Cerebral Ischemia After Aneurysmal Subarachnoid Hemorrhage

To the Editor:

We read a recent article published in Stroke which dealt with postoperative cerebral infarction after surgery of intracranial aneurysms.1 The article contained shortcomings on which we are obligated to comment. Contrary to the authors’ statement, there are several published articles on post–subarachnoid hemorrhage cerebral infarction mostly caused by either delayed cerebral ischemia or by aneurysm occlusion (with open surgery or endovascular occlusion).2–5 See also discussion sections of these articles for additional publications on this issue.

We have done serial CT and MRI investigations after rupture and treatment of intracranial aneurysms to reveal appearance of infarctions in our randomized enoxaparin trial.4–6 Location of lesions were also correlated with extensive neuropsychological and social tests.7 Approximately one third of patients had postoperative infarction (15% of grade I patients), one third because of delayed cerebral ischemia, and remaining patients had no lesion. Infarcts on the first postoperative day had worse prognosis than those caused by delayed ischemia.2 This might explain the observation of somewhat better treatment results obtained with endovascular coiling as compared with open surgery in a randomized international trial of selected patient population after aneurysm rupture.8 In a nonrandomized international study on unruptured aneurysms,9 11% of patients with aneurysm occlusion by open surgery had cerebral infarction whereas 5% of those with endovascular aneurysm occlusion had such a lesion. However, durability and overall treatment risks of endovascular treatment are unknown in a long-term follow-up. Thus, open surgery of unruptured aneurysms by neurosurgeons having postoperative infarct risk of ≤5% should continue aneurysm surgery.

Krayenbuhl and colleagues report a postoperative infarct rate of 14% (5 of 36 patients; 27% for patients with ruptured and 8% for those with unruptured aneurysms). Although infarct rates after ruptured and unruptured aneurysms are different, authors unexpectedly combined these patient groups: 25 patients had unruptured and 11 ruptured aneurysms. Patients were collected with a high patient selection during 1.3 years. Despite this, observed infarct rate (n=5) was similar to expected one (n=6) obtained from previous studies.

The authors used univariate analysis of variance (ANOVA) which was not correct. ANOVA can be used for comparisons of 3 or more groups for continuous variables with normal distribution (not for ordinal scale or categorical variables). Furthermore, independent observation units for statistical comparisons should be patients not aneurysms (number of aneurysms can be a covariate). In their Table 4, the authors did not show distribution of continuous variables of groups compared. The authors used univariate statistics but not multivariate statistics. So, it remained open which variables in fact were independent risk factors for postoperative infarction.

Disclosures

None.

Seppo Juvela, MD, PhD
Department of Neurosurgery
Helsinki University Central Hospital
Helsinki, Finland
and Department of Neurosurgery
Turku University Central Hospital
Turku, Finland
Jari Siironen, MD, PhD
Department of Neurosurgery
Helsinki University Central Hospital
Helsinki, Finland


Cerebral Ischemia After Aneurysmal Subarachnoid Hemorrhage
Seppo Juvela and Jari Siironen

Stroke. 2009;40:e547; originally published online May 14, 2009;
doi: 10.1161/STROKEAHA.109.550103
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2009 American Heart Association, Inc. All rights reserved.
Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the
World Wide Web at:
http://stroke.ahajournals.org/content/40/9/e547

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published
in Stroke can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office.
Once the online version of the published article for which permission is being requested is located, click
Request Permissions in the middle column of the Web page under Services. Further information about this
process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Stroke is online at:
http://stroke.ahajournals.org//subscriptions/