

Bacterial Infection of Liver: A Bird's Eye View

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ABSTRACT

The gastrointestinal tract is colonized by trillions of bacteria and, any injury of the gut barrier causes their translocation to liver and pathogenesis, directly or indirectly. The bacterial infections manifest as liver abscess, acute hepatitis, granulomatous hepatitis, hepatic tuberculosis, spontaneous peritonitis, spontaneous empyema, syphilitic hepatitis, and hepatic brucellosis. The diagnosis includes standard assays for stool and blood culture, biochemistry of liver function and radiology. Chemotherapy with antibiotics as per international guidelines is the treatment option.

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Key words: Liver diseases; Bacterial infection; Pyogenic liver abscess; Bacterial hepatitis; Syphilitic hepatitis

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INTRODUCTION

Liver links the gastrointestinal tract and general circulation, and

plays a central role in nutrient metabolism, synthesis of functional proteins and detoxification of drugs and xenobiotics. Liver is subjected to various metabolic, chemical or infectious diseases that can be inflammatory (acute or chronic hepatitis), non-inflammatory (hepatosis) and cirrhotic. Chronic liver diseases patients have impaired immune system that subsequently worsens over time with disease progression leading to risks of microbial infections^[1]. The gastrointestinal tract harbors the most complex human microbial ecosystem, estimated to be colonized by more than a trillion bacteria of different species^[2]. Injury of the gut barrier causes intestinal translocation and accumulation of bacteria and their components (DNA and endotoxin) towards hepatopathogenesis^[3-6], directly or indirectly.

PYOGENIC LIVER ABSCESS

The bacterial pathogens infecting liver varies according to the site of entry, and could be enteric and usually polymicrobial. The bacterial or pyogenic abscess of liver is thus, classified as per one of the routes of entry such as the biliary tract, portal vein and hepatic artery or by direct extension^[7]. *Streptococcus milleri*, *Escherichia coli*, *Streptococcus fecalis*, *Klebsiella pneumoniae* and *Proteus vulgaris* infections arising through the biliary tract are the most common cause of liver abscesses. Clinical conditions such as complicated diverticular disease, appendicitis, peritonitis and pancreatitis may cause portal vein pyaemia leading to pyogenic liver abscesses^[8,9]. Symptoms include pyrexia, right upper quadrant pain, malaise and anorexia, and in some cases tender hepatomegaly. Serum biochemistry shows elevation in bilirubin, alkaline phosphatase and transaminases. The available chemotherapy includes appropriate analgesics, antibiotic therapy and drainage of the abscess^[8,9].

BACTERIAL HEPATITIS

While hepatotropic viruses are the most common causes of acute hepatitis, bacterial hepatitis are relatively very rare^[4]. Patients with positive blood culture have hyperbilirubinemia and elevated levels of alkaline phosphatase and transaminases. Bloodstream infection and severe sepsis results in hepatic ischemia or acute hepatitis. *Brucella abortus*, *Bartonella henselae*, *Coxiella burnetii*, *Leptospira interrogans*, *Yersinia pestis*, *Treponema pallidum* etc. have been

implicated in cases of acute hepatitis^[4]. Most bacterial infections of liver are however, secondary hepatitis with only discrete clinical and laboratory findings. Antibiotics as per the international guidelines are the standard treatment options.

GRANULOMATOUS HEPATITIS AND HEPATIC TUBERCULOSIS

Granulomatous liver disease is one of the most important manifestations of certain bacterial infections^[10]. Hepatic tuberculosis, a rare manifestation of liver disease caused by *Mycobacterium tuberculosis* may present as an abscess or a more diffused form of granulomatous hepatitis^[11,12]. Standard anti-tubercular drug treatment is effective in most of cases, however, if difficult to diagnose, surgical procedures could be adopted.

SPONTANEOUS BACTERIAL PERITONITIS

Patients in advanced stages of liver cirrhosis tend to develop bacterial peritonitis without evident source of infection, termed as spontaneous bacterial peritonitis (SBP)^[13]. The usual bacteria causing SBP are mostly *Escherichia coli*. Diagnosis of SBP is done in patients with liver cirrhosis if the ascites polymorphonuclear cell count exceeds 250 cells/ μ L in the absence of other forms of peritonitis. Prophylactic therapy is based on the oral administration of non- or poor-absorbable antibiotics to eliminate or reduce the load of Gram-negative bacteria without affecting Gram-positive or anaerobes. Prophylaxis has been recommended in high risk patient populations with prior history of SBP, admitted with gastrointestinal bleed, and with low total protein content in ascitic fluid^[14]. Cephalosporines, the third generation antibiotic is the established treatment for SBP. Notably, the development of infections by quinolone- or methicillin-resistant bacteria is the main complication of long-term norfloxacin prophylaxis^[14]. Therefore, SBP prophylaxis should be strictly restricted and considered only in high-risk populations or the patients awaiting liver transplantation.

SPONTANEOUS BACTERIAL EMPYEMA

Spontaneous bacterial empyema (SBEM) is a rare spontaneous infection of a preexisting hepatic hydrothorax. SBEM is diagnosed in patients with liver cirrhosis after exclusion of pneumonia. *Escherichia coli* and *Klebsiella pneumoniae* are the major causative agents of SBEM^[15,16]. Third-generation cephalosporins is the first-line treatment.

SYPHILITIC HEPATITIS

Liver dysfunction in primary or secondary syphilis caused by *Treponema pallidum*^[17,18], termed as 'syphilitic hepatitis' is rare. However, this is seen in congenital and tertiary syphilis that typically results from the generalized pathological changes affecting multiple organs. Primary and secondary syphilis are easy to treat with penicillin, doxycycline, azithromycin, or ceftriaxone.

HEPATIC BRUCELLOSIS AND BRUCELLOMA

Brucelloma is hepatic abscess caused by *Brucella melitensis*^[19]. Hepatic brucelloma is a rare complication of brucellosis, causing a range of clinical manifestations. The hepatic lesion size is diagnosed by radiological and histological assessment, and treated by combined antibiotic therapy.

CONCLUSION

While viral hepatitis and associated chronic liver diseases are most common, bacterial liver disease is also an important health issue. The most common microbes responsible for liver infection are Gram-negative enteric and pneumococci. Risk factors for bacterial infection include decompensated alcoholic liver disease, fulminant hepatic failure, gastrointestinal bleeding, invasive procedures and impaired immune system. Translocation and accumulation of gastrointestinal bacteria causes liver abscess, acute hepatitis, granulomatous hepatitis, hepatic tuberculosis, peritonitis, empyema, syphilitic hepatitis, and hepatic brucellosis. Although, chemotherapy with standard antibiotics is the treatment option, the ideal drugs should be safe, affordable, and effective while protecting the anaerobic gut flora.

CONFLICT OF INTERESTS

The authors declare that they do not have conflict of interests.

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