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Case Report

Consecutive Coil Migrations Through Solitaire AB Stents During Stent-assisted Coiling of an Aneurysm: A Case Report

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Abstract

Endovascular treatment has been established as a safe and efficacious approach to the treatment of cerebral aneurysms. These stents provide support to decrease the risk of coil herniation. However, complications associated with stent-assisted embolization include aneurysm recurrence, stent migration, in-stent stenosis, and hemorrhagic and thromboembolic complications. Herein, we report a case of consecutive coil migrations into the distal middle cerebral artery (MCA) during stent-assisted coil embolization. F/U 1-month perfusion magnetic resonance imaging showed no hypoperfusion in the MCA territory.

Keywords: Stent; coil migration; wide-necked aneurysm; intracranial aneurysm

Soliter AB Stentleri İle Anevrizmanın Stentin Eşlik Ettiği Kolillenmesini İzleyen Koil Migrasyonu: Bir Olgu Sunumu

Özet

Endvasküler tedavi serebral anevrizmalarin tedavisinde güvenli ve etkili bir yaklaşım olarak kabul edilmektedir. Bu stentler koil hernisyonu riskinin azalmasına destek sağlar. Ancak stentle desteklenen embolizasyonun anevrizma tekrarı, stent migrasyonu, stent içi stenoz ve hemorajik ve tromboembolik olaylar gibi komplikasyonları vardır. Burada distal orta serebral artere (MCA) stentle desteklenen koil embolizasyonunu izleyen koil migrasyonu olgusu bildirmekteyiz. İzleyen 1 aylık perfüzyon sonrasında manyetik rezonans görüntülemede MCA alanında hipoperfüzyon dikkat çekmemiştir.

Anahtar Kelimeler: Stent, koil migrasyonu; geniş-boyunlu anevrizma; intrakraniyel anevrizma

INTRODUCTION

Wide-necked intracranial aneurysms were classically considered to be the major limitation for endovascular treatment (1). With advancements in endovascular devices and techniques, stent-assisted coil embolization has been found to be safe and efficacious for complex and wide-necked intracranial aneurysms (2). These stents provide support to decrease the risk of coil herniation. However, we report a case of consecutive coil migrations during stent-assisted coil embolization.

CASE PRESENTATION

A man aged 74 years was admitted to our hospital because of headache. He had a medical history of hypertension and his neurologic examination was normal. Magnetic resonance (MR) angiography revealed a small, wide-necked aneurysm of the distal internal carotid artery (ICA) (Figure 1). The aneurysm was 2.3 x 1.4 mm in size, and located in the vascular concavity of the distal ICA. It would have been difficult to place a microcatheter into the aneurysm because of the acute angle between the aneurysmal sac and the tortuous distal ICA. Therefore, we planned stent-assisted coil embolization using the "jailing" technique (3). Premedication was initiated 5 days prior to the procedure with 100 mg of aspirin and 75 mg of clopidogrel per day. The patient underwent endovascular treatment under general anesthesia. A Rebar Micro Catheter® was advanced over a micro guidewire into the normal distal artery beyond 1-2cm. The coiling catheter was then navigated into the aneurysm in order to jail it with the stent. The catheter was placed in the aneurysm sac after a number of attempts. The initial 1.5 x 20-mm coil was deployed (MicroPlex 10, Hypersoft helical, MicroVention®). After that, a 6 x 20-mm Solitaire AB stent (EV3, Irvine, CA, USA) was introduced into the hub of the Rebar catheter and deployed by withdrawing the microcatheter. The initial coil and catheter tip were not moved while the Solitaire stent was being deployed. While a second identical 1.5 x 20-mm coil was being deployed into the aneurysm, the first coil migrated out of the aneurysm into the parent artery and then into the distal middle cerebral artery (MCA) (Figure 2). The herniated coil was located in the M3 branch of the MCA. We did not attempt to retrieve the coil because we were concerned about further herniation of the coil, and the 10-minute delayed angiography did not show compromised flow in the distal MCA. However, the contour of the aneurysm became more irregular. Due to the concern of high risk of aneurysm rupture, we performed a second trial of coil embolization for the aneurysm.

A 2 x 20-mm coil (Axium, ev3) was advanced. However, the coil was too large to be deployed into the aneurysm. Again, a 1.5 x 20-mm coil was deployed (MicroPlex 10, Hypersoft helical, MicroVention®). The coil deployed showed a more favorable appearance like that of a complex coil. The 20-minute delayed angiography showed no movement of the coil. However, angiography after detaching the coil showed mild coil protrusion into the parent artery. We tried to place a second stent but a microcatheter could not be passed through the initial stent. In the 30-min delayed angiography, the coil migrated out of the aneurysm into the distal MCA (Figure 3). The coiling was not reattempted. The 40-min delayed angiography after coil migration showed normal contrast filling of the distal MCA.

