Spontaneous Thrombosis of Significant Aneurysm Recanalization in the Long Term Follow-up of Coiled Aneurysms Observation in Two Cases

I. SAATCHI, U. KERIMOGLU, C. BARBAROS, T. HAZIROLN, S. CEKIRGE

Department of Radiology, Hacettepe University Hospital; Ankara, Turkey

Key words: aneurysm recanalization, spontaneous thrombosis, GDC

Summary

Endovascular treatment of cerebral aneurysms with detachable coils has now been proved to be a superior alternative to open microsurgery in terms of survival free of disability at one year according to the recently published large randomized International Subarachnoid Aneurysm Trial (ISAT). However, aneurysm recanalization secondary to coil compaction is still the main problem of this technique observed in the follow-up period but treatment strategies for these regrowths are not yet well established.

We present two interesting cases in which we observed a significant aneurysm recanalization at six month control angiography that was found to be spontaneously thrombosed in the late follow-up angiograms at the second and fifth years consecutively.

Introduction

Although the target of cerebral aneurysm treatment is total occlusion, there has been no 100% success obtained with either with surgery or endovascular treatment. Recanalization and regrowth are the unfavorable results of both endovascular treatment and surgical clipping. It has been well documented in the surgical series that the aneurysm residuum or aneurysm regrowth after surgery may cause dangerous re-

bleeding months or years after the first treatment even after angiographically checked complete surgical clipping¹⁻⁴.

The treatment strategy of aneurysm residuum or regrowths is not well established. However, there are articles suggesting neurosurgical management following incomplete endovascular treatment or endovascular management of recurrent or residual aneurysms after surgery due to the risk of rebleeding especially in young patients^{5,6}.

On the other hand, Sato and Suzuki showed that there is a chance of spontaneous obliteration of the aneurysm residuum and the risk of recurrent bleeding is low⁷. We present these interesting two cases to provide an insight into the potential of spontaneous thrombosis of aneurysm regrowth that may create a new consideration for future retreatment strategies

Case Reports

Case 1

A 52-year-old man was admitted to hospital with subarachnoid hemorrhage (SAH). A cerebral angiography revealed a saccular aneurysm in the A1 portion of the right anterior cerebral artery (figure 1A) which was partially thrombosed on the CT (not shown). He was in Grade 1 according to the Hunt and Hess scoring. Under general anesthesia and using standard neurointerventional techniques, the aneurysm sac

Figure 1 A) Conventional angiography on anterior-posterior (A-P) projection shows a saccular aneurysm in the A1 portion of the right anterior cerebral artery. B) Postembolization control angiography on oblique projection demonstrates completely embolized aneurysmal sac. C) Six months follow-up angiography on A-P projection shows recanalization at the neck of the previously embolized aneurysm. D) Second year control examination with right internal carotid artery injection on A-P projection reveals spontaneous thrombosis of the recanalization. E) Fifth year angiography demonstrates stable occlusion of the sac.

was completely embolized with Guglielmi Detachable Coils (Boston Scientific, Fremont, CA, USA) (figure 1B). The patient was then discharged with no neurological deficit on the third postoperative day. Control angiography was performed six months after treatment revealing recanalization as a result of coil compaction (figure 1C). The risk of rebleeding was explained to the patient but he refused retreatment and was lost to follow-up.

The patient applied to our neurointerventional unit two years after the embolization with no neurological symptoms but concerns about the aneurysm. Second (figure 1D) and fifth year (figure 1E) follow-up angiograms surprisingly showed spontaneous thrombosis of the recanalized portion of the aneurysm.

Case 2

A 38-year-old man was admitted to the hospital with severe SAH predominantly in the anterior interhemispheric fissure on the CT scan. He was in Grade 3 according to the Hunt and

Hess scoring. Cerebral angiography demonstrated a giant anterior communicating artery aneurysm (figure 2A) responsible for bleeding and two smaller unruptured incidental aneurysms in the right middle cerebral artery bifurcation and right internal carotid artery. After cerebral angiography, a decision was made to perform endovascular treatment of the bleeding giant aneurysm. Under general anesthesia the aneurysm sac was totally occluded with GDC embolization. Then he showed an excellent recovery in ten days. His other two incidental aneurysms were then surgically clipped. Repeated angiography before discharge confirmed the total elimination of the embolized and surgically clipped aneurysms (figure 2B). Six months follow-up angiography showed significant recanalization of the aneurysm (figure 2C). The patient refused retreatment. After five years he presented with headache. The patient underwent control angiography which showed spontaneous thrombosis of the recanalized aneurysm (figure 2D).

Discussion

According to the results of the large and randomized International Subarachnoid Aneurysm Trial (ISAT) of neurosurgical clipping versus endovascular coiling in 2143 patients, endovascular coil treatment is significantly more likely to result in survival free of disability at one year after subarachnoid haemorrhage than neurosurgical treatment⁸. Although endovascular coiling has proved to be a strong alternative to surgical clipping, recanalization of aneurysms with recurrences in 10% to 20% of patients after coiling is still the main drawback of this technique. It has been well documented in the surgical series that the residual aneurysm neck after surgery ranges between 3.8% to 18%^{2-4,9-12} with a rebleeding rate ranging between 3.5% to 28%²⁻⁴. Aneurysm regrowth has been reported to occur in 3.5 to 15% of patients^{3,4} and a 2.7% rate of aneurysm rerupture was reported even after complete surgical clipping of the aneurysm.

