Superselective Embolization of Colonic Bleeding

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Lower gastrointestinal hemorrhage is less common than upper gastrointestinal hemorrhage but in my hospital more commonly referred to interventional radiologists because of the proficiency of upper endoscopy to diagnose and treat upper gastrointestinal bleeding. Patients with severe bleeding who are hemodynamically stable usually undergo screening with tagged red blood cell scanning. In the event of a positive study, urgent mesenteric angiography is performed, usually within 1 hour of the nuclear medicine study. Angiography is performed with an intention to treat.

PROCEDURE

Either the superior or inferior mesenteric artery or rarely the internal iliac artery is catheterized with a conventional 5 French catheter and arteriography is performed. If a bleeding site is identified (Fig. 1A and 1B), a 3F microcatheter is inserted coaxially through the 5F catheter and directed to the site. I do not use simultaneous saline drip through the 5F catheter; I have not found it necessary. Immediately prior to embolization, it is helpful to perform an angiogram through the microcatheter to best define the relevant anatomy (Fig. 1C). This can be done with a hand injection or power injection at 500–700 PSI at 2–3 mL per second. Embolization is generally performed only if a microcatheter can be advanced to the border of colon (i.e., marginal artery or vasa recta) and coils are deposited as distally as possible (Fig. 1D). It is not always possible to advance a microcatheter into the terminal vasa recta; it is therefore important to assess the more proximal arcades when planning embolization. If a single terminal marginal artery without proximal arcades is present, it should not be embolized as this would

occlude flow to a large segment of colon and predispose the patient to ischemia.

If the vasa recta can be catheterized, two or three microcoils in the size range 2–3 mm × 20–30 mm usually suffice to control bleeding. This is particularly true for diverticular bleeding, which in my experience responds best to embolization. If the vasa cannot be catheterized, I embolize the marginal artery as long as perfusion is maintained to the bowel proximal and distal to the site of embolization. Good hemostasis is typically achieved without ischemic complications when an ~3- to 4-cm segment of marginal artery has been occluded adjacent to the bleeding vessel. Anecdotally, I have also seen others embolize longer segments (10–12 cm) without ischemic sequelae; however, my bias is that this practice is overly aggressive without added benefit.

If polyvinyl alcohol is used, particles should be larger than 250 µm to avoid end-organ ischemia. Also, if polyvinyl alcohol is used, the terminal artery must be catheterized; this agent should not be deposited into the marginal artery. Occasionally, when vasospasm abates, early rebleeding may occur, particularly in coagulopathic patients. Repeated embolization may be of benefit in this case but only if sustained correction of coagulopathy can be achieved. Some reperfusion after regression of vasospasm may be protective against long-term ischemic complications such as bowel stricture.

DISCUSSION

In my hospital, superselective embolization of colonic bleeding has become the treatment of choice for any patient with bleeding severe enough to require angiography. Most patients with gastrointestinal bleeding are successfully managed conservatively. Only the minority ever received imaging studies—usually those patients

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Figure 1 Embolization of colonic hemorrhage. (A, B) Digital subtraction angiogram of superior mesenteric artery shows bleeding from the right colon. (C) Angiogram performed via microcatheter shows active extravasation from terminal vasa recta branch of right colic artery. (D) Superior mesenteric angiogram after microcoil embolization shows arrest of bleeding.

have either protracted or very severe bleeding requiring emergent treatment.

Early efforts at embolization of lower gastrointestinal bleeding were handicapped by the relatively large catheters and primitive embolic agents of the time. Thus, vasopressin infusion developed into the catheter-directed treatment of choice. When microcatheters became widely available in the late 1980s and early 1990s, embolization was reappraised with the new catheters and found to be both effective and associated with minimal ischemic sequelae.

Most interventional radiologists use either microcoils or polyvinyl alcohol particles for embolization. I favor microcoils for several reasons. They are easy to see, control, and therefore deploy accurately. Also, the risk of nontarget embolization is minimal. Overall, microcoils are more “forgiving” than particles. In addition, coils can be used in the marginal artery. In contrast, if particles are used, the terminal artery must be catheterized and embolization should be done with a great deal of attention and care to avoid nontarget embolization.

Most of the patients in my hospital have either diverticular bleeding or hemorrhage from angiodysplasia. Diverticular bleeding responds best to embolization. Most of these patients are older with comorbid conditions and tolerate minimally invasive therapy much better than surgical alternatives. Endoscopic treatment is also effective if a bowel preparation or purge can be performed for 6–12 hours prior to colonoscopy. Clearly, patients with very severe bleeding are not candidates for the latter approach and are better served with urgent angiography.

SUGGESTED READINGS

- Darcy M. Treatment of lower gastrointestinal bleeding: vasopressin infusion versus embolization. *J Vasc Interv Radiol* 2003;14:535–543
- Funaki B. Microcatheter embolization of lower gastrointestinal hemorrhage: an old idea whose time has come. *Cardiovasc Intervent Radiol* 2004;27:591–599