed with peritonitis but postoperatively diagnosed with SRUB. She was treated surgically, and her postoperative recovery was good. We offer a case study of successful management through laparoscopic surgery.

## 2. Case presentation

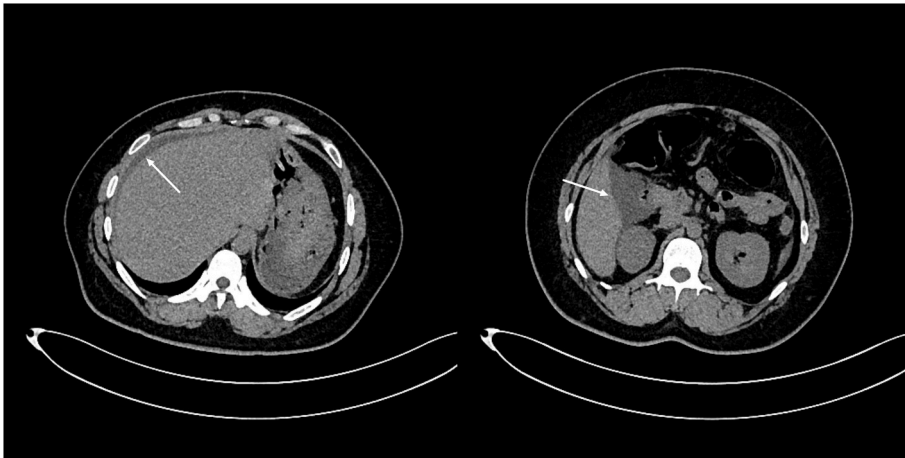
A 39-year-old woman with sudden onset of diffuse abdominal pain for 24 hours was seen in the Emergency Department of our hospital. Her vital signs were as follows: blood pressure was 129/86 mmHg, heart rate was 70/min, respiratory rate was 20/min, and body temperature was 36.4 °C. Physical examination showed a bulging abdomen with slight tension in the abdominal muscles, pressure and rebound pain throughout the abdomen, positive mobile turbid sounds, and no bowel sounds.

The patient had a cesarean section in 2013 and denied any trauma history or recent abdominal or urethral surgery. She noticed very little daytime urination. Laboratory tests showed elevated white blood cell count ( $10.40 \times 10^9/L$ ), serum creatinine (144  $\mu\text{mol/L}$ ), and urea (378  $\mu\text{mol/L}$ ). Computerized tomography (CT) showed fluid accumulation in the abdominal cavity (F.1). An abdominal puncture found bloody fluid.

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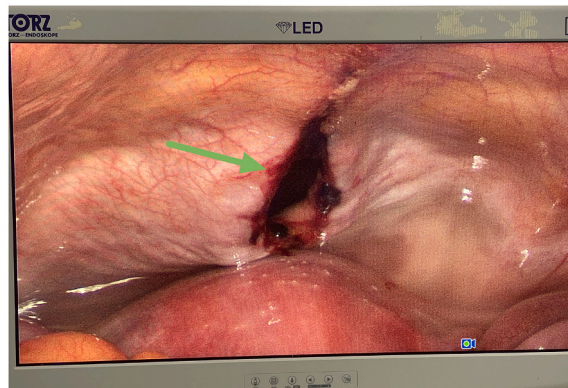
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**F.1.** CT of the abdomen showing extensive free fluid.

Immediately after completing the preoperative examination and signing the consent form, the patient underwent laparoscopic exploratory surgery. Surprisingly, the peritoneal fluid was clear rather than bloody. After careful exploration, we found her bladder had ruptured in the posterior wall (**F.2**). We requested the urologist to work together to complete the remaining operations. We performed a laparoscopic posterior bladder parietal wall repair, which was sutured in full. Then the plasma layer muscle encapsulated suture was done (**F.3**). We conducted a bladder injection test in the urinary catheter and no leakage was observed. And we performed a suprapubic cystostomy. Finally, a cystostomy tube and abdominal drainage tube were left in place (**F.4**). Her postoperative diagnosis was SRUB and peritonitis.



**F.2.** Rupture of the posterior bladder wall was observed laparoscopically.



**F.3.** The bladder after laparoscopic surgical repair.



F.4. The cystostomy tube is marked by an arrow and another is an abdominal drainage tube.

