



G30 Is Hypertension a Risk Factor for Fatal Rupture of Intracranial Aneurysms?

Ana Rubio, MD, PhD*, Office of the Chief Medical Examiner, 111 Penn Street, Baltimore, MD 21201; Christopher Cox, PhD, Division of Epidemiology, Statistics and Prevention, National Institute of Child Health and Human Development; DHHS, 6100 Executive Boulevard, Room 7B05, Bethesda, MD 20892; David Fowler, MD, Office of the Chief Medical Examiner, 111 Penn Street, Baltimore, MD 21201; Juan Troncoso, MD, Neuropathology Unit; Department of Pathology, Johns Hopkins School of Medicine, 720 Rutland Avenue, Baltimore, MD 21205

After attending this presentation, attendees will be able to describe detail of the characteristics of the subjects dying from ruptured berry aneurysms, including age, gender, and risk factors, detailed location, size, and anatomic extension of the subarachnoid hemorrhage depending on the location; and describe the risk factors for fatal rupture of berry aneurysms.

This presentation will impact the forensic community and/or humanity by demonstrating a better understanding of the epidemiology and risk factors of nontraumatic subarachnoid hemorrhage, specifically ruptured berry aneurysms

Background: Berry (saccular) aneurysms of the circle of Willis arteries are the most common cause of fatal subarachnoid hemorrhage in the absence of pre-existing trauma. The incidence of intracranial berry aneurysms increases with age, with a 1% prevalence in the overall population, 2% in middle age individuals and 5% in older people. The annual risk of rupture is estimated as 0.6%, with a very high fatality rate. Berry aneurysms have a multifactorial etiology. They are most commonly found at points of branching. An underlying defect in the wall of the vessel where the aneurysm subsequently forms is frequently found. They are familial in about 5% of the cases, and multiple in a similar percentage of cases. Besides age, other risk factors for the development and rupture of berry aneurysms are smoking, hypertension, heavy alcohol use or drugs. The role of hypertension in the development and rupture of aneurysms is controversial, and there are no previous studies correlating heart weight (raw or normalized) with the development or rupture of berry aneurysms.

Goals: To better define the population affected by fatal rupture of berry aneurysms and detect and characterize risk factors. A primary hypothesis of the study is that an increased heart weight represents a risk factor for aneurysmal rupture.

Subjects and Methods: We designed and performed a case-control study. **Cases** were all individuals autopsied at the Office of the Chief Medical Examiner for the State of Maryland in whom subarachnoid hemorrhage secondary to ruptured berry aneurysm was identified.

Two **controls** were selected per case in order to increase the power of the study. In order to minimize bias, controls were matched for age (within five years) and gender; we only selected individuals who died accidentally, and had an autopsy performed in our office, prior (one of the controls) or subsequent (the other control) to the matching case.

Anthropometric parameters including age, gender, race, height and weight were recorded. We obtained clinical information including history of smoking, alcohol or drug use and hypertension. At autopsy, heart weight, presence and severity of coronary atherosclerosis, brain weight and toxicologic findings were tabulated. Heart weight is normalized for height, weight and body surface, as previously described. In addition, detailed information regarding the ruptured aneurysm was considered for the cases (side, location, size, distribution of the subarachnoid hemorrhage, presence of additional, unruptured aneurysms). Data was analyzed by multiple logistic regression, with case/control status as dependent variable and heart weight and other predictors as potential risk factors.

Results: A total of 145 cases (65 women [aged 47.5+/-12.7 years] and 80 men [aged 44+/-10.7 years]) and 290 controls (130 women [aged 47.5+/-13.2 years] and 160 men [aged 43.9+/-11.1 years]) were included in the study. Results of the multiple logistic regression analysis include odds ratios and confidence intervals for additional risk factors.

Berry Aneurysm, Hypertension, Fatal Rupture