



Effective Management of Ileocecal Hemorrhage with Super-Selective Arterial Embolization: A Case Study

Rachman, Achmad Aulia^{1*}; Limanto, Danang Himawan²; Sembiring, Yan Efrata²

Abstract

Background: Acute colonic bleeding, including rectal bleeding and melena, affects approximately 36 per 100,000 people annually, with a higher incidence in the elderly. Effective management requires prompt diagnosis and intervention, especially for severe cases characterized by persistent bleeding and significant decreases in hemoglobin levels. Traditional therapeutic options include pharmacologic therapy, endoscopic coagulation, transcatheter therapy, and surgery. While percutaneous embolization is established for upper GI bleeding, its effectiveness for lower GI bleeding remains debated due to concerns over potential intestinal infarction. **Methods:** We present a case of a 31-year-old female with a history of severe mitral regurgitation and chronic atrial fibrillation who underwent mitral valve replacement. Post-operatively, she developed black tarry stools indicative of lower GI bleeding. Initial treatments, including proton pump inhibitors, tranexamic acid, and vitamin K, were ineffective. Gastroscopy and colonoscopy showed no active bleeding, but abdominal CT revealed contrast extravasation at the ileocecal junction, likely from the ileocolic artery. Super-selective arterial embolization was

performed using a 6 Fr femoral sheath and microcatheter (2.7 Fr) with non-spherical polyvinyl alcohol (nsPVA) particles (355-500 µm) to target the bleeding source. **Results:** The embolization successfully halted hematochezia with no signs of peritonitis or mesenteric infarction. Post-procedure, the patient was discharged after 4 days with no abdominal pain or readmission for complications. **Conclusion:** Super-selective arterial embolization is a safe and effective method for managing lower GI bleeding, with no observed intestinal infarction in this case. This approach demonstrates the feasibility of embolization in controlling severe colonic hemorrhage, potentially offering a viable alternative to more invasive procedures while minimizing the risk of bowel ischemia.

Keywords: Lower gastrointestinal bleeding, Super-selective embolization, Ileocecal hemorrhage, Polyvinyl alcohol particles, Endovascular treatment

Introduction

Acute colonic bleeding, or lower gastrointestinal (GI) bleeding, presents a significant medical challenge, characterized by bleeding from the colon, rectum, or anus. This condition manifests as either haematochezia—bright red blood, clots, or burgundy stools—or melena (Schiller, 1998). The annual incidence of hospitalization for acute colonic bleeding is approximately 36 cases per 100,000 people, a figure that is about half the rate of upper GI bleeding (Brenner, 2009). Hospitalization rates are notably higher among the elderly population (Saltzman, 2006; Jensen, 2011, Ghassemi et al. 2013). Patients with acute colonic bleeding often present with a reduction

Significance | Super-selective embolization offers a safe and effective method for managing ileocecal hemorrhage with minimal risk of intestinal infarction.

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in haematocrit levels and painless haematochezia, typically without orthostatic symptoms (Laine, 2004; Mowat, 2007). While most cases of acute colonic bleeding resolve spontaneously (Daddazio, 2004), urgent assessment and timely intervention are critical, particularly in cases of severe haematochezia. This condition is defined by persistent bleeding within the first 24 hours of hospital admission, coupled with a decrease in haemoglobin levels of at least 2 g/dL or the need for a transfusion of two or more units of packed red blood cells (Laine, 2002; Aihara, 2010).

Lower GI bleeding can originate from either the small bowel or the colon (Lanas, 2010; Pasha, 2014), with various therapeutic options available, including pharmacologic therapy, endoscopic coagulation, transcatheter therapy, and surgical intervention (Gralnek, 2009; McAlindon, 2003). Among transcatheter options, pharmacologic control and embolization are the primary methods (Saito, 2008; Gerson, 2006). While percutaneous embolization is well-established for managing upper GI hemorrhage (Dake, 2004; Vaziri, 2011), its application in lower GI bleeding is less standardized (Ertle, 2011). The treatment of lower GI bleeding, particularly below the ligament of Treitz, remains controversial due to the high risk of intestinal infarction associated with embolization (Stollman, 2006; Kim, 2009).

