CASE REPORT

Bilateral ureteric stones: an unusual cause of acute kidney injury

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SUMMARY

A 49-year-old man presented to the accident and emergency department, with a short history of vague abdominal pain, abdominal distension and two episodes of frank haematuria. A plain chest film showed dilated loops of large bowel and blood results on admission showed an acute kidney injury (stage 3). A diagnosis of bowel obstruction was made initially but a CT scan of the abdomen showed bilateral obstructing calculi. After initial resuscitation, the patient had bilateral ultrasound-guided nephrostomies and haemofiltration. He later underwent bilateral antegrade ureteric stenting. A decision will later be made on whether or not he is fit enough to undergo ureteroscopy and laser stone fragmentation.

BACKGROUND

Ureteric colic is a common presentation to primary care settings and can present in a number of ways, such as abdominal pain, metabolic derangement and an acute change in kidney function. Bilateral ureteric stones are an uncommon presentation of renal colic, urinary outflow obstruction and can cause an acute kidney injury (AKI) of great severity in a number of hours. It is important for these patients to be adequately resuscitated and have some form of intervention quickly in order for them to make a good recovery and for that, one must have a high suspicion of renal pathology when faced with an acute abdomen.

CASE PRESENTATION

A 49-year-old man presented to the accident and emergency department, with a 2–3-day history of generalised abdominal pain. The pain was worst in the lower abdomen with increasing abdominal distension and the patient had a vague history of chest pain. He also reported two episodes of frank haematuria and not being able to open his bowels for 2 days.

He had a history of hydrocephalous with a ventriculoperitoneal shunt, right-sided hemiparesis due to a cerebrovascular accident, recurrent partial seizures and recurrent sigmoid volvulus, which had been treated previously with an open sigmoid colectomy. He lived in a residential care home, the staff of which helped with his ongoing personal and healthcare.

On general examination, he appeared unwell and was grunting. He was afebrile, tachycardic, tachypnoeic and hypertensive while saturating 97% on 40% oxygen. His abdomen was distended and tympanic but soft with generalised tenderness

(a midline laparotomy scar was noted). There were excoriations noted in the groins but no hernias detected.

The patient promptly had a central line and urinary catheter inserted, which drained 100 mL of frank blood. He underwent fluid resuscitation, received intravenous antibiotics and immediately had a plain chest film. He later underwent a CT scan of his abdomen.

INVESTIGATIONS

An arterial blood gas evaluation was taken immediately, revealing severe metabolic acidosis with attempted respiratory compensation. The pH was 6.96 and lactate 2.2 mg/dL, with a base excess of –27.0 mmol/L and bicarbonate of 3.8 mmol/L. This was repeated 2 h later showing overall deterioration, with a pH of 6.86, lactate of 3.5 mg/dL, a base excess of –28.8 mmol/L and bicarbonate of 2.0 mmol/L.

Blood tests on admission revealed haemoglobin of 12.6 g/dL, a white cell count of $30.45 \times 10^9/L$ and a platelet count of $392 \times 10^9/L$. The patient also had an international normalised ratio of 1.2. Furthermore, he had a sodium level of 141 mmol/L, potassium 4.8 mmol/L, creatinine 1639 $\mu\text{mol/L}$ and urea level 52.6 $\mu\text{mol/L}$. His magnesium was 1.5 mmol/L and phosphate was 3.9 mmol/L. Owing to the chest pain, he had a troponin T test, which showed 55 ng/L.

Portable chest X-ray on admission showed lung fields that were reduced in size with large bowel loops visible underneath the diaphragm on both sides. The patient was too unwell to undergo a plain abdominal film at that time but a working diagnosis of AKI with large bowel obstruction was made.

Once stabilised, he underwent a CT scan of the abdomen, which revealed a bilateral hydronephrosis due to bilateral ureteric stones (figure 1) and dilated loops of large bowel. Combining the clinical picture, imaging and blood results, he was diagnosed with pseudo-obstruction as a result of metabolic derangement due to AKI—precipitated by bilateral ureteric stones.

DIFFERENTIAL DIAGNOSIS

Prior to the CT scan, there were a number of differential diagnoses: mesenteric ischaemia (due to initial high lactate), mechanical bowel obstruction, pseudo-obstruction and bowel perforation.

TREATMENT

Following the diagnosis of bilateral ureteric obstruction and stage 3 AKI, the patient was transferred to

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Figure 1 A coronal CT scan of the patient showing bilateral ureteric calculi obstructing the vesicoureteric junctions bilaterally.

the emergency recovery department in order to undergo ultrasound-guided nephrostomies bilaterally. He was transferred to the intensive care unit postprocedure, where he underwent haemofiltration. Six days later the patient underwent bilateral radiologically guided antegrade ureteric stenting ([figure 2](#)).

