Multidisciplinary Approach to Refractory Upper Gastrointestinal Bleeding: Case Series of Angiographic Embolization

Ko Eun Lee,1 Ki-Nam Shim,1 Chung Hyun Tae,2 Min Sun Ryu,1 Sun Young Choi,1 Chang Mo Moon,1 Seong-Eun Kim,1 Hey-Kyung Jung,1 and Sung-Ae Jung1

1Department of Internal Medicine, Ewha Medical Research Institute, Ewha Womans University School of Medicine, Seoul, Korea; 2Department of Health Promotion Medicine, Ewha Medical Research Institute, Ewha Womans University School of Medicine, Seoul, Korea; 3Department of Radiology, Ewha Medical Research Institute, Ewha Womans University School of Medicine, Seoul, Korea

Received: 16 October 2015 Accepted: 29 April 2016

Address for Correspondence:
Ki-Nam Shim, MD
Department of Internal Medicine, Ewha Medical Research Institute, Ewha Womans University School of Medicine, 1071 Anyangcheon-ro, Yangcheon-gu, Seoul 07985, Korea
E-mail: shimkn@ewha.ac.kr

INTRODUCTION

Upper gastrointestinal (UGI) bleeding is defined as gastrointestinal blood loss proximal to the Treitz ligament (1). The prevalence of acute UGI bleeding is approximately 160 cases per 100,000 people in the United States, which amounts to over 400,000 people per year (1). About 80%–90% of acute UGI bleeding is due to nonvariceal causes, and the most common cause is gastro-duodenal peptic ulcer (20%–50%) (2,3). Gastroduodenal erosions, Mallory-Weiss tears, and arterio-venous malformation can also cause acute UGI bleeding (3). The mortality rate associated with nonvariceal bleeding is high. In the United Kingdom, the in-hospital mortality rate is reported to be as high as 9.6%, and is especially high in the elderly (2,4). In Korea, the rate of rebleeding after a successful endoscopic hemostasis for peptic ulcer disease is 17.8%, and the 30-day mortality rate is reported as 2.15%, and it is as high as 7.65% in patients older than 80 years old (5-7).

In cases of UGI bleeding, early upper endoscopy is recommended within 24 hours of presentation for both diagnostic and treatment purposes, and in most cases the bleeding is managed by endoscopic hemostasis such as sclerotherapy, thermocoagulation, and hemoclipping (8). However, in some cases, rebleeding occurs after endoscopic hemostasis, usually within the first 7 days after the procedure, and the risk varies according to age, size, depth, concurrent comorbidities, and presentation with shock (9,10). When rebleeding occurs, repeated endoscopic hemostasis, transcatheter arterial embolization (TAE), or surgery can be attempted. However, to our knowledge, research on outcome of TAE in Korea was scanty, and there was a study about factors associated with rebleeding after TAE in nonvariceal UGI bleeding recently, such as coagulopathy and number of embolization territories (11). Here, we report 8 cases of TAE performed for nonvariceal UGI bleeding.

Keywords: Gastrointestinal Hemorrhage; Embolization; Angiography; Endoscopic Hemostasis

CASE DESCRIPTION

Although medical and endoscopic hemostasis is now considered as the first-line therapy for nonvariceal upper gastrointestinal (UGI) bleeding, refractory bleeding still occurs in 5%–10% of the patients. In these patients, transcatheter arterial embolization (TAE) or surgery is required, but research on embolization for unmanageable UGI bleeding in Korea is scanty. We reviewed the medical records of 518 patients who underwent endoscopic hemostasis during 4 years. Among these subjects, 8 patients who required embolization due to failure of endoscopic hemostasis were enrolled. Mean patient age was 74.00 ± 8.25 years, and rebleeding occurred in 4 patients within 48 hours after TAE. Three patients with duodenal rebleeding underwent surgery, and the other patient with a gastric ulcer underwent endoscopic hemostasis. Nonvariceal UGI bleeding remains a serious clinical challenge, especially in older patients. A multidisciplinary approach including endoscopists, interventional radiologists, and surgeons may be important for the treatment of nonvariceal UGI bleeding.

We performed a retrospective analysis on 518 patients who had received upper endoscopic hemostasis procedures from January 2010 to August 2014 in a single tertiary hospital. We reviewed clinical data (age, gender, underlying disease, drug causing bleeding, patient status, and laboratory findings), endoscopic data (bleeding site, Forrest classification), and angiographic data (site of embolization, procedural outcome, material used for embolization). In 128 (24.7%) patients, rebleeding occurred after first endoscopic hemostasis, and in 28 (5.4%) patients, rebleeding occurred after repeated endoscopic hemostasis, which was followed by additional treatments such as surgery or TAE. Among these patients, TAE was performed in 8 (1.5%) patients (Fig. 1).
Of the 8 cases analyzed in this study, 4 represented gastric ulcer bleeding, 3 were duodenal ulcer bleeding, and one was duodenal gastrointestinal stromal tumor (GIST) bleeding identified by surgery. We reviewed one case of gastric ulcer bleeding and GIST bleeding each in detail.