In this context, we present a case involving super-selective arterial embolization for the management of ileocecal hemorrhage (McCluskey, 2012). This approach aims to address the challenges associated with lower GI bleeding and provide insights into the efficacy and safety of embolization as a therapeutic option (Burge, 2008; Zuckerman, 2010). Super-selective embolization allows for targeted intervention with reduced risk of complications such as intestinal infarction and collateral damage (Murphy, 2013; Nykänen et al. 2018).

2. Case Report Presentation

2.1 Patient Information

A 31-year-old female with a history of severe mitral regurgitation and chronic atrial fibrillation was scheduled for mitral valve replacement surgery. She had been on warfarin for anticoagulation but discontinued it five days prior to the procedure. There was no previous history of spontaneous bleeding.

2.2 Surgical and Postoperative Course

The patient underwent mitral valve replacement with a mechanical valve. During the surgery, an unforeseen complication led to an extended duration of cardiopulmonary bypass. Postoperatively, she was admitted to the intensive care unit (ICU) due to unstable hemodynamics and a history of bleeding. Her ICU stay was prolonged because of these complications.

2.3 Development of Gastrointestinal Symptoms

On the 18th postoperative day, the patient began experiencing black tarry stools with a trace of red blood. Despite administration of

proton pump inhibitors, tranexamic acid, and vitamin K to manage the bleeding, her condition did not improve by the 28th day. Gastroscopy revealed no active bleeding, while colonoscopy identified blood clots from the cecum to the rectum but did not show any active bleeding.

2.4 Diagnostic Imaging and Intervention

To further investigate the source of the bleeding, an abdominal computed tomography (CT) scan with contrast was performed. The CT scan revealed extravasation of contrast at the ileocecal junction, with a suspected source originating from the ileocolic artery (Figure 1).

The decision was made to proceed with an embolization procedure. Access was obtained via the left common femoral artery using a 6 French femoral sheath. A 0.035-inch, 260 cm guiding wire was inserted, followed by a 5 French diagnostic cobra-shaped catheter. The catheter was advanced to the superior and inferior mesenteric arteries, and contrast was injected, confirming leakage from the ileocolic artery, a branch of the superior mesenteric artery, into the cecal lumen.

A 2.7 French microcatheter was then navigated as distally as possible towards the lesion. Embolization was carried out using non-spherical polyvinyl alcohol (nsPVA) particles sized 355-500 µm. Post-embolization, no contrast leakage or pooling was detected (Figure 2). The hematochezia ceased, and there were no signs of peritonitis or mesenteric infarction.

2.5 Outcome

The patient was discharged four days after the embolization procedure. She reported no abdominal pain or symptoms suggestive of peritonitis upon follow-up visits. There were no readmissions or further complications related to the procedure.

This case highlights the effective management of a complex lower gastrointestinal bleeding scenario following mitral valve replacement surgery. The use of super-selective arterial embolization proved successful in controlling the bleeding and preventing further complications.

3. Discussion

In this study, we successfully managed a case of lower gastrointestinal (GI) bleeding through an embolization procedure, demonstrating its efficacy and potential benefits compared to other treatment options. Acute lower GI bleeding, typically defined as bleeding from a site distal to the ligament of Treitz, poses significant management challenges. While conservative measures result in spontaneous resolution in approximately 85% of cases (Ghassemi & Jensen, 2013), more invasive interventions such as embolization become necessary when conservative treatments fail.

Historically, embolization was less preferred due to concerns over its invasiveness and potential complications. However, recent advancements have markedly improved its safety profile. Super-

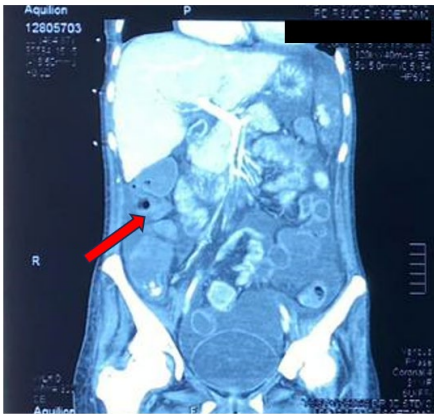


Figure 1. CT scan showing contrast extravasation at the ileocecal junction. Abdominal CT angiography showed extravasation of contrast from the ileocecal artery, branch of superior mesenteric artery.



