CASE REPORT

Actinomyces infection causing acute right iliac fossa painNarendranath Govindarajah,¹ Waseem Hameed,² Simon Middleton,² Michael Booth²¹Department of General Surgery, Royal Berkshire NHS Foundation Trust, Reading, Berkshire, UK²Royal Berkshire NHS Foundation Trust, Reading, Berkshire, UK**Correspondence to**

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SUMMARY

This is a case of a 75-year-old man being admitted to the on-call surgical department with acute abdominal pain. On arrival he was clinically dehydrated and shocked with localised pain over McBurney's point and examination findings were suggestive of appendiceal or other colonic pathology. Full blood testing revealed a white cell count of $38 \times 10^9/L$ and a C reactive protein (CRP) of 278 mg/L. A CT scan revealed a gallbladder empyema that extended into the right iliac fossa. This case highlights the potential for a hyperdistended gallbladder empyema to present as acute right iliac fossa pain with blood tests suggestive of complicated disease. Further analysis confirmed *Actinomyces* infection as the underlying aetiology prior to a laparoscopic subtotal cholecystectomy. This case serves to remind clinicians of this as a rare potential cause of atypical gallbladder pathology.

BACKGROUND

Acute abdominal pain, in particular right iliac fossa pain is a very common presenting symptom in primary and secondary care. Acute abdominal pain in patients over 60 years old can be harder to fully diagnose clinically for a variety of reasons. Studies published have shown that among elderly patients presenting to the emergency department (ED) with abdominal pain, at least 50% were hospitalised and 30–40% eventually had surgery for the underlying condition. These studies also showed that approximately 40% of these patients were misdiagnosed, contributing to an overall mortality rate of approximately 10%.¹

The use of CT has greatly improved the diagnostic accuracy of this particular cohort of patients.² The most common causes of acute abdominal pain in the elderly include biliary tract disease, appendicitis, diverticulitis, neoplastic disease, vascular causes and urological pathology. Often they present to the primary or secondary care later than younger patients are often immunosuppressed and therefore can present with the aforementioned pathology in an atypical manner.

CASE PRESENTATION

A 75-year-old man is admitted to the on-call surgical department via his general practitioner with a 1-day history of right iliac fossa pain. On enquiry he described sudden onset right iliac fossa pain which started that morning while he was a passenger in his car with no associated abdominal trauma. The pain was sharp and initially 8/10 in severity and localised to the right without radiation. This man reported two episodes of 'coffee-ground'

vomit without any frank haematemesis, haematochezia or melaena. Preceding this event, he described some unintentional weight loss over the preceding months and a reduced appetite with nausea without any change in bowel habit. The patient also reported several weeks of hiccups that had become worse over the preceding days leading up to his acute admission.

His medical history showed that he had been treated for non-metastatic squamous cell carcinoma (SCC) of the larynx, treated with excision and radiotherapy and is still under the care of ear, nose and throat surgery. He also has asthma and a hiatus hernia for which he takes regular inhalers and proton-pump inhibitors, respectively. He is an ex-smoker having stopped many years ago but does drink up to a bottle of wine each day. There was a family history of colorectal cancer on his paternal side diagnosed at 61 years old; however, this man had a normal colonoscopy within the preceding 5 years. There was no history of gallstones or other hepatobiliary disease.

On examination he was fully alert and orientated. He was tachypnoeic and tachycardic (sinus rhythm) at 40 breaths/min and 130 bpm, respectively. He had no fever with a temperature of 36.7°C with a blood pressure of 130/70 mm Hg. His airway was patent, with good air entry bilaterally. He was clinically dehydrated on admission. His abdomen was not distended but he had localised exquisite right iliac fossa peritonism over McBurney's point with normal bowel sounds. There was fullness on the right side of his abdomen without any palpable organomegaly. He did not have an expansive abdominal aorta or any pain radiating to the back with no significant cardiovascular history.

INVESTIGATIONS

His initial venous blood gas results showed a pH of 7.43 with a bicarbonate concentration of 27.8 mmol/L (base excess of 4.1) and a lactate of 1.7 mmol/L. Urinalysis was unremarkable. Blood tests showed raised inflammatory markers and white cell count (WCC) with deranged liver function. Table 1 shows the initial blood tests on admission into the department. The ECG confirmed that he was tachycardic but in sinus rhythm with no ischaemic changes.

