



# An unexpected cause of deranged liver function: pyogenic liver abscess

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## DECLARATIONS

### Competing interests

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Written informed consent to publication has been obtained from the patient or next of kin

### Guarantor

MC

### Contributorship

MC reviewed the case-notes and literature, and wrote the manuscript; LT performed the post-mortem examination and provided the images; MK led the care of the patient and conceived the case report; all contributors have approved the manuscript

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This report describes the postmortem discovery of pyogenic liver abscesses as a cause of incidental abnormalities in liver function tests, where an earlier suspicion for this unusual diagnosis may have altered the fatal outcome.

## Case report

An 80-year-old woman was admitted after a collapse without loss of consciousness. The only symptom reported was urinary frequency with recent treatment for a urinary tract infection. Other significant past medical history included choledocholithiasis, for which she had an endoscopic retrograde cholangiopancreatograph (ERCP) with biliary stenting two years previously. On examination she was afebrile, and had bilateral crackles at the lung bases, with minimal abdominal discomfort but no guarding or rebound tenderness. Chest X-ray showed right lower zone consolidation and possible lower lobe collapse with a raised hemi-diaphragm. Her blood tests showed a normocytic anaemia (haemoglobin 11.4 g/dL) and marked inflammatory response (white cell count  $21.9 \times 10^9/L$  and C-reactive protein 265 mg/L). She was treated for a chest infection with intravenous co-amoxiclav (at 1.2g TDS).

Her blood tests also showed a raised alanine transferase at 129 u/L and alkaline phosphatase at 146 u/L. This incidental finding triggered investigation with abdominal ultrasound, which found two irregular hypoechoic masses suggestive of metastases. She was planned for a computer tomography (CT) scan to search for a site of primary cancer.

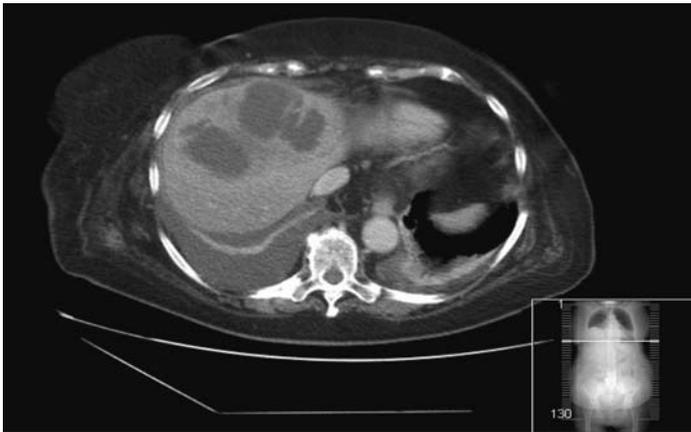
Meanwhile, the patient became clinically unwell with respiratory distress and worsened inflammatory markers (white cell count  $35 \times 10^9/L$ ). Her

liver function tests remained abnormal and her albumin level dropped from 30 g/L to 23 g/L. She started spiking fevers of 38°C and developed diarrhoea, so her antibiotic regime was changed after 3 days of co-amoxiclav to piperacillin and tazobactam (Tazocin, at 4.5 g TDS) with metronidazole (500 mg TDS).

Two weeks after admission, she underwent a CT scan of the abdomen which identified multiple loculated lesions within the liver, with no other intra-abdominal pathologies identified. The metal biliary stents were visualized and appeared patent (Figure 1). The differential diagnoses for the liver abnormalities were necrotic metastases and, unexpectedly, liver abscesses. Microbiology advice was sought to continue antibiotic regime (21 days of intravenous Tazocin and metronidazole received) but to consider drainage of the abscesses. Unfortunately, by this time the patient had deteriorated. For the first time the patient experienced right upper quadrant pain and exhibited tenderness on examination. Her respiratory function worsened and chest X-ray showed a 'white-out' appearance due to large pleural effusion. A multidisciplinary decision involving the family and palliative care agreed not to pursue pleural or abdominal drainage, but to keep the patient comfortable. She died after two days.