However, the long term anatomical outcome after coil embolization is not fully documented yet. Murayama et Al.¹³ published their experience reporting no cases of delayed aneurysm recanalization in 52 aneurysms completely occluded with coil embolization. On the other

hand, aneurysms embolized with coils may have a residual neck especially in wide necked or large aneurysms.

Murayama et Al. reported that approximate-

Figure 2 A) Angiography at A-P projection reveals three aneurysms of which the largest is seen at the anterior communicating artery. The other two aneurysms are seen at the right middle cerebral artery bifurcation and the supraclinoid portion of the internal carotid artery. B) Control angiography after embolization and surgery on A-P projection demonstrates total occlusion of the embolized anterior communicating aneurysm. The other two aneurysms, which were surgically clipped, are also eliminated from the circulation. C) Angiography performed at 6th month follow-up on oblique projection shows the significant recanalization of the previously coiled aneurysm. D) Fifth year follow-up reveals spontaneous thrombosis of the recanalized aneurysm.

ly one third of aneurysms with a residual neck remnant showed further thrombosis, one third remained unchanged and one third showed recanalization. Some authors accepted that there must be a significant risk of rebleeding in endovascularly treated aneurysms with incomplete occlusion based on the published data from recurrent aneurysms following surgical clipping^{2,11,14}. It is not yet known if the risks of rebleeding in aneurysms with neck remnants treated endovascularly or surgically are similar or different. We believe that only histopathological comparison of aneurysm remnants in these two groups can define the probable clinical outcome of these treated aneurysms.

Because it is difficult to know what to do with a recanalized aneurysm after coil embolization, the decision for retreatment in this group of patients is subjective and depends on multiple factors, including anatomical orientation (side wall or bifurcation) and location of

the aneurysm, the age and clinical condition of the patient, and the size of the remnant aneurysm. According to articles on the aneurysm remnants either in surgical or endovascular group^{5,6}, retreatment has been suggested and performed if the patient is young and in good clinical condition⁶.

However, Sato and Suzuki reported in their surgical series that there is a good chance of spontaneous obliteration of the aneurysm residuum and the risk of recurrent rupture is low⁷. To our knowledge, our two interesting cases, presented herein, are the first reports in English literature that there is also a possibility of spontaneous thrombosis of significant aneurysm regrowth after coil embolization of cerebral aneurysms. We believe that these two anecdotal cases may not change our retreatment indications but may create a new discussion and consideration in the management of recanalized aneurysms after coil embolization.

References

- 1 Brilstra EH, Rinkel GJE et Al: Treatment of intracranial aneurysm by embolization with coils. A systemic review. *Stroke* 30: 470-476, 1999.
- 2 Drake CG, Allcock JM: Postoperative angiography and the slipped clip. *J Neurosurg* 39: 683-689, 1973.
- 3 Drake CG, Friedman AH, Peerless SJ: Failed aneurysm surgery. Reoperation in 115 cases. *J Neurosurg* 61: 848-856, 1984.
- 4 Feurberg I, Lindquist C et Al: Natural history of postoperative aneurysm rests. *J Neurosurg* 66: 30-34, 1987.
- 5 Gurian JH, Martin NA et Al: Neurosurgical management of cerebral aneurysms following unsuccessful or incomplete endovascular embolization. *J Neurosurg* 83: 843-853, 1995.
- 6 Cekirge HS, Islak C et Al: Endovascular coil embolization of residual or recurrent aneurysms after surgical clipping. *Acta Radiologica* 41: 111-115, 2000.
- 7 Sato S, Suzuki J: Prognosis in cases of intracranial aneurysm after incomplete direct operations. *Acta Neurochir* 24: 245, 1971.
- 8 International Subarachnoid Aneurysm Trial (ISAT) Collaborative Group. International Subarachnoid Aneurysm Trial (ISAT) of neurosurgical clipping versus endovascular coiling in 2143 patients with ruptured intracranial aneurysm: a randomised trial. *Lancet*; 360: 1267-1274, 2002.
- 9 Acevedo JC, Turjman F, Sindou M: L'artériographie post-opérative dans la chirurgie des anévrismes intracrâniens. Etude prospective dans une série consécutive de 267 anévrismes opérés. *Neurochirurgie* 43: 257-284, 1997.
- 10 Allcock JM, Drake CG: Postoperative angiography in cases of ruptured intracranial aneurysm. *J Neurosurg* 20: 752-759, 1963.
- 11 Lin T, Fox AJ, Drake CG: Regrowth of aneurysm sacs from residual neck following aneurysm clipping. *J Neurosurg* 70: 556-560, 1989.
- 12 Macdonald RL, Wallace MC, Kestle JRW: Role of angiography following aneurysm surgery. *J Neurosurg* 79: 826-832, 1993.
- 13 Murayama Y, Vinuela F et Al: Embolization of incidental cerebral aneurysm by using the Guglielmi detachable coil system. *J Neurosurg* 90: 207-214, 1999.
- 14 Drake CG, Vanderlinden RG: The late consequences of incomplete surgical treatment of cerebral aneurysms. *J Neurosurg* 27: 226-238, 1967.

Isil Saatci, M.D.
Hacettepe University Hospital
Department of Radiology
Sihhiye
TR 06100 Ankara, Turkey