Management Of Tiny Unruptured Intracranial Aneurysms: 
A Comparative Effectiveness Analysis


BACKGROUND: Greater use of less invasive and high-resolution imaging has led to an increase in the detection of unruptured intracranial aneurysms, most of which measure 3mm or less. Management of these small aneurysms is controversial. While the rupture rate is low, many neurosurgeons recommend treating all aneurysms regardless of size. Treatment, however, entails a risk of complications.

METHODS: In this comparative effectiveness analysis, the authors, coordinated at Yale School of Medicine, constructed a decision tree (from a societal perspective) with Markov modeling, which simulated a large randomized trial without direct involvement of patients, to compare five parallel strategies for the management of tiny unruptured intracranial aneurysms: annual, biennial, or five-yearly surveillance with magnetic resonance angiography (MRA), coiling with MRA follow-up, and no treatment or preventive follow-up. Clinical parameters were based on recent large cohort studies and meta-analyses. The model started with a 50-year-old patient, and covered the patient’s lifespan.

RESULTS: Base case calculation showed no follow-up to be the most effective strategy (mean benefit, 19.40 quality-adjusted life-years [QALYs]), followed by imaging every five years (18.05 QALYs). Coiling was least effective (17.53 QALYs). In a probabilistic sensitivity analysis modeling 10,000 patients, when compared with no follow-up, five-year follow-up was better only 0.050% of the time. In sensitivity analyses considering the aneurysmal growth rate or rupture risk, no follow-up was the most effective overall strategy, while five-yearly surveillance was most effective among imaging strategies.

CONCLUSIONS: The authors suggest that no follow-up or imaging every five years seem to be the most effective strategies for patients with tiny unruptured intracranial aneurysms.

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PMID: 29159405

EDITOR’S COMMENTARY: These authors, primarily from Yale, performed a Markov decision model analysis of what to do with the management of a tiny (<3 mm) intracranial aneurysm without a history of subarachnoid hemorrhage (a true incidentaloma). Their analysis considered 5 possibilities: (1) coil them all (2) surveillance with MRA (3 different time-based strategies) or (3) do nothing. They found that “less is more” and that the winning strategy as measured by quality adjusted life years (QALYs) and societal cost is to do nothing. If the rupture rate is believed to be >1.7% per year (based on patient’s risk profile), then they should all be coiled. Imaging surveillance annually, biannually, every 5 years, did not improve outcomes as much as one might instinctively think.