Figure 2 A coronal CT scan image showing urostomies and ureteric stents in place.

OUTCOME AND FOLLOW-UP

The nephrostomies were removed once the patient began to pass good amounts of urine urethrally and his creatinine returned to its baseline. After discussion with the urology team, it was decided that the patient would return in 2–3 weeks to have ureteroscopy±laser stone fragmentation of first the right ureter and kidney and then the left. The rationale for this was that the patient had several comorbidities and the risk of a prolonged surgery needed to clear both kidneys would be significant.

DISCUSSION

The presentation of this patient was not typical of ureteric calculi obstruction. Ureteric stones can occasionally present as an acute abdomen, depending on level of obstruction and side. For example, a midureteric stone can mimic appendicitis or diverticulitis.¹ But on review of the current literature, to have bilateral obstructing stones is quite unusual.

More commonly, patients present with severe colicky pain from the flank to the groin, nausea/vomiting and haematuria.² Ureteric stones can act as a nidus for infection, so patients may also present with rigours. It is estimated that 6% and 12% of women and men, respectively, will have at least one episode of ureteric colic at some stage in their life, with a peak incidence at 40–60 years for men and in the late 20s for women.^{3 4}

Previous case reports of individuals with bilateral ureteric stones have tended to present with the classical symptoms associated with ureteric colic, aforementioned.^{5–7} None of the patients in these cases were as unwell as our patient—with such metabolic derangement—but one did have an AKI that resolved completely once bilateral JJ stents were inserted via ureteroscopy.⁵ The authors of these studies have suggested that it is possible that the actual number of bilateral stones is underestimated—as many stones could have passed spontaneously or missed diagnosis.

On the basis of the presenting report and the patient's medical history, a differential of obstruction was very reasonable. But a ureteric calculus, let alone bilateral calculi, was not initially considered as a differential, this could have been further confused by the patient's inability to give a clear history due to his reduced cognition. Incidentally, the choice of imaging modality—CT of the abdomen/pelvis—was the standard needed to diagnose ureteric stones, as CT has a sensitivity of 94–100% and specificity of 92–100%.⁸ CT of the abdomen/pelvis is the preferred imaging modality in the acute setting for this reason. CT scanning can detect a range of pathologies, in this instance bilateral obstructing ureteric stones as well as pseudo-obstruction.

An obstructed kidney, bilateral obstruction or obstruction of a solitary kidney with signs of infection and hydronephrosis is a urological emergency. Furthermore, anuria, intractable pain or vomiting must also be considered an emergency.⁹ Immediate decompression is needed to avoid further complications as <50% of patients will spontaneously pass stones >5 mm.⁹ Bilateral outflow obstruction can cause severe metabolic dysfunction with severe acidosis and AKI, which can result in irreversible kidney damage.^{4 9}

There are two approaches to decompressing the kidney; either via ureteroscopy and retrograde JJ stenting or nephrostomy, which will allow the kidney to drain and allow resolution of any infection. However, current evidence is not clear on which approach is the safest or most effective.^{1 4} Regardless of technique used, guidelines state that stone removal should be delayed until there is resolution of any underlying infection and the patient is optimised for surgery.⁹

In this instance, the patient underwent bilateral percutaneous nephrostomies due to evidence of an infection, with raised

inflammatory markers, severe metabolic acidosis and stage 3 AKI requiring haemofiltration.

The most common postrenal causes of AKI include prostatic hypertrophy (ie, benign prostatic hyperplasia), clot retention and prostate, bladder or cervical cancer. Other extraluminal causes include bowel malignancies or retroperitoneal fibrosis.¹⁰ These are important differentials to exclude when investigating a patient with an AKI. In this patient, CT of the abdomen and pelvis quickly identified the bilateral obstructing stones and hydronephrosis, which correlated with an increased creatinine level, indicating that urgent intervention was needed.

Learning points

- ▶ The occurrence of bilateral ureteric stones, an uncommon and a rare cause of acute kidney injury, is potentially life-threatening.
- ▶ Ureteric colic usually presents with severe flank to groin pain often associated nausea/vomiting, but it can also present as an acute abdomen, which can delay diagnosis if stones are not considered as a differential.
- ▶ In obstructing ureteric stones, with signs of infection and hydronephrosis, urgent intervention is needed to preserve renal function. Either retrograde stenting via ureteroscopy or nephrostomy should be used depending on facilities available and stability of the patient.

Competing interests None declared.

Patient consent Obtained.

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