Case Report

Actinomycotic liver abscess

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ABSTRACT

Actinomycosis bacteria are known for their disregard to anatomical boundaries and their ability to infect organs all over the body including the liver. Here the infection is usually contained in the form of single or multiple abscesses. The clinical manifestations produced are variable even protean and only in some patients point to the right upper abdominal quadrant. However with appropriate imaging modalities and culture techniques for microaerophilic organisms accurate diagnosis is possible and specific antibiotic therapy can be initiated. We report a patient with an actinomycotic liver abscess and no apparent predisposing factor. She was diagnosed on the basis of a history of fever and right upper quadrant pain and tenderness, the abdominal ultrasound and computed tomography findings of a hypodense liver lesion and a histopathology specimen following a diagnostic and therapeutic aspiration of the liver abscess, and had an excellent response to penicillin therapy which demonstrates the nowadays possible avoidance of laparoscopic, and open surgical intervention for this condition.

Keywords: Actinomycosis, liver abscess, cryptogenic.

Saudi Medical Journal 2000; Vol. 21 (8): 771-774

A 34 year old Indonesian housemaid presented to Riyadh Medical Complex in May 1999 with the complaint of fever and rigors for 5 days followed by malaise and right upper quadrant pain for 3 weeks. She had last been to Indonesia 2 years ago and denied any past medical or surgical history and her family history was unremarkable. She had no allergies, regular menses, and had insertion of an intrauterine contraceptive device (IUCD) following the birth of her only child 16 years ago. The physical examination revealed an afebrile patient, normotensive, with a regular pulse of 80/min and a respiratory rate of 18/min. No lymph nodes were palpable, she was not jaundiced and there was no lower limb oedema. There were no signs of chronic liver disease and no apparent skin rash. Her chest, cardiovascular and central nervous system examinations were normal. The abdomen revealed a tender hepatomegaly with a liver span of 18 cm and a smooth edge. Urinalysis showed 1+ albumin and no glucose or bile pigment. Laboratory tests revealed a peripheral blood white cell count of 16.2 x 10 per cubic millimeter with 90% polymorphs and 10% lymphocytes and a hemoglobin of 10.5 g/dl, mean cell volume (MCV) 73.6, mean cell hemoglobin (MCH) 24 and a platelet count of 786. The erythrocyte sedimentation rate was 115 mm/1st hour and the serum electrolytes were normal. Liver function tests revealed an Asparate transaminase (AST) 22 u/l, Alanine transaminase (ALT) 8 u/l, Alkaline phosphatase (ALP) 190 u/l, total protein 96 g/l, and a serum albumin of 31 g/l. The alpha-fetoprotein level was 1 microgram/l. Serum amylase initially 310 u/l was normal the next day. Lactate dehydrogenase (LDH) was 468 u/l, creatinine phosphokinase (CPK) 34 u/l. The prothrombin time was slightly prolonged 18.1 s. Screens for human immunodeficiency (HIV), hepatitis B virus (HBV) and hepatitis C virus antibody (HCV-ab) were negative. *Ecchinococcus* and *brucella* titres were negative and amoebiasis titre weakly positive at 1/34. Blood cultures and urine cultures obtained on

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Received 24th October 1999. Accepted for publication in final form 18th April 2000.

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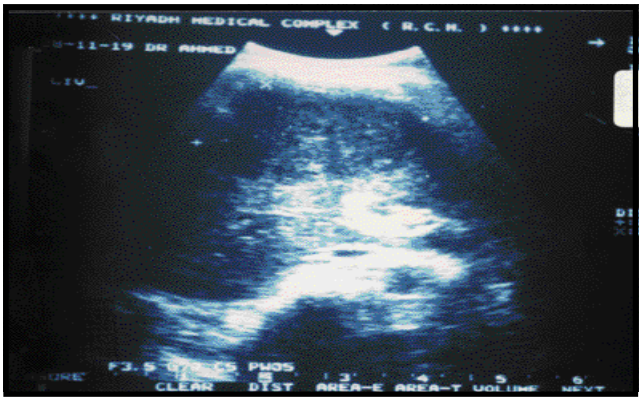

Figure 1 - Ultrasonogram showing 8 x 7 cm hypoechoic lesion in the anterior segment of the right lobe of the liver.

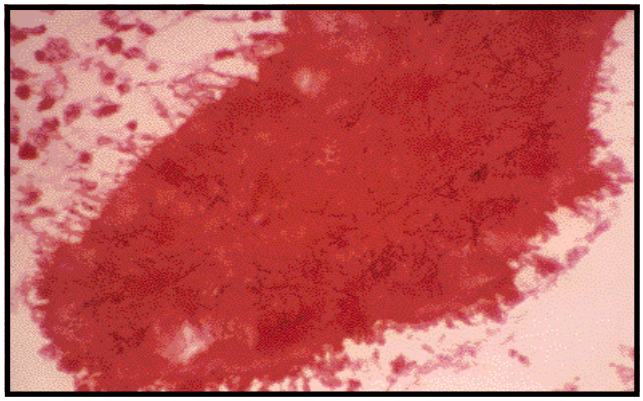

Figure 3 - GMS stain, showing the black filaments within the matrix of the actinomycotic granule (Magnificant x 400).

