

# DELAYED RUPTURE OF A PREVIOUSLY COILED UNRUPTURED ANTERIOR COMMUNICATING ARTERY ANEURYSM: CASE REPORT

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**OBJECTIVE AND IMPORTANCE:** We describe a case of an unruptured anterior communicating aneurysm that was treated successfully with Guglielmi detachable coils, which subsequently ruptured 23 months after initial therapy. This report discusses only the second published case of an unruptured lesion that was well embolized (>95% occlusion) and stable at 6-month angiographic follow-up that ruptured in a delayed fashion almost 2 years after the primary procedure.

**CLINICAL PRESENTATION:** An 80-year-old man presented in Hunt and Hess Grade IV as a result of a ruptured anterior communicating artery aneurysm. The patient had undergone endovascular therapy 23 months earlier with documented nearly complete (1-mm residual neck) occlusion at 0 and 6 months.

**INTERVENTION:** The patient underwent diagnostic catheter angiography at the time of admission, which revealed a 10-mm aneurysm adjacent to the previously embolized lesion. No further therapy was administered, and the patient died within 24 hours as a result of ictus. The request for an autopsy was denied.

**CONCLUSION:** Aneurysm rupture after Guglielmi detachable coil embolization is a rare event. Most cases involve previously ruptured lesions. To the best of our knowledge, only one previous case of delayed rupture of an unruptured aneurysm that was managed endovascularly has been published in the English-language literature. This second case points to the need for vigilance in the follow-up of patients with coiled lesions.

**KEY WORDS:** Aneurysm, Guglielmi detachable coils, Rupture

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The incidence of rupture from an aneurysm previously treated endovascularly is estimated to be between 1 and 4% on the basis of retrospective series. The vast majority of these events represent previously ruptured aneurysms that were treated with coil therapy and then re-ruptured at a later date. The incidence of delayed rupture of a previously unruptured aneurysm that was treated endovascularly is exceedingly rare.

## CASE REPORT

A 78-year-old man presented with an asymptomatic 11-mm anterior communicating artery aneurysm (Fig. 1). Sequential magnetic resonance imaging scans had demonstrated gradual lesion enlargement. The patient was referred by a cardiothoracic surgeon who wanted the aneurysm treated before the patient's aortic valve was replaced. Routine embolization of the lesion was performed with the patient under general anesthesia with the use of a combination of 14 Guglielmi detachable coils (regular stiffness and soft coils, T10 and T18). At the end of the procedure, a small amount of residual neck was filling to allow for continued perfusion of the anterior communicating arteries (Fig. 2). The

patient made an uneventful recovery, and his cardiac surgery was performed without complication. Six months later, the patient returned for repeat cerebral angiography to assess the aneurysm status. No change was seen in terms of coil compaction or aneurysm growth (Fig. 3). In view of the patient's age and the quality of his coiling, we opted to forgo our usual 12-month follow-up study.

Twenty-three months after the initial embolization procedure, when the patient was 80 years of age, he presented with Hunt and Hess Grade IV subarachnoid hemorrhage consistent with a ruptured anterior communicating artery aneurysm. Repeat angiography revealed a new component of the original aneurysm measuring 10 mm at its greatest diameter (Fig. 4). The patient sustained brain death shortly afterward. An autopsy was requested but was denied.

## DISCUSSION

The incidence of bleeding from an aneurysm during or after endovascular therapy is 2 to 4% (2). A review of our results in 180 aneurysms embolized in the past 27 months showed

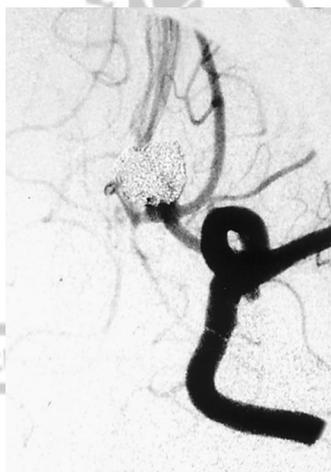
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a procedure-related incidence of bleeding of 2% and an incidence of delayed bleeding of 1.5%. Aside from the case reported here, we had an additional case of a patient who experienced hemorrhage within 24 hours of Guglielmi detachable coil embolization. That case involved an older woman who required full continuous heparinization after her embolization to manage a massive perisubarachnoid hemorrhage myocardial infarction.

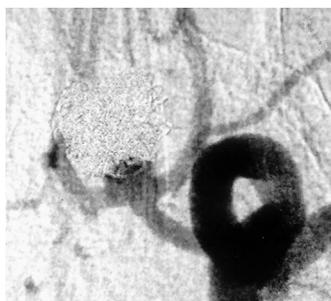
It is exceedingly rare for a previously unruptured aneurysm that is well embolized (>95% obliterated) to present in a delayed fashion with subarachnoid hemorrhage. In 1998, Hodgson et al. (1) reported a case of an 8-mm unruptured middle cerebral artery aneurysm that was treated endovascularly and at 6 months appeared to be completely occluded. At 18 months after the original procedure, the aneurysm ruptured, and angiography revealed a large recurrence. In the latter case, it is unclear in our examination of the published images whether the aneurysm was truly completely obliterated at 6 months. Nevertheless, it was interpreted as such by the authors and, to their credit, was reported later as a delayed recurrence and hemorrhage. The explanation why the aneurysm in our patient grew and ruptured after what was thought to be an effective embolization will never be determined conclusively. We can, however, speculate about the causative factors:



