Migrated embolization coil causes intestinal obstruction

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ABSTRACT

Visceral artery pseudoaneurysm is a rare, potentially fatal entity, but proper identification and management with coil embolization can lead to good outcomes. Embolization coils can migrate to various destinations, causing delayed complications in several case reports. A case of small bowel obstruction due to migrated embolization coils from a gastroduodenal pseudoaneurysm 6 years after initial treatment is presented. (J Vasc Surg Cases and Innovative Techniques 2018;4:8-11.)

Visceral artery pseudoaneurysms (VAPs) are generally caused by regional infection, inflammation, or trauma[1,2] and rupture at a much higher rate than true visceral artery aneurysms (VAAs). One study of 233 patients reported a rupture rate of 3.1% in true VAAs at clinical presentation compared with 76.3% in VAPs.[3] Because rupture may occur regardless of size, repair is justified at all sizes.[4,5] Studies report >90% mortality with conservative management[2] and 20% to 50% mortality with contemporary management of VAA rupture in common anatomic locations.[6]

In view of the hostile environment and systemic complications of the underlying cause associated with VAP, coil embolization has become the standard of care.[7] However, open repair remains an option for patients who represent an acceptable operative risk.[2,6] Whereas coil embolization has a high initial success rate if endovascular access is feasible, rare cases of delayed coil migration have been reported.[8-27] A case of mechanical small bowel obstruction secondary to coil migration is presented here.

CASE REPORT

A 66-year-old man with a history of alcohol abuse and chronic pancreatitis presented to the emergency department complaining of generalized weakness and dizziness for 1 week. Initial laboratory assessment revealed severe anemia (hematocrit of 8.9%) and positive result of the fecal occult blood test. Computed tomography angiography revealed a 6- × 5.9-cm pseudoaneurysm arising from the gastroduodenal artery (GDA; Fig 1) with a contained rupture, which was confirmed by angiography (Fig 2, *A*).

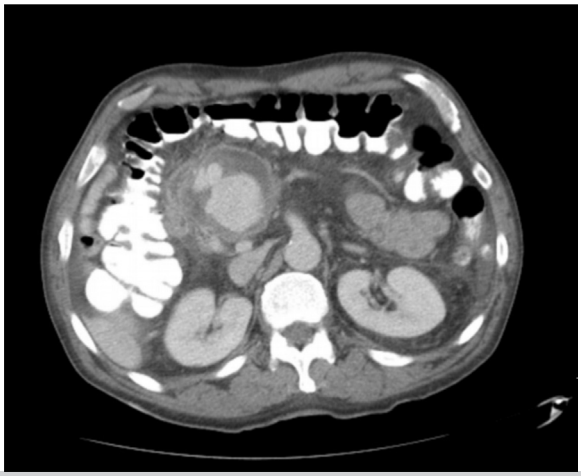

Fig 1. Computed tomography depicts a visceral artery pseudoaneurysm (VAP) in the region of the gastroduodenal artery (GDA).

Coils of various sizes were inserted into the pseudoaneurysm until it was completely filled. A large Terumo Medical Corporation (Somerset, NJ) framing coil was followed by Terumo HydroCoils and Cook (Bloomington, Ind) Tornado and Nester coils. Repeated imaging 2 weeks later showed expansion of the VAP, and angiography revealed a small retroperitoneal artery independently supplying the aneurysm sac, which was further filled with 0.018-inch Terumo framing coils and 0.035-inch Terumo HydroCoils. At this time, the proximal normal GDA was also embolized with 0.018-inch and 0.035-inch detachable coils to prevent recurrence. Angiography after coil embolization of the GDA demonstrated no flow, and angiography of the superior mesenteric artery showed no retrograde filling of the pseudoaneurysm (Fig 2, *B* and *C*).

Six years later, the patient presented with a 2-day history of confusion and severe abdominal pain with nausea and vomiting. He had diffuse abdominal pain and developed fever, tachycardia, and hypotension shortly after admission. Laboratory assessment revealed leukocytosis, elevated lactate, and normal lipase. Computed tomography scan revealed a high-grade distal mechanical small bowel obstruction caused by a foreign body (Fig 3). The GDA embolization coils were also displaced from their original location (Fig 4).

Exploration of the abdomen revealed a foreign body in the lumen of the bowel at the ileocecal valve. The small bowel

