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·病例报告 Case report·

Coil migrating out of a small wide-necked aneurysm embolized with stent-assisted technique

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Stent-assisted coiling is one of the techniques used to treat intracranial aneurysms with wide necks or unfavorable neck-to-fundus ratios, which have been traditionally considered as poor candidates for Guglielmi detachable coil (GDC) embolization owing to the significant risk of coil herniation into the parent artery[1-5]. With this technique, fusiform, wide-necked and geometrically difficult aneurysms as well as pseudoaneurysms have been successfully treated with different follow-up results. Herein, we present an aneurysm case with a coil escaping from the confinement of the stent.

Case report

A 60-year-old woman complained of dizziness and headache for 6 months. A cerebral angiography was performed and revealed two small wide-necked aneurysms on both internal carotid-posterior communicating arteries (Fig. 1 A, B). Clinically, there were no documented history of hemorrhage and essentially normal neurological examination presented. After consideration of the risks, benefits and potential complications, endovascular treatment of both aneurysms was chosen for this patient.

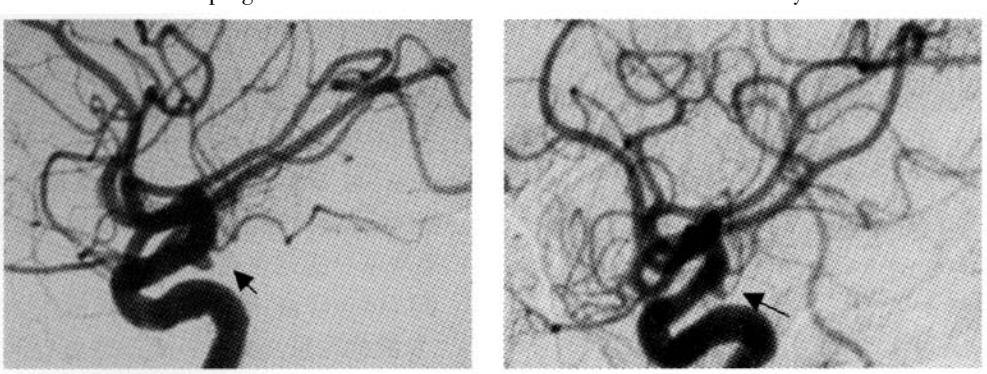

Fig.1 [Lateral views of left (A) and right (B) carotid angiograms] Two small aneurysms were clearly shown on both internal carotid-posterior communicating arteries

First, stent-assisted GDC embolization of the left wide-necked aneurysm was performed successfully under general anesthesia with electroencephalographic (EEG) monitoring. Before micro-catheterization, 5000 units of heparin was administered and the activated clotting time was maintained at approximately 300 seconds throughout the procedure. After a Neuroform stent (4.0 mm × 15 mm, Boston Scientific) was placed across the aneurysm orifice, a microcatheter (SL-10, Excel, Boston Scientific) was introduced through the stent mesh into the lumen of the aneurysm. And then, two-dimensional GDC-US coils (2 mm × 2 cm and 2 mm × 1 cm, Boston Scientific) were packed into the aneurysm with complete occlusion of the aneurysm lumen with preservation of the left internal carotid artery (Fig. 2 A,B). The patient was discharged two days afterprocedure. Aspirin (100 mg/d) and ticlopidine (250 mg/d) were routinely administered 3

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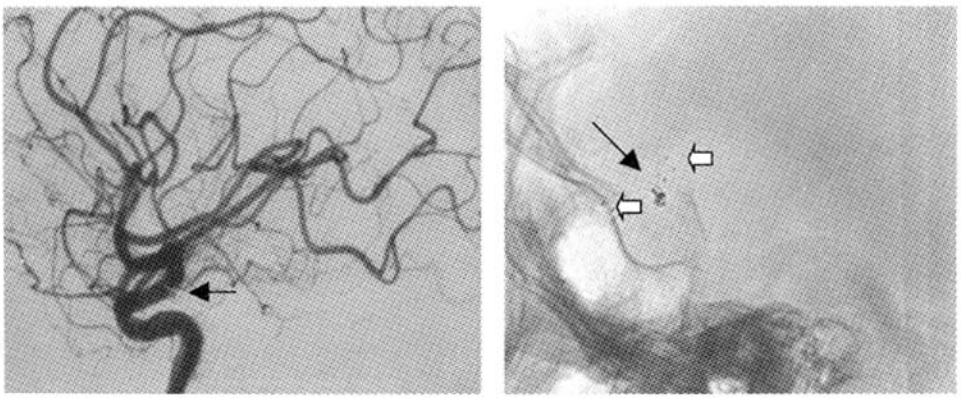
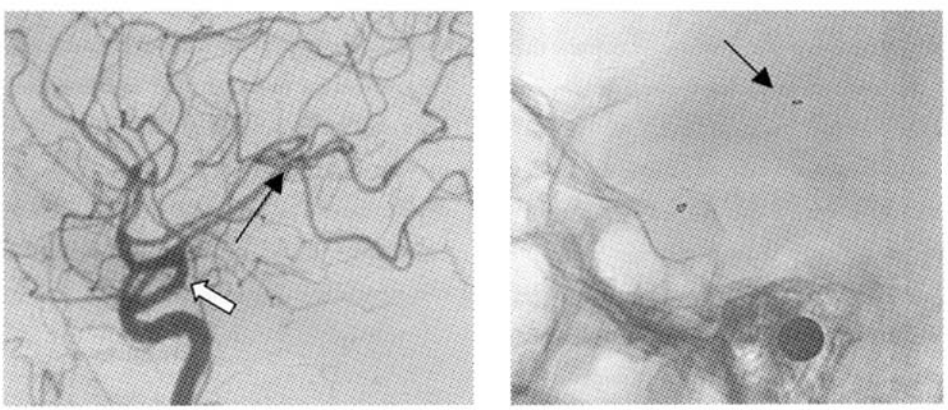


A B

Fig.2 Stent-assisted coiling of the left carotid-posterior communicating artery aneurysm. A. Post-procedure angiography of left carotid artery showed that thesmall aneurysm was totally occluded (→) with concurrent preservation of the parent artery. B. Lateral plain film showed both ends of the stent (⇩) and the two packed coils within the aneurysm. Part of the outboard coil (→) was perpendicular to the long axis of the stent and the outboard coil would later escape from the stent confinement into the branch of left middle cerebral artery.



