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Case Report

Rescue Therapy of Inadvertent Coil Migration for Endovascular Treatment of Type II Endoleak

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Coil migration during endovascular procedures is not an unusual complication, but there is no standard management strategy for bailout. Here, we describe a technique for removal of a migrated coil using a snare. During embolization of type II endoleak from the inferior mesenteric artery in a post-endovascular aneurysm repair patient, the coil migrated to the sigmoidal artery causing an occlusion. We used a microsnare loop and successfully retrieved the migrated coil. This is the first case in Korea that uses a loop snare for the removal of a migrated coil during visceral endovascular treatment to our knowledge. This technique of using a microsnare for removal of displaced coils can be a good resort in selected cases.

Key Words: Endovascular aneurysm repair, Type 2 endoleak, Coil embolization

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INTRODUCTION

With the increased use of endovascular therapy, intraprocedural complications are more frequently being reported. Coil migration during embolization procedures have been reported to occur in 2%-6% of cases [1,2], and the consequences can be catastrophic [3,4]. However there is currently no standard management strategy for coil migration [5], and most of reported cases occurred during intracranial procedures. We herein describe a case of migrated coil retrieval during a visceral endovascular procedure using a snare.

CASE

In September 2009, an 83 year old man was referred to the outpatient clinic due to a 56×59 mm sized infrarenal fusiform abdominal aortic aneurysm that was discovered incidentally. He had many medical co-morbidities including hypertension, chronic obstructive pulmonary disease, Alzheimer’s disease and benign prostatic hyperplasia, which were well controlled with medications. After close examination of the aneurysm by computed tomography (CT) angiography, the patient underwent an elective endovascular aneurysm repair using a Zenith AAA Endovascular graft (Cook Medical, Bloomington, IN, USA). The procedure was uneventful and the patient was discharged at postoperative day 5 without complications. One month after the operation, follow-up CT angiography showed a patent stent graft without thrombus and a decrease in size of the remaining aneurysm sac. However the patient was lost to follow-up and did not present to the outpatient clinic until April 2015. CT angiography at this time showed an increase in aneurysm size (from 57 mm to 80 mm) compared to the previous CT 5 years ago, with a newly appeared type II endoleak from the inferior mesenteric artery (Fig. 1). Therefore we decided to perform a coil embolization procedure for treatment of the type II

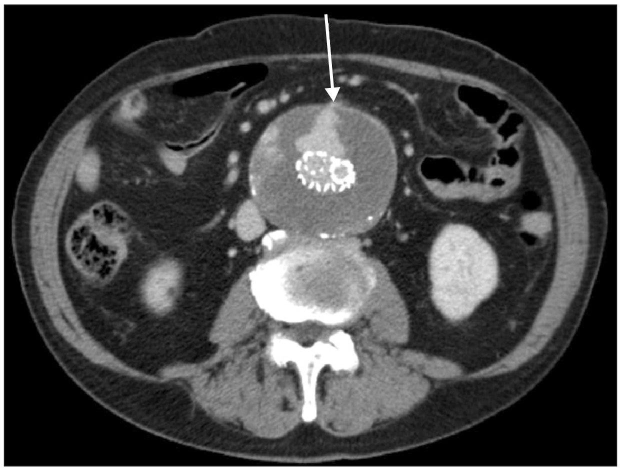

Fig. 1. A computed tomography image of an abdominal aortic aneurysm previously treated with endovascular aneurysm repair and showing the presence of type II endoleak. The arrow indicates an endoleak from the inferior mesenteric artery.

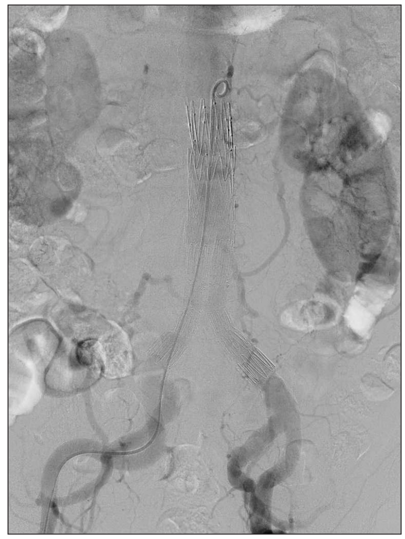

Fig. 2. Angiographic finding of a type II endoleak. The aneurysmal sac was visualized via the superior mesenteric artery, arc of Riolan and inferior mesenteric artery.

endoleak.

