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Emergency arterial embolization of upper gastrointestinal and jejunal tumors: An analysis of 12 patients with severe bleeding

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Abstract
Purpose: The goal of this study was to retrospectively assess the efficacy of emergency percutaneous transcatheter arterial embolization in patients with severe bleeding due to upper gastrointestinal or jejunal tumor.
Materials and methods: Twelve patients (7 men, 5 women; mean age, 74 years ± 14 (SD); range: 54—86 years) with severe bleeding from the upper gastrointestinal tract, with failed endoscopic treatment not eligible for emergency surgery were treated by emergency percutaneous transcatheter arterial embolization. The bleeding cause was gastric tumor in 7 patients, duodenal tumor in 4 patients and jejunal tumor in one patient. Procedure details and follow-up were reviewed.
Results: Twelve embolization procedures were performed using various embolic agents. Embolization was achieved and bleeding was stopped in all patients. Five patients underwent surgery within the 30 days following embolization. In the remaining 7 patients, no bleeding occurred at 1 month follow-up in 6 patients and bleeding recurred in one patient at 1 month. In this later patient, endoscopic treatment was successful.
Conclusion: The results of our study suggest that transcatheter arterial embolization is safe and effective in patients with severe arterial bleeding due to upper gastrointestinal or jejunal tumor. In some patients, transcatheter arterial embolization can be used as a bridge to surgery.

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Severe bleeding is a potential complication in patients with upper gastrointestinal or jejunal benign or malignant tumor [1—6]. In such cases, after the diagnosis has been confirmed by endoscopy or imaging, an emergency treatment is required and mostly performed endoscopically or surgically [6,7]. Until now, the potential role of emergency percutaneous transcatheter arterial embolization as a possible option for the treatment of patients with this condition has been reported scarcely in case reports or small series [2—4,8,9].

The goal of this study was to retrospectively assess the efficacy of emergency percutaneous transcatheter arterial embolization in this patients with severe bleeding due to upper gastrointestinal or jejunal tumor.

Materials and methods

Patients

From September 2007 to June 2013 inclusively, 71 patients with massive bleeding due to malignant or benign masses of the upper gastrointestinal tract were referred to our institution. Of these, 12 patients with failed endoscopic treatment not eligible for emergency surgery were further referred to the department of interventional radiology of our institution for angiography and possible embolization and were included in our study. Interventional treatment is part of an institutional integrated clinical pathway for the management of upper gastrointestinal bleeding. There were 7 men and 5 women with a mean age of 74 years ± 14 (SD) years (range: 54—86 years). Written informed consent was obtained from the patients or their relatives. All patients had severe bleeding from the upper gastrointestinal tract, with hematemesis ($n = 10$) and/or melena ($n = 5$) that required blood transfusion. Two patients were hemodynamically unstable. Hemodynamic instability was considered when persistent hypotension (systolic blood pressure < 90 mmHg) in spite of administration of 2 L of crystalloid solution and transfusion of 2 units of packed red blood cells.

Laboratory tests revealed decreased hemoglobin levels in all patients (mean 6.8 g/dL; range: 5.0—10.2 g/dL). Endoscopy, performed in all patients within 12 hours before embolization, demonstrated 2 bleeding lesions of the cardia, 5 gastric masses, and 3 duodenal lesions. In 2 patients computed tomography (CT) was performed before endoscopy. In 2 patients, upper gastrointestinal endoscopy was negative, and CT performed before angiography revealed presence of 2 jejunal lesions.

Endoscopic treatment was attempted in all 10 patients with gastroduodenal masses; in all of them injection of diluted adrenaline (1:10,000 dilution) into and around the bleeding site was attempted under endoscopy. In 2 patients hemoclips were deployed and in 4 patients sclerosant injection was attempted. In all 10 patients the hemorrhage did not stop. Failure was considered when persistent bleeding was observed at endoscopy after treatment, persistent blood coming out from the nasogastric tube, when the patient had hemodynamic instability, and when further transfusions after endoscopic therapy were necessary. After failed endoscopy, surgery was not considered due to poor clinical conditions in 8 patients who had coexisting comorbidities, advanced age, hemodynamic instability, or intravascular disseminated coagulopathy, locally advanced neoplastic disease in 3 patients, and distant metastatic lesions in 1 patient.

Angiography technique

Interventional procedures were performed by three radiologists with at least 5 years of experience in interventional radiology. Diagnostic angiography was performed in all patients through a femoral access and selective catheterization of the celiac trunk, the gastroduodenal artery, the left gastric artery, and the superior mesenteric artery using diagnostic 5-Fr SH 1.0 (Cook Medical, Bloomington, IN, US) or Sim 1 (Terumo Medical Corporation, Somerset, NJ, USA) catheters. A J-shaped hydrophilic guidewire was used (Terumo Medical Corporation). In 5 patients, when the vessel targeted for embolization could not be superselectively catheterized with the diagnostic catheter, a 2.7-Fr hydrophilic microcatheter (Terumo Medical Corporation) was used to confirm findings and to perform embolization. Lesions were visualized as tumoral blush or active contrast extravasation.

After embolization, the procedure was stopped when control angiogram showed no evidence of active bleeding and/or occlusion of the feeding vessels.

Data collection

After the procedure, hemoglobin levels were repeatedly checked until stabilization. Embolization was considered successful when hemoglobin blood levels stabilized without further transfusion in the next 3 days after the procedure, no further hematemesis or blood from the nasogastric tube were observed, and hemodynamic stability was present. Patients whose clinical conditions recovered underwent surgery as soon as possible.

Any complications of the procedure were recorded. Survival of non-operated patients was also recorded.

Results

Embolization was achieved in all patients, with angiographic demonstration of no further extravasation of contrast material and occlusion of the pathological vessels feeding the tumors.

Details regarding clinical and pathological findings, embolized arteries, and embolic materials are reported in Table 1. Gelatin sponge (Gelfoam®, Pfizer, New York, NY, USA) only was used in 4 patients, gelatin sponge and coils in 2 patients, microspheres in 3 patients, coils in only 2 patients and microspheres and coils in 1 patient. We used 500—700 μ and 700—900 μ acrylic polymer microspheres (Embosphere®, Biosphere Medical, Roissy en France, France) and 3 to 5 mm diameter 0.018 or 0.035 pushable metallic coils (Boston Scientific, NJ, USA).

In one patient with a large GIST of the gastric fundus, rupture of the left gastric artery after injection of embolic particles occurred and hemorrhage was immediately stopped with a 3-mm metallic coil (Fig. 1).

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