Bacterial infections of the liver

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Abstract

Bacterial infections of the liver can be categorised into three entities: acute bacterial hepatitis, bacterial liver abscesses and granulomatous liver disease caused by bacteria. A broad spectrum of bacteria has been implicated in different forms of hepatic infections, and a wide variety of systemic bacterial infections affect the liver during the course of infection. Clinical symptoms, causative pathogens and therapeutic approaches overlap widely. Most bacterial infections that affect the liver cause secondary hepatitis with only discrete clinical and laboratory findings. Standard diagnostic procedures including physical examination, imaging and microbiological cultures will usually be sufficient to detect and ascertain the bacterial causes of hepatitis. Therapy of bacterial infections of the liver usually includes antimicrobial chemotherapy according to standard guidelines for the underlying disease and the identified pathogen as well as additional invasive therapy which may be required for certain manifestations.

Introduction

The liver can be affected by a wide variety of systemic infections. In bacterial infections most common forms of liver involvement are pyogenic abscesses, acute hepatitis and granulomatous liver disease.

Bacteria can reach the liver in several ways: Hematogenous spread of bacteria into the liver during bloodstream infection via the portal vein or the hepatic artery, direct spread of bacteria from a contiguous focal infection, via the biliary tree, or following internal or external trauma. These infections usually manifest as so-called pyogenic abscesses that are clinically indistinguishable from other abscesses such as the amoebic liver abscess (caused by Entamoeba histolytica).

While viruses are the most common causes of acute hepatitis, infections due to bacteria such as Neisseria meningitidis, Salmonella typhi, Brucella spp. or Campylobacter spp., have also been associated with this clinical
entity. Infections due to bacteria such as *Mycobacterium* spp., *Tropheryma whippelii*, *Treponema pallidum*, *Coxiella burnetii* or *Rickettsia* spp. are among the major causes of granulomatous liver disease.

This chapter reviews the different forms of liver diseases that can be caused by bacteria and summarises the clinical features and therapeutic options for the most common forms and pathogens.

**Routes of infection**

There are in general four mechanisms by which bacterial infections of the liver develop: haematogenous, biliary, contiguous spread, and *via* direct inoculation.

Haematogenous seeding of bacteria can occur *via* the portal vein or the hepatic artery from the systemic circulation and are frequently associated with peritonitis, diverticulitis or generalised bloodstream infection or sepsis. In the pre-antibiotic era, the haematogenous route was the most common method of infection, and infection usually originated from appendiceal pathology [1]. Today bacterial infections of the liver are most commonly associated with biliary disease [2, 3].

Underlying conditions leading to bacterial infections of the liver *via* the biliary tree are most commonly cholangitis, cholecystitis, or malignancies such as cholangiocarcinoma [3].

Translocation of bacteria from infectious processes in close proximity of the liver such as appendicitis, diverticulitis and other inflammatory processes of the intestine are less frequent, although contiguous spread from the lung, kidney, colon or the stomach has been reported [2, 4–6].

There are two potential mechanisms of direct infection: iatrogenic following invasive procedures such as ERCP, percutaneous liver biopsy [7] or abdominal surgery [8] accounting for approximately 7% of all pyogenic abscesses of the liver, or *via* penetrating trauma through the skin or secondary to accidental ingestion of sharp objects such as fish bones [9] or toothpicks [10] accounting for approximately 5% [3].

Cryptogenic infections where the route of infection and/or the underlying condition cannot be identified account for 40–99% of abscesses based on data from several studies [2, 4, 11, 12].

**Clinical entities**

Bacterial infections of the liver can be categorised into three entities: acute bacterial hepatitis, bacterial (pyogenic) liver abscesses and granulomatous liver disease caused by bacteria. While this differentiation remains largely theoretical in most infections because clinical symptoms, causative pathogens and therapeutic approaches overlap widely, differ-