**Case 1**
A 75-year-old man visited the emergency room after experiencing syncope and history of melena on August 7, 2014. He had underlying hypertension, a history of single vessel coronary artery occlusion disease, end-stage renal disease managed with hemodialysis, and was taking aspirin regularly. His vital signs were stable and his hemoglobin level was decreased to 3.9 g/dL. Emergency esophagogastroduodenoscopy (EGD) was performed, and a huge ulcer with blood oozing was found at the posterior wall of the midbody. Sclerotherapy was performed...
but the oozing continued, and hemoclipping also failed (Fig. 2A and B). Therefore, emergency TAE was performed on the same day. Celiac artery angiogram showed no extravasation, and empirical embolization of the left gastric artery (LGA) was performed (Fig. 2C and D). The patient did not experience more bleeding, and was discharged without any complications.

**Case 2**

A 74-year-old man visited the emergency room with melena on April 16, 2012. He had underlying hypertension, a history of myocardial infarction and cerebrovascular accident (CVA), and was taking warfarin. He was transferred to our hospital after EGD and hemoclipping for duodenal Dieulafoy’s lesion bleeding at another hospital 2 days ago. His initial vital signs were stable, and hemoglobin level was decreased to 8.2 g/dL. Levin tube irrigation was negative, and digital rectal examination suggested melena. The patient was admitted, treated with intravenous proton pump inhibitors. One day later, follow-up EGD was performed and hemoclips were observed near the protruded mass at the second portion of the duodenum without active bleeding. Two days later, he experienced syncope and presented 1,000 mL of melena with a systolic blood pressure (BP) of 50 mmHg and a pulse rate over 120, and was transferred to the intensive care unit. Emergency EGD was performed. A protruded mass with minor blood oozing was observed, and sclerotherapy was performed. However, his hemoglobin level did not recover despite transfusion, and follow-up EGD was performed again the next day. Blood spurting was observed at the center of the mass, and hemoclipping was performed. However, blood oozing continued (Fig. 3). The patient was referred to the radiology department for TAE. Angiographic findings showed focal nodular hypervascular staining in the second portion of the du-

![Fig. 3. EGD findings of case 2. (A) On the next day of admission, about 2 cm sized protruded mass with hemoclipping is observed. (B) On the mass, surface ulceration with minor blood oozing is observed on 3 days after admission. (C) Four days after admission, blood spurting is observed at the center of mass, but (D) blood oozing still remains despite application of hemoclips. EGD = esophagogastroduodenoscopy.](http://jkms.org)
Embolication of the superior pancreaticoduodenal artery (SPDA) was performed (Fig. 4). His hemoglobin level was still low with hematochezia, and surgery was performed. Mass excision was performed at the second portion of the duodenum, and the pathologic findings revealed a 2.1 × 1.4 cm sized benign GIST. The patient was discharged without complications.

**DISCUSSION**

In cases of UGI bleeding, the rate of rebleeding after early endoscopic hemostasis is about 10%–30%, and in 5%–10% of cases, endoscopic procedures fail and require TAE or surgery (12,13). In this report, the rate of rebleeding after early endoscopic hemostasis was 24.7% (128/518) and 5.4% (28/518) of the patients underwent TAE or surgery due to rebleeding after repeated endoscopic hemostasis, which is similar to the rates reported by previous studies.