A B

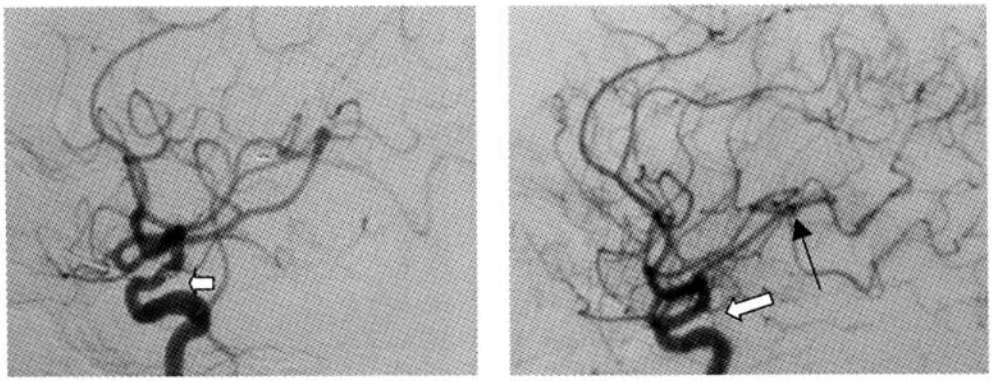
Fig.3 A. Follow-up angiography five months later showed that one coil got away from the confinement of the stent and entered one branch of the left middle cerebral artery. The aneurysm was till completely occluded (⇩). B. Comparison with Fig. 2 B, it was clear that the outboard coil broke loose from the stent.

days before the procedure and for 3 months after the procedure.

Five months later, she was hospitalized for embolization of her right internal carotid-posterior communicating artery aneurysm with no documentation of cerebral stroke. Before stent-assisted GDC embolization of the mirror aneurysm, cerebral angiography revealed that one of the two packed coils within the aneurysm of the left internal carotid-posterior communicating had escaped from the stent confinement and entered one of the branches of the left middle cerebral artery (Fig. 3 A, B) without causing occlusion of any arterial branches. However, the aneurysm remained completely occluded. And then, embolization of the right smaller aneurysm was successfully performed using a Neuroform stent (4.0 mm × 15 mm, Boston Scientific) and a 2 mm × 15 mm coil (Trufill, DCS ORBIT, Cordis). The same post-procedure anticoagulation measures as last time were employed. Another three months later, the patient, with normal neurological outcome, was followed up with cerebral angiography, which showed that the two aneurysms of both internal carotid-posterior communicating arteries remained completely occluded and the branch of the left middle cerebral artery with the escaped coil remained patent (Fig.4 A, B).

Discussion

Coil escape from the confinement of a stent described as in this report is a rare event, which indicates that a coil may pass through the relatively bigger mesh of the stent and enter the cerebral vasculature causing possible



A B

Fig.4 Follow-up angiograms three months after the right aneurysm embolization showed that the two aneurysms on both the right (A) and left (B) internal carotid-posterior communicating arteries were completely occluded (◊) with the patency of the parent arteries and the branches of the left middle cerebral artery (→).

disasters. Fortunately, in our case, the escaped coil got into a relatively larger arterial branch, resulting in no arterial occlusion. We did not know exactly when the coil broke loose from the stent, but we were quite certain that when it occured, the patient must have been continuing with anti-coagulation therapy (aspirin and ticlopidine). Five months later as the escaped coil was found in the left middle cerebral arterial branch, the patient had stopped taking ticlopidine and only took aspirin with no neurological symptoms. Therefore, we presumed that the coil had escaped from the stent confinement long enough for progressive epithelization to cover the thrombogenic metallic coil and that was also the reason why we did not perform snare retrieval technique to remove the escaped coil at the very moment when the escaped coil was found. Another three months passed, this patient remained intact neurologically even though the escaped coil was still in one of the branches of the left middle cerebral artery. This time, we were quite sure that the escaped coil, having been covered by the neointimal hyperplasia, might never cause trouble[6].

The Neuroform microstent is the first flexible, self-expanding nitinol stent specifically designed for use in the cerebral vasculature[1,7,8]. It can serve as an initial scaffold for coil placement. However, it has been reported that when the stent is placed on a convexity, the cells will actually open to larger than 2-French, making coil prolapse of 2-and 3-mm relatively easy[1,8]. Smaller coils (e.g. 2 or 3 mm) can easily prolapse through the cells of the stent, so great care must be taken during manipulation. Placing a balloon in the stent was also suggested to provide better protect the artery from protrusion of smaller coils[1,8].

When employing stent-assisted technique in treating cerebral aneurysms with unfavorable neck-to-fundus ratio, great attention must be paid to the choice of proper-sized coils and careful, appropriate deployment of coils so as to prevent unexpected events such as coil escape. Further development is necessary to perfect this technique especially in terms of coil compaction, aneurysmal recurrence and in-stent stenosis as well as coil escape.

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