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## Interventional Radiology

# Bleeding diverticulum of the colon treated with CT-guided percutaneous injection of epinephrine and cyanoacrylate

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### ABSTRACT

Hematochezia may be a result of anatomic, vascular, inflammatory, infectious, or neoplastic diseases. Colonoscopic evaluation and therapy may be limited because of intermittent bleeding in the setting of numerous diverticula. This report describes a patient with diverticulosis who presented with hematochezia and hemodynamic instability with failed colonoscopic and arteriographic evaluations, and was treated with percutaneous transcolonic diverticular cyanoacrylate and epinephrine injection.

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## Introduction

Hematochezia may be a result of anatomic (diverticulosis), vascular (ischemic or angiodysplasia), inflammatory (inflammatory bowel disease), infectious, or neoplastic diseases. Colonoscopic evaluation and therapy may be limited because of intermittent bleeding in the setting of numerous diverticula [1]. In a study of 48 patients with hematochezia, for example, a definitive bleeding diverticular source was identified in only 10 patients (21%) [1]. This report presents a patient with diverticulosis who presented with hematochezia and hemodynamic instability with failed arteriographic and colonoscopic evaluations, and was treated with percutaneous transcolonic diverticular cyanoacrylate and epinephrine injection.

## Case report

Institutional review board approval was not required for preparation of this report. An 82-year-old man with diverticulosis presented with hematochezia. At presentation, the patient's heart rate was 120 beats/min with a blood pressure of 90/40 mmHg and a hemoglobin level of 9.2 g/dL (normal: 13.5–17.0 g/dL). The patient was treated immediately with a transfusion of 2 units of packed red blood cells with an increase in the hemoglobin level to 11.6 g/dL. The patient began preparation for colonoscopy; however, during preparation, he experienced additional episodes of hematochezia with a repeat check of the hemoglobin showing a drop to 7.7 g/dL. Computed tomography (CT) angiography was

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**Fig. 1 – Axial contrast-enhanced arterial phase computed tomography image of the abdomen showing enhancement within a diverticulum (white arrow) along the hepatic flexure. This was the site of bleed noted on nuclear medicine red blood cell scintigraphy.**

performed 8 hours following initial presentation and demonstrated extensive diverticulosis of the colon with hemorrhage into a diverticulum in the proximal transverse colon. Superior mesenteric artery, inferior mesenteric artery, and middle colic artery arteriographies were performed immediately following CT angiography; however, no extravasation, arteriovenous fistula, pseudoaneurysm, or arterial irregularity was observed. Three additional units of packed red blood cells were administered with an increase in the hemoglobin level to 9.5 g/dL. Colonoscopy performed the following morning demonstrated extensive colonic diverticulosis with no evidence of acute hemorrhage.

One day after colonoscopy, the patient had an additional episode of hematochezia with a drop in the hemoglobin to 6.5 mg/dL. Gastroenterology colleagues felt that the diagnostic and therapeutic yields of colonoscopy were low. Repeat CT angiography again demonstrated active hemorrhage into a diverticulum in the proximal transverse colon (Figs. 1 and 2). Technetium-99m pertechnetate red blood scan showed bleeding within the right upper quadrant likely with an origin near the hepatic flexure. Repeat superior mesenteric artery, inferior mesenteric artery, and middle colic artery arteriographies, however, again demonstrated no abnormality.

A decision was made to percutaneously treat the bleeding diverticulum. The procedure was performed under conscious sedation with local anesthesia. The patient was placed in a supine position on the angiographic table. Initially, CT of the abdomen without contrast showed high attenuation material in a diverticulum within the proximal transverse colon. Under CT guidance, a 21-gauge Chiba needle (Cook Medical, Bloomington, IN) was advanced percutaneously through the colon directly into the offending diverticulum (Fig. 3). One milliliter of a 1:10,000 epinephrine (Henry Schein Medical, Melville, NY) solution was injected into the diverticulum followed by 1 mL of a 1:3 mixture of n-butyl cyanoacrylate (TruFill, Codman and Shurtleff, Raynham, MA) and ethiodized oil (Lipiodol, Guerbet,



**Fig. 2 – Delayed venous phase axial computed tomography image of the abdomen at the same level demonstrating active extravasation into the transverse colon (white arrow).**

Villepinte, France) (Fig. 4). Completion CT demonstrated filling of the diverticulum with n-butyl cyanoacrylate.

The patient was discharged home 7 days after the injection without additional episodes of hematochezia. At 90-day follow-up, no additional episodes of hematochezia had occurred.

## Discussion

Colonoscopic and arteriographic interventions are the standard of care for the treatment of bleeding diverticula.



**Fig. 3 – After failure of colonoscopy and angiography to identify and treat the site of hemorrhage, a decision was made to attempt percutaneous treatment. Axial computed tomography of the abdomen shows a 21-gauge Chiba needle inserted through the skin into the bleeding diverticulum (white arrow).**



**Fig. 4 – Repeat computed tomography of the abdomen after the injection of epinephrine and *n*-butyl cyanoacrylate shows high-attenuation material within the diverticulum consistent with glue.**

Colonoscopic interventions for bleeding diverticula include epinephrine injection, multipolar electrocautery, and placement of an endoclip [2]. A recent meta-analysis showed that 16.2% of diverticular bleeds required treatment [2]. The most common treatment was emergent endoscopy with ligation of the offending vessel in 66.6% of patients whereas 10.5% underwent arteriography with embolization [2]. The failure rate for

endoscopy and arteriography, together, was only 2.6% with 66% of treatment failures requiring colectomy [2,3].

Colonoscopy and arteriography with embolization, however, have a high risk of rebleeding (11%-38% at 30 days), particularly in high-risk patients such as those with hematocrit <35%, a creatinine >150  $\mu$ M, tachycardia, or hypotension [2-4]. As a result, alternative therapies, such as high-dose barium impaction therapy, have been proposed as an adjunct treatment for diverticular bleeding [4]. Although additional studies are warranted, percutaneous transcolonic injection of cyanoacrylate and epinephrine may serve as an additional therapy for the management of diverticular bleeding in high-risk patients when colonoscopy and arteriography have failed.

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