IRIS AperTO

UNIVERSITÀ DEGLI STUDI DI TORINO

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

Subarachnoid hemorrhage in elderly: Advantages of the endovascular treatment.

This is the author's manuscript

Original Citation:

Availability:

This version is available http://hdl.handle.net/2318/91526 since 2017-01-17T15:06:36Z

Published version:

DOI:10.1111/j.1447-0594.2011.00725.x

Terms of use:

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

27 April 2024

IRIS AperTO

UNIVERSITÀ DEGLI STUDI DI TORINO

This is the author's final version of the contribution published as:

Garbossa D; Panciani PP; Fornaro R; Crobeddu E; Marengo N; Fronda C; Ducati A; Bergui M; Fontanella M.. Subarachnoid hemorrhage in elderly: Advantages of the endovascular treatment.. GERIATRICS AND GERONTOLOGY INTERNATIONAL. 12 (1) pp: 46-49.
DOI: 10.1111/j.1447-0594.2011.00725.x

The publisher's version is available at:
http://doi.wiley.com/10.1111/j.1447-0594.2011.00725.x

When citing, please refer to the published version.

Link to this full text:
http://hdl.handle.net/2318/91526

This full text was downloaded from iris - AperTO: https://iris.unito.it/

iris - AperTO

University of Turin's Institutional Research Information System and Open Access Institutional Repository

Subarachnoid hemorrhage in elderly: Advantages of the endovascular treatment

Diego Garbossa,[1]* Pier Paolo Panciani,[1]* Riccardo Fornaro,[1] Emanuela Crobeddu,[1] Nicola Marengo,[1] Chiara Fronda,[1] Alessandro Ducati,[1] Mauro Bergui[2] and Marco Fontanella[1]

Divisions of [1]Neurosurgery and [2]Neuroradiology, Department of Neuroscience, University of Turin, Turin, Italy

Aim: Subarachnoid hemorrhage (SAH) from aneurysm rupture accounts for approximately 3% of all strokes. A significant improvement in surgery and endovascular procedures has reduced mortality and morbidity. Nowadays, endovascular treatment is a viable alternative to conservative treatment in elderly patients. We designed a retrospective observational study on all endovascular procedures carried out in our department in order to evaluate the outcome in elderly patients compared with a younger cohort.
Methods: A total of 378 patients with aneurysmal SAH were treated with detachable platinum coils in our department (1994–2009). Of these, 310 patients were aged 20–69 years and 68 were aged over 70 years. Data were stratified according to Hunt–Hess (H–H) grade at admission. The mean follow up was 4.8 years. The final outcome was evaluated through the Glasgow Outcome Scale (GOS).
Results: We observed a favorable outcome (GOS 5–4) in both groups of patients admitted with moderately good clinical conditions (H–H 1–3), with no statistically significant difference. In contrast, in the case of H–H grade at admission > 3, we observed a statistically significant poor outcome in elderly patients.
Conclusions: We consider the endovascular treatment as first choice for elderly patients presenting with a good H–H grade at admission. Quick functional recovery and reduced hospitalization time were observed. Unlike young patients, a chance of recovery in elderly patients with H–H 4–5 is more difficult to achieve. Therefore, a conservative approach should be considered.

Keywords: aneurysm, conservative management, elderly, endovascular treatment.

Introduction

Subarachnoid hemorrhage (SAH) from aneurysm rupture accounts for approximately 3% of all strokes.[1] A significant improvement in surgery and endovascular procedures has reduced mortality and morbidity. Nevertheless, the overall outcome remains relatively poor.[2] The case-fatality rate varies between 32% and 67%.[3] A total of 30% of survivors remain dependent on others, mainly as a result of persistent cognitive impairment rather than focal neurological deficits.[4,5]
The incidence of SAH increases with advancing age, reaching 78/100 000 per year in the eighth decade compared with 15/100 000 per year observed until the sixth decade. Furthermore, longer life expectancies and improved health has resulted in an increased proportion of elderly people in the general population. Hence, the elderly account for a significant number of the patients presenting with SAH.
Thirty years ago, aggressive management was not considered feasible in elderly patients, and a conservative treatment was advocated in patients aged more than 60 years.[6] Recently, a benefit from treatment of aneurysm rupture was observed in some elderly patients.[7–9] Nevertheless, older patients have a greater risk of poor outcome than younger patients.[10,11] This is mainly because of poorer clinical grades on admission[12,13] and higher frequency of comorbidity.[10,14] It is wellrecognized that surgical treatment of aneurysms, whether ruptured or unruptured, carries increased morbidity in elderly.
In contrast, endovascular treatment is a viable alternative.
In view of life expectancy, the risk of recanalization might be acceptable in this population. However, it has not yet been clearly shown what the advantages of this approach are compared with a conservative choice.
Therefore, we designed a retrospective observational study on all procedures carried out in the past 16 years in the Department of Neuroscience, University of Turin, Turin, Italy. Two cohorts of patients, in the age groups 20–69 years and 70–82 years, respectively, were compared with statistical analysis. The results were stratified according to the severity of SAH at onset. Finally, we discussed the benefits and limits of endovascular treatment in elderly patients.

