Orthotopic urinary diversion is considered the most sophisticated form of urinary diversion after radical cystectomy. It provides patients with a method of urinating physiologically without a stoma or a urine bag. Patients’ social function and quality of life are less affected. However, the neobladder is not a true bladder. Patients still need to carefully monitor the emptying of a neobladder. Emptying regularly is important to avoid chronic reservoir over-distension, and self-catheterization is often necessary. Although spontaneous perforation of the neobladder is an uncommon complication, physicians should take note when an acute abdomen is found in a patient with a neobladder, especially with neobladder calculus formation.

**Case Presentation**

A 63-year-old man with non-insulin-dependent diabetes mellitus and hypertension had undergone radical cystectomy and Studer ileal neobladder construction 12 months prior to admission due to locally advanced bladder cancer. After the operation, the function of the urinary reservoir remained satisfactory. Complete day-time continence and occasional night-time incontinence were noted. However, subacute abdominal pain developed after alcohol consumption. The patient was sent to our emergency room 1 hour later because his symptoms progressed. In the emergency room, laboratory data were essentially normal except for leukocytosis (white blood cell [WBC] count, 12.2 × 10⁹/L). Physical examination showed no significant muscle guard- ing or rebounding pain. Plain abdominal radiography showed suspicious bladder calculus (Figure 1). Standing chest radiography showed no free air over the subphrenic space. After observation for about 6 hours, the abdominal pain worsened. Laboratory data showed worsening leukocytosis (WBC, 14.5 × 10⁹/L) with left shift, although the C-reactive protein concentration was abnormal (11.2 mg/L). Physical examination revealed significant muscle guarding and abdominal rebounding pain at this time, while abdominal computed tomography (CT) demonstrated fluid accumulation in the cul-de-sac and subphrenic region (Figure 2). Under the impression of hollow-organ perforation inducing acute peritonitis, emergency exploratory laparotomy was performed by a general surgeon. During the operation, two small perforations in the neobladder and calculus formation within it were discovered. In addition, severe intraperitoneal adhesion was noted. After removing the neobladder stone and repairing the neobladder, a Foley catheter was inserted for urine drainage. The patient’s postoperative recovery was excellent.
tion sites about 0.5 cm in diameter were noted over the upper part of the anterior aspect of the neobladder, and a gray stone without stitch contact about 2 cm in diameter was noted within the neobladder (Figure 3). We removed the neobladder stone and repaired the perforated ports. A three-way Foley catheter was then inserted and a drain tube was left at the depending site. Postoperative recovery was uneventful, except for ileus with abdominal distension during the first few postoperative days. The patient was discharged 12 days after surgery without the Foley catheter and continence function was not affected. Analysis revealed the recovered stone to be an apatite stone.

**DISCUSSION**

Spontaneous rupture of orthotopic ileal bladder replacement is uncommon. Nippgen et al reported a spontaneous perforation rate of 4.3% [1]. Over-distension of the neobladder is considered a major factor in the pathogenesis. Other risk factors include transmural infection, intraperitoneal adhesion precipitating seromuscular tearing of the bladder wall during over-filling, chronic distension (especially residual urine > 500 mL), and previous minor blunt abdominal trauma. Chronic ischemic change, possibly facilitated by detubularization and variability of mesenteric circulation, is considered an additional factor.

Most patients with spontaneous neobladder rupture present with acute or subacute abdominal pain initially, and peritonitis develops subsequently. Gender and age are not factors in rupture. Rupture sites are often in the upper

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**Figure 1.** Plain abdominal radiograph shows a suspicious bladder stone (arrow).

**Figure 2.** Abdominal computed tomography shows fluid accumulation in the cul-de-sac (arrow).

**Figure 3.** Neobladder stone is about 2 cm in diameter without stitch contact; analysis revealed an apatite stone.
part of the reservoir, and perforated ports are usually small (0.3–3 cm in diameter) [2].

The diagnosis of spontaneous rupture of the neobladder requires a high degree of suspicion. Retrograde cystography is adequate to evaluate genuine urinary bladder perforation but not to diagnose perforation of a neobladder. Severe intra-abdominal adhesion and anatomic structural changes after ileal neobladder replacement influence the outcome of cystography. Rosen and Light reported a 75% failure rate in the diagnosis of such cases with cystography [3]. Abdominal CT is a useful tool to survey the acute abdomen, although it is less helpful in the diagnosis of this condition. Elder et al. proposed the introduction of air through a catheter inside the bladder, so that a leak of bubbles through the bladder wall identifies the perforation [4]. Laboratory data are non-specific. Most patients are diagnosed with perforation of the neobladder during exploratory laparotomy, with only a few cases correctly diagnosed before surgery.

There is one reported case of successful conservative management of neobladder rupture with a wide-bore indwelling catheter to drain the bladder and a small intraperitoneal catheter through a stab incision to drain peritoneal collection [5]. It has been suggested that an over-distended neobladder can be released using an 18-gauge needle [6]. However, many investigators still suggest that immediate exploratory laparotomy is essential for diagnosis and treatment [7–9]. The result of surgical treatment and postoperative recovery are usually excellent. Continence function is rarely affected.

Calculus formation in the pouch occurs in 10–16% of patients secondary to mucous deposits and urea-splitting bacterial infection [10]. Therefore, patients with mucin retention should be advised to irrigate the neobladder with warm saline and be treated for bacteriuria if the microorganism is urea-splitting, which predisposes to stone formation.

Prevention of orthotopic ileal bladder perforation involves careful monitoring of neobladder emptying. Patients should adopt the habit of urinating when they sense vague lower abdominal discomfort. They should be encouraged to void regularly and be aware of the risk of neobladder perforation.

In our case, over-distension of the neobladder due to neobladder stone obstruction was believed to be the main contributing factor. Failure to void after alcohol consumption and chronic diabetes with neuropathy may have been additional important factors.

In conclusion, spontaneous perforation of the neobladder is an uncommon complication of orthotopic ileal neobladder. Over-distension of the neobladder is a major risk factor. Patients should be encouraged to void regularly, and physicians in the emergency room should keep in mind the possibility of spontaneous rupture when acute abdomen develops in patients with a neobladder, especially with intravesical calculus formation.

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迴腸新造膀胱結石產生併自發性穿孔—病例報告

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六十三歲男性病人患有糖尿病、高血壓和膀胱癌。於一年前接受根除性膀胱切除併迴腸新造膀胱手術。此次病人因飯後急性腹痛來到急診求診，經一天的觀察和支持性治療後出現急性腹膜炎之症狀，隨後病人接受緊急剖腹探查手術。術中迴腸新造膀胱發現有結石產生併有兩處穿孔，病人經移除結石、膀胱修補、置入尿管和抗生素使用，術後恢復良好。

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