Recurrent Walled-Off Necrosis Following Embolization with N-Butyl-2-Cyanoacrylate in a Patient with Upper Gastrointestinal Tract Bleeding

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Abstract

A 60-year-old man with a history of rheumatoid arthritis experienced bloody stool and presented in a state of shock. Emergency endoscopy showed upper gastrointestinal bleeding from a duodenal ulcer. Endoscopic hemostasis was attempted but failed. Gastroduodenal angiography revealed an extravasation from a duodenal branch of the anterior superior pancreaticoduodenal artery (ASPDA). Hemostasis was achieved by subsequent selective transarterial embolization (TAE) with N-butyl-2-cyanoacrylate (NBCA) performed via the duodenal branch. Although no recurrent bleeding was observed, walled-off necrosis (WON) developed twice at 1 and 8 months after TAE due to localized necrotizing pancreatitis. WON is a rare but potentially serious complication of TAE with NBCA from a branch of the ASPDA.

Key words: Pancreatitis, TAE, NBCA, Complication, WON

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Introduction

Endoscopy is considered the first-line therapy for bleeding duodenal ulcers, as it is the gold standard for diagnosis, and multiple interventions can be performed to arrest the bleeding [1]. Transarterial embolization (TAE) has become an established and favored therapeutic approach for treating non-variceal upper gastrointestinal (GI) hemorrhaging [2], and it is the preferred second-line therapy when endoscopic intervention fails.

Recently, TAE with N-butyl-2-cyanoacrylate (NBCA) for bleeding in the GI tract has been performed in hemodynamically unstable patients and has been recognized as a safe technique [3]. NBCA can be injected through a microcatheter into small, tortuous arteries or the collateral circulation, both of which are too difficult to access and embolize using a microcoil. NBCA can also enable simultaneous embolization of the collateral vessels connected to the bleeding focus, which can prevent recurrent bleeding from the retrograde collateral flow. According to previous reports that described the use of NBCA embolization for the treatment of GI tract bleeding, the technical success rate was nearly 100%, with a clinical success rate > 70% [4, 5]. However, there have been few reports on the complications associated with this technique. We herein report a case of walled-off necrosis (WON) after TAE using NBCA for bleeding in the upper GI tract. WON is characterized by necrotic tissue contained within an enhancing wall of reactive tissue. It is a mature, encapsulated collection of pancreatic and/or peripancreatic necrosis and has a well-defined inflammatory wall; usually, this maturation occurs ≥ 4 weeks after the onset of necrotizing pancreatitis [6].

Case Report

A 60-year-old man with a history of rheumatoid arthritis (RA) suffered from bloody stool and presented in a state of...
shock. Following emergency endoscopy, he was diagnosed with upper GI bleeding due to a duodenal ulcer. An abdominal computed tomography (CT) scan revealed extravasation from the upper GI tract (Fig. 1). TAE was attempted after endoscopic hemostasis had failed. Using a femoral artery approach, a 4F catheter (shepherd hook; Medikit, Tokyo, Japan) was placed into the gastroduodenal artery. Emergency angiography revealed extravasation from a duodenal branch of the anterior superior pancreaticoduodenal artery (ASPDA) (Fig. 2). A 2.1-F microcatheter (Virtus; Boston Scientific, Tokyo, Japan) was selectively introduced into the duodenal branch over a 0.016-inch microguidewire (Meister; ASAHI INTECC, Seto, Japan). The branch of the bleeding source was too small (approximately 0.5 mm in diameter) to place a coil. We therefore performed TAE using NBCA. NBCA (0.35 ml) diluted with iodized oil (Lipiodol; Guerbet, Aulnay-sous-Bois, France) at a ratio of 1:2 was injected via the microcatheter to fill in the target branch and bleeding point. Gastroduodenal angiography immediately after TAE showed the disappearance of the extravasation, with the cast of NBCA filling the target branch and bleeding point. Unintended filling of NBCA cast in a proximal branch of the ASPDA was also noted. Common hepatic and superior mesenteric angiography also showed no extravasation.