Materials and methods

In the period 1994–2009, 378 patients with SAH as a result of aneurysm rupture were treated in our department. We used detachable platinum coils (GDC, Boston Scientific, MA, USA) according to the technique described by Bergui *et al*.[15]
A total of 68 patients (18%) of the present series were 70–82 years-of-age (mean 74 years, SD 1 4.44) with female predominance (52 women, 16 men). A total of 28 patients (41.2%) presented with Hunt–Hess (H–H) grades 1–2, 22 (32.3%) with grade 3 and 18 (26.5%) with grades 4–5 (Table 1). Endovascular treatment was carried out within 72 h of bleeding.
A total of 310 (82%) were 20–69 years-of-age. H–H grades at admission are shown in Table 2.
The clinical outcome was evaluated with the Glasgow Outcome Scale (GOS).[16] Clinical follow up was carried out in all patients in both cohorts (minimum follow up 8 months; median 4.8 years). The statistical analysis was carried out using the GraphPad Software (GraphPad Software, San Diego, CA, USA).

Results

The overall outcome was stratified according to the H–H grade at admission (Tables 1 and 2). In elderly patients, we observed a favorable outcome in 44 cases (64.7%). The rate of good outcomes in the 20–69 years cohort was higher (78.4%), but the difference was not statistically significant ($c_2 = 1.4$, $P = 0.24$).

The rate of patients discharged with a poor outcome (GOS 3–1) was significantly ($c_2 = 4.3$, $P = 0.04$) higher in elderly patients (24/68, 35.3%) than in younger patients (67/310, 21.6%).

After stratification, we observed a favorable outcome (GOS 5–4) in both groups of patients admitted with good clinical conditions (H–H 1–2), with a statistically not significant difference ($c_2 = 0.01$, $P = 0.91$). Similarly, a good outcome (GOS 5–4) was observed in patients with H-H 3, without significant differences between the two cohorts ($c_2 = 0.3$, $P = 0.55$).

In contrast, in cases admitted with H–H 4–5, we observed a worse outcome in elderly patients. As a matter of fact, almost 80% of patients over 70 years (14/18, 77.8%) showed aGOS < 3, compared with just over40% of cases (33/79, 41.8%) in the younger cohort. The difference was statistically significant ($c_2 = 3.9$, $P = 0.04$).

Embolization was complicated by ruptured aneurysms in two elderly patients (2.9%) and in five younger patients (1.6%), respectively. Additional embolization allowed aneurysm exclusion in all cases. The difference in the iatrogenic rupture rate was not statistically significant ($c_2 = 0.4$, $P = 0.49$).

A higher thromboembolic complication rate ($c_2 = 3.6$, $P = 0.056$) was observed in elderly patients (6/68, 8.8%) versus the younger cohort (11/310, 3.5%). Among these, just three patients (1 elderly patient), all admitted with H–H > 3, showed definitive neurological impairment.

The procedural time was slightly higher in elderly patients. Analysis of our operator logs showed an average of 54 min for a single aneurysm coiling, approximately 11 min longer than a single embolization in younger patients.

Discussion

The treatment of hemorrhagic stroke in elderly patients is a multidisciplinary challenge. Age and comorbidities frequently lead to a conservative treatment. We considered an aggressive approach in cases of SAH as a result of aneurysm rupture.

In previous studies, the cut-off age for elderly was 65 years.[13,17,18] Nevertheless, the chronological definition should be updated according to the increase in life expectancy. Therefore, we preferred to use 70 years as the cut-off age.

The outcome after SAH, regardless of treatment, is strongly influenced by several variables: patient factors (age, sex, comorbidities, Fisher and H–H grades, time to treatment), aneurysm factors (size, morphology and location) and institutional factors (availability and experience of endovascular services and neurosurgeons, first aid evaluation).[19]

The H–H grade at admission represents the most relevant prognostic factor. Among elderly patients, 44 patients (64.7%) were discharged with a favorable outcome (GOS 5–4). Of these, 42 patients (95.5%) presented with H–H 1–3, and just two (4.5%) with H–H 4–5. Similarly, in the younger group, a good outcome was observed in 243 patients (78.4%). The H–H grade at admission was 1–3 in 210 patients (86.4%) and 4–5 in 33 cases (13.6%).

