Iatrogenic Marginal Artery Dissection during Superselective Microcoil Embolization for Colonic Bleeding

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Superselective embolization has become the primary endovascular treatment of choice for lower gastrointestinal hemorrhage refractory to medical management. Untoward events, particularly ischemic complications, are rare with this technique. To my knowledge, iatrogenic marginal artery dissection has not been reported.

CASE REPORT

A 60-year-old man with known history of end-stage renal disease and diverticulosis presented to our emergency department with bright red blood per rectum. He was admitted to the intensive care unit and underwent technetium 99m red blood cell scanning that revealed a source of bleeding in the region of the left colon (Fig. 1).

He was referred to the Vascular and Interventional Radiology Section for embolization (Fig. 1). The right common femoral artery was catheterized and a 5F sheath was inserted. The inferior mesenteric artery was catheterized using a 5F Rosch Inferior Mesenteric catheter (Cook, Bloomington, IN) and an inferior mesenteric angiogram was performed (Fig. 2) revealing active bleeding in the region of the left colon. A 3F microcatheter (Renegade Hi-Flo; Boston Scientific, Natick, MA) was then advanced to the marginal artery, and repeat superselective angiography disclosed the site of bleeding (Fig. 3A). The catheter was advanced into the marginal artery to the site of bleeding. More selective catheterization of the vasa rectae

proved impossible due to vasospasm. Thus, the decision was made to embolize the marginal artery at the bleeding site. A 3 × 30 mm microcoil (Complex fibered microcoil; Boston Scientific, Natick, MA) was deployed at the site without difficulty. A second 3 × 30 mm microcoil was pushed to the end of the catheter but could not be fully released using the coil pusher (Coil Pusher-16; Boston Scientific, Natick, MA). Therefore, the pusher was removed and a 3-mL syringe filled with saline was attached to the catheter and rapidly flushed to “blow” the coil out of the end of the catheter. Concurrent with this maneuver, the patient complained of sharp left lower quadrant pain localized precisely to the site of embolization. A small amount of contrast was injected through the microcatheter during fluoroscopy, and stasis was noted in the marginal artery adjacent to the coils. The microcatheter was then removed and a repeat inferior mesenteric arteriogram was performed revealing an iatrogenic dissection of the marginal artery (Fig. 3B). Even after several minutes, contrast persisted along the marginal artery at the site of dissection (Fig. 3C). The catheters were then removed and hemostasis was achieved. The results were discussed with the referring surgical and intensive care unit services.

After the embolization, the patient’s abdominal pain slowly resolved and bleeding temporarily stopped. Blood products were replaced and the patient’s condition stabilized. Twenty-four hours later, he rebled, and after discussion with multiple consulting services, the

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Figure 1 Nuclear scintigraphy of left colonic hemorrhage. Four images from a technetium 99m tagged red blood cell scan show a focus of hemorrhage in the left lower quadrant that progresses on sequential scanning (white arrow).

patient elected to have a segmental colonic resection. On laparotomy, the colon was noted to be pink and a 1-foot section of bowel was removed encompassing the site of

bleeding depicted on angiography. On gross analysis, extensive diverticulosis and a small mass with adjacent lymphadenopathy was found.

Figure 2 Inferior mesenteric angiogram of left colonic hemorrhage. (A) Arterial phase of digital subtraction angiogram shows focus of bleeding in the left lower quadrant. (B) Venous phase of digital subtraction angiogram demonstrates extravasated contrast material indicating active hemorrhage.

Figure 3 Superselective angiography and embolization. (A) Initial marginal arteriogram shows focus of bleeding. Note areas of vasospasm along marginal artery (small white arrows). (B) Repeat inferior mesenteric arteriogram after coil embolization shows lack of perfusion to segment of left colon surrounding site of embolization. (C) Fluoroscopic image shows persistence of contrast retained in iatrogenic dissection.

Figure 4 Illustration showing coil and coil pusher becoming entangled when inner lumen of catheter is too large.

DISCUSSION

Superselective embolization for lower gastrointestinal bleeding is a routine procedure in my hospital. To date, we have performed over 100 such embolizations and had very few complications. There are several “lessons learned” from this procedure.

The numbers and types of microcatheters have grown exponentially in the past few years—thus simply asking for a microcatheter, coils, and a coil pusher is no longer appropriate. In this case, the microcoil (0.018 inches) and coil pusher (0.016 inches) were much smaller than the inner luminal diameter (0.027 inches) of the microcatheter. The larger inner luminal diameter of this catheter (Renegade Hi-Flo) facilitates excellent angiography but is generally best reserved for particle embolization such as uterine fibroid embolization. In this case, the coil and pusher became entangled in the catheter, and redundancy in the coil caused it to become folded on itself and lodged at the end of the catheter (Fig. 4). A coil becoming lodged at the end of a catheter is not an uncommon event, even when appropriate-size coils, coil pushers, and microcatheters are used in combination. When this occurs, the quickest way to dislodge the coil is simply to flush it out the end of the microcatheter using a small syringe (e.g., 3 mL) filled with saline. Incidentally, you can deploy coils using the same technique instead of using a coil pusher (which avoids the tedium associated with longer procedures), although the rapid expulsion of the coil from the catheter tends to erode the end of the catheter quickly, and if the catheter tip is in a precarious position, the rapid flush could displace the tip into a different vessel. In this case, I believe that the distal end of the coil created a small intimal dissection as it exited the catheter—this prob-

ably contributed to the perception that it was “stuck” in the catheter. The rapid expulsion of the coil using a saline flush then propagated the dissection along the marginal artery. Interestingly, the patient experienced sharp pain during this event, indicating that an acute dissection, even in a small marginal artery, can incite local symptoms.

At this point, the risk of bowel ischemia is markedly increased compared with a typical successful superselective embolization. In the latter instance, even when the marginal artery is embolized, only a short segment of 3 to 5 cm is occluded with preservation of collateral flow proximal and distal to the point of bleeding. The patient did not develop ischemia or infarction but rebled 24 hours after embolization. This may indicate that the dissection slowly recanalized as vasospasm abated in the marginal artery. Overall, despite the fact that an untoward event occurred in this patient, the endovascular procedure arrested hemorrhage temporarily, allowing blood products to be replaced and the patient’s condition to improve before surgery. Definitive identification of the bleeding site enabled segmental resection to be performed instead of total colectomy. Surgery would have been necessary in any event given that bleeding was likely tumoral in origin, and it underscores the importance of colonoscopy in these patients, even in successful embolization procedures.

SUGGESTED READINGS

- Funaki B. Microcatheter embolization of lower gastrointestinal hemorrhage: an old idea whose time has come. *Cardiovasc Intervent Radiol* 2004;27:591–599
- Funaki B. Superselective embolization of colonic bleeding. *Semin Intervent Radiol* 2005;22:139–140