



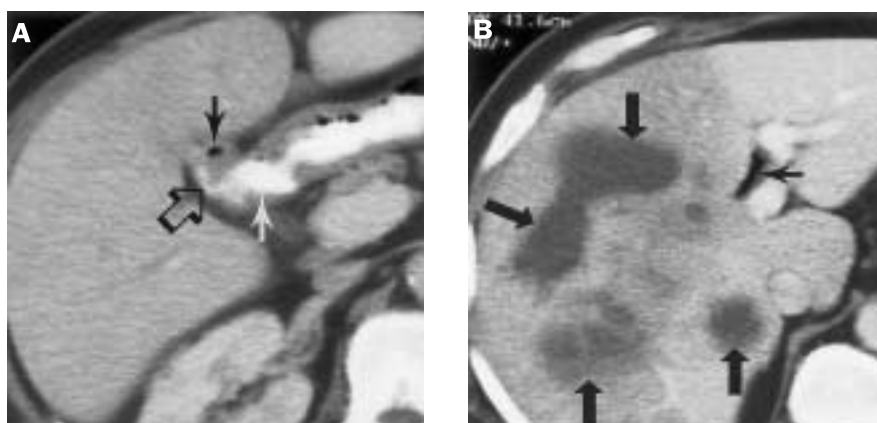
## Cholecystoduodenal Fistula Presenting as Multiple Hepatic Lesions in a Patient with Pneumobilia

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**Figure 1.** Contrast-enhanced CT scan of the abdomen

A 57 year-old man presented with upper respiratory symptoms, malaise, non-specific aches and pains, nausea, vomiting, and weight loss. On physical examination he had firm hepatosplenomegaly. The patient's past medical history was unremarkable for gastrointestinal disease. A contrast-enhanced computed tomography scan revealed multiple hepatic lesions and pneumobilia [Figure 1]. A few fine-needle aspirations were obtained from the liver lesions and an upper gastrointestinal series was performed. Following the liver biopsy the patient developed fever, leukocytosis and sepsis, and eventually underwent an exploratory laparotomy.

The CT scan [Figure 1A] and upper gastrointestinal series [Figure 2] show pneumobilia (small black arrows), gas and contrast in the gallbladder (large black arrows) and a cholecystoduodenal fistula (open arrows) extending to the

immediate post bulbar segment of the duodenum (white arrow). A more cephalad CT image [Figure 1B] shows multiple large non-enhancing hypo-attenuating liver lesions within the right hepatic lobe, proven by biopsy to be hepatic abscesses (large black arrows). These findings are consistent with a cholecystoduodenal fistula complicated by ascending cholangitis and multiple hepatic abscesses. Laparotomy demonstrated a cholecystoduodenal fistula, which was treated with division and closure and cholecystectomy. Pathologic examination of the resected gallbladder disclosed calculi and chronic fibrous cholecystitis.

Biliary-enteric fistulas are a communication of the biliary tract to the bowel, most commonly to the duodenum and much less frequently to the colon, stomach, or other segments of the gastrointestinal tract. The reported incidence of

spontaneous internal biliary fistulas is 0.4–1.9% [1–4]. Cholecystoduodenal fistula is the most common type, occurring in 50–76% of cases [2–4]. Less common types of biliary-enteric fistulas are cholecystocolic fistula (occurring in 13–21%) and choledochoduodenal fistulas (13–19%). Cholecystoduodenal fistula is often spontaneous, with approximately 90% of cases due to cholelithiasis, usually with chronic cholecystitis or choledocholithiasis. Other etiologies include peptic ulcer disease, neoplasms of the gastrointestinal tract, inflammatory bowel disease, trauma, or congenital malformation [1–4].

Since signs and symptoms are non-specific, a high index of suspicion is needed to make the diagnosis. Imaging plays an important role in early diagnosis and prevention of possible complications,



**Figure 2.** Upper gastrointestinal series.

such as gallstone ileus and ascending cholangitis with hepatic abscess formation. The best diagnostic imaging methods are endoscopic retrograde cholangiopancreatography, upper gastrointestinal series, and CT [4,5]. However, since patients usually present with non-specific symptoms, plain film radiography, ultrasound, CT, or upper gastrointestinal series are usually performed as the initial investigation and not endoscopic retrograde cholangiopancreatography. Plain abdominal radiographs may show pneumobilia, distended small bowel loops, and sometimes an ectopic gallstone [5]. Contrast studies such as

upper gastrointestinal series and CT may show the contrast material delineating the fistula. Other findings indicative of this diagnosis include a contracted, thick-walled gallbladder adherent to adjacent bowel, pneumobilia, and non-visualization of the gallbladder by ultrasound.

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### Less is more

*Ludwig Mies van der Rohe (1886-1969), German-born U.S. architect and Director of the Bauhaus in the early 1930s. Following his principles of 'skin and bones' construction, he was the leading figure of the International Style, and pioneer of the glass and steel skyscraper.*

## Capsule

### Ozone consumption

In addition to their well-defined role in antigen binding in the humoral immune response, antibodies were recently shown to be capable of catalyzing the oxidation of water by singlet oxygen. Wentworth et al. confirmed that the hydrogen peroxide generated from this reaction can be produced at quantities sufficient for bactericidal activity. More surprising, however, was that another

species from the reaction, which displays the tell-tale signs of ozone, was needed to finish the job; this same species was detected at the site of inflammation in an antibody-dependent *in vivo* model. Antibody-generated oxidants, including ozone, may thus be rudimentary contributors to immune defenses.

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## Capsule

### Anemia gene discovered

A rare type of anemia found mainly in Bedouins may provide insight into the disease. Scientists at Schneider Children's Medical Center, Tel Aviv University, and the Weizmann Institute of Science identified the gene *CDA-1* (congenital dyserythropoietic anemia-1) responsible for a type of anemia found in several Bedouin families. These findings (*Am J Hum Genet*, December 2002) could lead to effective detection and eventually treatment. Also, understanding the role of this gene's protein product could provide important clues to other types of anemia and to general mechanisms of blood cell formation. *CDA-1* is characterized by a medium to high deficiency in blood production, and critical patients receive blood transfusions throughout their lifetime. It is a rare disease worldwide, but the most

vulnerable group is the Negev Desert's Bedouin population, which practices consanguineous marriage. The high disease prevalence in this Israeli population was crucial to the identification of the *CDA-1* gene. The researchers observed that mutations in this specific gene correlate with the disease. These mutations modify a previously unknown protein called codanin-1, which is likely present in the nuclear envelope of bone marrow cells that divide and give rise to red blood cells. Studies of this protein, which may become an important pharmaceutical target similar to erythropoietin, may yield a better understanding of blood cell maturation and anemia and eventually lead to an effective remedy for *CDA-1*.

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