Postmortem examination was performed as the investigations could not confirm liver abscesses or explain for the drastic respiratory deterioration. It found the liver to have a large necrotic abscess in the right lobe with considerable parenchymal disruption but a normal gallbladder and biliary system. On the lungs there were focal areas of pneumonic consolidation but the right hemithorax was filled by thick purulent material (Figures 2 and 3). The postmortem diagnosis was consistent with hepatic abscess causing empyema of the right lung and septicaemia.

**Figure 1**  
CT scan of the abdomen showing multiple loculated lesions within the liver, identified as possible metastatic lesions or pyogenic abscesses



This woman was likely predisposed to liver abscess due to the presence of foreign body in the biliary tract from metal stenting, although there was no evidence of obstruction. The early presentation resembled a respiratory infection; failure to respond to conventional antibiotics had triggered alarm to look for other pathologies but the assumption of malignancy turned out

**Figure 2**  
A large necrotic abscess in the right lobe of the liver causing gross parenchymal disruption



incorrect. A more timely diagnosis or suspicion for hepatic abscess with the help of CT scanning, prior to the patient's deterioration, may have altered the final outcome. With hindsight, the presentation of right-sided chest signs and X-ray appearance of raised right hemi-diaphragm is fairly common in pyogenic liver abscess causing contiguous spread to neighbouring structures.

## Discussion

Pyogenic liver abscess is a rare condition, with a hospital incidence between 2–18 per 100,000 population, and suggestion of an increasing trend in incidence.<sup>1–3</sup> In the pre-antibiotic era, pyogenic liver abscesses occurred in young patients around their third to fourth decade due to intra-abdominal infections, commonly secondary to appendicitis.<sup>4</sup> Now, the median age is in the sixth decade, and biliary tract disease is the commonest source of infection.<sup>1,5,6</sup> This includes cholecystitis, gallstones, cholangiocarcinoma and pancreatic tumour. Colonic diseases such as colon cancer and diverticulitis form the next commonest course.<sup>2,3</sup> Infective organisms are polymicrobial, with bowel origin Gram negative organisms, such as *Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* being implicated most frequently.<sup>3,7</sup>

The main clinical findings include fever (often swinging fever) and right hypochondrial pain and tenderness, nausea and vomiting, malaise; but extra-gastrointestinal features such as cough, shortness of breath and lung consolidation also occur.<sup>2,3,5</sup> Our case patient presented late with the classical features pointing to hepatic infection, thus delaying the diagnosis. A retrospective study comparing patients above the age of 70 with those below found that elderly patients presented with similar symptomatology but were less likely to exhibit abdominal signs.<sup>8</sup> There were no differences in the predisposing conditions or aetiologies. Another retrospective study similarly found significantly fewer elderly patients (>65 years) reporting abdominal pain, but were more likely to have a biliary abnormality; in younger patients alcohol excess and a cryptogenic aetiology were more common.<sup>7</sup>

Patients with pyogenic liver abscess will usually, but not invariably, show abnormalities

**Figure 3**

The right lung was compressed by thick purulent material which coated the whole pleural surface of the lung, with focal areas of solid pneumonic consolidation



in their haematology and biochemistry tests – a 10-year study by Mohsen found 33% of patients with normal liver function and 10% with normal white cell count on admission.<sup>3</sup> Imaging forms the mainstay for diagnosis, with the modality of choice being ultrasound in many case series. It is non-invasive, available, allows simultaneous guided aspiration, and has a sensitivity and specificity of 90%.<sup>3,6</sup> Computer tomography yields up to 100% sensitivity in diagnosis.<sup>2,3</sup>

