Urinary bladder rupture secondary to indwelling catheterisation: two case reports

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ABSTRACT

Iatrogenic bladder perforation from urethral catheterisation is uncommon and can be unrecognised on presentation, with no haematuria or frank peritoneal signs. We report delayed diagnosis of two cases of urinary bladder rupture secondary to long-term indwelling catheter to highlight the ‘red-flag’ symptomatology and management approach. Health care professionals should keep a high index of suspicion, especially in patients with bladder pathology.

Key words: Urinary bladder; Urinary catheters

INTRODUCTION

Delayed diagnosis of catheter-related iatrogenic injuries secondary to urethral catheterisation results in morbidity.1 We present two cases of intraperitoneal bladder perforation secondary to urinary catheterisation in patients with a long-term indwelling catheter.

CASE PRESENTATION

Patient 1

In December 2017, a 73-year-old man presented with acute abdominal distension and repeated vomiting following a routine exchange of 14 French silicon Foley catheter by a community nurse. The patient was lethargic and febrile (38.1°C) with sinus tachycardia (158 beat per minute). He had benign prostatic hyperplasia with recurrent bladder stones and obstructive uropathy and had refused surgical intervention. He was on long-term urinary catheter for 2 years. Physical examination showed a distended tympanic abdomen without peritonism. Turbid urine (450 mL) was noted in the Foley drainage bag without gross haematuria. Serum urea and creatinine levels were elevated to 15.6 mmol/L and 374 µmol/L, respectively. Radiographs showed prominent bowel loops suggestive of ileus with no evidence of free gas under diaphragm (Figure 1). At 9 hours after presentation, computed tomography (CT) images showed low-density free fluid in the pelvis with diffuse peritoneal stranding suggestive of peritonitis (Figure 2). Exploratory laparotomy 3 hours after CT revealed friable urinary bladder with a 2-mm perforation at the dome. The defect was trimmed and repaired in two layers with 2-0 Vicryl absorbable suture. Methylene blue test confirmed no leakage, and cystoscopy found mild cystitis changes only. Histology of the trimmed segment showed non-dysplastic urothelium with evidence of inflammation and focal necrosis. At 4-week follow-up, cystogram showed no contrast extravasation after instillation of 350 mL of contrast agent (Figure 3). Patient agreed to undergo transurethral resection of prostate to avoid the long-term indwelling catheter.

Patient 2

In March 2012, a 90-year-old woman was admitted for painless haematuria with clot retention requiring multiple sessions of bladder irrigation. 10 years earlier, she had been treated with pelvic brachytherapy for carcinoma of the cervix and was complicated by recurrent urinary retention and was unable to wean off the catheter. At 1 month prior to admission, she...
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**Figure 1.** Radiographs showing prominent bowel loops suggestive of ileus with no evidence of free gas under diaphragm.

**Figure 2.** Axial computed tomographic image showing the tip of Foley catheter transversing through the bladder wall with urinoma and air in the pelvis.

**Figure 3.** At postoperative week 4, cystogram in (a) anterior-posterior view and (b) 30° oblique view showing a trabeculated bladder with no contrast extravasation.
had started on a long-term indwelling catheter for a hypocontractile bladder.

The patient’s serum urea level was elevated to 10.0 mmol/L, with a normal creatinine level at 77 umol/L. Urine culture grew *Escherichia coli* and *Pseudomonas aeruginosa*. She was initially diagnosed as having irradiation cystitis with superimposed urinary tract infection. In view of persistent gross haematuria, cystoscopy was arranged 5 days later and found a 3-cm perforation over the posterior wall with diffuse bladder telangiectasia. Laparotomy was performed to repair the defect with a 2/0 Vicryl continuous double-layer suture reinforced with an omental patch. Histology of the trimmed portion showed evidence of inflammation only. At postoperative 2 weeks, the patient had persistent fever, and CT images showed intact bladder mucosa with no intra-abdominal collection (Figure 4). Nonetheless, the patient died 1 month after the index operation secondary to hospital-acquired pneumonia.

**DISCUSSION**

Most urinary bladder ruptures are trauma-related and extraperitoneal in nature that can be managed conservatively.² Atraumatic bladder perforations are typically intraperitoneal with a high mortality rate (50%),³ and usually complicated by a stormy clinical course owing to delayed diagnosis.⁴

A PubMed search revealed that, between 1997 and 2017, only nine case reports of urinary bladder rupture secondary to indwelling catheterisation were identified (Table). Only five of them presented with gross (n=3) or microscopic (n=2) haematuria. Diagnosis was primarily made by CT (n=6); only one case was diagnosed by cystogram.⁵ Four cases had perforation at the bladder dome.

Constant urinary drainage generates intravesical pressure difference and leads to prolonged collapse

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**Figure 4.** At postoperative week 2, axial computed tomographic image showing intact bladder mucosa at posterior wall of the urinary bladder.

<table>
<thead>
<tr>
<th>Study</th>
<th>Sex/age, y</th>
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<tr>
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<td>M/83</td>
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<td>Chronic retention of urine</td>
<td>Confusion</td>
<td>Gross</td>
<td>-</td>
<td>Computed tomography</td>
<td>Left wall</td>
</tr>
</tbody>
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**Table**

Nine case reports of urinary bladder rupture secondary to indwelling catheterisation in the literature
of bladder mucosa around the Foley catheter tip.6 The resultant pressure necrosis accumulates over time and leads to a focal weak point at risk of injury during catheter exchange.2,5 Chronic inflammation secondary to bacterial colonisation further weakens the mucosa and makes it more vulnerable from iatrogenic perforation.2,7 The bladder dome is the most common site of injury,8 as it is the weakest and most mobile part. In addition, background bladder pathologies such as chronic or recurrent cystitis, tuberculous infection, and a history of irradiation2,9 affect bladder compliance and weaken bladder mucosa. A blocked catheter can cause bladder overdistension directly contributing to rupture,2 especially in a non-compliant bladder. Bladder diverticulum from chronic outlet obstruction is also a weak point prone to perforation.

Presentation with acute abdomen and peritonitis is rare, as many patients are chronically debilitated with impaired sensation.10-12 The cardinal sign of gross haematuria is uncommon, especially in the first 24 to 36 hours of rupture.3,13,14 Signs of progressive abdominal distension with anuria, or frank discrepancy between bladder irrigation balance should prompt further investigations. In the presence of urinary ascites, urea and creatinine are actively absorbed through the peritoneal membrane falsely mimicking acute renal impairment.4 A diagnosis of intraperitoneal urine leakage should be considered when the ratio of ascitic fluid to serum creatinine is >1.0.9

The gold standard for diagnosis of urinary bladder rupture is by retrograde cystogram,15 which can delineate the exact perforation site.2 Although CT can assess other intra-abdominal organs, an inflated Foley balloon within a bladder diverticulum may be misinterpreted as concealed perforation.16,17 When in doubt, computed tomographic cystogram should be performed for definitive diagnosis.

CONCLUSION

Iatrogenic bladder perforation from urinary catheterisation is rare but should be considered in patients with background bladder pathology. Presentation could be subtle especially in chronically debilitated patients without haematuria or frank peritoneal signs. Health care professionals should keep a high index of suspicion to ensure early detection. Risk of bladder perforation should be discussed when counselling patients with an indwelling catheter.

DECLARATION

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REFERENCES