Pyogenic liver abscess caused by Streptococcus milleri

Case reports

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Summary

In recent years Streptococcus milleri has emerged as an important cause of pyogenic liver abscess. Whether this represents a changing epidemiological pattern or merely reflects the more widespread application of routine anaerobic bacterial culture techniques is unclear. The isolation of Strept. milleri on culture of a blood specimen from a patient presenting with a pyrexial illness should alert the clinician to the possibility of an underlying liver abscess. Although it is isolated anaerobically this organism should not be mistaken for an obligate anaerobe, especially since it is resistant to metronidazole. Two cases of primary pyogenic liver abscess caused by this organism are reported.


Recent surveys of pyogenic liver abscess have indicated that the disease, although not common, remains a challenging diagnostic and therapeutic problem associated with a significant mortality if inadequately treated. In 1975 Bateman et al. reported on the isolation of Streptococcus milleri in 3 cases of pyogenic liver abscess. The organism was cultured in 21% of 75 streptococcal isolates from visceral abscesses. A year later Reid and Davidson noted that this organism was apparently becoming an increasingly common cause of pyogenic liver abscess. More recently Moore-Gillon et al. were able to culture Strept. milleri as the sole agent or as part of a mixed infection in 13 (81%) of a total of 16 cases of pyogenic liver abscess seen at St Thomas's Hospital, London, between 1970 and 1980. Blood cultures were performed in 11 of these cases, with positive identification of Strept. milleri in 5.

Recently Strept. milleri has been noted in polymicrobial cultures of specimens from patients with bowel-related sepsis at Groote Schuur Hospital, Cape Town. In addition, 2 cases of pyogenic liver abscess in which Strept. milleri was the sole infecting agent have been successfully treated.

Case reports

Case 1

A 45-year-old man presented at a day hospital complaining of weakness, dizziness and loss of weight. He was found to be anaemic and was put on oral haematinic agents. Over the next few weeks his general condition deteriorated and his symptoms persisted, and he was admitted to Groote Schuur Hospital. Examination revealed an ill-looking man with a high, swinging temperature and dental caries. Examination of his cardiorespiratory system and abdomen was unremarkable. He was therefore thought to have a pyrexia of unknown origin, and the relevant investigations were carried out.

The haemoglobin concentration was 7.6 g/dl, the white cell count 12.7 x 10^9/1, and the ESR 150 mm/1st h (Westergren); a differential count showed 82% polymorphonuclear cells with toxic granulations. The serum albumin level was 27 g/l (normal 35-50 g/l), the alkaline phosphatase level 463 U/I (normal 30-85 U/I) and the aspartate transaminase level 160 U/I (normal 0-40 U/I). The initial chest radiograph was clear and a radiograph of the mandible showed a possible left premolar root abscess. Culture of the urine was negative. Blood culture demonstrated a growth of Strept. milleri sensitive to penicillin, which was commenced at a dose of 2 million U 6-hourly. Despite the penicillin the hectic swings in the patient's temperature continued, and he also developed a tender hepatomegaly. Serial chest radiographs demonstrated the evolution of a right basal effusion with atelectasis and elevation of the right hemidiaphragm (Fig. 1). An ultrasound scan of the liver demonstrated a large (15 x 10 cm) abscess, situated in the posterosuperior aspect of the right lobe (Fig. 2). Attempted aspiration under ultrasonic control confirmed that this was pyogenic, but it was not possible to evacuate a significant volume of pus.

Fig. 1. Case 1. Chest radiograph demonstrating the elevated right hemidiaphragm and pleural effusion commonly associated with liver abscess.
Fig. 2. Case 1. Longitudinal ultrasound scan clearly demonstrating a large unilocular abscess in the right lobe of the liver.

Because of the failure of percutaneous drainage the patient underwent surgical drainage via a right posterior extraperitoneal approach through the bed of the 12th rib. A large unilocular cavity was drained of 200 ml of pus, from which *Strept. milleri* was subsequently cultured. The cavity was drained with an irrigation sump drain.

The subsequent course was uncomplicated and by the second postoperative day the patient's temperature had settled and his symptoms had improved. Sinography performed 1 week postoperatively showed complete resolution of the abscess cavity. His dental abscess was treated by extraction of the offending tooth. While in the ward he was maintained on penicillin and when discharged was well; he was given instructions to continue taking the antibiotic for a further month. On follow-up he was well.

Case 2

A 64-year-old woman was initially admitted to hospital with bilateral pleuritic chest pain, epigastric pain, headaches and a high temperature. On examination she was pale and pyrexial with a tachycardia. Clinical examination of the chest revealed decreased breath sounds at the right base, while a 3 cm tender hepatomegaly with guarding and tenderness in the right upper quadrant was noted on examination of the abdomen. A chest radiograph revealed an elevated hemidiaphragm. The haemoglobin concentration was 7 g/dl, the white cell count 15.6 x 10^9/l, and the ESR over 150 mm/1st h (Westergren). Biochemical investigation of a blood sample revealed a slightly low potassium level, a urea level of 13,1 mmol/l, and a creatinine level of 204 mmol/l. The serum albumin level was 20 g/l and the bilirubin level was normal. All liver enzyme values were elevated, notably the alkaline phosphatase level (450 U/l) and the transaminases. Blood cultures were negative.