Under local anesthesia, an access was made via the right common femoral artery. An aortic angiography was first taken which showed a definite type II endoleak (Fig. 2). With the assistance of roadmap imaging, the orifice of the superior mesenteric artery was selected and the inferior mesenteric artery was carefully catheterized via the arc of Riolan. After selective angiography of the inferior mesenteric artery, the point of endoleak between the aneurysmal sac and the inferior mesenteric artery was identified. The origin of the inferior mesenteric artery was coil embolized using interlock-18 coils (Boston Scientific, Natick, MA, USA) sized 0.2×3.0 cm and 0.3×6.0 cm. During embolization, the 0.3×6.0 cm coil migrated to the sigmoidal artery by accident and caused an occlusion. Before trying to remove the migrated coil, an additional 0.3×6.0 cm coil was inserted into the inferior mesenteric artery to ensure total occlusion of the vessel (Fig. 3).

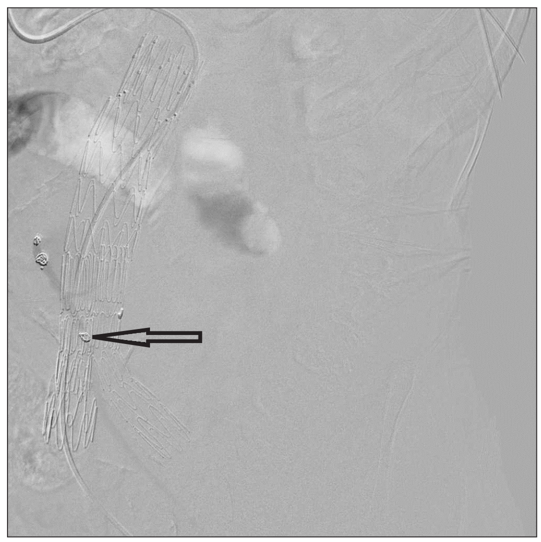

Fig. 3. Angiographic finding after coil migration. The sigmoidal artery was occluded by the migrated coil (arrow).

An initial attempt was made to remove the coil with a 2 mm sized Amplatz Gooseneck Microsnare (EV3, Covidien, Plymouth, MA, USA). Under roadmap guidance, a microcatheter was advanced over the migrated coil. After positioning the loop perpendicular to the long axis of the vessel by using a true 90° snare loop, the coil was successfully surrounded by the snare loop. However, retrieval of the coil was unsuccessful because the 2 mm sized snare loop was too weak to draw the coil back, detaching itself from the coil or getting distorted during the process.

Next, a Hi-Torque Whisper guidewire (Abbott Laboratories, Chicago, IL, USA) was inserted past the coil and attempts were made to pull back the migrated coil in a similar way by forming a loop and drawing the coil back. However, this attempt also failed due to the same reason, the weakness of the device. Subsequently a Solitaire FR Revascularization 6-20 (EV3, Covidien) stent system, which is a device used for mechanical thrombectomy in ischemic stroke patients to remove blood clots, was inserted in an attempt to retrieve the migrated coil by deploying the stent and pulling it backwards. However, unlike blood clots, the migrated coil was too hard and was firmly attached to vessel wall, and our attempt for removal was unsuccessful.