A plain chest radiograph did not show any evidence of pneumoperitoneum secondary to any possible viscus perforation. An urgent abdominal CT was arranged. The CT abdominal radiograph imaging report showed a hyperdistended gallbladder (figure 1) which was 15 cm in length with two

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Table 1 Initial blood tests on admission

Sodium	136 mmol/L (133–146)
Potassium	5.0 mmol/L (3.5–5.3)
Urea	11.5 mmol/L (2.8–7.8)
Creatinine	79 μ mol/L
Amylase	<30 IU/L (30–110)
Total bilirubin	24 μ mol/L (0–22)
Alkaline phosphatase (ALP)	397 IU/L (30–130)
Alanine aminotransferase (ALT)	47 IU/L (0–55)
C reactive protein (CRP)	278.6 mg/L (0–4.9)
Haemoglobin (Hb)	85 g/L (125–180)
White blood cells (WBC)	$38.90 \times 10^9/L$ (4.0–10.50)
Platelets	$780 \times 10^9/L$ (145–500)
Mean cell volume	91.5 fL (80–101)
Neutrophils	$37.20 \times 10^9/L$ (1.80–7.50)

contained perforations as per radiological opinion (figure 2). Interestingly, this inflammation around the perforations had caused an extrinsic duodenal compression (figure 3) and although the common bile duct (CBD) was dilated to 12 mm no obstructing calculus was visualised.

DIFFERENTIAL DIAGNOSIS

This man was managed initially as a case of likely intra-abdominal sepsis with possible bowel perforation, prior to the CT imaging results and on clinical findings. The most likely pre-CT differentials were of appendiceal or right-sided colonic pathology with perforation (diverticular or neoplastic). The lack of visible free air on the erect chest radiograph did of course not exclude an intra-abdominal perforation. The localised right-sided tenderness with profoundly raised inflammatory markers and associated neutrophilia supported both of the above possible differential diagnoses. The raised bilirubin also pointed towards appendicitis as there is good evidence for hyperbilirubinaemia in acute appendicitis.³ The preceding history of intermittent pain and unintentional weight loss in conjunction with advancing age would also lead to a possible diagnosis of a

Figure 2 Coronal view of the CT abdominal radiograph showing the hyper-distended gallbladder which measured 15 cm at maximal length without any visible calculi.

perforated caecal tumour; however, he had undergone a normal colonoscopy within the past 5 years. Evidence has shown that up to 10% of patients over 60 admitted to the ED with abdominal pain are eventually diagnosed with malignancy.

The raised alkaline phosphatase (ALP) could point to a biliary or neoplastic cause but this is a non-specific enzyme with a variety of causes that will affect it including sepsis.

However, the CT imaging confirmed clear gallbladder pathology, specifically a gallbladder empyema. This accounted for the grossly elevated inflammatory markers, deranged liver function testing and the clinical presentation of hiccups secondary to diaphragmatic irritation.

TREATMENT

He was prescribed oxygen, fluid resuscitated, catheterised and started on regular intravenous co-amoxiclav (1.2 g) and a stat dose of gentamycin (480 mg).

Figure 1 CT abdominal radiograph horizontal view with intravenous contrast showing a markedly distended gall bladder with two contained perforations into the pancreatic bed and on the right adjacent to the liver capsule of segment 6.

Figure 3 This CT abdominal radiograph image shows the inflammatory mass around the presumed contained perforation into the pancreatic bed causing extrinsic duodenal compression.

Following this CT scan the patient then underwent ultrasound (USS)-guided drainage of the gallbladder, he also had a nasogastric tube inserted. USS showed numerous gallstones within the bladder and a 12 Fr drain was inserted and 60 mL of pus was aspirated and sent off for microbiological analysis. These stones were not visualised on the preceding CT scan in keeping with only approximately 15% of gallstones being radio-opaque. The final microbiological analysis from the pus sample confirmed *Actinomyces naeslundii* on recombinant DNA analysis.

OUTCOME AND FOLLOW-UP

Actinomyces is a Gram-positive anaerobic to microaerophilic filamentous bacterium that is a commensal of the oral cavity with a low pathogenicity and requires disruption of mucosal integrity to cause disease. Mostly *Actinomyces* infections that occur are of the oral cavity or cervicofacial areas, usually from dental surgery, trauma or sepsis. However, it has also been known to cause disease in the thorax, gastrointestinal tract (GI) and pelvis. *Actinomyces* has been implicated in causing pelvic disease in women, commonly associated with intrauterine contraceptive devices. The prevalence of *Actinomyces* of the gallbladder will be discussed further on in this case report.

The patient responded very well to a course of intravenous co-amoxiclav, percutaneous drainage and fluid resuscitation. He was discharged home with the drain still in situ and returned for an expedited laparoscopic cholecystectomy under the care of the most senior upper GI consultant. His procedure was very challenging and in the end, he underwent a laparoscopic subtotal cholecystectomy with an operative time of more than 6 h. The patient unfortunately developed a bile-leak postoperatively managed with an endoscopic retrograde cholangiopancreatography (ERCP) which confirmed a leak in the middle third of the CBD and a 10 cm plastic stent was inserted. He has been discharged following a 2-week hospital admission, having made a full recovery with a further ERCP and stent removal 6 weeks postprocedure.

DISCUSSION

As explained in the background section of this case report this is an interesting case in terms of diagnosis. This man presented with acute right-sided abdominal pain with tenderness of McBurney's point and raised inflammatory markers. The top differential diagnoses would have included appendiceal or right-sided colonic pathology with a strong suspicion of perforation.

