

Correspondence

Correspondance

GALLSTONES RESULTING FROM ABDOMINAL SHOTGUN WOUND

Several reports have described the association of metallic foreign bodies and gallstones,¹ suggesting that metal objects may act as a nidus for stone formation. But to explain this phenomenon based on what is known about the pathogenesis of gallstones is difficult.²

A 43-year-old man was admitted because of severe right upper quadrant pain. Twelve years previously he had suffered a shotgun injury to the epigastrium and had undergone emergency laparotomy for a 5-cm long wound, which had tracked into the right upper quadrant. Numerous small-bowel and mesenteric perforations had been repaired but no major organ damage noted. A small hole in the gallbladder had been identified and closed in 2 layers without exploration or drainage. The patient's postoperative course was uncomplicated and he had been healthy in the intervening years.

Abdominal ultrasonography now showed a small contracted gallbladder containing numerous stones. As a result he underwent elective cholecystectomy. Several rounds of buckshot were found embedded in the wall of the peritoneal cavity. Examination of the specimen revealed 4 large stones (each approximately 1.5 cm in dimension), confirming the diagnosis of cholecystitis associated with cholelithiasis. A radiograph of the 4 stones showed a single pellet of buckshot in the centre of each. Further examination of the stones revealed concentric rings of deposition typical of cholesterol stones.

Only 2 other cases of acute cholecystitis secondary to shrapnel have been reported.³ Not surprisingly most cases describing biliary stones secondary to metal objects have presented

as obstruction of the common bile duct rather than cholecystitis.^{3,4} The earliest reference to a metal-induced stone was in 1878 when Nauche described gallstones that formed around a steel needle.⁵ Goldham,⁶ in 1930, was the first to report a bullet acting as a nidus. Today, the most common cause of this scenario is a surgical clip that migrates into the common bile duct after a cholecystectomy.^{7,8}

Interestingly, metal objects in the biliary tree do not typically cause stones.⁴ Thus, other factors must predispose some patients to form stones.

How a metallic foreign body could promote biliary stone formation is unclear. The major requirement for the formation of cholesterol gallstones is cholesterol supersaturation in the bile. This usually occurs because of excess cholesterol secretion.⁹ There is no evidence to suggest that metal can affect cholesterol secretion. Yet, by itself cholesterol supersaturation is not enough to initiate stone formation. An abnormality of nucleation is also required.¹⁰ Often this is the presence of known nucleating factors such as mucous glycoproteins or immunoglobulins. It is possible that a metal object could act as a nucleating factor, but more likely it causes local inflammation that results in the secretion of a known nucleating factor. A metal object, like any foreign body, could also promote stone growth by simply contributing to bile stasis.¹¹ However, with our current understanding of the pathogenesis of biliary stones, it is impossible to say with assurance how metal objects may promote stone formation.

James C. Ellsmere, BEng
Christopher G. Jamieson, MB BS
Department of Surgery
Dalhousie University
Halifax, NS

References

1. Morse LJ, Millin J. Gallstone formation secondary to a foreign body. *N Engl J Med* 1971;284(11):590-1.
2. Strasberg SM. The pathogenesis of cholesterol gallstones — a review. *J Gastrointest Surg* 1998;2(2):109-25.
3. Sanowski RA, Arbaje-Ramirez S. Acute cholecystitis secondary to unusual gallstones. *Am J Gastroenterol* 1979;71(2):193-5.
4. Mitchell R, Kerr R, Barton J, Schmidt A. Biliary obstruction secondary to shrapnel. *Am J Gastroenterol* 1991;86(10):1531-4.
5. Ban JL, Horose FM, Benfield JR. Foreign bodies of the biliary tract. *Ann Surg* 1972;176:102-7.
6. Goldham H. Steckschuss im Ductus cysticus. *Zentralbl Chir* 1930;57:2664-6.
7. Martinez J, Combs W, Brady PG. Surgical clips as a nidus for biliary stone formation: diagnosis and therapy. *Am J Gastroenterol* 1995;90(9):1521-4.
8. Walker WE, Avant GR, Reynolds VH. Cholangitis with a silver lining. *Arch Surg* 1979;114:214-5.
9. Holzbach RT, Marsh M, Olszewski M, Holan K. Cholesterol solubility in bile. Evidence that supersaturated bile is frequent in healthy man. *J Clin Invest* 1973;52(6):1467-79.
10. Burnstein MJ, Ilson RG, Petrunka CN, Taylor RD, Strasberg SM. Evidence for a potent nucleating factor in gallbladder bile of patients with cholesterol gallstones. *Gastroenterology* 1983;85:801-7.
11. Fridhandler TM, Davison JS, Shaffer EA. Defective gallbladder contractility in the ground squirrel and prairie dog during the early stages of cholesterol gallstone formation. *Gastroenterology* 1983;85(4):830-6.

© 1999 Canadian Medical Association