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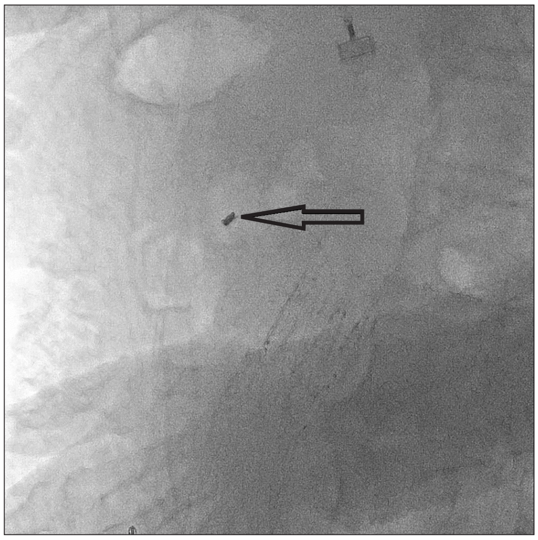

Fig. 4. Retrieval of the migrated coil using a Amplatz Gooseneck Microsnare (EV3, Covidien, Plymouth, MA, USA). The arrow shows the snared coil passing through the superior mesenteric artery.

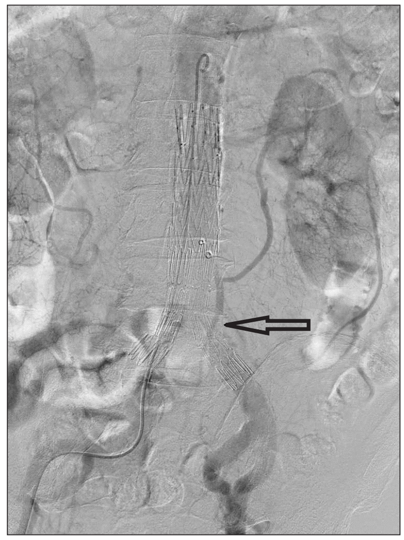

Fig. 5. Final angiography shows an occluded inferior mesenteric artery by coils and no evidence of injury to the sigmoidal artery (arrow).

Finally a 4 mm sized Amplatz Gooseneck Microsnare was inserted, and in the same manner as previous attempts, the migrated coil was snared and pulled back. Using this larger device, the migrated coil was successfully removed (Fig. 4). Final angiography showed no evidence of injury of the sigmoidal artery with total occlusion of the endoleak (Fig. 5). The patient was discharged at postoperative day 2 without complications.

DISCUSSION

Since the use of coil embolization as an alternative to microsurgical clipping, there have been a handful of case reports about coil migration, especially for intracranial interventions. Guglielmi et al. [1] reported 1 case of coil migration from 43 cases (2.3%). Another early study by Casasco et al. [2] reported 4 cases of coil migration from 71 cases (5.6%), which resulted in the death of two patients and the presence of neurological deficit in two patients. After a paradigm shift in the treatment of intracranial aneurysms towards endovascular procedures, the number of studies describing the results from endovascular treatment has grown rapidly. Henkes et al. [3] reported 46 cases of coil migration during treatment of 1,811 aneurysms (2.5%). While most of the coil migrations occurred during the procedure, there were also some reports of delayed migration [4,5].

There is no consensus regarding the best retrieval technique for migrated coils. Many case reports and case series have described various methods for removal of migrated coils. Techniques can be classified by the class of devices used for retrieval. Lee [6] described two cases where the authors used a microwire which was manually shaped like a pigtail to retrieve the displaced coils. Prestigiacomo et al. [7] and Koseoglu et al. [8] described the use of Gooseneck microsnares to retrieve coils and fractured foreign bodies. Some authors also used retriever devices, such as Henkes et al. [9] who reported the use of an Alligator Retrieval Device (Chestnut Medical Technologies, Menlo Park, CA, USA) or Liu et al. [10] who reported an intraprocedural retrieval of migrated coils using the Trevo Stentriever device (Concentric Medical, Mountain View, CA, USA).

In many case reports, the authors used several devices during their attempts to remove migrated coils. We also applied a Whisper guidewire, a retrieval stent and two kinds of Gooseneck microsnares. Each device had its strengths and weaknesses when used as a retriever. As there are no definite guidelines for retrieval of migrated coils, the endovascular operator should understand the features of each device and appropriately apply the device under given clinical circumstances.

This report describes, to our knowledge, the first case in Korea of migrated coil retrieval during an intra-abdominal endovascular procedure using a Gooseneck microsnare. While the strategy for treatment of coil migration requires concrete guidelines, retrieval management should continue to evolve along with advances in endovascular techniques.

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