Transcatheter Embolization of the Marginal Artery of Drummond as Treatment for Life-Threatening Retroperitoneal Hemorrhage Complicating Heparin Therapy

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Abstract

We report a case in which life-threatening retroperitoneal hemorrhage complicated heparin therapy. The bleeding originated from the marginal artery of Drummond which was catheterized with a 3-Fr coaxial catheter system (Tracker-18 catheter) and embolized with microcoils. Bleeding stopped and no ischemic complications developed for 3 years after embolization.

Key words: Marginal artery of Drummond—Hemorrhage, therapy—Percutaneous embolization—Embolic material, microcoil—Heparin, complication

Most bleeding episodes complicating heparin therapy are self-limited following discontinuation of heparin [1–5]. When the bleeding fails to respond to conservative management, angiography is performed for diagnosis and potential treatment. We present a patient with heparin-induced massive retroperitoneal bleeding from the marginal artery of Drummond who was treated with embolization.

Case Report

A 64-year-old woman with a history of coronary artery disease was admitted to the hospital for percutaneous transluminal coronary angioplasty (PTCA). One week prior to admission, she had a myocardial infarction. At the time of admission, she was on sodium warfarin and aspirin. She underwent successful PTCA of a left anterior descending coronary artery stenosis and was placed on heparin (1200 units/h). Two days after PTCA, she complained of right flank pain

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and became hypotensive. Her blood pressure was 80/60 mm Hg. Laboratory studies yielded the following values: hemoglobin, 7.6 g/dl; hematocrit, 22.4%; platelets, 189,000/mm^3; prothrombin time, 15 s (normal, 11.4–13.3 s); and partial thromboplastin time, 55 s (normal, 21.3–28.9 s). The patient was resuscitated with intravenous fluids and 13 units of blood including fresh-frozen plasma.

A computed tomographic (CT) scan showed a large retroperitoneal hematoma in the right anterior pararenal space extending from the inferior margin of the liver to the pelvis (Fig. 1). Emergency angiography was performed from a right transfemoral approach. An abdominal aortogram showed extravasation of contrast material on the right side of the abdomen inferior to the kidney. The right kidney was displaced superiorly; a right renal arteriogram showed no extravasation. Right second and third lumbar arteriograms showed no extravasation. A celiac axis arteriogram was normal. A digital subtraction superior mesenteric arteriogram revealed extravasation of contrast medium from the marginal artery of Drummond at the anastomotic junction of the right colic and ileocolic arteries (Fig. 2). Embolization of this artery was performed by placing three straight
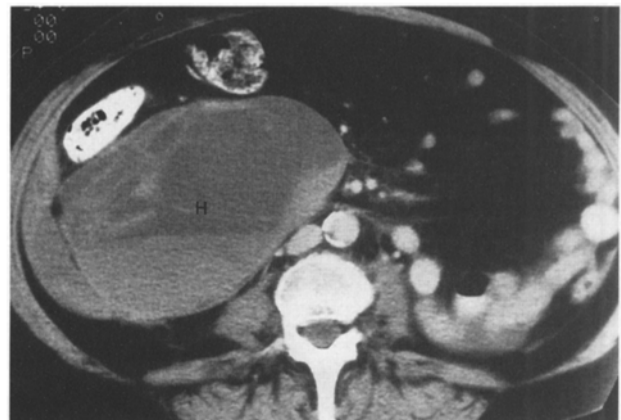

Fig. 1. CT with contrast section through the abdomen below level of the kidney showing hematoma with areas of high-density fluid (H) in the retroperitoneal space anterolateral to the inferior vena cava, consistent with fresh blood.
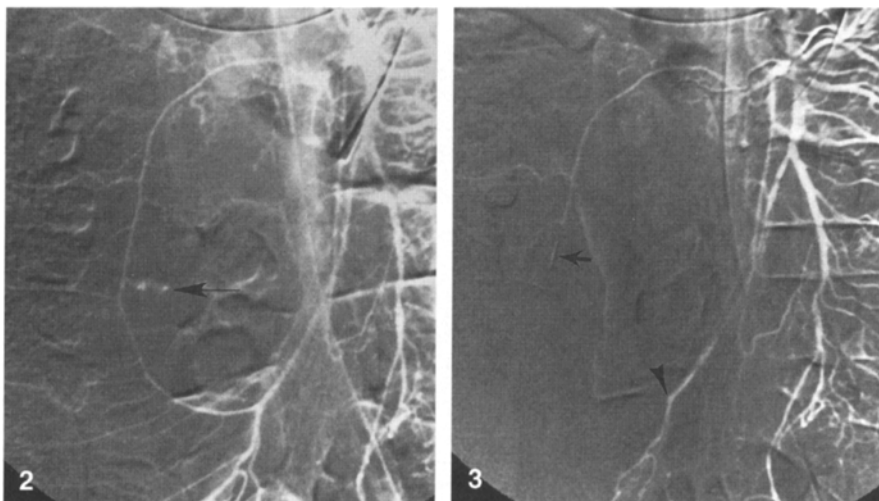
Fig. 2. Digital subtraction superior mesenteric angiogram showing extravasation of contrast material (arrow) from the marginal artery of Drummond midway between the right colic and ileocolic arteries.

