Meticillin-resistant *Staphylococcus aureus* liver abscess

Introduction

Pyogenic liver abscesses are uncommon in clinical practice, with the implicated organisms usually of gastrointestinal origin. *Staphylococcus aureus* is occasionally isolated as the pathogen, but meticillin-resistant *S. aureus* causing a liver abscess is extremely rare.

This article describes a 78-year-old man who presented with abdominal pain and vomiting. Investigations revealed a liver abscess from which meticillin-resistant *S. aureus* was isolated. The abscess was drained radiologically with extended antibiotic cover and resulted in complete recovery. A thorough search for the source of his meticillin-resistant *S. aureus* revealed a history of colonization and meticillin-resistant *S. aureus* bacteraemia of unknown origin 6 weeks previously which had been treated with appropriate antibiotics. This case highlights the potential for meticillin-resistant *S. aureus* to seed and cause liver abscesses, and the need for swift and aggressive treatment.

Discussion

Pyogenic liver abscess are uncommon with approximately 11 cases per million persons per year (Johannsen and Madoff, 2000). Most pathogens originate from gastrointestinal tract flora, mainly as a result of benign biliary disease, malignant colonic tumours or therapeutic manipulation of the biliary tree. They are usually polymicrobial, most commonly containing *Klebsiella*, group D *Streptococcus*, *Escherichia coli* and *Bacteroides*. *S. aureus* is isolated in approximately 4% of cases, usually in children under 5 years of age (Johannsen and Madoff, 2000) but meticillin-resistant *S. aureus* in a hepatic abscess is rare.

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The right hepatic lobe is more commonly involved than the left as it contains a denser network of biliary canaliculi and

Case Report

A 78-year-old man was admitted in December 2008 feeling generally unwell with upper abdominal pain and recurrent vomiting. He had a history of hypertension and chronic back pain secondary to osteoarthritis. He frequently attended the hospital outpatients pain clinic where he had a facet joint injection in August 2008.

He had been admitted to a nearby hospital at the beginning of November 2008 with similar symptoms. On that admission he was afebrile and haemodynamically stable. Examination had revealed a soft abdomen with tenderness in the epigastrium. Blood tests had shown a normal white cell count of 7.0×10^9/litre, elevated C-reactive protein of 86.2 mg/litre, normal amylase of 87 units/litre and normal liver function tests. Biliary pathology was excluded with a normal abdominal ultrasound and peptic ulcer disease was excluded via a normal gastroscopy. During that hospital stay he had spiked a temperature and had blood cultures taken which had grown meticillin-resistant *Staphylococcus aureus*. He was promptly treated with intravenous vancomycin 1 g twice daily initially with dose adjustments according to serum levels for a total of 5 days. He was then treated with 5 days of oral rifampicin 300 mg twice daily and trimethoprim 200 mg twice daily. The focus for meticillin-resistant *S. aureus* bacteraemia could not be identified. It was hoped that antibiotic treatment would prevent seeding of the meticillin-resistant *S. aureus*. His meticillin-resistant *S. aureus* colonization screen was positive so he was also treated with appropriate topical agents. He was eventually discharged home feeling better.

On his subsequent admission to the authors' hospital, he was apyrexial but looked unwell and dehydrated. His pulse rate was 102 beats per minute and blood pressure was 102/67 mmHg. General and systemic examination was unremarkable. Blood results on admission showed elevated white cell count of 14.9×10^9/litre and a C-reactive protein of 309 mg/litre. Liver function tests were deranged with a bilirubin of 15 μmol/litre, alkaline phosphatase 251 units/litre, alanine transaminase 121 units/litre and albumin 17 g/litre.

An abdominal ultrasound showed a heterogeneous area in the liver suspicious of an abscess. A computed tomography scan of the abdomen revealed a large lobulated low attenuation area in the liver, 10 cm in maximum diameter, lying close to the diaphragmatic surface in the right lobe (*Figure 1*). There was also a reactive right-sided pleural effusion.

A transcutaneous external pigtail drain was introduced into the abscess cavity under computed tomography guidance (*Figure 2*). Green turbid fluid was drained which grew meticillin-resistant *S. aureus* sensitive to mupirocin, trimethoprim, gentamycin, teicoplanin and vancomycin – exactly the same as the positive blood cultures taken in November 2008. Blood cultures taken on this admission were negative, as were several meticillin-resistant *S. aureus* colonization screens. His chest X-ray, urine culture and a transthoracic echocardiogram were normal. He was human immunodeficiency virus negative. The most likely source of the abscess was felt to be seeding from the previous meticillin-resistant *S. aureus* bacteraemia.

The drain left in situ continued to drain pus until it accidentally came out 10 days later. The patient was initially commenced on intravenous metronidazole 500 mg three times daily, tazocin 4.5 g three times daily and teicoplanin 600 mg once daily which were continued for 10 days in addition to anti-colonization therapy. Teicoplanin levels were therapeutic. As the patient improved clinically and biochemically the intravenous antibiotics were converted to oral linezolid for 18 days and he was discharged 3 weeks later feeling a lot better.