F/U 1-month perfusion MRI showed no hypoperfusion in the MCA territory (Figure 4). At the 3-month follow-up, the patient had been taking 100 mg of aspirin and 75 mg of clopidogrel per day. He was neurologically normal.

Figure 1: *Angiograph at working angle showed a wide-necked aneurysm in the distal internal carotid artery (2.3 x 1.4 mm).*

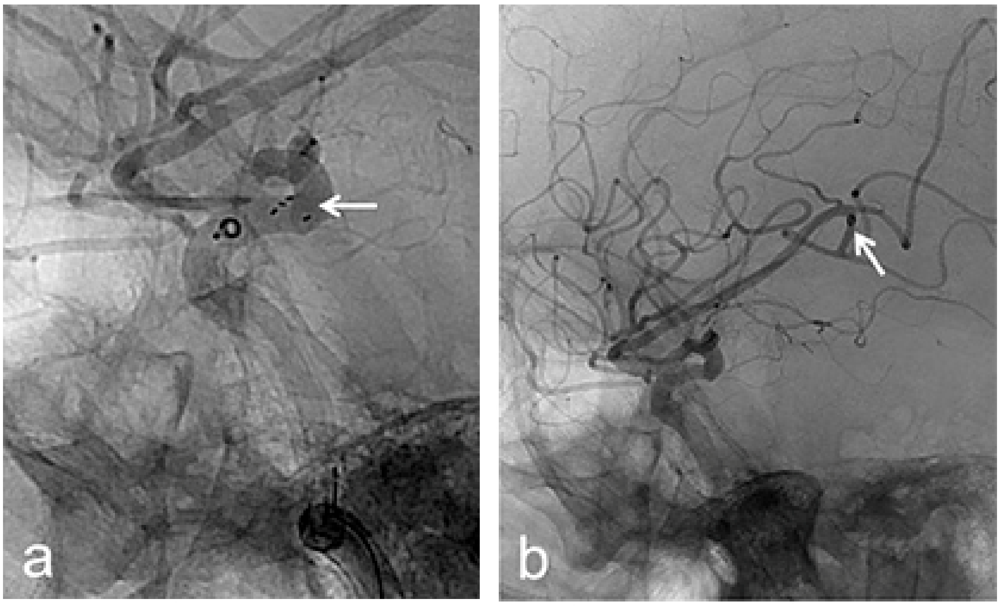

Figure 2: *First migration of coil in stent-assisted coil embolization of an aneurysm.*
a) 1.5 mm x 20-mm helical coil placed, which appeared to be in good position. The distal marker of Solitaire AB stent is visible (arrow).
b) When a second identical 1.5 mm x 20-mm coil was being deployed into the aneurysm, the first coil migrated out of the aneurysm into the distal middle carotid artery (arrow).

