Hepatic abscess and cystic fibrosis

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Summary: Extrapulmonary infection is rare in cystic fibrosis. We describe two adult patients with cystic fibrosis whose course was complicated by the development of liver abscesses. The possible aetiology of these abscesses is discussed and the diagnosis, treatment and prognosis of pyogenic hepatic abscess is briefly reviewed.

Introduction

Almost all patients with cystic fibrosis (CF) eventually develop chronic pulmonary infection with specific bacterial pathogens, notably *Pseudomonas* species and *Staphylococcus aureus*.¹ Despite this, the development of septicaemia^{2,3} or metastatic infection⁴⁻⁶ has rarely been described in the disease. The present report describes two adults with CF whose course was complicated by the development of liver abscesses.

Case reports

Case 1

This 20 year old male was diagnosed as having CF at 3 months of age, based on evidence for pancreatic insufficiency and elevated sweat chloride values. Progressive pulmonary deterioration was noted from the age of 5 years, and during this period of time he required frequent courses of parenteral antibiotic therapy for pulmonary exacerbations. At 8 years of age he presented with hepatomegaly and abnormal liver function tests, and a clinical diagnosis of focal biliary cirrhosis was reached. His routine medical regimen included supplementary pancreatic enzymes and fat soluble vitamins, chest physiotherapy, oral cephalixin and inhaled albuterol. His sputum was chronically colonized with *Ps aeruginosa* and *Ps cepacia*. Pulmonary function tests at age 20 years revealed moderately severe obstructive

abnormalities: forced vital capacity (FVC), 48% predicted; forced expiratory volume in one second (FEV₁), 66% predicted; FEV₁/FVC ratio, 65%.

The patient was admitted to hospital because of clinical and radiological evidence of worsening pulmonary status. On physical examination he was acutely ill with a temperature of 39°C, and a respiratory rate of 30/minute. He had nasal flaring, intercostal retractions, diffuse crackles, and was cyanosed but non-icteric. The liver was enlarged 7 cm below the right costal margin but he had no splenomegaly or ascites. Admission laboratory studies included white cell count $15.9 \times 10^9/l$ with a normal differential, erythrocyte sedimentation rate 62 mm/h, serum aspartate aminotransferase (AST) 120 U/l (normal <36), alkaline phosphatase (ALP) 243 U/l (normal <150), serum albumin 30 g/l. Treatment was instituted with oxygen, physiotherapy and parenteral antibiotics. During the subsequent four days the patient remained febrile, developed increased respiratory distress, and right sided pleuritic chest pain referred to the shoulder tip. A chest radiograph at this time revealed a large right pleural effusion. At thoracentesis, 350 ml of serosanguinous fluid was obtained, but cultures of this fluid were negative. In view of rising hepatic enzymes, an abdominal ultrasound examination was performed and demonstrated a fluid-containing lesion, compatible with an abscess, in the right lobe of liver (Figure 1), but no gall stones. This finding was confirmed by a computerized tomography (CT) scan. Under ultrasound guidance, 10 ml of purulent material was aspirated percutaneously from this lesion, and the cavity was irrigated with saline solution. In view of the potential for anaerobic infection, clindamycin was added to the antibiotic regimen. However, subsequent cultures of the

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Figure 1 Case 1. Sonogram in a sagittal plane showing a small echo-free lesion (arrow) in the right lobe of the liver. K=kidneys, L=liver.

material obtained from the liver abscess were negative for aerobic and anaerobic bacteria, acid-fast bacilli and fungi, and no parasites were visualized microscopically. Blood cultures were consistently negative during the patient's hospital course, and serological tests for *Echinococcus* and amoebiasis were non-reactive. Parenteral antibiotic therapy was continued for 4 weeks, and at the time of discharge, complete resolution of the abscess cavity was evident on repeat abdominal ultrasound examination. Complete clearing of the pleural effusion also occurred. No recurrence of the hepatic abscess has been noted during a 5-year follow-up period.

Case 2

This 21 year old male with CF, was a younger sibling of the first patient presented. He had advanced lung disease (FVC 38% predicted, FEV₁ 32% predicted; FEV₁/FVC ratio 68%), and his sputum was chronically colonized with *Ps aeruginosa* and *Ps cepacia*. He had no past history of hepatobiliary disease, but had been hospitalized on numerous occasions because of acute lung infections.

