Liver Cysts and Abscesses

Liver cysts

Epidemiology
Hepatic cysts are usually asymptomatic and are often found incidentally. Therefore, it is difficult to predict the exact prevalence. A Norwegian study of a university hospital patient population using ultrasound found an incidence of 11.3% (12.5% females and 9.7% males). No patients were under the age of 40. [1]

Cystic lesions of the liver include:
- Simple cysts.
- Multiple cysts due to polycystic liver disease.
- Neoplastic cysts.
- Hydatid (echinococcal) cysts.
- Abscesses.

Other cysts can occur in the liver region but these are separated from hepatic cysts because they involve the bile ducts. They include:
- Ductal cysts.
- Choledochal cysts: a congenital dilatation of part or whole of the common bile duct. See separate article Choledochal Cysts.
- Cysts related to Caroli's disease: Caroli's disease is the combination of cystic dilatation of the intrahepatic bile ducts and infantile polycystic kidney disease. It has autosomal recessive inheritance. It can present with fever, abdominal pain and recurrent attacks of cholangitis. [2]

Simple cysts [3]
- Pathophysiology: these are thought to be congenital. Lined with biliary-type epithelium but cyst fluid does not contain bile. Because the fluid is continuously secreted, they reaccumulate after aspiration.
- Presentation: they are usually asymptomatic; they can cause right upper quadrant pain and bloating symptoms if large. If very large, they may be palpable abdominally. Rupture, torsion and jaundice caused by bile duct obstruction are rare.
- Investigations: ultrasound, MRI and CT scanning can show cyst anatomy. LFTs may be mildly abnormal. [4]
- Treatment: options include awaiting spontaneous resolution or, if symptoms occur, aspiration/sclerotherapy. Laparoscopic or open fenestration may be more effective but are associated with a higher rate of morbidity and mortality. [4]
- Prognosis: Spontaneous resolution is the norm. Symptomatic cysts respond well to treatment.

Polycystic liver disease [4]
- Pathophysiology: adult polycystic liver disease is congenital and is usually associated with autosomal dominant polycystic kidney disease with mutations in PRKCSH and SEC63 or PKD1 and PKD2 genes. A considerable amount of research has been done on the genetic defects involved.
- Presentation: kidney cysts usually occur before liver cysts and chronic kidney disease is common. However, polycystic liver disease rarely leads to hepatic fibrosis and liver failure. Hepatomegaly and abdominal pain may be present. Cysts are usually first noticed during puberty. Rupture, haemorrhage and infection are rare.
- Investigations: examination of the kidneys and renal function needs to be carried out. LFTs may be normal but liver failure is rare. Ultrasound, MRI and CT scanning will show multiple liver cysts.
- Treatment: this is only needed if symptoms occur. As with simple cysts, options include aspiration-sclerotherapy and deroofing. Liver transplantation is occasionally employed.
- Prognosis: one study reported a recurrence rate after aspiration-sclerotherapy of 19%. [5] Cyst infection can lead to an indolent course with a high risk of recurrence.

Neoplastic cysts
Cystadenomas and cystadenocarcinomas are rare. Cystadenoma is the pre-malignant lesion.
- Presentation: usually asymptomatic or vague symptoms including bloating, nausea and fullness can occur. Abdominal pain and biliary obstruction can result as they enlarge.
- Investigations: LFTs may be normal. Carbohydrate antigen (CA) 19-9 levels may be raised. This can also be measured in cyst fluid. [6] Typical patterns may be seen on CT scanning. MRI and enhanced ultrasound can also be useful. [7]
- Treatment: this is by resection. Despite complete resection, cystadenocarcinomas can recur. [6]

Hydatid (echinococcal) cysts
Pathophysiology: these are caused by infestation with the parasite *Echinococcus granulosus* - a tapeworm. Carnivores such as dogs and wolves act as definitive hosts. They pass out eggs with their stools which can then be ingested by sheep, cattle and humans. The egg larvae then invade the gastrointestinal tract and mesenteric vessels of these intermediate hosts and can pass to the liver. In the liver, the larvae grow and the hydatid cyst develops, producing daughter cysts. Other carnivores who eat the liver of the intermediate hosts can then become infected and adult worms can develop in their gastrointestinal tract. The parasite is found worldwide. Human infection most often occurs in those who raise sheep or cattle or who have contact with dogs.\[9\]

