

# Aneurysm rupture

## Another reason to abstain from smoking

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Smoking independently increases risk for aneurysm rupture and aneurysm formation.<sup>1,2</sup> It may weaken the wall of intracranial aneurysms due to inflammation, making them more vulnerable to trigger factors and therefore to rupture.<sup>3</sup> Previous studies have assessed the effect of current smoking. In this issue of *Neurology*®, Can et al.<sup>4</sup> assess the effect of both smoking intensity and duration on intracranial aneurysm rupture.

From a registry of 4.2 million patients treated at Massachusetts General and Brigham and Women's Hospitals between 1990 and 2013, the authors retrospectively identified 5,589 patients with intracranial aneurysms using natural language processing.<sup>5</sup> They prospectively added 474 patients, treated between 2013 and 2016. From the total of 6,063 in the dataset, the authors confirmed 4,701 patients with 6,411 definite saccular aneurysms. Of these, 1,302 (28%) presented with a rupture. The authors dichotomized patients into those with any ruptured or only unruptured aneurysms and assessed smoking habits. This study not only considered current smoking but also duration and intensity of smoking, as well as quitting. They defined smoking as current, former, or never; former smokers were defined as those who quit smoking at least 1 year before diagnosis. Smoking status was known among 4,596 patients, and smoking duration and intensity among 2,134 and 2,271 patients, respectively.

Patients presenting with ruptured aneurysms were more often men, younger, and nonwhite. The authors found that current smokers have a 2-fold greater odds of aneurysm rupture, and former smokers have a little less than a 2-fold greater odds of aneurysm rupture in comparison to never smokers. The authors found a dose-response relationship, with both current and former smokers having an increased risk of aneurysm bleeding with more intense use. They did not find any reduction in risk with longer duration of smoking cessation, suggesting that early cessation of smoking does not protect from aneurysm bleeding.

This is the first study to address smoking habits, instead of investigating only whether a patient smokes or not. The strength of this study is the use of controls

harboring intracranial aneurysms, instead of healthy persons, making both study arms comparable. Limitations of the study include the primarily retrospective design and the incomplete information regarding smoking duration and intensity (available in fewer than 50% of individuals).

We already know how deleterious smoking is.<sup>6</sup> This study confirms our worst fears: increasing the intensity and duration of smoking increases the odds of aneurysm rupture and quitting does not lead to improved odds in the short term. This finding has immediate and important implications for current practice. Liberal availability of imaging has allowed greater identification of unruptured aneurysms than ever before. These patients are followed annually and advised to treat hypertension and stop smoking.<sup>7</sup> In a somewhat analogous situation, many smokers interpret lung cancer screening offered to smokers as part of routine care as a way of avoiding the harms of smoking, and this type of screening adversely influences smoking cessation.<sup>8,9</sup> Although not yet proven, follow-up of intracranial aneurysms may reasonably have a comparable negative effect on smoking cessation. With these new data, clinicians should urgently advise nonsmokers not to start smoking and strongly urge smokers to quit smoking immediately. Despite the disappointing overall results of smoking cessation programs, counselling patients on quitting abruptly seems to have better long-term results: in a randomized controlled trial, 22% of the participants in the abrupt cessation group had stopped smoking, vs 15.5% in the gradual cessation group.<sup>10</sup>

The study by Can et al. is an open invitation to further research: a prospective study of the effect of smoking intensity and duration on intracranial aneurysm rupture, a study investigating whether aneurysm follow-up programs are effective in preventing patients from smoking or in encouraging patients to quit smoking, and a study investigating other methods that may lead to more patients quitting smoking.

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## DISCLOSURE

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## REFERENCES

1. Vlak MH, Rinkel GJ, Greebe P, Algra A. Independent risk factors for intracranial aneurysms and their joint effect: a case-control study. *Stroke* 2013;44:984–987.
2. Vlak MH, Rinkel GJ, Greebe P, Algra A. Risk of rupture of an intracranial aneurysm based on patient characteristics: a case-control study. *Stroke* 2013;44:1256–1259.
3. Vlak MH, Rinkel GJ, Greebe P, van der Bom JG, Algra A. Trigger factors and their attributable risk for rupture of intracranial aneurysms: a case-crossover study. *Stroke* 2011;42:1878–1882.
4. Can A, Castro VM, Ozdemir YH, et al. Association of intracranial aneurysm rupture with smoking duration, intensity, and cessation. *Neurology* 2017;89:1408–1415.
5. Castro VM, Dligach D, Finan S, et al. Large-scale identification of patients with cerebral aneurysms using natural language processing. *Neurology* 2017;88:164–168.
6. Jha P, Ramasundarahettige C, Landsman V, et al. 21st-century hazards of smoking and benefits of cessation in the United States. *N Engl J Med* 2013;368:341–350.
7. Thompson BG, Brown RD Jr, Amin-Hanjani S, et al. Guidelines for the management of patients with unruptured intracranial aneurysms: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke* 2015;46:2368–2400.
8. van der Aalst CM, van den Bergh KA, Willemsen MC, de Koning HJ, van Klaveren RJ. Lung cancer screening and smoking abstinence: 2 year follow-up data from the Dutch-Belgian randomised controlled lung cancer screening trial. *Thorax* 2010;65:600–605.
9. Zeliadt SB, Heffner JL, Sayre G, et al. Attitudes and perceptions about smoking cessation in the context of lung cancer screening. *JAMA Intern Med* 2015;175:1530–1537.
10. Lindson-Hawley N, Banting M, West R, Michie S, Shinkins B, Aveyard P. Gradual versus abrupt smoking cessation: a randomized, controlled noninferiority trial. *Ann Intern Med* 2016;164:585–592.