However, it was the CT scan that showed a gallbladder empyema. There were several parts of his history which may have led to a progression of undiagnosed neoplastic disease which had perforated leading to this acute presentation. The USS scan which finally confirmed the cause of the empyema as being secondary to radiolucent stones as he has had previous imaging for his staging of his laryngeal cancer which had not demonstrated any gallstones. This patient had never disclosed any history of biliary colic or an obstructive jaundice. Acalculous cholecystitis or cholangiocarcinoma can cause empyema; however, as in this case, gallstones are the predominant cause.

With regard to the initial blood testing, this patient had a CRP level of 278 mg/mL and a level of >100 mg/mL is invariably associated with complicated disease. He also had a grossly elevated platelet count of 780 (145–500) which suggests a sub-acute component to this picture compared with the raised WCC and CRP that suggest acute inflammatory pathology over the preceding hours leading up to presentation. The raised ALP level of 397 (30–130) is a non-specific enzyme but most likely

due to biliary sepsis, the CBD diameter was also dilated to 12 mm on USS and it is possible that the patient may have passed a gallstone as this could have also produced a peak in ALP.

It was felt with discussion with the upper gastrointestinal team in the surgical department that as the gallbladder was so distended the safest option was for cholecystectomy and drainage prior to laparoscopic cholecystectomy to decompress the gallbladder in order to maximise the possibility of performing the procedure laparoscopically. The patient's grossly distended gallbladder would have increased the probability of incorrect port placement initially and difficulty in establishing a safe view of Calot's triangle intraoperatively.

As explained previously *Actinomyces* is a known commensal of the oral cavity and can cause infection in several areas of the body but usually requires disruption of membrane integrity to become pathogenic. This patient had not had extensive dental or oral surgery; however, as mentioned previously he did have laryngeal surgery for non-metastatic SCC. It can be postulated that the gallstones had caused microtrauma leading to bacterial translocation from the GI tract to the gallbladder and resultant opportunistic infection, which ultimately led to an empyema. However, this is unable to be proved definitively as this patient did not have any repeated instrumentation to his upper GI or surgical procedures prior to his admission, which are known risk factors for *Actinomyces* infection particularly with prosthetic material that can become colonised.

This particular bacterium is known to cause chronic suppurative infections with a granulomatous inflammation. The literature has reported only 18 cases of *Actinomyces* infection of the gallbladder until now.⁴ Specific risk factors that have been identified for such infections are diabetes mellitus, neoplastic disease, steroid use, previous surgery and the presence of foreign bodies.⁵ In this case the only factor of note was previous laryngeal cancer. *Actinomyces* is well known to be a 'great imitator' in clinical practice as it often mimics other pathology such as inflammatory or neoplastic disorders.

The Tokyo Guidelines, which were updated in 2013, deal specifically with the management of acute cholecystitis and cholangitis. According to these guidelines, patients are graded according to the severity of their clinical presentation from grade 1 (Mild), grade 2 (Moderate) and grade 3 (Severe—evidenced by end organ dysfunction).⁶ The patient we have presented in this report would have fallen into the grade 2 category of acute cholecystitis. He scored a grade 2 as his WCC was > 18 000/mm³ and was found to have marked inflammation on imaging. These international guidelines state that he should have received an emergency cholecystectomy within 72 h of symptoms; however, it was the marked distended gallbladder empyema that has complicated his management. It was felt clinically that he should have received percutaneous transhepatic gallbladder drainage (PTGBD) due to the gross anatomical distortion to minimise the potential difficulty and risks of the laparoscopic cholecystectomy, which would be the only definitive treatment. According to the guidelines, PTGBD is normally reserved for grade 3 acute cholecystitis with end-organ dysfunction that this patient did not exhibit. Percutaneous decompression of the gallbladder is essential for preventing these patients from becoming critically unwell⁷ and part of source control in sepsis management prior to definitive surgical therapy. There is no randomised control evidence of when the optimal time is to perform an elective cholecystectomy; however, this patient received his laparoscopic cholecystectomy 2 weeks post-PTGBD.

Learning points

- ▶ The diagnosis of the acutely unwell elderly patient with abdominal pain can be more difficult than in younger patients and the case for definitive imaging is becoming more important.
- ▶ Although established, this case is an important reminder that gallbladder pathology can present as acute right iliac fossa pain.
- ▶ *Actinomyces* is a rare cause of atypical gallbladder pathology.
- ▶ Grossly elevated inflammatory markers are invariably associated with complicated disease and elevated platelet counts can be a sign of subacute pathology.
- ▶ Be aware of the Tokyo Guidelines with regard to management of acute cholecystitis and acute cholangitis as a guide to best clinical practice.

Contributors WH contributed with the initial collection of case material to put the report together and with initial proof-reading. SM provided overall guidance

and support throughout the submission process. MB was a consultant UGI surgeon who performed the procedure and was responsible for the overall care of the patient.

Competing interests None.

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