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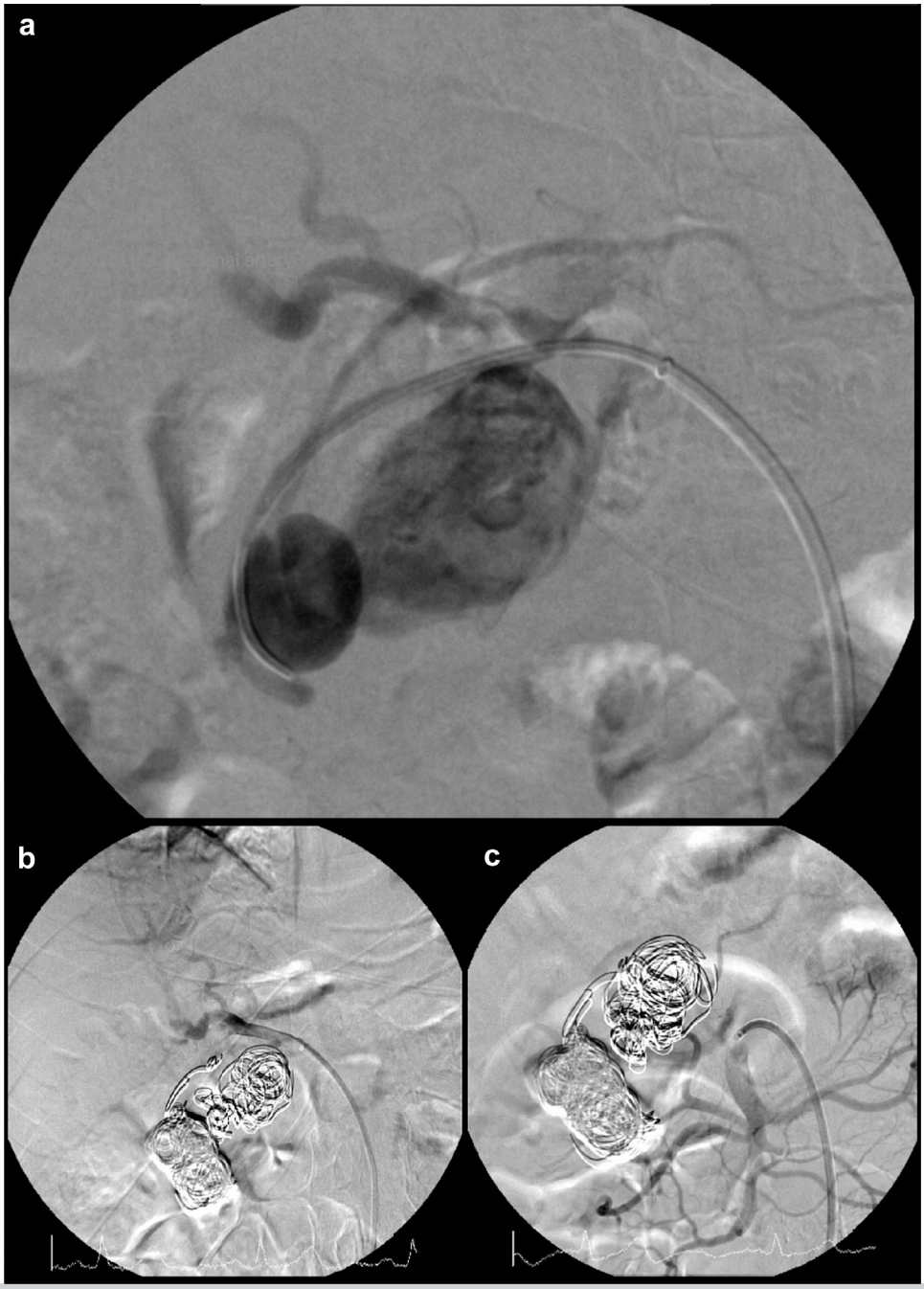

Fig 2. A, Angiography reveals gastroduodenal artery (GDA) pseudoaneurysm with contained rupture. Angiography after repeated coil embolization demonstrates no flow in the visceral artery pseudoaneurysm (VAP) with injection through the common hepatic artery **(B)** and superior mesenteric artery **(C)**.

was dilated but completely viable. Enterotomy exposed a metallic foreign body consistent with a cluster of embolization coils, which were removed (Fig 5), and the enterotomy was closed primarily. Esophagogastroduodenoscopy revealed a normal-appearing duodenal mucosa to the ligament of Treitz with no obvious pathway of coil migration.

Unfortunately, the patient never fully recovered from the procedure, and his hospital course was complicated by multiple drug-resistant infections, primarily related to pulmonary aspiration. He remained encephalopathic and required mechanical ventilation and tube feeds until he eventually died 9 months postoperatively. The patient's family gave full consent to share the information presented in this case.

DISCUSSION

The PubMed database was searched for all English reports of coil migration, and the bibliography of each publication was further evaluated for any additional

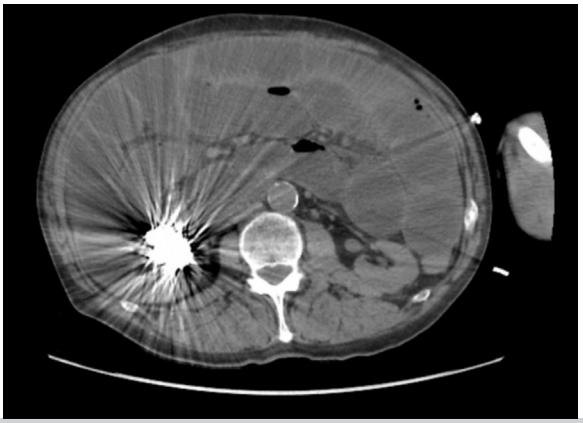

Fig 3. Computed tomography shows massively dilated small bowel and foreign body in the right lower quadrant.