presentation were negative. The patient was admitted with the working diagnosis of a hepatic abscess. She was commenced on ceftriaxone 1 g intravenously every 12 hours and metronidazole 500 mg intravenously every 8 hours. A chest-radiograph obtained revealed no abnormality. An abdominal radiograph revealed an IUCD to be present. Ultrasound of the abdomen on day 2 showed a well defined rounded mass 8 x 7 cm in the anterior segment of the right lobe of the liver with lymph node enlargement in the porta hepatis (Figure 1). Computed tomography on day 3 revealed a low attenuation lesion in the anterior segment of the right lobe of the liver with central areas of necrosis and enhancing slightly with contrast (Figure 2). On the same day the patient underwent a CT guided therapeutic and diagnostic aspiration of the liver abscess, pus like material was sent for analysis, accompanied by a physician, to stress the need for anaerobic cultures and accordingly a blood agar culture was set up anaerobically at 37° Celsius for 7 days as well as a Robertson's meat medium culture.

On day 9 while cultures of the material had remained negative, the histopathology report showed colonies of *actinomycosis* in a dense necroinflammatory suppurative exudate, Gram stain, periodic acid shift (PAS) stain and Grocott's stain were positive and organisms with branched filaments seen (Figure 3). Penicillin 4 million units intravenously every 6 hours was added to the antibiotic regimen and ceftriaxone was discontinued after a total of 12 days, and metronidazole after a total of 19 days of therapy. The patient had remained afebrile through the entire period and there was marked improvement in her general condition. A search was made to exclude possible predisposing causes for the actinomycotic liver abscess. Examination of the oral cavity was normal, she was not diabetic or otherwise immunocompromised and had not undergone any kind of abdominal surgery in the past. On day 25 the patient had removal of her IUCD under general anesthesia when manual attempts failed. This was discovered to be of the copper T-loop type. *Pseudomonas* species were cultured from it sensitive

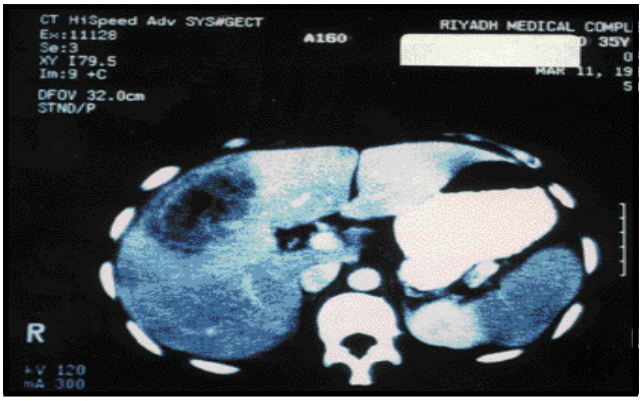

Figure 2 - CT abdomen with contrast showing a heterogenous lesion with central areas of necrosis in the anterior segment of the right liver lobe.

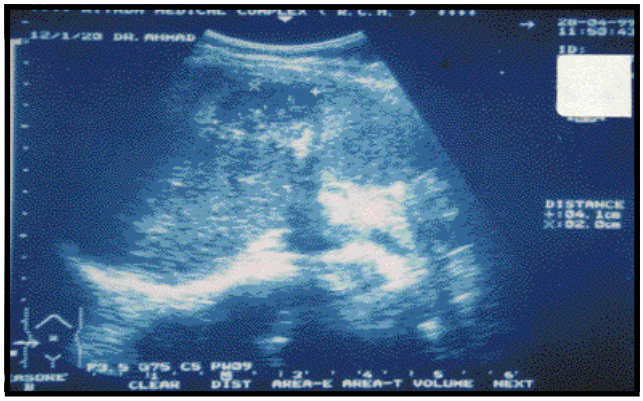

Figure 4 - Ultrasonogram of actinomycotic hepatic abscess 6 weeks into antibiotic therapy documenting shrinkage to size 4 x 2 cm.

to ciprofloxacin, and the patient was started on ciprofloxacin 500 mg orally every 12 hours on day 27. She started to complain of dysuria a day later, and urine cultures revealed *E.coli* sensitive to ciprofloxacin, which was continued for a total of 10 days. Repeat ultrasounds on day 21, 3 weeks into antibiotic therapy, and day 42, 6 weeks into antibiotic therapy, showed progressive shrinkage of the abscess with sizes 5.3 x 3 cm and 4 x 2 cm (Figure 4).

Overall the patient received 6 weeks of intravenous penicillin and was discharged on oral amoxacillin 2 g orally 3 times a day aiming for a total duration of one year, she opted to return to Indonesia and was lost to follow-up.

