



ORIGINAL ARTICLE / *Interventional imaging*

Efficacy of emergency transarterial embolization in acute lower gastrointestinal bleeding: A single-center experience

C. Bua-ngam^{a,*}, J. Norasetsingh^a, T. Treesit^a,
B. Wedsart^a, O. Chansanti^a, J. Tapaneyakorn^a,
T. Panpikoon^a, S.A.-O. Vallibhakara^b

^a Vascular and body interventional radiology unit, department of diagnostic and therapeutic radiology, faculty of medicine, Ramathibodi hospital, Mahidol university, 270, Rama VI Road, 10400 Ratchathewi, Bangkok, Thailand

^b Section of clinical epidemiology and biostatistics, faculty of medicine, Ramathibodi hospital, Mahidol university, Bangkok, Thailand

KEYWORDS

Percutaneous arterial embolization;
Angiography;
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Abstract

Purpose: The purpose of this study was to assess the safety and efficacy of transcatheter arterial embolization (TAE) in the treatment of acute lower gastrointestinal bleeding (LGIB) and to determine the potential factors that influence treatment outcome.

Material and methods: A total of 38 patients with acute LGIB who were treated by TAE were retrospectively included. There were 24 men and 14 women, with a mean age of 61 years (range: 9–84 years). Patient characteristics, laboratory findings, treatments, causes of bleeding, angiographic findings, and outcomes were reviewed.

Results: Active contrast extravasation was observed in 26/38 patients (68.4%) and was the most frequent angiographic finding, followed by abnormal mucosal staining (8/38; 21.1%) and tumor staining (4/38; 10.5%). Technical success of TAE was obtained in 35/38 patients (92%) whereas technical failure was observed in 3/38 patients (8%). Clinical success rate following TAE was 63%. Bowel ischemia occurred in 5/38 patients (13%) following TAE; mild ischemia without sequelae was observed in 3 patients and severe ischemias with bowel perforation requiring surgery in 2 patients. No variables were identified as significant predictive factors of failed TAE.

Conclusion: TAE is a safe and effective treatment to control massive acute LGIB, especially in the emergency setting with a clinical success rate of 63%.

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* Corresponding author.

E-mail addresses: pap191@hotmail.com (C. Bua-ngam), sand.oic@hotmail.com (J. Norasetsingh), nong2204@yahoo.com (T. Treesit), tonmail2004@yahoo.com (B. Wedsart), jernychan@hotmail.com (O. Chansanti), jiemjit.tap@mahidol.ac.th (J. Tapaneyakorn), loveuteng@hotmail.com (T. Panpikoon), dr.sakda@gmail.com (S.A.-O. Vallibhakara).

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Acute gastrointestinal bleeding is an emergency condition that can lead to significant morbidity and mortality without prompt initiation of proper management [1]. Bleeding originating distal to the ligament of Treitz is defined as lower gastrointestinal bleeding (LGIB) [2]. The annual incidence of acute LGIB ranges from 20.5 to 27.0 per 100,000 adults in the general population and accounts for 1% to 2% of all hospital emergencies [1].

Immediate proctosigmoidoscopy or colonoscopy is the initial examination of choice for the diagnosis and treatment of acute LGIB. However, in an emergency setting without bowel preparation, the definite or potential source of bleeding can be obscured by blood or fecal content, resulting in a high rate of non-diagnostic endoscopic examinations. In addition endoscopy conveys a risk of bowel perforation [3,4]. When endoscopy is not feasible or after failed endoscopic management, transarterial embolization (TAE) is a relatively safe alternate option to emergency surgery [5]. The various pathologic causes of LGIB, the long length of the lower gastrointestinal tract, the often intermittent nature of LGIB, and the various embolic agents can complicate the angiographic evaluation and affect the treatment outcome of TAE [2,6,7].

The aim of this study was to assess the safety and efficacy of TAE in the treatment of acute LGIB and to determine the potential factors that influence the treatment outcome.

