Some blood pressure medicine may decrease the aneurysm rupture risk for people with high blood pressure

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A multi-center study of more than 3,000 people with high blood pressure and brain aneurysms found that the use of RAAS inhibitors, a class of

blood pressure lowering medications, reduced the risk of an aneurysm rupture by 18%, according to new research published today in *Hypertension* journal.

An aneurysm is a bulging or weakening in the wall of an artery. When this happens in an artery in the brain, it is called an intracranial aneurysm . If an intracranial aneurysm ruptures, it spills blood around the brain and cuts off oxygen to an affected area, which can cause a hemorrhagic stroke, coma and death. These strokes account for 3-5% of all strokes, but a larger proportion of morbidity and mortality than other types of strokes. Each year, approximately 30,000 adults in the United States have intracranial aneurysms that rupture, according to the National Institute of Neurological Disorders and Stroke. Additionally, stroke is a leading cause of disability in the United States.

The body's renin-angiotensin-aldosterone system (RAAS) includes hormones that affect blood pressure regulation, and dysregulation of the RAAS can lead to the development of high blood pressure. Two components of RAAS have been shown to be involved in the development of intracranial aneurysms, and previous research has found that dysregulation of RAAS may also contribute to aneurysm rupture. RAAS inhibitors, medications that block the effects of the RAAS, are often used to treat high blood pressure.

"Approximately half of patients with intracranial aneurysms have high blood pressure, which can cause vascular inflammation and increase the risk of aneurysm rupture," said the study's senior author Qinghai Huang, M.D., Ph.D., professor of neurosurgery at Changhai Hospital, Second Military Medical University in Shanghai, China. "Given that one-third of patients with ruptured aneurysms die and another third remain dependent for daily life activities, there is a need to identify modifiable risk factors to prevent aneurysm rupture."

This multi-center study analyzed data collected from 2016 to 2021 at 20 medical centers in different regions across China, collected pre- and post-rupture, to evaluate the association among the use of RAAS inhibitors and other blood pressure medications, including beta-blockers and diuretics, on the risk of aneurysm rupture.

More than 3,000 adults with high blood pressure and intracranial aneurysms were included. The study sample was one-third men and two-thirds women, with an average age of 61 years old. Participants' hypertension status was categorized as controlled (normal blood pressure with the use of antihypertensive medications) or uncontrolled (high blood pressure, defined as 140/90 or above, with the use of antihypertensive medications), and was determined by blood pressure measurements taken at one point in time, three months before they were hospitalized for aneurysm.

The analysis found that 32% of participants who took RAAS inhibitors experienced an intracranial aneurysm rupture, compared to 67% of those who used non-RAAS inhibitors.

"We were surprised to find that even among people with controlled hypertension, those who took RAAS inhibitors still had a significantly lower rupture risk than individuals who used non-RAAS inhibitors. Our study highlights that using the proper antihypertensive medications to achieve normalization of blood pressure may remarkably decrease the risk of a ruptured aneurysm," Huang said.

"Based on these data, we estimate that nearly 18% of ruptured aneurysms may be prevented if all patients with high blood pressure and intracranial aneurysms were prescribed with RAAS inhibitors. Due to the strong potential benefit and high safety of RAAS inhibitors, these findings may also help clinicians to optimize treatment to help people with high blood pressure prevent aneurysm rupture."

Using a multivariable model, the researchers calculated that women's risk of aneurysm rupture was 1.8 times higher than men's risk, and that the following factors increased the risk of aneurysm rupture:

- uncontrolled hypertension;
- exposure to second-hand smoke; and
- untreated Type 2 diabetes.

"These findings confirm previous studies indicating that—in addition to blood pressure control—smoking cessation and aggressive treatment of Type 2 diabetes may also help reduce the risk of aneurysm rupture," Huang said. "However, more research is needed to understand how RAAS inhibitors are involved in the prevention of intracranial aneurysm rupture in adults with high blood pressure."

The authors noted that limitations include the study's retrospective nature, the existence of potential confounders, that hypertension was defined as a blood pressure of 140/90, rather than of 130/80, that the exact value of participants' blood pressure was not taken and that the duration and dose of RAAS inhibitors was not recorded in the database.

More information: Effect of Renin-Angiotensin-Aldosterone System Inhibitors on the Rupture Risk Among Hypertensive Patients With Intracranial Aneurysms, *Hypertension* (2022). DOI: 10.1161/HYPERTENSIONAHA.122.18970

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