We reviewed 8 rare cases in which TAE was performed for nonvariceal UGI bleeding. Among these cases, there were 4 males, the mean age was 74.00 ± 8.25 years, and most of the patients were taking drugs known to cause bleeding, such as aspirin, or warfarin (Table 1). All patients had at least one underlying disease. The initial hemoglobin levels of all patients were below 9 g/dL, prothrombin time (PT) was prolonged in 4 patients, and initial systolic BP of 3 patients was under 90 mmHg. Initial endoscopic findings revealed gastric origin bleeding in 4 cases and duodenal origin bleeding in the other 4 cases. Forrest classification Ia with spurting hemorrhage and Ib with oozing hemorrhage were also found in 4 cases each. Hemoclipping or sclerotherapy was performed in initial endoscopic hemostasis. In 3 cases, TAE was performed due to rebleeding despite successful primary hemostasis, and in 5 cases, TAE was performed after failure of primary endoscopic hemostasis. Regarding angiographic findings, extravasation was observed in 2 cases out of 8 cases, and embolization was performed at the arterial bleeding site. In the other 6 cases, empirical embolization was performed. The major limitation of TAE is that if it is not performed at the time of bleeding, it is difficult to identify the bleeding vessel because the injected contrast is not extravasated into the bowel lumen, and in this situation, empirical embolization is performed based on the patient’s clinical signs, endoscopic findings, and imaging findings (14). Of the 8 cases of embolization observed in this study, 4 were successful, but the other 4 cases showed rebleeding within 48 hours after the procedure. Among the cases with rebleeding, 1 patient was successfully managed with endoscopic hemostasis, and 3 patients eventually received surgery. TAE procedures showed a 50% success rate, but the other 50% of the cases resulted in rebleeding which required additional endoscopic hemostasis or surgery. Several studies have reported that the rebleeding rate of TAE in nonvariceal UGI bleeding ranges from 9%–47%, and this may be due to the...
### Table 1. Baseline and clinical characteristics for each case undergoing TAE

| Patient No. | Age, yr | Sex | Underlying disease | Causative drugs | Hb, g/dL | PLT, 10^3/µL | PT, INR | Systolic BP, mmHg | Initial presenting symptom | Location of hemorrhage | Forrest classification | Extravasation on angiography | Artery of embolization | Embolization material | Outcome of embolization (consequent procedure) |
|-------------|---------|-----|-------------------|-----------------|----------|--------------|---------|------------------|---------------------------|------------------------|----------------------|-------------------------|------------------------|------------------------|----------------------------------|
| 1           | 83      | F   | HTN, DM           | NSAIDs (ketorolac) | 7.1      | 222          | 1.23    | 70               | Melena                    | Duodenum, bulb           | la                   | No                      | GDA                   | Gelatin sponge            | Success             |
| 2           | 75      | M   | HTN, IHD, CKD     | Antiplatelets (aspirin) | 3.9      | 61           | 1.06    | 161              | Melena                    | Stomach, body            | lb                   | No                      | LGA                   | Gelatin sponge            | Success             |
| 3           | 74      | M   | HTN, IHD, CVA     | Anticoagulants (warfarin) | 8.2      | 126          | 1.29    | 110              | Melena                    | Duodenum, second portion | la                   | No                      | SPDA                 | Gelatin sponge            | Failure (surgery)   |
| 4           | 77      | F   | IHD, PAOD         | Antiplatelets (aspirin, clopidogrel) | 8.2      | 471          | 1.15    | 110              | Hematochezia              | Duodenum, second portion | lb                   | Yes                     | SPDA                 | Gelatin sponge            | Failure (surgery)   |
| 5           | 73      | F   | HTN               | NSAIDs (loxoprofen) | 6.5      | 134          | 1.85    | 88               | Hematemesis               | Stomach, body            | la                   | Yes                     | LGA                   | NBCA                  | Failure (endoscopic hemostasis) |
| 6           | 58      | M   | CVA               | NSAIDs (ketorolac)  | 3.6      | 203          | 1.10    | 70               | Melena                    | Stomach, antrum          | lb                   | No                      | GDA, SPDA            | NBCA                  | Success              |
| 7           | 85      | F   | HTN               | None             | 5.5      | 390          | 0.98    | 112              | Syncope                   | Duodenum, bulb           | la                   | No                      | SPDA                 | NBCA                  | Failure (surgery)   |
| 8           | 74      | M   | HTN, DM           | Antiplatelet (apipoprelate) | 8.4      | 88           | 1.03    | 101              | Hematemesis               | Stomach, cardia          | lb                   | No                      | LGA                   | Gelatin sponge            | Success             |

TAE = transcatheter arterial embolization, Hb = hemoglobin, PLT = platelets, PT = prothrombin time, BP = blood pressure, F = female, HTN = hypertension, DM = diabetes mellitus, NSAIDs = nonsteroidal antiinflammatory drugs, GDA = gastroduodenal artery, M = male, IHD = ischemic heart disease, CKD = chronic kidney disease, LGA = left gastric artery, CVA = cerebrovascular accident, SPDA = superior pancreaticoduodenal artery, PAOD = peripheral artery occlusive disease, NBCA = N-butyl cyanoacrylate.
REFERENCES

