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Interventions for Treating Brain Arteriovenous Malformations in Adults

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Background

Various interventions have been used—either alone or in staged combinations—when trying to eradicate the nidus of a brain arteriovenous malformation (AVM): neurosurgical excision, stereotactic radiotherapy/“radiosurgery” (using gamma knife, linear accelerator, or proton beam), or endovascular embolization (using glues, particles, fibers, coils, or balloons).

Objectives

To assess the clinical effects of interventions to treat brain AVMs in adults (with the aim of either partial obliteration or total eradication) using data published in randomized controlled trials (RCTs).

Methods

Search Strategy

We searched: (1) the Cochrane Stroke Group Register (last searched December 2004); (2) medical literature databases (MEDLINE 1966 to December 31, 2004 and EMBASE 1980 to December 31, 2004); (3) online and paper journal surveillance; (4) the Cochrane Central Register of Controlled Trials (CENTRAL; The Cochrane Library Issue 1, 2005); (5) international registers of clinical trials; (6) bibliographies of relevant articles identified by (1) to (5); and (7) we sought unpublished data from manufacturers of interventional treatments for brain AVMs.

Selection Criteria

We sought RCTs of any or all of the interventions for brain AVMs, compared against each other or against usual medical therapy, with relevant clinical outcome measures.

Data Collection and Analysis

Two authors independently applied the inclusion criteria and reviewed the relevant studies.

Results

We did not find any RCTs meeting our selection criteria. We found just 2 RCTs that tested the equivalence of 2 embolic

agents for the preoperative embolization of brain AVMs (1 published, 1 unpublished), but none of the primary or secondary outcome measures in these 2 trials met our desired criteria; although important clinical outcomes were reported, meaningful comparison of the 2 treatment arms was impossible.

Implications for Practice

There are no RCTs to influence the choice of interventional treatment for brain AVMs in clinical practice. The decision to treat is only informed by indirect comparisons of the outcome of case series without a control group, and personal experience.

Implications for Research

There are currently grounds for 2 types of RCTs. First, a policy of interventional treatment should be compared against usual medical therapy for unruptured brain AVMs (Figure); 1 such RCT is underway (<http://www.arubastudy.org>). Second, different interventions should be compared against each other in a randomized trial for the treatment of both ruptured and unruptured brain AVMs (Figure).

Note: The full text of this review is available in the Cochrane Library (for subscribers <http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD003436/frame.html>). The full article should be cited as: Al-Shahi R, Warlow CP. Interventions for treating brain arteriovenous malformations in adults. *Cochrane Database Syst Rev*. 2006. Issue 1. Art. No.: CD003436. DOI: 10.1002/14651858.CD003436.pub2.

KEY WORDS: cerebral aneurysm ■ cerebral arteriovenous malformations ■ subarachnoid hemorrhage ■ cerebral hemorrhage ■ intracerebral hemorrhage ■ angiography

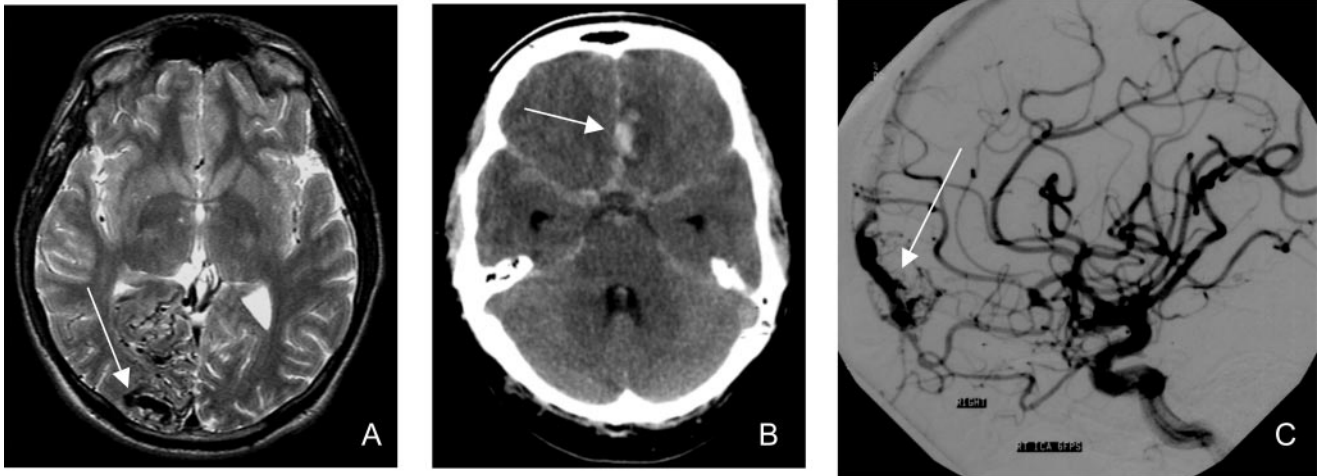
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A, A healthy woman in her late 50s presented with episodic migraine with visual aura occurring twice every year. Brain MRI revealed a right occipital lobe AVM, fed by terminal branches of the right posterior and middle cerebral arteries with 3 veins draining the nidus to the straight sinus and superior saggital sinus. Wouldn't this woman ideally be randomized in a trial such as ARUBA (<http://www.arubastudy.org>)? B and C, A healthy man in his late 40s presented with a subarachnoid hemorrhage (B) from a feeding artery aneurysm associated with a right frontal brain AVM fed by a single branch of the right anterior cerebral artery with a solitary vein draining the nidus to the superior saggital sinus (C). Wouldn't a randomized trial answer whether this brain AVM should be embolized or surgically excised?