Presentation: can be asymptomatic for many years or can present with pain and large right upper quadrant mass.\[8\] Large cysts can rupture into the biliary tree (causing jaundice or cholangitis), through the diaphragm into the chest, or into the peritoneal cavity (causing anaphylactic shock). Secondary infection and hepatic abscesses can result from hydatid cyst rupture. Hydatid cysts may also form in the lungs and other organs.\[10\]

Investigations: eosinophilia may be present. Echinococcal antibody titres are positive in about 80\% of patients. False positives and false negatives can occur.\[11\] A classic appearance may be seen on CT or MRI scanning (daughter cysts within a thick-walled main cavity).\[12\]

Treatment: this is needed to prevent complications due to cyst growth and rupture. It uses chemotherapy with albendazole or mebendazole, percutaneous procedures and conventional surgery. For treatment details, see separate article Hydatid Disease, which includes hydatid disease management.

Liver abscesses

Liver abscesses are caused by bacterial, parasitic, or fungal organisms.\[13\] In developed countries, pyogenic abscesses are the most common but worldwide, amoebae are the most common cause.\[14\]

Epidemiology

A large American study estimated the incidence to be 3.6 per 100,000 population. However, the incidence varies geographically and a study of Taiwanese patients reported an incidence of 17.6 per 100,000 population. A UK study of a hospital in Birmingham serving a multi-ethnic population of 500,000 identified 86 patients.\[15\]
Aetiology

* **Pyogenic liver abscess:**
  - This can be single or multiple. One study found that the right lobe was affected in 74% of cases, the left in 16% and both in 10%.\[15\]
  - Most are secondary to infection originating in the abdomen (cholangitis secondary to stones or stricture or malignancy is the most common; diverticulitis, appendicitis, Crohn's disease, perforated peptic ulcer).
  - It may be iatrogenic secondary to liver biopsy or a blocked biliary stent.
  - Bacterial endocarditis and dental infection are other causes.
  - A French study found no cause in 18.4% of cases.\[16\]
  - It is more common in the immunocompromised.
  - The French study found that 17.5% of adults with liver abscesses had diabetes.\[16\]
  - Liver cirrhosis is a strong risk factor.\[17\]
  - Liver abscess is a complication of umbilical vein catheterisation in infants. In children and adolescents there is usually immune compromise or trauma.
  - It tends to be polymicrobial. Organisms are usually of bowel origin. *Klebsiella pneumoniae* has emerged as the most common organism seen.\[18\]
  - Other organisms include *Escherichia coli* and *Bacteroides* spp., enterococci and anaerobic streptococci. *Staphylococcus* and *Haemolytic streptococci* are more likely if secondary to endocarditis/dental infection. *Fungal* (*Candida* spp. the most common) or opportunistic organisms are more likely if the patient is immunocompromised.\[19\]

* **Amoebic liver abscess:**
  - 12% of the world’s population is chronically infected with *Entamoeba histolytica*.\[20\]
  - Infection occurs most commonly in tropical and subtropical areas and is more likely if there is poor sanitation and overcrowding.
  - Transmission is via the faecal-oral route. Amoebae invade intestinal mucosa and can gain access to the portal venous system.
  - *E. histolytica* causes amoebic colitis and dysentery but liver abscess is the most common extra-intestinal manifestation of infection.\[20\]
  - Liver abscess can present without a preceding history of colitis. It can also present months to years after travel to an endemic area.
  - It affects the right lobe in 80%.\[21\]

Presentation

- Multiple abscesses tend to present more acutely and single ones more indolently.
- Right upper quadrant pain, tenderness, hepatomegaly, possible palpable mass.
- Swinging fever.
- Night sweats.
- Nausea and vomiting.
- Anorexia and weight loss.
- Cough and dyspnoea due to diaphragmatic irritation.
- Referred pain to the right shoulder.
- Jaundice (studies have reported an incidence range between 6-29% of cases, citing aetiologies such as hepatic pressure from an abscess, cholestasis or parenchymal disease).\[22\]
- Pyogenic liver abscesses can present as pyrexia of unknown origin (PUO) in some people who may not have right upper quadrant pain; pain is a prominent feature in amoebic liver abscess.
- Check history for travel to an *E. histolytica* endemic area.

