

Endovascular Treatment of Ruptured Intracranial Aneurysms using Platinum Coils in Patients over 70 Years of Age

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Summary

Endovascular treatment of intracranial aneurysms using platinum coils was performed in 26 patients with age over 70 years. The patients ranged from 70 to 86 years old (mean 77.5). Preoperative World Federation of Neurological Surgeons (WFNS) scale revealed that 6 patients were in grade I, 5 in grade II, 2 in grade III, 12 in grade IV, and 1 in grade V. The location of aneurysms are as follows; 10 were in the internal carotid artery, 7 in the anterior cerebral artery, 1 in the middle cerebral artery, and 8 in the vertebro-basilar system. Intra-aneurysmal occlusion was accomplished in 25 patients, resulting in 6 complete occlusion (24%), 3 neck remnant (12%), 11 body filling (44%), and both of neck remnant and body filling in 5 (20%). In one patient with vertebral artery union aneurysm, the parent artery was occluded just proximal to the aneurysm.

Eleven of 13 patients with good clinical grade (grade I, II, and III) resulted in good clinical outcome, whereas 11 of 13 patients with poor clinical grade (grade IV and V) showed poor outcome. Periprocedural complications such as thromboembolism and intra-procedural rupture occurred in 5 patients (19.2%). Each of the complications was attributed to severe atherosclerotic changes of parent arteries. Sympto-

matic cerebral vasospasm occurred in only one patient (3.8%).

In conclusion, endovascular coil embolization is a useful therapeutic alternative for treating ruptured intracranial aneurysms in patients over 70 years of age, especially in patients with good clinical grade (better than grade III).

Introduction

The incidence of subarachnoid hemorrhage (SAH) increases with advanced age¹. Aneurysm rupture in the elderly patients will become an issue of greater importance.

Recent advancement of interventional neuroradiology has enabled us to treat cerebral aneurysms which were previously considered to be inoperable². However, the efficacy of this type of treatment for elderly patients remained to be determined. In the present study, we described the advantages and problems of the endovascular treatment for elderly patients with aneurysmal SAH.

Material and Methods

Twenty-six patients over 70 years of age with ruptured aneurysms underwent detachable

platinum coil embolization between April 1995 and July 1999. In 26 patients who underwent endovascular treatment; 4 were males and 22 were females with the ages ranged from 70 to 86 years (mean 77.5 years old). Preoperative WFNS scale revealed that 6 patients were in grade I, 5 in grade II, 2 in grade III, 12 in grade IV, and 1 in grade V. Eighteen aneurysms were located in the anterior circulation and 8 in the posterior circulation. Guglielmi detachable coils (GDCs) were used in 12 patients, IDCs were in 14 patients and 2 patients were treated with both of them. All of the patients were treated within 72 hours of primary hemorrhage. Outcomes were evaluated at 3 months after the ictus according to the Glasgow Outcome Scale (GOS) score.

Results

Clinical results

GOS score at 3 months after discharge revealed that 10 patients were in good recovery (38.5%), 3 in moderate disability (11.5%), 5 in severe disability (19.2%), 5 in vegetative state (19.2%), and 3 in death (11.5%). Symptomatic cerebral vasospasm occurred in only one patient (3.8%) without aggressive management for vasospasm (including clotlysis, triple-H therapy and chemical and/or mechanical angioplasty). Eleven of 13 patients with good initial clinical grade (better than grade III) obtained favorable clinical outcome. In contrast, 11 of 13 patients with poor initial clinical grade (grade IV and V) resulted in poor clinical outcome worse than severe disability.

Morphological results

In 25 patients with intra-aneurysmal occlusion with preservation of parent arteries, complete aneurysmal occlusion was achieved in 6 patients (24%), a small neck remnant was observed in 3 (12%), a body filling in 11 (44%), and both of them in 5 (20%). Only one patient with vertebral artery union aneurysm underwent intentional parent artery occlusion.

Periprocedural complications

Periprocedural technical complications were observed in 5 patients (19.2%). Intra-procedural perforation of the aneurysm occurred in 3

patients and thromboembolic complications during or after the procedure were observed in 2 patients. Intra-procedural aneurysm ruptures were managed by the immediate delivery of additional coils and no permanent neurological deficits were observed. One patient with thromboembolic complication had clinical outcome of severe disabled.