A diagnosis of liver abscess was made on clinical grounds, and an ultrasound scan confirmed the presence of an abscess measuring 5 x 7 cm in the right lobe (Fig. 3). This was thought to be amoebic, although aspiration was not attempted. On the strength of these findings treatment with intravenous metronidazole was commenced, with gradual resolution of the patient's temperature and an improvement in her symptoms. An amoebic complement fixation test was reported as negative, but in view of the apparent response to the metronidazole treatment with this antibiotic was continued.

Repeat ultrasonography after 1 week showed the evolution of the initial posterior right lobe abscess to one of 10 cm in diameter, while two further abscesses had developed, one measuring 7 cm and situated in the anteromedial right lobe and one measuring 4 cm and situated in the caudate lobe (Fig. 4). These were still considered to be amoebic, and because of her clinical improvement the patient was discharged on metronidazole therapy.

She was admitted to the surgical unit at Groote Schuur Hospital 2 weeks later with severe abdominal pain and persistent pleuritic pain and pain in the tip of the shoulder. Clinical examination confirmed the previous chest findings and revealed a generalized peritonitis. Urgent investigations revealed that the chest radiograph was unchanged, while abdominal radiographs demonstrated a small-bowel ileus with free intraperitoneal fluid. An ultrasound scan was reported as showing a large abscess in the right lobe, a smaller abscess in the caudate lobe and a 5 cm abscess in the left lobe (Fig. 5). In addition there was a localized collection of fluid in the left flank. A diagnosis of ruptured liver abscess with peritonitis was made. The haemoglobin concentration was 8 g/dl and the white cell count 26.0 x 10^9/l. The serum urea level had risen to 25.3 mmol/l and the creatinine level to 264 mmol/l. The results of liver function tests were still grossly abnormal and the serum bilirubin level had risen slightly.

Following resuscitation the patient underwent emergency laparotomy, at which a frank, purulent, generalized peritonitis was confirmed. In each lobe of the liver there was a large multiloculated pyogenic abscess, that in the left lobe having ruptured to produce the clinical symptoms. Large volumes of pus were evacuated from each abscess and the cavities were drained with irrigation sump drains.

Cultures of pus specimens during the operation produced a pure growth of *Strept. milleri* sensitive to penicillin. The patient's subsequent course was uneventful and she was discharged, after a tube sinogram revealed resolution of the abscess cavities, to continue on antibiotic therapy for a further month.
Fig. 4. Case 2. Transverse ultrasound scan 4 weeks later demonstrating two further abscesses of 7 cm and 4 cm in diameter in the right lobe.

Fig. 5. Case 2. Transverse ultrasound scan 1 month later showing 4 abscesses in the right lobe and a single abscess in the left lobe (or a large multiloculated abscess).

Discussion

Pyogenic liver abscess remains uncommon, and untreated carries a reported mortality rate of 100%. Even with medical treatment the mortality rate is significant (over 50%), especially when multiple abscesses are present or there are associated complications.

Over the years the presenting features of pyogenic liver abscess have apparently changed, and recent reviews have emphasized the continued need for a high degree of clinical
In recent years increased interest in *Strept. milleri* as a cause of pyogenic liver abscess has been shown.1,4 The greater awareness of this organism as a cause of abscess formation has resulted from greatly improved anaerobic culture techniques and better speciation of isolates.2 Others have also noted streptococcal species and anaerobic streptococci on culture, but speciation was incomplete. *Strept. milleri* is a commensal of the mouth and gastrointestinal tract and is an important aetiological agent in visceral abscesses.2,3,13 It is a micro-aerophilic organism and is frequently isolated anaerobically, growth being poor aerobically but enhanced by the addition of carbon dioxide.4,6 Haemolysis and the presence of a Lancefield group antigen are variable within the species. The majority of *Strept. milleri* strains are non-haemolytic and are devoid of group antigen. Between 25% and 33% form the Lancefield group antigen A, C, G or F, and all streptococci with the F antigen have the biochemical characteristics of *Strept. milleri*. The organism produces a typical 'toffee or caramel' odour on culture.

Of clinical importance is the fact that *Strept. milleri* is resistant to metronidazole, and it should therefore not be confused with a true anaerobe.6 The organism is, however, very sensitive to penicillin, erythromycin, clindamycin and the cephalosporins.

Because of the poor overall results of medical management, surgical drainage must be considered to be the most important present form of therapy. However, new advances in interventional radiology in respect of percutaneous catheter drainage, especially in the poor-risk patient, may modify this therapeutic approach.14 Whatever the form of drainage, it is recommended that the appropriate antibiotic be given as an adjunct for at least a month.4

**Addendum**

A third patient with a large pyogenic abscess caused by *Strept. milleri* (the abscess being situated in the right lobe of the liver) has recently been treated surgically with success.

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**REFERENCES**