Differential diagnosis

- Causes of PUO.
- Metastatic malignancy affecting the liver.
- Hepatocellular carcinoma.
- Biliary disease including cholecystitis.
- Bacterial pneumonia.
- Gastritis.

Investigations

- Raised white cell count.
- Raised erythrocyte sedimentation rate (ESR).
- Mid normochromic normocytic anaemia.
- Abnormal LFTs (raised alkaline phosphatase, low albumin, raised serum transaminases, raised bilirubin).
- Blood culture is positive in 50%.\[23\]
- Stools can contain cysts or trophozoites of *E. histolytica*.
- Serology should be carried out if *E. histolytica* is suspected.
- Raised right hemidiaphragm on CXR. May be atelectasis or pleural effusion.
- Ultrasonography can show abscess and also allow guided percutaneous aspiration and drainage. Aspirated fluid should be sent for culture and sensitivity. It also allows biliary tree examination.
- CT scanning can show the abscess, allow guided aspiration and drainage and show other intra-abdominal abscesses or a possible cause such as diverticular disease, appendicitis, etc. It is good for the detection of small abscesses.
- Endoscopic retrograde cholangiopancreatography (ERCP) can show the site and cause of biliary obstruction and allow stenting and drainage.
- Investigation should always seek to determine the underlying cause.
Treatment

- **Antibiotics:**
  - **Pyogenic liver abscess:** The UK study reported the use of a third-generation cephalosporin plus an anti-anaerobic agent such as metronidazole as the most commonly used first-line treatment. A penicillin plus metronidazole were used second-line. Antibiotic resistance is an increasing problem. Factors likely to increase this risk include indwelling biliary stents, recurrent cholangitis and multiple courses of antibiotics. Treatment may be needed for up to 12 weeks and should be guided by the clinical picture, culture results, local microbiological advice and radiological monitoring. [15]
  - **Ameobic liver abscess:** Metronidazole is the treatment of choice. 95% of patients with amebic liver abscesses recover with this alone. Most patients show a response to treatment within 72-96 hours. [24] Diloxanide furoate should be prescribed for 10 days to eliminate intestinal amoebae after the abscess has been successfully treated. [25]
  - Antifungal agents such as amphotericin are used if fungal abscess is suspected.

- **Drainage:** [26]
  - Most patients with pyogenic liver abscess and those with very large amoebic abscesses, may not recover with antibiotics alone and need drainage guided by ultrasonography or CT.
  - Percutaneous aspiration can be carried out for small abscesses although catheter drainage has become the standard of care. Larger abscesses may also need catheter drainage which is also CT- or ultrasound-guided. Drainage should also be carried out if there is impending rupture.
  - Open surgery may be necessary if the abscess has ruptured and there are signs of peritonitis, if the abscess is larger than 5 cm or multiloculated, or if there is a known abdominal pathology such as appendicitis.

- **Supportive measures:**
  - Fluids
  - Nutrition
  - Pain relief

Complications

- Overwhelming sepsis.
- Rupture of the abscess into adjacent structures (pleural, peritoneal and pericardial spaces).
- Secondary infection of amebic liver abscesses.

Prognosis

- **Pyogenic liver abscess:** Advances in diagnostic and interventional radiology over the period of three decades have reduced the mortality rate from 9-80% to 5-30%. [27] Factors that affect prognosis include presence of shock, acute kidney injury and acute respiratory failure. [28]
- **Ameobic liver abscess:** Since the introduction of rapid diagnosis and effective medical treatment, mortality rates have fallen to 1-3%. [24, 29]

In the Birmingham study, described under Epidemiology, above, mortality rate was 11%. [15]

Further reading & references

3. Sporadic Hepatic Cysts; Transplant Pathology/Internet Services, 2013

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