A follow-up computed tomography scan at 4 weeks showed a wedge-shaped low attenuation area in the right lobe of the liver at the site of the previous abscess, most likely as a result of an infarcted area post-drainage with no sign of recurrence of the collection and no sign of necrosis (*Figure 3*). On review in outpatient clinic at 6 weeks he remained well and liver function tests were normal. Subsequent follow-up computed tomography liver and magnetic resonance cholangiopancreatography was normal at 8 weeks. He remains well to date.

Figure 1. Computed tomography scan at presentation showing a large lobulated low attenuation area in the liver, 10 cm in maximum diameter, lying close to the diaphragmatic surface in the right lobe.

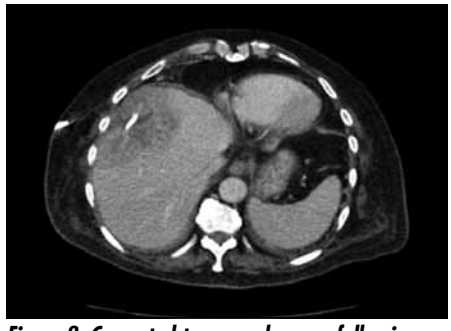

Figure 2. Computed tomography scan following insertion of transcutaneous external pigtail drain into the abscess.

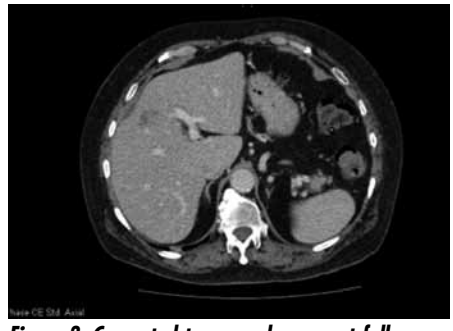

Figure 3. Computed tomography scan at follow up shows resolution of the abscess.

accounts for more hepatic mass (Sherlock and Dooley, 1997).

Pyogenic abscesses can be single or multiple. Biliary system infection is the most common cause of pyogenic liver abscess and is generally associated with multiple lesions, whereas abscesses arising via the portal vein are usually solitary (Chi et al, 2004).

Presentation is highly variable but classically comprises fever, right upper quadrant pain or fullness, and jaundice. However, jaundice is rare unless biliary tree infection is the cause or there is extensive hepatic involvement. Other clinical manifestations include chills, cough, pleuritic pain sometimes radiating to the right shoulder, malaise, vomiting and nausea.

Leucocytosis and deranged liver function tests are common blood abnormalities. Blood cultures are positive in only 50% of patients. Plain chest films are abnormal in around half of patients, showing changes such as elevated right hemidiaphragm, basilar atelectasis and right pleural effusion. Ultrasound and computed tomography are sensitive imaging modalities but a definitive diagnosis requires cultivation of purulent material obtained from the abscess cavity.

Untreated pyogenic liver abscess is almost invariably fatal. Percutaneous drainage in combination with antibiotics for 2–6 weeks is the mainstay of treatment for a liver abscess, although operative debridement or resection is occasionally required (Smith et al, 2007). The combination of percutaneous drainage and antibiotic therapy has a cure rate of 69–90% (Chi et al, 2004). Antibiotic therapy without drainage should be reserved for those who have a risk associated with drainage or in whom the abscess is too small to be drained. Antibiotics should be started as soon as a pyogenic liver abscess is suspected and modified when culture results are available. When selecting antibiotic therapy, care should be taken not to use hepatotoxic drugs if liver function is deranged. Abscesses generally resolve after a full course of therapy. One case report describes successful use of tigecycline where conventional therapy had failed to treat a meticillin-resistant *S. aureus* liver abscess (Khanna and Inkster, 2008).

Very few cases of isolated meticillin-resistant *S. aureus* liver abscess have been reported. In most cases the patient had an underlying chronic disease such as chronic kidney disease (Chi et al, 2004), sickle cell disease (Mancao et al, 2007), human immunodeficiency virus (Sayana et al, 2010) or a clear route of transmission for meticillin-resistant *S. aureus*, such as an infected ventriculo-peritoneal shunt (Shen et al, 2003).

Conclusions

In the current case the cause of the initial meticillin-resistant *S. aureus* bacteraemia is uncertain. The patient, although elderly, had no clear risk factors for developing a liver abscess. His attendance at the outpatients pain clinic could have been the source of his colonization with meticillin-resistant *S. aureus*. He also had a facet joint injection 3 months before his initial presentation with meticillin-resistant *S. aureus* bacteraemia. The authors emphasize the need for screening for meticillin-resistant *S. aureus* colonization and appropriate treatment of all hospital attenders including outpatients especially before elective interventions. **BJHM**

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LEARNING POINTS

- Meticillin-resistant *Staphylococcus aureus* is a rare cause of pyogenic liver abscess. However, as resistant bacteria become more frequent with the widespread use of antibiotics it must be considered, particularly in patients with risk factors for colonization.
- Frequent hospital attendance, as an inpatient or outpatient, is a risk factor for meticillin-resistant *S. aureus* colonization and potential for subsequent bacteraemia with its associated complications.
- Screening for meticillin-resistant *S. aureus* colonization and appropriate treatment especially before any elective interventions remains of paramount importance in hospital medical practice. This also needs to be adopted in GP practice to increase the capture rate in the community and prompt early treatment.