He was recently admitted because of an acute exacerbation of his lung disease. On examination, he was moderately ill, with a fever of 39°C, and a respiration rate of 40/min. Abdominal examination was normal. Laboratory data included white cell count $13.3 \times 10^9/l$ with a normal differential, sedimentation rate 24 mm/h. Liver function tests included alkaline phosphatase 200 U/l. Initial ther-

apy consisted of parenteral ceftazidime and piperacillin. Low grade fever characterized the initial hospital course. In addition, he complained of intermittent upper abdominal pain, referred to the right shoulder tip. In view of this, an abdominal ultrasound examination was performed which revealed two space-occupying lesions, one located in the left lobe, the other in the right lobe of the liver: no gall stones were visualized. This finding was confirmed by CT scan (Figure 2). Under CT guidance 2 ml of serosanguinous material was aspirated from the lesion in the left lobe of the liver, and 1 ml from the right lobe lesion. Histological examination of this material revealed neutrophils mixed with red blood cells; no parasites were visualized, and all cultures were sterile. Blood cultures were also repeatedly negative. The antibiotic regimen was changed to gentamicin and metronidazole and continued for 4 weeks. On discharge from hospital, an ultrasound examination revealed considerable reduction in the size of both liver lesions, and a repeat ultrasound 3 months later showed complete resolution of these lesions.

Discussion

Pyogenic hepatic abscess is an uncommon problem in both adults⁷ and children,⁸ particularly in patients with normal immune mechanisms. The cases presented are of interest because of the rarity of extrapulmonary infections in CF patients. Although liver involvement is relatively common in

Figure 2 Case 2. CT scan in a transverse plane showing two lesions in the liver, one in the right lobe (white arrow), and the second in the left lobe (black arrow). G=stomach, S=spleen, A=aorta.

CF, to our knowledge hepatic abscess has not previously been described in association with the disease. Unfortunately, the source of infection in each of our patients was unclear. Bacterial infection may become established in the liver in several ways, including through biliary sepsis, trauma, direct extension from infection of contiguous structures, or infection in abdominal viscera drained by the portal vein.⁷ None of these pathogenic mechanisms, however, applied in either of our patients. It is tempting to speculate that the hepatic abscesses in the patients described resulted from systemic septicaemia, arising from the lower respiratory tract. Pneumonia as a source of septicaemia, leading to the development of hepatic abscess has previously been described.⁸ Although rare, bacteraemia can occur in CF^{2,3} and recently the development of brain abscess has been described in adult patients with CF,⁴⁻⁶ the source of which was presumed to be septicaemia related to bronchiectatic lung disease.⁴ In our patients it is possible that a small area of hepatic necrosis may have provided a nidus for infection. Alternatively, the patients may have had asymptomatic congenital liver cysts which became superinfected in the course of bacteraemia, and this might explain the occurrence of liver abscess in two siblings. However, we have no direct evidence that either of these mechanisms applied to our patients, as numerous blood cultures, and culture of the material aspirated from the liver abscesses were sterile in both cases, possibly reflecting prior parenteral antibiotic therapy. This finding of sterile cul-

tures of blood and of pus obtained from liver abscesses is not unusual, as attested by recent reviews of the subject.^{9,10} The absence of a documented septicaemic illness and the failure to isolate similar organisms from the lung and from the liver abscesses in our patients, suggest that these abscesses were most likely cryptogenic in nature, i.e. abscesses for which no source of infection can be determined.^{7,8}

The diagnosis of hepatic abscess is frequently not made during life, both because of the rarity of the lesion and its non-specific clinical presentation.^{7,8} However, in recent years the diagnosis and precise localization of liver abscess has been facilitated by the advent of newer imaging techniques, ultrasonography and CT in particular.⁹⁻¹⁷ These techniques have also revolutionized the management of hepatic abscess. Thus, although transperitoneal surgical drainage has been the traditional treatment,⁷ recently percutaneous aspiration, guided by CT or ultrasound, has increasingly replaced open drainage both in children and adults with hepatic abscess.⁹⁻¹⁷ Although percutaneous drainage is not universally successful,¹⁷ we opted for this approach, as both our patients were considered poor surgical risks in view of advanced lung disease. Irrespective of whether an open or closed drainage procedure is used, all patients with hepatic abscess should receive parenteral antibiotic therapy.^{9,10,12-15} Whilst awaiting culture results, an empiric antibiotic regimen should be chosen that will cover the pathogens most frequently isolated from hepatic

abscess, namely Gram-negative bacilli and anaerobes.⁷ The optimal duration of antibiotic therapy is not known, but a minimum of 4–8 weeks is generally recommended.⁷ Finally, despite recent advances in diagnostic methods and approaches to treatment, pyogenic liver abscess is still associated with a substantial mortality.¹⁵ Craig *et al.*¹² recently

attempted to identify prognostic factors with respect to pyogenic liver abscesses. These investigators found that, with appropriate antibiotic therapy and drainage, patients like ours who present with 1–2 abscesses and have no evidence of jaundice or biliary obstruction generally have a good prognosis.

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