

Does Daily Aspirin Protect Against Aneurysmal Growth?

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Learning Objectives

(1) Recognize radiographic growth as a risk factor for rupture of previously unruptured intracranial aneurysms.

(2) Recognize inflammation as potential mediator of aneurysm growth.

(3) Evaluate possible role of aspirin in attenuating inflammation-mediated growth of unruptured intracranial aneurysms.

(4) Recognize future directions for evaluating role of aspirin in attenuating growth of previously unruptured intracranial aneurysms.

Introduction

Radiographic aneurysm growth has been identified as a significant risk factor for rupture of previously unruptured intracranial aneurysms (UIAs). Published growth per aneurysm year (GPAY) statistics for UIAs range from 1.6% to 18.4%. Work in both animal models of cerebral aneurysms and in patients whose aneurysms were biopsied intraoperatively have identified the inflammatory cascade as a potential key mediator of UIA growth. Previous authors also have demonstrated attenuation of inflammatory markers in the aneurysm wall with a daily aspirin regimen. We sought to evaluate the effect of daily aspirin use on radiographic UIA growth. We hypothesized that a daily aspirin regimen would decrease the incidence of radiographic UIA growth during the aneurysm surveillance.

Methods

We performed a single institution retrospective review of patients undergoing radiographic surveillance of UIAs from 2001 - 2012. Our UIA surveillance protocol recommends followup imaging every 6-months for 24-months then annually through five years. Imaging modalities for surveillance included magnetic resonance angiography (87%); computed tomographic angiography (9%); and digital subtraction angiography (4%). Aspirin use was ascertained and recorded by both dose and frequency. A two-tailed Student's t-test was used to evaluate the difference between groups.

Results

From 2001 to 2012, 186 patients harboring 223 UIAs underwent radiographic surveillance and had explicit documentation of aspirin status in their medical record. The mean aneurysm surveillance period was 3.27 years, 3.9 years for those on a daily aspirin regimen and 4.0 years for those on non-daily aspirin. Daily aspirin use was documented in 59 patients; 46 patients on aspirin 81mg daily and 13 patients on aspirin 325mg daily. Of 127 patients not taking daily aspirin, 16.5% demonstrated growth for a GPAY of 4.1%. Among the 59 patients on a daily aspirin regimen, 11.9% demonstrated growth for a GPAY of 3.0% (p=0.410). There was no significant difference between those on aspirin 325mg daily—23.1% growth, 4.93% GPAY (N=13)—and those on aspirin 81mg daily—8.7% growth, 2.36% GPAY (N=46) (p=0.162).

Unruptured Intracranial Aneurysms by Aspirin Use

Group	N	Growth	No Growth	Absolute Growth	Median Years Aneurysm Follow-Up	Growth per Aneurysm per Year
Daily Aspirin	59	7	52	11.9%	3.9	3.0%
325 mg	13	3	10	23.1%	4.7	4.9%
81 mg	46	4	42	8.7%	3.7	2.4%
Non-Daily Aspirin	127	21	106	16.5%	4.0	4.1%

Limitations

(1) Retrospective evaluation of aspirin use does not reflect adherence to the patient's reported aspirin regimen. A prospective evaluation including platelet function assays to confirm the therapeutic effect of aspirin and adherence to an aspirin regimen.

(2) Radiographic surveillance modalities were non-uniform in this retrospective review with each subject to its own limitations. In the event that growth was either documented or suspected on non-invasive imaging, the patients subsequently underwent digital subtraction angiography.

(3) Our patient sample size may be underpowered to detect a statistically significant difference in per aneurysm year UIA growth. Using our GPAY of 3.0% and 4.1% with group sizes of 59 and 127, respectively, we calculate a subsequent study would need roughly 342 patients to evaluate the 1.1% difference between groups with p < 0.05 and power of 0.8.

Conclusions

Patients on a daily aspirin regimen demonstrated a lower rate of radiographic aneurysm growth than those on sporadic aspirin regimen, but the difference was not statistically significant. Our study is likely underpowered to demonstrate the effect of aspirin on UIA growth. Further investigations using larger sample sizes, prospective design, and data from multiple centers is needed to adequately evaluate the protective effect of daily aspirin on unruptured intracranial aneurysm growth.

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