Follow-up results

During the follow-up period ranged from 2 to 45 months with mean follow-up period of 18 months, aneurysmal recanalization was observed in 3 patients (11.5%) with incomplete obliterated aneurysms. Two coil compactations were detected by the follow-up angiograms at 3 and 7 months after the procedure. These 2 patients with coil compaction required the additional coil embolization, resulting in complete obliteration.

Discussion

In a recent retrospective analysis of 98 SAH patients older than 70 years who were surgically treated in Sweden, satisfactory results were obtained in 74% of individuals in good clinical condition (grades I and II) at admission³. A similar figure was reached by endovascular treatment in our series. Therefore, regardless of types of treatment, the overall good outcome observed with advancing age may be explained by good clinical grade at admission. The clinical grade at initial presentation appears to correlate with the overall clinical outcome.

In this series, we have encountered an increased incidence of complications (20%) in coil embolizations of ruptured aneurysms when compared with technical complications observed in the previous clinical studies^{4,5}. It is conceivable that the high percentage of technical complications in elderly patients seems to be closely related to the atherosclerotic changes of cerebral arteries since the cerebral vessels have become more rigid, especially in the presence of chronic high blood pressure. Therefore, a more extensive caution has to be exercised during the endovascular procedure of patients over 70 years of age.

Without any aggressive treatment for vasospasm such as clotlysis, CSF drainage and triple H therapy, the incidence of symptomatic

vasospasm in our series was lower than that reported in nonsurgical series⁶ or in series of patients undergoing surgical clipping and cisternal drainage⁷. Similar relationship between age and cerebral vasospasm is demonstrated by the other clinical studies^{8,9,10}. These observations can be explained by the nature of aged arteries. The cerebral arteries become more rigid with advancing age, and are less responsive to spasmogenic factors^{9,10}.

Conclusions

Endovascular coil embolization is a useful treatment of ruptured intracranial aneurysms, even in the elderly patients over 70 years of age, especially those in initial clinical grade better than 3 as WFNS scale. However, there were higher incidence of intra-procedural complications related to atherosclerotic changes of parent arteries.

References

- 1 Sari C, Tuomilehto J et Al: Epidemiology of subarachnoid hemorrhage in Finland from 1983 to 1985. *Stroke* 22: 848-853, 1991.
- 2 Guglielmi G, Viñuela F et Al: Electorothrombosis of saccular aneurysms via endovascular approach. Part 2: Preliminary clinical experience. *J Neurosurg* 75: 8-14, 1991.
- 3 Fridriksson SM, Hillman J et Al: Intracranial aneurysm surgery in the 8th and 9th decades of life: impact on population-based management outcome. *Neurosurgery* 37: 627-632, 1995.
- 4 Viñuela F, Duckwiler G et Al: Guglielmi detachable coil embolization of acute intracranial aneurysm: perioperative anatomical and clinical outcome in 403 patients. *J Neurosurg* 86: 475-482, 1997.
- 5 Murayama Y, Malisch T et Al: Incidence of cerebral vasospasm after endovascular treatment of acutely ruptured aneurysms: report on 69 cases. *J Neurosurg* 87: 830-835, 1997.
- 6 Miyaoka M, Sato K et Al: A clinical study of the relationship of timing to outcome of surgery for ruptured cerebral aneurysms. A retrospective analysis of 1622 cases. *J Neurosurg* 79: 373-378, 1993.
- 7 Kawakami Y, Shimamura Y: Cisternal drainage after early operation of ruptured intracranial aneurysm. *Neurosurgery* 20: 8-14, 1987.
- 8 Fortuny LA, Adams CB et Al: Surgical mortality in an aneurysm population: effects of age, blood pressure and preoperative neurological state. *J Neurol Neurosurg Psychiatry* 43: 879-882, 1980.
- 9 Inagawa T: Cerebral vasospasm in elderly patients treated by early operation for ruptured intracranial aneurysms. *Acta Neurochir* 115: 79-85, 1992.
- 10 Inagawa T: Cerebral vasospasm in elderly patients with ruptured intracranial aneurysms. *Surg Neurol* 36: 91-98, 1991.

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