

Long-Term Follow-up Angiography is Indicated after Coiling of Intracranial Aneurysms

Nohra Chalouhi MD; Cory Donovan Bovenzi; Vismay Thakkar MBBS; Jeremy Dressler; Pascal Jabbour MD; L. Fernando Gonzalez MD; Robert M. Starke MD MSc; Aaron S. Dumont MD; Robert H. Rosenwasser MD, FACS, FAHA; Stavropoula I.

Tjoumakaris MD

Department of Neurosurgery, Thomas Jefferson University and Jefferson Hospital for Neuroscience, Philadelphia,



Introduction

Aneurysm recurrence remains the major shortcoming of coiling in intracranial aneurysms. The need for long-term imaging follow-up has been recently questioned. We assess the diagnostic yield of long-term follow-up digital subtraction angiography (DSA) and determine the predictors of delayed aneurysm recurrence.

Methods

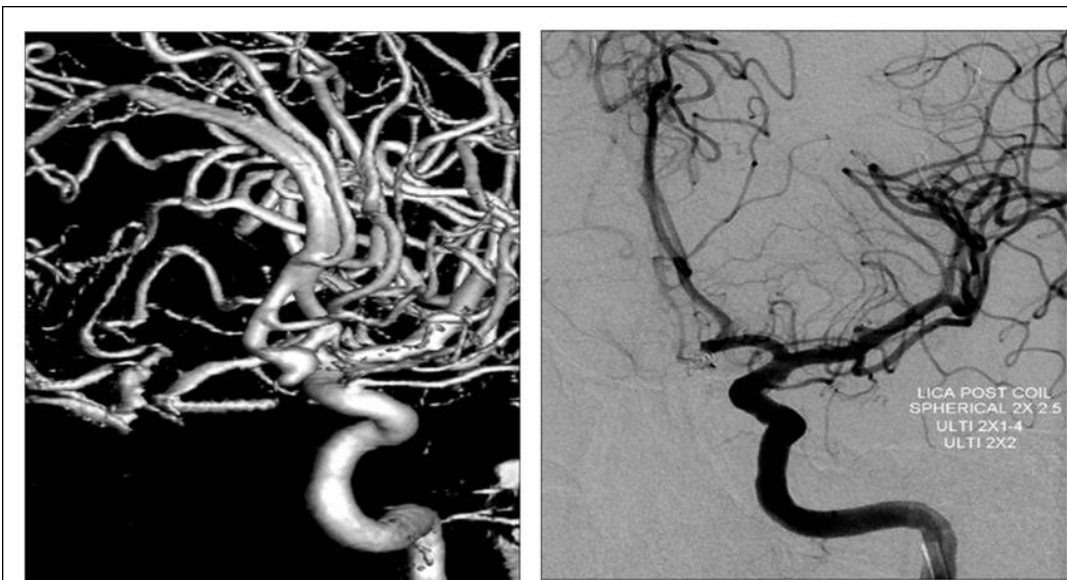
Patients with intracranial aneurysms who were coiled between 2003 and 2008 at our institution were identified. Inclusion criteria were: 1) Available short-term (=36 months) and long-term follow-up DSA (>36 months), and 2) no aneurysm recurrence or only minor recurrence (not requiring further intervention i.e. <20%) on short-term follow-up DSA (patients who underwent retreatment were excluded). A total of 209 patients met these criteria and constituted our study population.

Results

Of 209 patients included in the study, 88 (42%) were initially treated in the setting of subarachnoid hemorrhage. On short-term follow-up angiography, 158 (75%) aneurysms showed no recurrence and 51 (25%) showed minor recurrence (not retreated). On long-term follow-up angiography, 124 (59%) aneurysms showed no recurrence while 85 (41%) aneurysms showed a recurrence requiring further intervention in 55 (26%). In multivariate analysis, the predictors of recurrence on long-term follow-up angiography were 1) larger aneurysm size ($p=0.001$), 2) male gender ($p=0.006$), 3) conventional coiling ($p=0.05$), 4) aneurysm location ($p=0.01$), and 5) a minor recurrence on short-term follow-up angiography ($p=0.007$). Ruptured aneurysm status was not a predictive factor. The sensitivity of short-term follow-up angiography for detecting delayed aneurysm recurrence was only 40.0%

Conclusions

The results of this study suggest that the yield of long-term follow-up angiography is high after coiling of intracranial aneurysm. Patients with large aneurysms, patients with a minor recurrence on short-term follow-up angiography, patients treated with conventional coiling, and male patients benefit the most from long-term follow-up angiography.



3D reconstruction of DSA (left) showing an aneurysm arising from the anterior communicating artery. Frontal views of DSA immediately after coiling (right) showing adequate aneurysm obliteration.



Frontal views of DSA (left) showing adequate aneurysm obliteration at 6 months. Long term follow-up DSA at 40 months (right) showing a major aneurysm recurrence.