Follow-up medical history found that she had consumed 500 mL of 53-degree liquor the day before symptom onset. The patient recovered well and on the first postoperative day we removed the gastric tube and put her on a liquid diet. On the third postoperative day, the patient's temperature dropped to normal and we performed laboratory tests. Laboratory tests showed white blood cell count ( $8.0 \times 10^9/L$ ), serum creatinine ( $89 \mu\text{mol/L}$ ), and urea ( $256 \mu\text{mol/L}$ ). Her infection was effectively controlled and we discontinued the antibiotic treatment. On the fourth postoperative day we removed the abdominal drainage tube. We had the urinary catheter removed on the sixth day after the surgery. And after removing the urinary catheter, she could urinate freely on her own. The cystostomy tube was removed five weeks after surgery, and the follow-up was free of complications and other related diseases at twelve months.

### 3. Discussion

Bladder rupture can be a complication of blunt and penetrating trauma or occur spontaneously in diseased and non-diseased bladders [4]. SRUB is an acute surgical condition with low morbidity but high mortality ( [5,6] ). Its diverse and non-specific clinical symptoms pose a significant challenge to the treating physician, leading to misdiagnosis or underdiagnosis. SRUB is defined as intraperitoneal and extraperitoneal based on its relationship to the peritoneum [7].

Patients with extraperitoneal rupture generally present with abdominal pain and distension, urination difficulty, oliguria or anuria, and fever [8]. Since intraperitoneal SRUB often causes urinary ascites and abdominal infections, its symptoms are more severe than extraperitoneal SRUB. As the patient's disease evolves, various atypical symptoms may develop. Therefore, a detailed follow-up history is crucial and may yield valuable information to aid diagnosis.

Our patient's medical history indicated she had consumed alcohol before symptom onset. Patients may have altered bladder fullness sensations and abnormal behavioral responses after drinking alcohol, increasing SRUB risk [4]. Urinary retention can occur after alcohol consumption, potentially due to rapid bladder filling caused by alcohol's diuretic effect, thinning the bladder wall and predisposing it to rupture [9]. We suspect that our patient's alcohol consumption caused the rupture.

CT cystography is the best test for patients with suspected SRUB because it has high diagnostic accuracy and can evaluate structures such as the abdomen and pelvis. Cystoscopy is comparable to CT cystography for diagnosing bladder rupture. However, it is time-consuming and may not provide information on adjacent structures [10,11].

SRUB laboratory test results are generally similar to those for acute renal failure, including elevated serum creatinine, urea nitrogen, and potassium levels [11]. Dissection is the gold standard for diagnosing SRUB [8]. We believe that laparoscopic exploratory laparotomy can replace traditional dissection to some extent.

Early SRUB diagnosis and treatment are crucial for patient prognosis [8]. However, there is no specific guideline for SRUB. The European Association of Urology and The American Urological Association agree that intraperitoneal bladder rupture must be surgically repaired. Conservative treatment is an option for extraperitoneal bladder injuries without complications. However, patients with complex extraperitoneal bladder injuries should be surgically repaired [12,13].

Conservative treatment includes close clinical observation, continuous bladder drainage, and prophylactic antibiotics. However, timely surgical intervention is necessary for patients with poor conservative treatment results or symptom exacerbation. The bladder should be managed throughout treatment, including functional recovery exercises.

Our SRUB case raises several notable points. Firstly, physicians should not rely wholly on ancillary tests since some abnormal results inaccurately indicate the lesion's location. For example, our abdominal puncture showed bloody fluid in the peritoneal cavity,

but surgery found clear fluid. We speculate that this may reflect a small amount of blood from the bladder incision mixing with urine withdrawn through the puncture. Over time, there was an increase in urine and peritoneal fluid.

Secondly, the treating physician must have a keen judgment of certain diseases. Timely surgery should be performed on patients with suspected organ rupture to prevent progression. Our timely treatment explored the true disease cause, did not exacerbate it, and provided a more satisfactory prognosis.

Thirdly, patients with conditions suitable for laparoscopic surgery should undergo minimally invasive surgery. Laparoscopic surgery's flexibility and ability to provide multiple visual angles allow the whole abdomen to be explored, minimizing the risk of missing an abdominal lesion. The advantages of a minimally invasive laparotomy to treat SRUB patients were confirmed in this case. In addition, minimally invasive techniques are less invasive, less painful to patients, have faster postoperative recovery, and have fewer complications. These advantages are incomparable to traditional open surgery.

In a word, when a patient has abdominal pain, oliguria, peritoneal effusion, and abnormal renal function indicators, especially without an associated trauma history, physicians must actively pursue alcohol use and consider SRUB. Early diagnosis and aggressive treatment are essential. We recommend laparoscopic surgery when patients require surgical intervention.

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## Author contribution statement

All authors listed have significantly contributed to the investigation, development and writing of this article.

## Data availability statement

No data was used for the research described in the article.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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