Discussion. *Actinomycosis* species exhibit a notorious disregard to anatomical boundaries and an ability to infect organs all over the body, in our case the liver.[1] The liver through its dual blood supply and the biliary tree can be involved by pyogenic infection originating in other sites of the body.[2,3] Abdominal pyogenic infection reaches via the portal vein and lodges in the right lobe if the primary infection lies in a part of the gut drained by the superior mesenteric vein and in the left lobe if the primary site is in the splenic vein or inferior mesenteric vein territory.[4] Most of these abscesses involve the right lobe of the liver.[5] Infection of the liver by species of *actinomycosis* can hence occur from oral disease via the hepatic artery and from intraabdominal disease via the portal vein or from direct extension of a subdiaphragmatic or subhepatic process but in the majority of cases no cause is found.[6]

We believe that the patient we report belongs to this cryptogenic variety since she was immunocompetent and had not undergone an abdominal surgical procedure in the past which might have predisposed her to actinomycotic infection.[7,8] The only possible source might have been her IUCD.[9-11] It is well known that these devices are associated with actinomycotic infection if left in situ for more than 2 years and that the risk appears to be increasing with time in our patient's case, 16 years.[12] However extension beyond the pelvis occurs rarely and involvement of the liver could occur only by hematogenous dissemination.[13] This last possibility was not proven in our patient since *actinomycosis* was not grown from her IUCD upon removal. The IUCD had been removed on day 25 of hospitalization while the patient had received 3 weeks of antibiotic therapy and the question is, whether our treatment sterilized the IUCD in view of the fact that even a single dose can interfere with the isolation of agents of *actinomycosis*.[14] Given the higher probability of multiple abscesses in cases of hematogenous spread of an actinomycotic infection involving an IUCD, we do not believe that the latter can be implicated as a cause in the case reported here.

Hepatic involvement leads the protean symptoms of malaise, fever and abdominal pain, as observed in our patient, eventually but not always localizing in the right upper quadrant, which poses a clinical challenge given the potential serious outcome.[6] Though usually indolent, acute presentation occurs in case of 'companion organisms' and the bulk of the evidence supports the concept that most if not all actinomycotic infections are polymicrobial in nature.[15] The infection produced a leukocytosis with a left shift, an elevated erythocyte sedimentation rate and an elevated alkaline phosphatase and a decrease in the level of albumin although liver function tests can be normal as previously described in the literature.[6,16,17]

Actinomycotic organisms can be identified macroscopically or microscopically by their sulfur granules which are a conglomeration of microorganisms that forms only in vivo.[1] They can also be seen as gram-positive filamentous branching organisms at the periphery of the granules. Anaerobic transportation and culture media are necessary for their recovery from biopsy specimens.[18] Ultrasonography and computed tomography (CT) of the liver are the imaging techniques of choice and readily identify the lesion(s), see figures 1 and 2, yet misdiagnosis still occurs as reported by Sugano et al[19] in Japan were 6 out of 11 patients with actinomycotic liver abscesses had partial hepatectomy for suspected hepatoma. This is probably due to the heterogeneity of abdominal actinomycosis on imaging studies as observed by Ha et al.[20,21]

The patient was first started on a combination of ceftriaxone and metronidazole according to the guidelines for treatment of a hepatic abscess by Mandell et al.[22] Here the occurrence of leukopenia on treatment with metronidazole has to be watched out for.[23] Then a percutaneous needle aspiration as a diagnostic and therapeutic procedure under CT guidance was carried out. The choice for this procedure was based on the results of a study conducted by Ch Yu et al[24] who demonstrated the safety and effectiveness of this procedure in combination with antibiotic treatment and suggested it to be a first line alternative to continuous percutaneous catheter drainage, especially for multiple abscesses.[24] The latter procedure i.e. percutaneous catheter drainage combined with appropriate antibiotic therapy had previously been shown to be effective, independent of the origin of the abscess and obviated the need for open surgical intervention.[20,25,26] Laparoscopic drainage is an option when surgical drainage of a liver abscess is unavoidable due to failed medical or percutaneous treatment or the presence of a large abscess. Recent results in a study by Tay et al[27] showed no

complications in 20 patients. Open surgical treatment is occasionally indicated even in the post-antibiotic era and plays a role in the treatment of liver lacerations as a complication of percutaneous procedures, in unstable patients exhibiting signs of continuous sepsis despite attempted non-surgical treatment, fever persisting beyond 2 weeks in the stable patient, or the failed aspiration of viscous pus, pus coexisting with solid debris or a multilocular abscess.[28] The advantages of the open procedure include the ability to explore the abdomen for a source, excellent exposure of the entire liver, accurate assessment of the best drainage site and access to the biliary tree for cholangiography and drainage.[20]

Once the diagnosis of actinomycotic liver abscess was established the patient received penicillin 16 million units a day in combination with metronidazole, and improved clinically and radiologically steadily, see also figure 4. If our patient had been penicillin-allergic tetracycline, erythromycin, which is also safe in pregnancy, minocycline, cephalosporins and clindamycin could have been used as alternatives. Following an initial course of intravenous antibiotics for 2-6 weeks oral therapy with penicillin or amoxacillin for 6-12 months is indicated.[1]

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