Comparing the outcome of older and younger patients with poor clinical condition at admission (H–H 4–5), elderly patients showed a significantly worse outcome. A total of 14 out of 18 (77.8%) patients in the older group presented a GOS < 3, whereas 33out of 79 in the younger group (41.8%) presented an unfavorable outcome.

In all patients of both groups, we carried out the endovascular treatment within 72 h from bleeding.

Early aneurysm treatment is achieved to prevent the increased risk of rebleeding reported in elderly patients as a result of less elastic properties of vessels and decreased responsiveness to vasospasm agents.[9,13,20]

In the present series, no major complications related to the endovascular treatment were observed. Additional embolization allowed for complete aneurysm exclusion to be achieved in the case of iatrogenic rupture, and surgery was always avoided.

The risk of rupture did not appear to be related to the age of patients. In contrast, the perioperative thromboembolic complication rate was higher in elderly patients. The increased risk is probably as a result of atheromatous degeneration of the cerebral and cervical arteries. In the present series, after thromboembolism (6/68, 8.8%), no case of massive cerebral infarct was observed and only one elderly patient, admitted with H–H > 3, showed definitive neurological impairment. Therefore, the complication rate is higher in elderly patients, but it does not lead to a statistically significant impact on the outcome, which is above all influenced by the H–H grade at admission.

We observed a slight difference in the procedural time. We assume that greater rigidity and tortuosity of arteries led to lengthening of the embolization time in elderly patients.

The length of hospital stay for stroke is generally high. On average, medical reasons account for the major length of hospitalization. Furthermore, nonmedical reasons, such as waiting for placement in a nursing home, might increase the days of stay. The mean length of hospitalization, mostly in elderly, might be influenced by the choice of treatment. A conservative approach can delay the time of discharge for medical and non-medical reasons. Functional independence is difficult to achieve and the transition to “long-term” care facilities is problematic. A prolonged hospitalization can lead to an increased risk of complications and compromise the recovery. Furthermore, the risk of rebleeding should always be considered.

In our experience, we observed a good outcome (GOS 5–4) in patients admitted with H–H 1–3. The treatment allowed the functional recovery to be optimized in all cases. We did not observe major complications and all patients were discharged at home or in rehabilitation centers within 20 days (mean hospitalization rate 18 1 4 days). In patients admitted with H–H 4–5, we observed a poor outcome and treatment did not seem to improve the chances of recovery. Unlike the younger cohort, less than 20% of elderly patients were discharged with a GOS > 3. Furthermore, the length of hospitalization was significantly higher in elderly patients with lower H–H grades (mean hospitalization rate 21 1 8 days).

The endovascular treatment allowed to us obtain: (i) good exclusion of bleeding aneurysms and prevention of rebleeding; (ii) reduction of medical complications not SAH related; (iii) quick functional recovery; and (iv) significant reduction in the

length of hospitalization in all patients admitted with a good H–H grade. Elderly patients admitted with H–H 4–5 seem not to benefit from aggressive management.
We consider coiling as the first choice of treatment for SAH in elderly patients presenting with good clinical conditions at admission. Surgery might be evaluated only in selected cases. A conservative approach should be considered for patients admitted with high H–H grade.