The management of pyogenic liver abscess involves the use of broad-spectrum antibiotics, usually in conjunction with interventions to remove the abscess. Reported success rates of using antibiotics alone varied greatly between 7–79%,<sup>9,10</sup> regardless of whether used alone or in combination, antibiotics are required in prolonged courses with mean duration of 38 days.<sup>3,7</sup> Before the 1970s, surgical removal was the commonest and first choice treatment,<sup>2,4,5</sup> but since there has been a shift towards percutaneous techniques under image guidance.<sup>2</sup> The choice between percutaneous needle aspiration or catheter drainage is influenced by the size of abscess, whether single or multiple, and clinician's preference.<sup>3</sup> Several studies have suggested superiority with catheter drainage, particularly with larger (>5 cm) abscesses, in terms of curative rates but not

duration of hospital stay.<sup>11,12</sup> Percutaneous approaches are less invasive, with reported case fatality of 0–15%,<sup>2,3,12</sup> which is lower than for open surgery.<sup>3</sup> Surgical options may be preferred if there is a co-existing condition requiring surgical treatment. Studies have not found any difference in the approach chosen based on patient age alone, and mortality after adjustments for other co-morbidities were similar between younger and older patients.<sup>7,8</sup> The overall mortality for pyogenic liver abscess in more recent studies ranged from 6–20%;<sup>1–3</sup> while factors such as age, early diagnosis, treatment options all affect outcome, the most consistently reported determinant of poor outcome is underlying malignancy.<sup>1,3,7,8</sup>

## Conclusion

Pyogenic liver abscess is a rare condition but can occur with commonly encountered settings such as biliary tract disease or intra-abdominal malignancy. The presentation is non-specific and the outcome without appropriate treatment is uniformly fatal.<sup>5,6</sup> As highlighted in this case, the diagnosis of liver abscess does not necessitate sophisticated imaging, but timely investigation is important to facilitate appropriate management. The difficulty for clinicians is to have an index of suspicion for this uncommon diagnosis, particularly when patients present without features pointing to hepatic pathology. Therefore, it is prudent to follow up on unexplained or persistently abnormal findings – for this patient the derangements in liver function tests was the first clue to liver pathology, but a prompt diagnosis of liver abscess may have changed the fatal outcome.

## References

- 1 Meddings L, Myers RP, Hubbard J, *et al.* A population-based study of pyogenic liver abscesses in the United States: incidence, mortality, and temporal trends. *Am J Gastroenterol* 2010;**105**:117–24
- 2 Branum GD, Tyson GS, Branum MA, Meyers WC. Hepatic abscess. Changes in etiology, diagnosis, and management. *Ann Surg* 1990;**212**:655–62
- 3 Mohsen AH, Green ST, Read RC, McKendrick MW. Liver abscess in adults: ten years experience in a UK centre. *QJM* 2002;**95**:797–802

- 4 Ochsner A, Debaquey M, Murray S. Pyogenic abscess of the liver. *Am J Surg* 1938;**40**:292–319
- 5 Miedema BW, Dineen P. The diagnosis and treatment of pyogenic liver abscesses. *Ann Surg* 1984;**200**: 328–35
- 6 Krige JE, Beckingham JJ. ABC of diseases of liver, pancreas, and biliary system. *BMJ* 2001;**322**:537–40
- 7 Chen SC, Lee YT, Yen CH, *et al.* Pyogenic liver abscess in the elderly: clinical features, outcomes and prognostic factors. *Age Ageing* 2009;**38**:271–6
- 8 Smoger SH, Mitchell CK, McClave SA. Pyogenic liver abscesses: a comparison of older and younger patients. *Age Ageing* 1998;**27**:443–8
- 9 McCorkell SJ, Niles NL. Pyogenic liver abscesses: another look at medical management. *Lancet* 1985;**1**:803–6
- 10 Herbert DA, Fogel DA, Rothman J, Wilson S, Simmons F, Ruskin J. Pyogenic liver abscesses: successful non-surgical therapy. *Lancet* 1982;**1**:134–6
- 11 Zerem E, Hadzic A. Sonographically guided percutaneous catheter drainage versus needle aspiration in the management of pyogenic liver abscess. *Am J Roentgenol* 2007;**189**:W138–W142
- 12 Rajak CL, Gupta S, Jain S, Chawla Y, Gulati M, Suri S. Percutaneous treatment of liver abscesses: needle aspiration versus catheter drainage. *Am J Roentgenol* 1998;**170**:1035–9

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