1. Gralnek IM, Barkan AN, Bardou M. Management of acute bleeding from a peptic ulcer. N Engl J Med 2008; 359: 928-37.
2. Hearnshaw SA, Logan RF, Lowe D, Travis SP, Murphy MF, Palmer KR. Acute upper gastrointestinal bleeding in the UK: patient characteristics, diagnoses and outcomes in the 2007 UK audit. Gut 2011; 60: 1327-35.
3. Esrailian E, Gralnek IM. Nonvariceal upper gastrointestinal bleeding: epidemiology and diagnosis. Gastroenterol Clin North Am 2005; 34: 589-605.
4. Yachimski PS, Friedman LS. Gastrointestinal bleeding in the elderly. Nat Clin Pract Gastroenterol Hepatol 2008; 5: 80-93.
5. Bae S, Kim N, Kang JM, Kim DS, Kim KM, Cho YK, Kim JH, Jung SW, Shim KN. Incidence and 30-day mortality of peptic ulcer bleeding in Korea. Eur J Gastroenterol Hepatol 2012; 24: 675-82.
6. Hong MJ, Lee SY, Kim JH, Sung IK, Park HS, Shim CS, Jin CJ. Rebleeding after initial endoscopic hemostasis in peptic ulcer disease. J Korean Med Sci 2014; 29: 1411-5.
7. Lee YJ, Kim ES, Hah YJ, Park KS, Cho KB, Jang BK, Chung WJ, Hwang JS. Chronic kidney disease, hemodynamic instability, and endoscopic high-risk appearance are associated with 30-day rebleeding in patients with non-variceal upper gastrointestinal bleeding. J Korean Med Sci 2013; 28: 1500-6.
8. Spiegel BM, Vakil NB, Olfman JJ. Endoscopy for acute nonvariceal upper gastrointestinal tract hemorrhage: is sooner better? A systematic review. Arch Intern Med 2001; 161: 1393-404.
9. Lau JY, Sung J, Hill C, Henderson C, Howden CW, Metz DC. Systematic review of the epidemiology of complicated peptic ulcer disease: incidence, recurrence, risk factors and mortality. Digestion 2011; 84: 102-13.
10. Suk KT, Kim HS, Lee CS, Lee JY, Kim MY, Kim JW, Baik SK, Kwon SO, Lee DK, Ham YL. Clinical outcomes and risk factors of rebleeding following endoscopic therapy for nonvariceal upper gastrointestinal hemorrhage. Clin Endosc 2011; 44: 93-100.
11. Lee HH, Park JM, Chian HJ, Oh JS, Ahn HJ, Choi MG. Transcatheter arterial embolization for endoscopically unmanageable non-variceal upper gastrointestinal bleeding. Scand J Gastroenterol 2015; 50: 809-15.
12. Loffroy R, Estivale L, Cherblanc V, Sottier D, Guiu B, Cercueil JP, Krausé D. Transcatheter embolization as the new reference standard for endoscopically unmanageable upper gastrointestinal bleeding. World J Gastrointest Surg 2012; 4: 223-7.
13. Guglielmi A, Ruzzenente A, Sandri M, Kind R, Lombardo F, Rodella L, Catalano F, de Manzoni G, Cordiano C. Risk assessment and prediction of rebleeding in bleeding gastroduodenal ulcer. Endoscopy 2002; 34: 778-86.
14. Shin JH. Recent update of embolization of upper gastrointestinal tract bleeding. Korean J Radiol 2012; 13 Suppl 1: S31-9.
15. Shin JH. Refractory gastrointestinal bleeding: role of angiographic intervention. Clin Endosc 2013; 46: 486-91.
16. Ang D, Teo EK, Tan A, Ibrahim S, Tan PS, Ang TL, Fock KM. A comparison of surgery versus transcatheter angiographic embolization in the treatment of nonvariceal upper gastrointestinal bleeding uncontrolled by endoscopy. Eur J Gastroenterol Hepatol 2012; 24: 929-38.
17. Wong TC, Wong KT, Chiu PW, Teoh AY, Yu SC, Au KW, Lau JY. A comparison of angiographic embolization with surgery after failed endoscopic hemostasis to bleeding peptic ulcers. Gastrointest Endosc 2011; 73: 900-8.
18. Vencelaskas L, Bratlie SO, Zachrisson K, Maleckas A, Pundzius J, Jönson C. Is transcatheter arterial embolization a safer alternative than surgery when endoscopic therapy fails in bleeding duodenal ulcer? Scand J Gastroenterol 2010; 45: 299-304.
19. Mirsadraee S, Tirukonda P, Nicholson A, Everett SM, McPherson SJ. Embolization for non-variceal upper gastrointestinal tract haemorrhage: a systematic review. Clin Radiol 2011; 66: 509-9.
20. Schenker MP, Duszak R Jr, Soulen MC, Smith KP, Baum RA, Cope C, Freeman DB, Roberts DA, Shlansky-Goldberg RD. Upper gastrointestinal hemorrhage and transcatheter embolotherapy: clinical and technical factors impacting success and survival. J Vasc Interv Radiol 2001; 12: 1263-71.