Spontaneous dissection of the carotid artery can be categorized according to the affected blood vessel (cervical or carotid) and the anatomical location of the dissection (intracranial or extracranial). It results from the separation of the arterial wall layers, most commonly the intimal layer, and can compromise blood flow to the brain, leading to stroke and other complications such as hematomas and pseudoaneurysm formation. In this article, the authors from Mexico and the United States have presented a case of a spontaneous dissection of the right internal carotid artery in a 50-year-old woman, who was fully vaccinated and infected with a non-Omicron variant of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The patient was successfully treated with a flow-diverter stent.

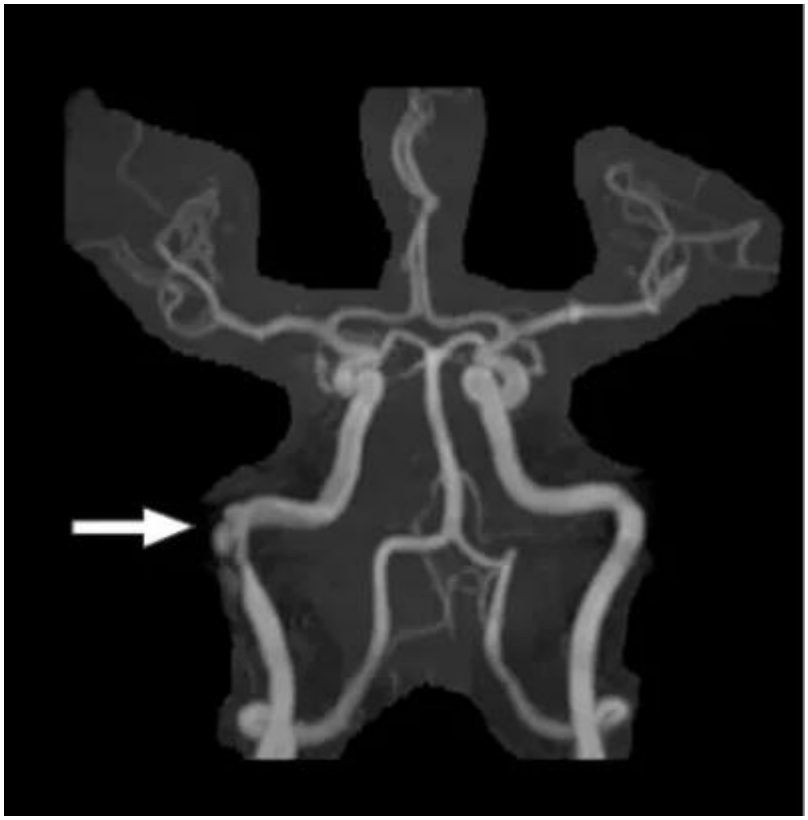
The authors emphasized that spontaneous carotid artery dissection can have both spontaneous and traumatic etiologies. The risk factors include hypertension, a family history of spontaneous carotid artery dissection, mechanical trauma, and connective tissue disorders, including vasculitis. The most common clinical symptoms are nonspecific headache and ipsilateral neck pain.

Some previous studies have also reported spontaneous dissection of blood vessels after SARS-CoV-2 infection or COVID-19 vaccination. One report described a case of spontaneous carotid artery dissection in a woman with post-COVID symptoms (fatigue, chest pain, shortness of breath, and headache) who developed a low-grade fever and acute worsening of headache one day after receiving the COVID-19 vaccine (four months after the initial COVID-19 symptoms). A magnetic resonance angiography (MRI) demonstrated a dissection of the left internal carotid artery, and CT angiography confirmed the diagnosis. The authors pointed out the importance of cytokine dysregulation, prothrombotic state, and endothelial damage during acute COVID-19 infection, while a robust immune response after vaccination could be a second trigger related to a damaged vascular endothelium due to the initial COVID-19 infection. https://doi.org/10.1016/j.chest.2021.07.806 In another study, two cases of spontaneous coronary artery dissection were diagnosed a few days following the administration of the messenger RNA (mRNA) vaccines (Comirnaty; Pfizer-BioNTech). The authors noted that the mRNA vaccine may trigger an immune response in some genetically predisposed individuals, resulting in systemic inflammation, in which vasculitis and hypercoagulable states may promote cardiovascular and cerebrovascular events. https://www.jscai.org/article/S2772-9303(22)00591-9/fulltext Furthermore, some publications have reported on patients diagnosed with an unruptured artery dissecting aneurysm that ruptured immediately after the mRNA COVID-19 vaccination. One of these publications reported a patient who experienced a subarachnoid hemorrhage due to a rupture of the dissecting aneurysm of the right vertebral artery one day after the first dose of mRNA-1273 (Moderna) COVID-19 vaccine. Another patient experienced subarachnoid hemorrhage as a result of the rupture of the dissecting aneurysm of the right vertebral artery seven days after the first dose of the BNT162b2 mRNA vaccine (Pfizer-BioNTech). The authors noted that a local inflammation and fragility of the saccular cerebral aneurysm wall, caused by systemic inflammation, could result in the rupture of arterial dissection.

https://www.jstage.jst.go.jp/article/nmccrj/9/0/9_2022-0012/_article The authors of the present study stated that the mechanisms of vascular damage and endothelial dysfunction may include direct invasion of endothelial cells by SARS-CoV-2 in patients with COVID-19.

