EUS-guided thrombin injection of cystic artery pseudoaneurysm leading to Mirizzi’s syndrome and hemobilia

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A 52-year-old man presented with a history of right upper-abdominal pain for 7 days and melena for 3 days. General examination revealed tachycardia, pallor, and icterus. Abdominal examination showed normal results. Laboratory investigations revealed hemoglobin, 7.2 gm (reference, 13-15); alanine aminotransferase, 314 U/L (reference, 0-30); aspartate aminotransferase, 140 U/L (reference, 0-30); serum alkaline phosphatase, 470 U/L (reference, 30-120); and serum bilirubin, 4.6 mg/dL (reference, 0.2-1.2). Abdominal US showed acute calcular cholecystitis and dilatation of intrahepatic biliary radicals.

The lower end of the common bile duct (CBD) was normal. It revealed a pseudoaneurysm of 3.4 cm × 2.4 cm (Fig. 1). CT angiography was done after hemodynamic stabilization and showed a pseudoaneurysm of the cystic artery (Fig. 2). EUS of the duodenal bulb showed hyperechoic contents within the CBD (Video 1, available online at www.VideoGIE.org).

As the CBD was followed up toward the liver hilum, an aneurysm 2.8 cm in diameter was noted (Fig. 3). A stone 1 cm in diameter was noted near the neck of the gallbladder.

Figure 1. Abdominal US view showing pseudoaneurysm, 3.4 cm × 2.4 cm, arising from cystic artery.

Figure 2. CT angiographic view showing pseudoaneurysm of cystic artery. RHA, Right hepatic artery; LHA, left hepatic artery; HAP, hepatic artery proper; CHA, common hepatic artery; GDA, gastroduodenal artery.

Figure 3. Linear EUS from duodenal bulb showing pseudoaneurysm. CBD, Common bile duct.

Figure 4. A stone 1 cm in diameter was seen near the neck of the gallbladder. The wall thickness of the aneurysm was 6 mm, and its internal diameter of the aneurysm was 1.5 cm.
The wall thickness of the aneurysm was 6 mm, and its internal diameter was 1.5 cm (Fig. 4).

On tracing the CBD toward the liver hilum, a hypoechoic mass was seen with a compression effect on the CBD. The hypoechoic mass was eventually traced to the thrombosed wall of the pseudoaneurysm. The course of the hepatic artery was followed. A branch of the hepatic artery was seen proceeding toward the neck of the pseudoaneurysm (Fig. 5).

A 22-gauge needle was used to puncture the pseudoaneurysm. One mL (500 units) of human thrombin was injected into the aneurysm (Fig. 6). After injection, the normal lumen of the lower CBD was seen. The aneurysm was completely obliterated. ERCP showed blood clots coming out from the papilla, suggestive of hemobilia (Fig. 7). It showed a narrowing of the common hepatic duct; the length of the narrowing was about 3 cm (Fig. 8).

A 10F plastic stent was placed in the CBD. Elective laparoscopic cholecystectomy was planned after 5 days. On dissection of the neck of the gallbladder, the thrombosed part of the aneurysm was initially delivered. Subsequently, a stone present in the neck area was removed (Fig. 9). The presence of the stent helped proper dissection of the neck of the gallbladder and gallbladder removal. A T tube was not placed in the CBD. On follow-up, the stent was removed after 1 month. A cholangiogram showed no CBD stricture. The patient was asymptomatic after 6 months.

Mirizzi's syndrome is an adverse event in which a gallstone becomes impacted in the cystic duct or neck of the gallbladder, causing compression of the CBD or common hepatic duct, resulting in obstruction and jaundice. Pseudoaneurysms of the cystic artery are rare, with 37 cases reported since 2000 in the literature. Cystic artery pseudoaneurysms are commonly associated with traumatic injury to the biliary vasculature (often from prior surgery) or with cholecystitis or pancreatitis.

Cystic artery pseudoaneurysm is a rare adverse event of acute cholecystitis. In acute cholecystitis, acute
inflammation secondary to gallstones leads to formation of a cystic artery pseudoaneurysm. Pseudoaneurysm of the cystic artery is a rare cause of hemobilia. Many patients will present with hemobilia, whereas other pseudoaneurysms are discovered incidentally.

Quincke’s clinical triad of hemobilia consists of jaundice, colicky abdominal pain, and upper-GI hemorrhage, although these findings are found in only a small subset of patients. The diagnosis is made with color Doppler US, contrast-enhanced CT, and catheter-based angiography, which is the investigation of choice. Cystic artery pseudoaneurysms can be treated by cholecystectomy with ligation of the cystic artery, selective transcatheter embolization, percutaneous direct injection of an embolization agent, or a staged approach with initial embolization followed by elective cholecystectomy. Embolization is particularly useful for patients in an unstable condition.

The present case, in which cystic artery pseudoaneurysm was obliterated by EUS-guided injection of thrombin, appears to be the first such reported case. EUS-guided obliteration avoided a possibly challenging selective angiographic embolization of the cystic artery, which is the usual standard temporizing method before cholecystectomy, particularly in a patient in an unstable condition.

In conclusion, EUS can be a useful modality in the diagnosis of pseudoaneurysm of the cystic artery. EUS-guided obliteration of the pseudoaneurysm is possible before definitive treatment (cholecystectomy) is undertaken. The EUS-guided thrombin injection of a cystic artery pseudoaneurysm can be used as a bridge therapy before definitive cholecystectomy. We have reported a case of acute cholecystitis with Mirrizzi’s syndrome resulting from cystic artery pseudoaneurysm treated by EUS-guided thrombin injection, followed by cholecystectomy.

**DISCLOSURE**

All authors disclosed no financial relationships relevant to this publication.

**Abbreviations:** CBD, common bile duct; CHD, common hepatic duct.

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**Figure 9.** On dissection of the neck of the gallbladder, the thrombosed part of the aneurysm was initially delivered. Subsequently a stone present in neck area was removed.