



Cost Effectiveness Analysis of Surveillance CTA or MRA in Small, Unruptured Intracranial Aneurysms

Matthew Fusco MD; Ajith J. Thomas MD; Christopher S. Ogilvy MD
Vanderbilt University Medical Center, Beth Israel Deaconess Medical Center

Introduction

Small, incidentally discovered intracranial aneurysms pose a unique dilemma for treating physicians. Unruptured aneurysms less than 4mm at the time of discovery are typically asymptomatic and associated with low risks of rupture. However, if these aneurysms should grow a higher risk of rupture is conferred. Most physicians elect not to treat these lesions and instead some pattern of serial follow up imaging via CTA or MRA is undertaken. It remains currently unknown what patterns of follow up may provide cost effective strategies in the prevention of subarachnoid hemorrhage by detecting a growing small aneurysm.

Methods

A systematic literature review of rupture and growth rates of small (< 4mm) intracranial aneurysms of all anatomic locations were undertaken. Costs of CTA and MRA were determined throughout the United States. Using this information, a decision analysis was created to determine thresholds for cost effective follow up patterns of CTA or MRA for various intracranial aneurysm locations with a range of associated rupture or growth risk factors.

Results

Annual rupture rates of aneurysms < 4mm range from 0.14-0.90%. Growth rates of small aneurysms average 6.7% and demonstrated growth increases the rupture rate by a factor of 12. Factors associated with increased rupture rates include hypertension, multiple aneurysms, and presence of an aneurysm bleb. Factors associated with increased growth rates include female gender, multiple aneurysms, and smoking status. The average insurance company payment in the US for a head CTA is \$6200 (range \$1500 in Redding, CA to \$10,700 in Bishop, CA) and \$3300 for a brain MRA (range \$500 in Auburn, IN to \$10,800 in Dyersburg, TN).

Conclusions

Intracranial aneurysms less than 4mm demonstrate low rates of rupture or growth. Small anterior or posterior communicating artery aneurysms demonstrate the highest risk of rupture. Serial imaging with CTA or MRA is expensive, and costs vary depending on geographic location. A decision analysis with cost utility evaluation will stratify which follow up patterns will prove cost effective in various aneurysms with specific associated risk factors for growth or rupture.

Learning Objectives

Understand the rupture rates of small intracranial aneurysms, their growth rates, and associated cost of follow up imaging.