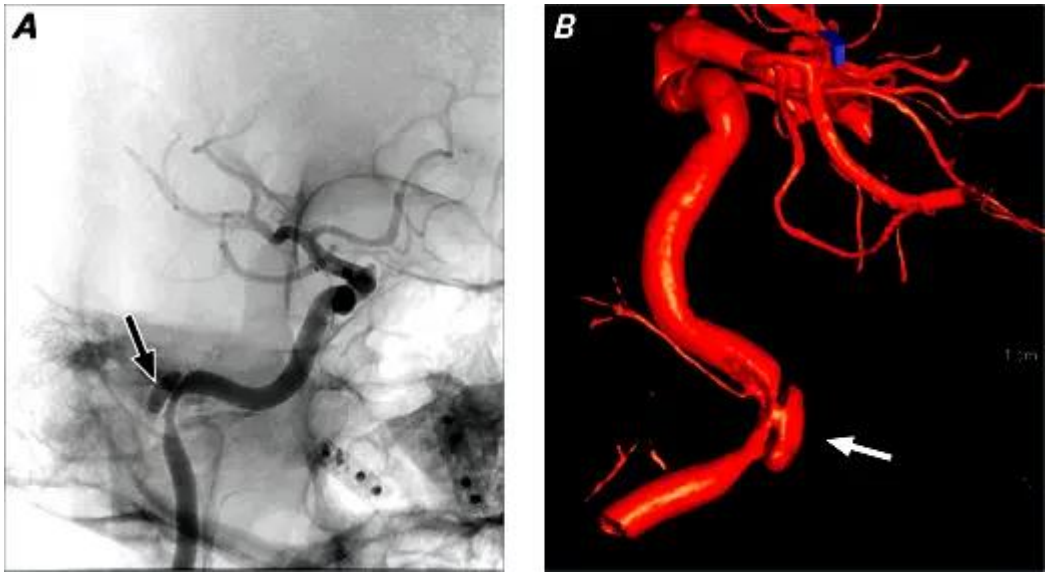
About the case

On May 9, 2022, a 50-year-old woman tested positive for a non-Omicron variant of SARS-CoV-2 by polymerase chain reaction; however, she was asymptomatic at that time. She had not previously been infected with SARS-CoV-2. Between January 2021 and April 2022, she underwent the complete SARS-CoV-2 vaccination regimen, including two boosters of the Moderna vaccine.
On May 10, 2022, she developed a mild, dull headache, which became severe the next day. She had occasional migraine headaches for 15 years, but her usual regimen which controls migraine symptoms did not reduce the pain. The headache was accompanied by right-ear pulsatile tinnitus and vertigo, triggered by supine head movements. Over the next week, the pain extended to the right side of her neck. On May 19, she was prescribed a 5-day course of azithromycin for a suspected ear infection, but this treatment did not resolve the symptoms.
On May 26, the patient's physician detected a carotid bruit. Ultrasonography of the cervical carotid arteries showed no significant occlusive disease of the common or internal arteries. MRI revealed a complex dissection of the vertical segment of the right internal carotid artery, accompanied by 70% stenosis, a pseudoaneurysm measuring 9 mm × 5 mm, and a linear filling defect associated with an intraluminal flap.



Original illustration from the article: non-contrast magnetic resonance angiogram showing dissection (white arrow) at the right internal carotid artery, with an intimal flap and moderate to severe luminal stenosis involving the distal right cervical internal carotid artery and right petrous internal carotid junction.

On June 7, 2022, the patient underwent a femoral access diagnostic angiogram, which confirmed a complex dissection of the petrous segment of the right internal carotid artery, accompanied by 70% stenosis and a 9-mm pseudoaneurysm.



Original illustration from the article: Right cerebral angiogram demonstrating complex dissection of the vertical segment of the petrous right internal carotid, associated with 70% stenosis, pseudoaneurysm, and a linear filling defect associated with an intraluminal flap (white arrow). B) Right cerebral angiogram with 3-dimensional rotational views.

On June 21, 2022, because of continued symptoms, a flow-diverter stent was placed *via* femoral access, resolving her symptoms successfully. After 6 months, a control MRI demonstrated a complete resolution of the dissection and stent patency.

Conclusion

This case report describes a fully vaccinated woman who tested positive for a non-Omicron variant of SARS-CoV-2 and experienced a spontaneous dissection of the intrapetrous internal carotid artery. The dissection was treated successfully with a flow-diverter stent. The authors suggested that persistent, unilateral head or neck pain with pulsatile tinnitus or bruit should be evaluated for potential cervical arterial dissection.

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