Materials and methods

Patient population

We retrospectively evaluated the clinical records of all patients who underwent emergency TAE for acute LGIB from December 2007 to July 2015. A total of 86 patients who underwent mesenteric angiography for the evaluation of acute LGIB were initially identified. Of these, 47 patients (54.7%) with positive diagnostic angiography findings were subsequently treated with attempted therapeutic embolization. We excluded 9 of these 47 patients with missing data because of an unavailable admission history or loss of follow-up data after referral to another hospital. Institutional review board approved the study and informed consent was waived.

A total of 38 patients were included in the study. All patients had clinically active massive LGIB at the time of angiography and failed to respond to conservative medical therapy, were unable to undergo endoscopic treatment, or had continued bleeding despite endoscopic treatment. The study group comprised 24 men and 14 women, with a mean age of 61 years (range: 9–84 years). Fourteen patients (36.9%) had a normal coagulation status.

Clinical data and definitions

The following data were collected from the electronic medical records: patient demographics, laboratory findings, treatments, causes of bleeding and outcome data. Acute LGIB was defined as melena or bloody stool that began shortly before presentation (generally within 48 hours). Patients were considered hemodynamically unstable when they had hypotension (systolic blood pressure of < 90 mmHg)

and tachycardia (heart rate of > 100/min) [8]. Blood loss was quantified by measuring the hemoglobin concentration and the amount of blood products transfused prior to embolization. If the patient required at least 4 units of blood within 24 hours, he was considered as having acute significant bleeding. Coagulopathy was diagnosed if one or more of the following criteria were present: international normalized ratio (INR) > 1.3, partial thromboplastin time > 33 seconds, or prothrombin time > 13.5 seconds. Thrombocytopenia was diagnosed when the platelet count was < 80,000/mm³. Preangiographic investigations involved endoscopy or radiographic studies performed after onset of acute LGIB episodes and within 7 days before the performance of TAE.

TAE methods and techniques

Selective angiographies were performed by one of six attending staff radiologists of our unit who had an experience in this field for at least 5 years or fellows under close supervision of the staff radiologist. The procedures were performed via a percutaneous transfemoral approach with a 5-French (Fr) sheath (Radifocus[®] Introducer II standard kit; Terumo, Hanoi, Vietnam). Under fluoroscopic guidance, angiographic examination of the superior and inferior mesenteric arteries was performed using 5-Fr angiographic catheters: Chuang-C (ImagerTM II; Boston Scientific Corporation, Galway, Ireland), Cobra (Beacon[®] Tip Torcon NB[®]; Cook Medical, IN, USA), Rim (Beacon[®] Tip Torcon NB[®]; Cook Medical), or Reverse curve (Beacon[®] Tip Torcon NB[®]; Cook Medical). No spasmolytic agents to reduce bowel peristalsis were administered. When the angiographic findings of the superior and inferior mesenteric arteries were negative, we evaluated the celiac and internal iliac arteries as possible sources of bleeding. If the bleeding site was identified, we performed superselective catheterization with a coaxial microcatheter: either a 2.7-Fr Progreat[®] (Terumo, Tokyo, Japan) or a 2.8-Fr RenegadeTM HI-FLOTM (Boston Scientific Corporation, Cork, Ireland). The tip of the microcatheter was placed proximal to the marginal artery or vasa recta and as close as possible to the bleeding site. The proper embolic agent was selected on an individual-patient basis by the operator. Embolization materials included gelatin sponge (SpongostanTM standard; Ethicon, Somerville, NJ, USA), microcoils (VortXTM; Boston Scientific Corporation, NY, USA), polyvinyl alcohol particles (ContourTM; Boston Scientific), or a combination of these materials. Finally, post-embolization angiography was performed to confirm the technical success of the procedure and re-evaluate other possible bleeding arteries.

The angiographic data were obtained from the original reports. We individually recorded the procedural data regarding the bleeding vascular territory, positive angiographic findings associated with the bleeding point, and number of arteries supplying the bleeding site.

Technical and clinical endpoints

Technical success was defined as the cessation of angiographic extravasation and/or the devascularization of flow in the supplying vessel and its branches of the bleeding site immediately after embolization based on angiographic findings (Fig. 1) [8,9]. Spontaneous cessation of bleeding as a

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