28-YEAR-OLD WOMAN, gravida 4, para 3, aborta 0 (35 weeks), presented with a 36-hour history of acute onset of postprandial right upper quadrant pain, nausea, and vomiting. She described similar episodes of this pain during the preceding month. Her physical examination was remarkable for right upper quadrant tenderness, but her temperature was 36.2°C and her white blood cell count was $7.1 \times 10^3/\mu L$. Ultrasonography of her right upper quadrant showed a distended gallbladder with multiple stones, but results of liver function tests were normal.

The patient was treated conservatively for the presumed diagnosis of acute cholecystitis but became more symptomatic the next day. Initially, a laparoscopic approach was attempted, but because of perihepatic adhesions and the inability to visualize the gallbladder, the abdomen was opened and the findings in Figure 1 and Figure 2 were noted.

What Is the Diagnosis?
A. Acute cholecystitis
B. Gallbladder volvulus
C. Acalculus cholecystitis
D. Hydrops of the gallbladder

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**Answer**

**Gallbladder Volvulus**

**Figure 1.** Acute gangrenous cholecystitis.

**Figure 2.** Gallbladder volvulus demonstrating a free-floating gallbladder and twisting of the cystic artery and duct on a short mesentery. After rotations of the gallbladder counterclockwise, a cholecystectomy was performed.

Wendel initially described gallbladder volvulus (also called gallbladder torsion) in a 25-year-old pregnant patient in 1898. Since then, more than 300 cases have been reported. Although it is more commonly found in elderly patients, especially women, gallbladder volvulus has been described in all age groups.

Although patients typically present with acute onset of abdominal pain and have right upper quadrant tenderness, a palpable mass may be present in only 20% of patients and gallstones are found in only 20% to 50% of cases. Lau et al described 3 triads of clinical diagnosis, which include the physical characteristics (thin, elderly, and deformed spine); symptoms (short history, abdominal pain, and early vomiting); and physical signs (abdominal mass, absence of tenderness, and a pulse rate–temperature discrepancy).

Imaging studies may contribute to the diagnosis but are often nonspecific. The ultrasound examination may show a distended gallbladder with a square appearance but no gallstones. A “bull’s-eye” may be seen on the hepatobiliary nuclear scan, and delayed filling of the gallbladder may be seen on decubitus images.

Anatomic variants of the peritoneal attachments between the gallbladder and the liver are present in all cases. These attachments create a “floating gallbladder” with a short mesentry containing only the cystic artery and duct, or a floating gallbladder with a long mesentery around which the gallbladder twists. The gallbladder torsion may be complete (360°), resulting in gangrenous cholecystitis, or incomplete (180°), resulting in intermittent symptoms of biliary colic. The direction of torsion may be clockwise or counterclockwise, and both directions are found with equal frequency.

Autopsy studies have found these anatomic variants in up to 4% to 5% of the population; however, the incidence of gallbladder torsion is much lower. Precipitating factors are common, eg, gastrointestinal peristalsis, kyphoscoliosis, visceroptosis, gallstones, cystic artery atherosclerosis, abdominal trauma, sudden motion, heavy meals, constipation, adhesions, weight loss, and postpartum status.

Although detorsion and pexis have been described, treatment remains to be cholecystectomy. Early diagnosis prevents perforation of a gangrenous gallbladder and should result in a surgical mortality of less than 5%. Laparoscopic cholecystectomy, as described by Nguyen et al and Schroder and Cusumano, is facilitated by decompression and untwisting of the gallbladder, which prevents injury to the common bile duct that may be tented up into the torsion.

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