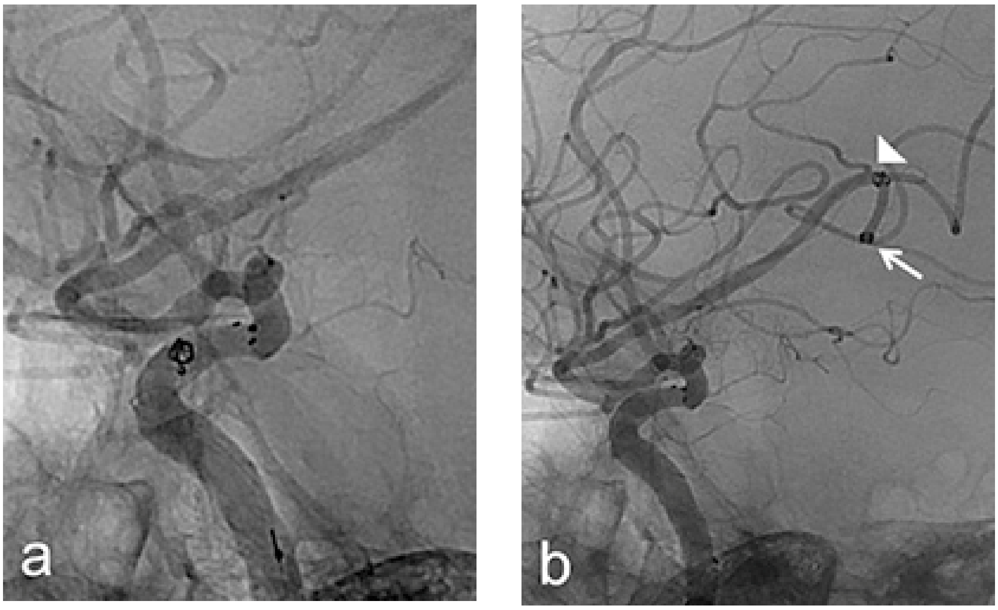

Figure 3: *Second migration of coil in stent-assisted coil embolization of an aneurysm.*
a) 1.5 mm x 2-mm helical coil placed which appeared a more favorable appearance like that of a complex coil. However, angiography after detaching the coil showed mild coil protrusion into the parent artery.
b) In the 30-min delay angiography after detaching the coil, the coil migrated out of the aneurysm into the distal middle carotid artery (arrowhead). The first migrated coil was further migrated into the distal middle carotid artery (arrow).

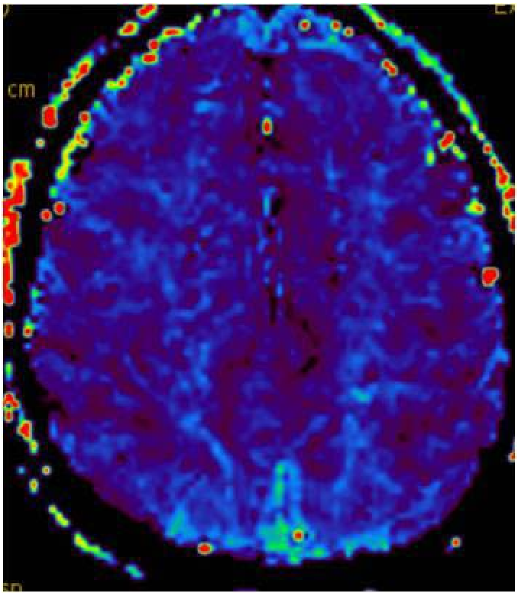

Figure 4: *F/U 1-month perfusion MRI showed no hypoperfusion in the middle cerebral artery territory on the time-to-peak map.*

DISCUSSION

Since publication of the International Subarachnoid Aneurysm Trial (ISAT) endovascular treatment has been established as an efficient, safe, and smart approach in the treatment of cerebral aneurysms (1). However, complications associated with stent-assisted embolization include aneurysm recurrence, stent migration, in-stent stenosis, and hemorrhagic and thromboembolic complications (4,5). Parent vessel size and curvature are associated with risk of incomplete stent apposition in patients undergoing stent-assisted coiling. In larger diameter vessels, such as the distal ICA, there may be a higher incidence of incomplete stent apposition (6). O"Hare et al. reported a case of coil migration into the MCA bifurcation during treatment of a periophthalmic aneurysm with the Neuroform stent (7). Stent lumen flattening in Solitaire stents when placed in tortuous vessels is less than that in Neuroform and Enterprise stents (8). Moreover, Solitaire stents have major advantages because they allow the retrieval, repositioning, and deployment of stents whenever necessary. Thus, in a large vessel (>4mm), we used the 6-mm Solitaire stent. Wide-necked small aneurysms and small coils together with stent cells may play a role in the escape of coils through the stent. It has been suggested that it is possible for small coils (2 to 3 mm) to prolapse through cells of the stent, especially when the stent is deployed at a vessel convexity (9). It has been suggested that complex three-dimensional (3-D) coils may have less chance of prolapse. However, we avoid using the 3-D coils because we think that 3-D coils do not provide enough space to create a stable intertwined coil pack in small-sized aneurysms. In our case, a 1.5-mm coil may appear to have been small for the aneurysm lumen measuring 2.3 x 1.4 mm. Under normal circumstances, in a narrow-necked aneurysm without a stent, these coils would certainly be undersized relative to the aneurysm. However, we believed that the coil could be securely positioned within the aneurysm sac with the stent, although it was only 2 mm, helical or complex. In our case, we think that the open side of the Solitaire stent overlapped the aneurysm neck and subsequently facilitated migration of the deployed coils. If a longer size coil had been chosen for our patient, it may have been in closer contact with the aneurysm wall after deployment and therefore may not have escaped from the stent. Little is known about the natural history of coil migration into the cerebral vasculature from the aneurysm after Guglielmi detachable coil treatment (10). It is not easy to retrieve a migrated coil. Antiplatelet and anticoagulation therapy may be helpful in situations of coil migration. Fortunately, in our case, the escaped coil did not cause occlusion of an artery and perfusion MRI showed normal perfusion.

CONCLUSION

Coil escape from the confinement of the stent is a rare event. However, we should always keep in mind that there is a possibility of coil migration through the stent when using coils smaller than 2-3mm. We must pay attention to coil size for wide-necked small aneurysms.

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