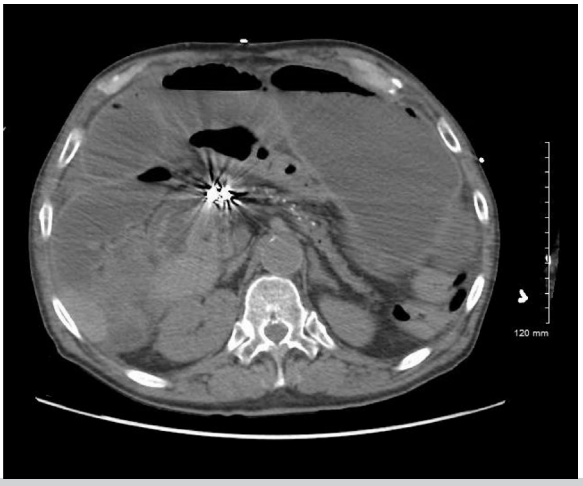

Fig 4. Computed tomography scan at time of delayed bowel obstruction reveals small number of residual coils in visceral artery pseudoaneurysm (VAP) with no evidence of residual VAP or cavity.

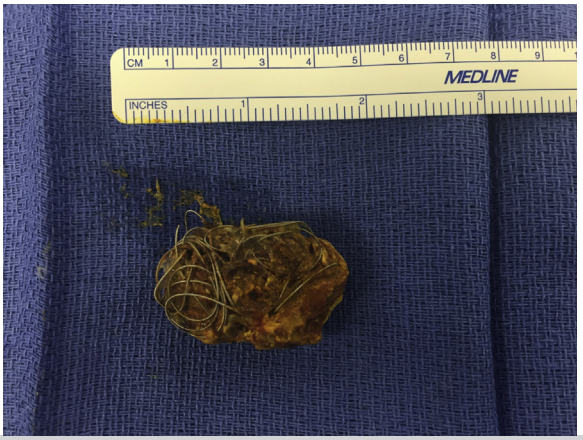

Fig 5. Cluster of embolization coils removed at operation.

cases. Five cases of coil migration from a hepatic artery pseudoaneurysm to the bile duct occurring 3 months to 8 years after the procedure (average of 29 months) have been reported.[8-12] Four cases of coil migration from the carotid circulation have been reported.[13-16] Coils produced symptoms with erosion of a cranial nerve,[13] hypopharynx,[14] middle ear,[15] and skin of the neck[16] ranging from 2 to 7 years after the procedure (average of 2.8 years). Coil embolization of a type Ia proximal endoleak and two type II endoleaks after endovascular repair of an abdominal aortic aneurysm has been associated with an aortoenteric fistula in three patients.[17-19] Coil embolization of the renal artery has been reported to result in migration to the ureter[20] and gastrointestinal tract[21] in two cases, 1 and 10 years after the procedure, respectively. There have been six cases of coil migration involving the celiac artery or its branches as reported in this case. Four patients underwent coil embolization of a splenic artery pseudoaneurysm culminating in migration to the gastrointestinal tract from 3 weeks to 9 months after the procedure (average of 59 weeks).[22-25] One patient was found to have coil migration from a GDA pseudoaneurysm to the stomach 10 months later,[26] and another patient died of a celiac enteric fistula 10 years after coil embolization of a celiac aneurysm.[27]

The number and size of coils deployed varied dramatically among the reported cases. Likewise, the size of the pseudoaneurysm that was embolized varied greatly. No association could be found between the magnitude of coils used for embolization and the likelihood of migration. It is apparent that coil migration occurs slowly over time in most cases.

Although most cases of coil migration were not associated with infection of the pseudoaneurysm or a persistent arterial fistula, there were four cases of aortoenteric fistula, one of which was fatal. It is unclear why the communication between the pseudoaneurysm and the final location of the coil heals completely without sequelae in most cases but not in all.

This case represents a rare case of coil embolization producing a small bowel obstruction as a result. Some reports claim that the risk of coil migration can be minimized by sandwich embolization or proximal and distal embolization without filling the aneurysm space.[22,24,26] This claim rests on the idea that thin walls of pseudoaneurysms are more amenable to enzymatic degradation than adjacent healthy vessels, providing a pathway for migration. However, complex arterial supply to the aneurysm sac can preclude total embolization by this method. As in our case, a small retroperitoneal artery not accessible through endovascular means independently supplied the aneurysm sac.

CONCLUSIONS

This case demonstrates that migration of a large cluster of embolization coils can cause small bowel obstruction. However rare, delayed coil migration is an important consideration in patients with previous known embolization of VAPs, especially those requiring large clusters of

coils directly into the aneurysm sac. Whereas no firm recommendations can be made from a limited number of case reports, it might be wise to limit the volume of coils employed during embolization of VAPs to the minimum necessary to achieve thrombosis.

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