Development of hepatolithiasis due to a celery stalk retained within the bile ducts of the liver

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ABSTRACT

INTRODUCTION Commonly encountered foreign bodies are remnants from surgical procedures and ingested materials. Rarely, the latter cause stone formation in the biliary tract.

CASE HISTORY We describe a 51-year-old female who underwent choledoduodenostomy and who presented with abdominal distension caused by multiple stones in the bile ducts within the liver (hepatolithiasis) and an intact celery stalk. Hepatolithiasis was demonstrated by ultrasonography and computed tomography of the abdomen. The celery stalk was not confirmed until exploration of the biliary duct.

CONCLUSIONS Here, we describe, for the first time, an intact, undigested celery stalk in the biliary tract which induced hepatolithiasis. We believe that choledochojunostomy favoured reflux of the celery stalk from the duodenum into the biliary tract.

KEYWORDS

Foreign body – Intrahepatic bile duct – Biliary tract – Vegetable

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Patients who have undergone biliary surgery and who are symptomatic may have retained foreign bodies. Commonly encountered foreign bodies are remnants from surgical procedures and ingested materials. Patients with enteric–biliary anastomoses carry the risk of reflux of food into the biliary system. Such reflux blocks normal flow into the biliary tract, leads to inflammation, bacterial adhesion and deposition of calcium bilirubinate, and eventually causes stone formation within the biliary tract.

Here, we provide a report of a 51-year-old female who had a choledoduodenostomy and who presented with abdominal distension caused by multiple stones within the bile ducts of the liver as well as an intact celery stalk.

Case History

A 51-year-old female was admitted to our hospital with intermittent episodes of abdominal distension over the course of 1 month. She had an open cholecystectomy 17 years previously, but operative details were not available.

Upon hospital admission, physical examination was unremarkable except for a postoperative scar in the right subcostal region. Vital signs were within normal ranges. Laboratory analyses demonstrated levels of alanine aminotransferase and gamma-glutamyltransferase to be increased slightly, but all other laboratory parameters were normal. Ultrasonography of the digestive system revealed

dilatation of the intrahepatic bile duct, pneumatosis in the biliary tract, and hepatolithiasis. Computed tomography of the abdomen demonstrated pneumatosis and dilatation of intrahepatic and extrahepatic bile ducts as well as irregular, high-density shadows in the hilar region of the left lobe of the liver (Fig 1). These features suggested multiple stones within the bile ducts of the liver. A preoperative diagnosis of hepatolithiasis was made. A hepatic left lateral lobectomy as well as biliary-duct exploration was planned.

Intraoperative exploration demonstrated severe adhesion in the upper abdomen, but a stricture in the biliary tract was not observed. After hepatic left lateral lobectomy, exploration of the biliary duct was done through the exposed terminus of the bile duct in the left lateral lobe. Multiple stones as well as a celery stalk (length, ≈4 cm) were found in the openings of the left hepatic duct, and were removed (Fig 2). An enteric–biliary anastomosis was suspected because of pneumatosis in the biliary tract, but we could not be sure until additional exploration at the end of the common bile duct (CBD). Strictures or residual stones were not detected in intrahepatic or extrahepatic bile ducts. The exposed end of the bile duct in the left lateral lobe was closed over a 18F T-tube. Culture of bile revealed growth of *Enterobacter* bacteria.

Gross examination of extracted stones revealed them to be dark-brown to black, and the largest measured 1.6cm in diameter. Resected liver tissue showed dilated bile

Figure 1 CT showing pneumatosis as well as dilatation, and multiple stones within, the intrahepatic bile duct.

Figure 2 Resected left lateral lobe of the liver and extracted celery stalk (inset). The white triangle denotes a dilated intrahepatic bile duct and stones within it.

ducts with local atypical hyperplasia. Surrounding liver tissue demonstrated moderate chronic hepatitis. The patient was discharged from hospital after an uneventful postoperative course.

Discussion

Foreign bodies in the biliary tract are considered to be predisposing factors for stone formation, which leads to pain in the upper abdomen, abdominal distension, jaundice, fever, abnormal liver-function tests or dilatation of the biliary tract alone or in combination. The most common cause is retained material from previous surgical procedures, such as gauze, sutures, stents or clips.

Ingested materials are considered to be a secondary cause of stone formation, and can lead to bowel perforation, penetration into adjacent structures or possible reflux from

the duodenum. Foreign bodies with a sharp, pointed end can cause perforations and penetrate the biliary tract. Orda *et al*¹ reported a case of a CBD stone caused by a fish bone. Endoscopic retrograde cholangiopancreatography demonstrated a choledochoduodenal fistula, which acted as the route of migration for the fish bone (which originated from the intestinal tract). Ban *et al*² reported a toothpick in the gallbladder of a patient. They believed that the toothpick had penetrated the biliary tract before causing the inflammation that ultimately led to a surgical procedure. Break-down of the mechanical barrier that is the sphincter of Oddi due to, for example, papillary-muscle dysfunction or cholangioenteric anastomoses, enables food material to reflux from the duodenum into the biliary tract. Kim *et al*³ reported two cases of CBD stones formed around a fish bone. There was no evidence of a choledochoduodenal fistula, and patients had not undergone surgery in the biliary tract previously. Reflux from the duodenum through the ampulla of Vater could be the best explanation for such these cases. Ban *et al*² reported another case in the same article. The patient had undergone a Roux-*en-Y* choledochojunctionostomy previously. Six stones were found in the biliary tree near the anastomotic stoma, which comprised a nidus of vegetable matter.

It is rare for vegetables to act as foreign bodies and to be found in the biliary tract. Szanto *et al*⁴ reported formation of a CBD stone induced by tomato skin. Otherwise, most conditions are like those described by Ban *et al*², in which vegetable fibres were encrusted with a mixture of cholesterol and bile salts.² Here, we have described, for the first time, an intact, undigested celery stalk in the biliary tract which induced hepatolithiasis. We believe that choledochojunctionostomy favoured reflux of the celery stalk from the duodenum to the biliary tract. The stalk in the biliary tract impaired the defence mechanisms of the host, resulting in promotion of bacterial proliferation and release of bacterial beta-glucuronidase, which eventually resulted in precipitation of calcium bilirubinate. Then, calcium bilirubinate was aggregated into stones by an anionic glycoprotein.⁵

References

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