Fig. 3. Digital subtraction superior mesenteric angiogram after microcoil embolization using a Tracker-18 catheter showing microcoils occluding the bleeding marginal artery (arrow) and cessation of contrast extravasation. The ascending branch of the ileocolic artery (arrowhead) is not opacified, presumably secondary to arterial spasm resulting from catheterization.

microcoils (1.5 cm long, Hilal Embolization Microcoils, Cook, Inc., Bloomington, IN, USA) into the bleeding artery through a Tracker-18 infusion catheter (Proximal OD/Distal OD: 3.0 F/2.7 F, Target Therapeutics, San Jose, CA, USA) passed coaxially through the 5 Fr angiographic catheter positioned in the ileocolic artery. The initial coil was deployed just distal to the bleeding site; the final coil was placed immediately proximal to the bleeding site. A repeat digital subtraction superior mesenteric arteriogram showed occlusion of the bleeding ascending branch of the ileocolic artery (Fig. 3). Bleeding stopped. The patient developed no clinical evidence of bowel ischemia. Anticoagulant therapy was resumed 15 days later and continued for more than 3 years. Three years passed since the embolization without recurrent bleeding despite continued anticoagulant therapy.

Discussion

To our knowledge this is the first patient to have undergone embolization of the marginal artery of Drummond for the treatment of spontaneous massive retroperitoneal bleeding complicating heparin therapy. This case demonstrates that the marginal artery of Drummond should be considered during angiographic explorations for the source of retroperitoneal bleeding. CT is useful in the diagnosis and characterization of intraabdominal fluid and hemorrhage and can direct the angiographer to the area of interest [6, 7]. However, retroperitoneal bleeding may be difficult to localize angiographically because of the complexity of its arterial supply. The retroperitoneal space extends from the diaphragm to the pelvis and contains a number of organs and structures. Well-defined fascial extension divides the space into three compartments: the anterior pararenal space, the perirenal space, and the posterior pararenal space. Because the bleeding site may be anywhere between the pelvis and the diaphragm, the initial angiographic procedures should include abdominal aortography and pelvic arteriography. If a bleeding site is not identified, sequential selective injections are made into the renal, iliac, and all ipsilateral lumbar arteries.

Finally, celiac axis and superior mesenteric arteriography is performed if a bleeding site has not been identified. When extravasation is not demonstrated after any of the injections, the patient should be reevaluated for signs of active bleeding. If it is determined that the patient is still bleeding, abdominal aortography is repeated.

Because the bleeding in our patient was life-threatening, we chose arterial embolization over vasopressin infusion for treatment. Vasopressin infusion has been the treatment of choice in patients with mesenteric bleeding, often as a prelude to resection of the affected hemicolon. We have used vasopressin infrequently because hemorrhage is frequently not controlled or hemorrhage commonly recurs after discontinuation of vasopressin ([8], KJ Cho, unpublished data). Furthermore, the vasoconstrictive effects of vasopressin may result in small bowel infarction and peripheral or myocardial ischemia [9, 10]. Therefore, vasopressin should be used with extreme caution in patients with angina pectoris. At our institution, superselective embolization is the initial angiographic method used to control mesenteric bleeding. The advent of 3 Fr coaxial catheter systems, such as the Tracker-18 infusion catheter, has made it possible to embolize the mesenteric branches at the level of intestinal arcades and arteriae rectae with significant reduction of the risk of intestinal infarction [11]. Although the arteriae rectae emerging from the marginal artery are the end arteries to the bowel, anastomoses between adjacent mural trunks in the bowel wall can provide adequate collateral blood supply and prevent bowel ischemia if embolization is limited to the bleeding artery. The embolic agents that have been used for mesenteric embolization are gelatin sponge, polyvinyl alcohol particles, and microcoils [11–15].

The reported complications of mesenteric embolotherapy are mesenteric ischemia and colonic stricture [8, 12, 16, 17]. The exact incidence of mesenteric

ischemia following embolization is unknown because the complication will depend on the level, extent, and site of mesenteric arterial occlusion by embolization and the state of local collateral circulation. On the basis of a review of the literature and the authors' experience, the incidence of mesenteric ischemia following embolization is probably lower than 20% [18]. Overembolization and occlusion of uninvolved branches with the resulting compromise of collateral circulation are probably responsible for the development of mesenteric ischemia following embolization. Superselective catheterization of the bleeding artery with the use of 3 Fr coaxial catheter systems will decrease the amount of embolic material required to stop the bleeding and thus minimize the risk of bowel ischemia.

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