An abdominal CT scan the next day showed retention of the NBCA mixture in the bleeding site and a low attenuation area in the pancreatic head (Fig. 3). Figure 3 also shows NBCA cast in the pancreatic branch just in front of the low-attenuation area in the pancreatic head. Based on these findings, the patient was diagnosed with pancreatitis that was suspected to be secondary to ischemia due to unintended embolization of a pancreatic branch of the ASPDA. This lesion had developed shortly after TAE. The laboratory data revealed an increased C-reactive protein level (25.84 mg/dl) and a pancreatic amylase level of 54 U/L (reference range, 30-110 U/L) (Table 1). Although hemostasis was successfully achieved, the patient complained of lumbar back pain 1 month after TAE. Laboratory data revealed an
vealed fluid accumulation around the peripancreatic area. Blood had increased again (370 U/L), and abdominal CT re-
months after TAE. The level of pancreatic amylase in his level normalized within three months after treatment. The pancreatic enzyme fistula. The patient’s treatment was managed conservatively around the peripancreatic area was presumed to be due to a
sion in the pancreatic head and fluid accumulation around the peripancreatic area was observed (red arrow).

This fluid accumulation on abdominal CT had been noted at 6 months after TAE; we therefore presumed that the necrotic component had continued to persist in the intervening time. Endoscopic retrograde cholangiopancreatography (ERCP) and abdominal CT after ERCP showed that a pancreatic cyst had fistulized to the peritoneum (Fig. 5). Endoscopic trans-
papillary stenting across the orifice of the fistula was performed, and the fistula closed 18 months after stenting.

Discussion

High technical and clinical success rates of endovascular treatments for GI bleeding have been reported [7-12]. TAE is generally regarded as a safe procedure with few complications. Indeed, Koo et al. [5] reported a case series of 102 patients managed with TAE with a 76.5% success rate and 2 cases of ischemic complications. Two patients developed bowel infarction after TAE due to inadvertent embolization of adjacent, non-target vessels. Wang et al. [13] reported a case series of 29 patients managed with TAE with a 93% success rate and no ischemic complications. There has only been one case report of necrotizing pancreatitis following TAE of the superior and inferior pancreaticoduodenal arteries with metal coils and gelatin sponges for a bleeding duodenal ulcer [14]. Although rare, pancreatitis is known to be a complication after TAE of the branch of the pancreaticoduodenal artery [14]. Pancreatitis following transcatheter arterial chemoembolization (TACE) for hepatocellular carcinoma also carries a significant risk of morbidity and mortality [15]. Clinically evident acute pancreatitis after TACE occurs at an incidence between 1.7% and 4% [15] via a mechanism similar to that of “ischemic” acute pancreatitis.

In swine, selective TAE with NBCA in the pancreas caused localized ischemic necrosis without clinically significant pancreatitis [16]. However, compared to embolization with coils, TAE using NBCA carries a potential risk of sta-
In the present case, some NBCA may have overflowed into the non-target vessels. Indeed, Koo et al. [5] reported a case of duodenal infarction after extensive dilution of the NBCA mixture should be avoided to prevent overflow of the mixture into non-target vessels. Additionally, it should be aware of the rare but potentially serious complication of pancreatic necrosis (or WON) due to overflow of NBCA into non-target branches. Furthermore, it should be kept in mind that WON may develop months after TAE.

The superior pancreaticoduodenal artery, inferior pancreaticoduodenal artery, and other pancreatic branches of the splenic artery form connections or anastomoses with one another and supply blood flow to the pancreas. Unlike coil embolization, NBCA injections may also embolize potential collateral vessels [18]. NBCA can therefore increase the success rate of and reduce the rebleeding rate after interventional embolization for hemorrhaging from the pancreaticoduodenal artery [4, 5]. During TAE with NBCA for active bleeding from the pancreaticoduodenal arteries, physicians should be aware of the rare but potentially serious complication of pancreatic necrosis associated with RA after TAE.

Figure 5. (a) Endoscopic retrograde cholangiopancreatography (ERCP) and (b) abdominal CT after ERCP performed 8 months post-TAE showing a cyst (white arrow) and the main pancreatic duct (yellow arrow). The pancreatic cyst was fistulized to the peritoneum (red arrow).

Conclusion

Walled-off necrosis following embolization with NBCA in a patient with upper GI tract bleeding is a rare but potentially serious complication.

Conflict of interest: The authors declare that they have no conflicts of interest to report.

References

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