References

1 Sudlow CL, Warlow CP. Comparable studies of the incidence of stroke and its pathological types: results from an international collaboration. International Stroke Incidence Collaboration. *Stroke* 1997; **28**: 491–499.
2 Andaluz N, Zuccarello M. Recent trends in the treatment of cerebral aneurysms: analysis of a nationwide inpatient database. *J Neurosurg* 2008; **108**: 1163–1169.
3 Rogowski J, Lillard LA, Kington R. The financial burden of prescription drug use among elderly persons. *Gerontologist* 1997; **37**: 475–482.
4 Sacco RL, Wolf PA, Bharucha NE *et al*. Subarachnoid and intracerebral hemorrhage: natural history, prognosis, and precursive factors in the Framingham Study. *Neurology* 1984; **34**: 847–854.
5 Fortuny LA, Adams CB, Briggs M *et al*. Surgical mortality in an aneurysm population: effects of age, blood pressure and preoperative neurological state. *J Neurol Neurosurg Psychiatry* 1980; **43**: 879–882.
6 Ryttlefors M, Howells T, Ronne-Engström E, Nilsson P, Enblad P. Neurointensive care is justified in elderly patients with severe subarachnoid hemorrhage – an outcome and secondary insults study. *Acta Neurochir (Wien)* 2010; **152**: 241–249.
7 Proust F, Gérardin E, Derrey S *et al*. Interdisciplinary treatment of ruptured cerebral aneurysms in elderly patients. *J Neurosurg* 2010; **112**: 1200–1207.
8 Fridriksson SM, Hillman J, Säveland H, Brandt L. Intracranial aneurysm surgery in the 8th and 9th decades of life: impact on population-based management outcome. *Neurosurgery* 1995; **37**: 627–631.
9 Yano S, Hamada J, Kai Y *et al*. Surgical indications to maintain quality of life in elderly patients with ruptured intracranial aneurysms. *Neurosurgery* 2003; **52**: 1010–1015.
10 Kassell NF, Torner JC, Haley EC Jr, Jane JA, Adams HP, Kongable GL. The International Cooperative Study on the Timing of Aneurysm Surgery. Part 1: overall management results. *J Neurosurg* 1990; **73**: 18–36.
11 Ross N, Hutchinson PJ, Seeley H, Kirkpatrick PJ. Timing of surgery for supratentorial aneurysmal subarachnoid haemorrhage: report of a prospective study. *J Neurol Neurosurg Psychiatry* 2002; **72**: 480–484.
12 Inagawa T, Yamamoto M, Kamiya K, Ogasawara H. Management of elderly patients with aneurysmal subarachnoid hemorrhage. *J Neurosurg* 1988; **69**: 332–339.
13 Lan Q, Ikeda H, Jimbo H, Izumiyama H, Matsumoto K. Considerations on surgical treatment for elderly patients with intracranial aneurysms. *Surg Neurol* 2000; **53**: 231–238.
14 Niskanen MM, Hernesniemi JA, Vapalahti MP, Kari A. One-year outcome in early aneurysm surgery: prediction of outcome. *Acta Neurochir (Wien)* 1993; **123**: 25–32.
15 Bergui M, Bradac GB. Acute endovascular treatment of ruptured aneurysms in poor-grade patients. *Neuroradiology* 2004; **46**: 161–164.
16 Jennett B, Bond M. Assessment of outcome after severe brain damage. *Lancet* 1975; **1** (1): 480–484.
17 Rowe JG, Molyneux AJ, Byrne JV, Renowden S, Aziz TZ. Endovascular treatment of intracranial aneurysms: a minimally invasive approach with advantages for elderly patients. *Age Ageing* 1996; **25**: 372–376.
18 Birchall D, Khangure M, McAuliffe W, Apsimon H, Knuckey N. Endovascular management of acute subarachnoid haemorrhage in the elderly. *Br J Neurosurg* 2001; **15**:35–38.
19 Fiehler J, Byrne JV. Factors affecting outcome after endovascular treatment of intracranial aneurysms. *Curr Opin Neurol* 2009; **22**: 103–108.
20 Molyneux A, Kerr R, International Subarachnoid Aneurysm Trial (ISAT) Collaborative Group, Stratton I *et al*. International Subarachnoid Aneurysm Trial (ISAT) of neurosurgical clipping versus endovascular coiling in 2143 patients with ruptured intracranial aneurysms: a randomized trial. *J Stroke Cerebrovasc Dis* 2002; **11**: 304–134.

Table 1 Stratification according to Hunt–Hess grade at admission

GOS	H–H 1–2	H–H 3	H–H 4–5	Overall outcome
5–4	26	16	2	44 (64.7%)
3	1	2	2	5 (7.4%)
1–2	1	4	14	19 (27.9%)
Total	28 (41.2%)	22 (32.3%)	18 (26.5%)	68

Patients aged 70–82 years. The outcome was evaluated through the Glasgow Outcome Scale (GOS). H–H, Hunt–Hess grade.

Table 2 Stratification according to Hunt–Hess grade at admission

GOS	H–H 1–2	H–H 3	H–H 4–5	Overall outcome
5–4	123	87	33	243 (78.4%)
3	1	7	13	21 (6.8%)
1–2	5	8	33	46 (14.8%)
Total	129 (41.6%)	102 (32.9%)	79 (25.5%)	310

Patients aged 20–69 years. The outcome was evaluated through the Glasgow Outcome Scale (GOS). H–H, Hunt–Hess grade.