Figure 2. Post-embolization angiogram showing no contrast leakage from the embolized ileocolic artery. Contrast extravasation in the ileocaecal region following injection of contrast (A). No contrast extravasation after the embolization (B)

selective embolization, which targets bleeding vessels with high precision, has been shown to be less invasive and more effective compared to vasopressin infusion (Nykänen et al., 2018). This method minimizes collateral damage to surrounding tissues and reduces the risk of major complications such as bowel ischemia (Lv & Gu, 2019).

Previous studies highlight the effectiveness of super-selective embolization in managing lower GI bleeding. For example, a study involving 21 patients demonstrated that embolization was technically successful in 16 out of 21 cases, achieving hemostasis in the majority (Bandi et al., 2001). The technique's success is highly dependent on the ability to position the catheter tip close to the bleeding site. In instances where super-selective catheterization was not achieved, embolization was less effective (Silver et al., 2005).

In our case, we used a microcatheter to access the ileocolic artery as distally as possible and employed non-spherical polyvinyl alcohol (nsPVA) particles sized 355-500 µm for embolization. This approach aligns with literature indicating that super-selective catheterization with microcatheters enables precise delivery of embolic agents, thus minimizing the risk of complications such as intestinal infarction (Pham et al., 2017). Non-selective embolization techniques used in the past were associated with high rates of bowel infarction, a concern mitigated by advances in catheter technology and embolic materials (McCluskey, 2012).

The choice of embolic agent also significantly impacts procedural outcomes. Polyvinyl alcohol (PVA) particles are preferred for their ability to achieve prompt and thorough embolization. Although gel foam is a temporary embolic agent with a higher incidence of recurrent hemorrhage, PVA particles provide a more durable solution (Oa et al., n.d.). Microcoils, another option, offer high visibility and precise placement but may not be suitable for all clinical scenarios (Ghassemi & Jensen, 2013).

Our study supports existing evidence that super-selective embolization can effectively control lower GI bleeding with a low incidence of major complications. A review of studies on angiographic embolization reported that 96% of patients achieved immediate hemostasis. However, early rebleeding and minor complications were observed, underscoring the need for careful patient selection and procedural precision (Dake, 2004).

Super-selective embolization represents a valuable tool in managing lower GI bleeding, offering a less invasive alternative with high efficacy when performed with meticulous technique. Advances in catheter technology and embolic materials will likely further enhance the safety and effectiveness of this approach.

4. Conclusion

In conclusion, this case underscores the efficacy and benefits of super-selective arterial embolization in managing lower gastrointestinal bleeding, particularly when conservative measures

fail. The approach effectively targeted the bleeding site with high precision, utilizing advanced techniques and materials that minimize the risk of complications such as bowel ischemia and infarction. Super-selective embolization has emerged as a viable alternative to traditional methods, offering significant advantages over other interventions like vasopressin infusion. By employing a microcatheter and non-spherical polyvinyl alcohol particles, we achieved successful hemostasis and resolved the patient's symptoms without further complications. This case highlights the evolving role of embolization in treating lower GI bleeding and supports its use as a less invasive, effective option. Continued advancements in catheter technology and embolic materials promise to further improve the safety and efficacy of this procedure, making it a valuable tool in managing complex gastrointestinal hemorrhages.

Author contributions

R.A.A. conceptualized the study and drafted the manuscript. L.D.H. contributed to data analysis and interpretation. S.Y.E. assisted in writing sections of the manuscript and provided critical revisions. All authors reviewed and approved the final version of the manuscript.

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Competing financial interests

The authors have no conflict of interest.

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