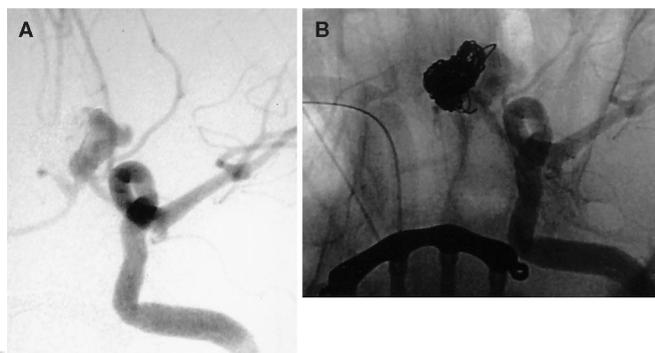
**FIGURE 1.** Oblique left common carotid arteriogram demonstrating initial anterior communicating artery aneurysm.



**FIGURE 2.** Oblique submental left internal carotid artery arteriogram showing the aneurysm immediately after coil embolization. A small amount of residual neck remains to maintain flow into the A2 segment.



**FIGURE 3.** Oblique submental left internal carotid artery arteriogram magnified view at 6-month follow-up showing slight residual neck.



**FIGURE 4.** Oblique submental left internal carotid artery arteriograms with (A) and without (B) digital subtraction obtained 23 months after the initial embolization showing aneurysm recurrence.

1. The aneurysm neck was never completely excluded from the circulation. Hemodynamic forces and inflammatory changes over time caused the residual neck to dilate and form a new portion of the aneurysm, which ruptured at 10 mm.

2. We originally embolized the opacifying portion of a partially thrombosed aneurysm. Over time, the thrombus resolved, leaving filling fundus behind. Once the protective elements of the thrombus were gone, the aneurysm ruptured.

3. The newly ruptured aneurysm represented new fundal growth from a diseased anterior communicating artery. Many aneurysmal anterior communicating arteries are circumferentially diseased. When it is clip-reconstructed, the remaining vessel is seen to be abnormal. It may be that we successfully obliterated the first aneurysm that formed and that the patient developed a second aneurysm along the residual diseased segment of the vessel.

4. This patient demonstrated a propensity for aneurysm growth, as was documented on his previous magnetic resonance images. This propensity might have either contributed to the growth of new aneurysm from the residual neck or led to the development of an entirely new aneurysm from the diseased vessel, as postulated in Point 3 above.

Clearly, the above are simple hypotheses that will never be proved or disproved. This case of delayed hemorrhage from a previously well-embolized unruptured aneurysm, however, emphasizes the point that meticulous follow-up is necessary in all individuals who undergo endovascular surgery. Although our routine has been to perform angiography at 6 and 12 months after treatment, it may well be prudent to perform catheter-based or magnetic resonance angiography for longer periods. Despite a low incidence of aneurysm bleeding or rebleeding in the 10 years that Guglielmi detachable coil embolization has been studied and used, we will not know the long-term results of this exciting treatment option for at least 2 more decades.

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## COMMENTS

The authors present an interesting case of delayed rupture of an anterior communicating artery aneurysm 23 months after coil embolization. Despite what appeared to be adequate treatment of this lesion at the time of 6-month follow-up angiography, delayed recanalization and fatal rupture of the aneurysm occurred. Far from signifying the inferiority of endovascular management of intracranial aneurysms as compared with open surgery, I think that the present case reaffirms the importance of meticulous long-term follow-up whenever coil embolization of an aneurysm is undertaken. I hope that with the introduction of new coated-coil technology, a lower rate of delayed postcoiling aneurysm recanalization may be realized.

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Horowitz et al. report a case of delayed rupture of a previously coiled, unruptured anterior communicating artery aneurysm. Despite adequate coil embolization of this lesion and 6-month angiographic follow-up that showed only a slight recurrence of the aneurysm neck, the aneurysm ruptured 2 years later. This report underscores the need for long-term angiographic follow-up after coil embolization. Such follow-up is particularly important in cases such as this one, in which the configuration of the aneurysm is irregular and has a fusiform component. In our experience, such lesions may recur with greater frequency than purely saccular aneurysms and may require either additional endovascular therapy or microvascular surgery. In fact, earlier and more frequent angiographic follow-up of such aneurysms is probably indicated after coil embolization.

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The patient described here represents the second reported case of an unruptured well-coil-embolized aneurysm to rupture in a delayed fashion. At the conclusion of the procedure, a residual neck remains (Type II occlusion) (2). The incidence of recurrent hemorrhage after coil embolization in ruptured aneurysms is approximately 3% and is associated with filling of either the fundus or the neck remnant (Type II or III). Moreover, the administration of anticoagulants during the periprocedural period increases the incidence of rerupture (3). Although this patient had a previously unruptured aneurysm, he subsequently underwent aortic valve replacement and most likely remained on either antiplatelet or anticoagulation medications.

Close inspection of the angiographic images shows circumferential aneurysmal dilation of the anterior communicating artery, because there is a double density of the communicating artery beyond the widths of the left A1 vessel. This circumferential dilation is probably what expanded during the 2-year period after coil embolization. This dilation may also represent a second lobe projecting perpendicularly to the plane demonstrated in the images. This lobe was left untreated but appears to be small.

Interestingly, in the series of coil-embolized ruptured aneurysms reported by Byrne et al. (1), a higher incidence of regrowth and rerupture was demonstrated during the second and third years after treatment. Obtaining angiographic studies at 18 and 24 months after treatment may be critical, because it may be that new aneurysm growth can be detected by following this time course of observation.

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