

Cerebellar Infarction Originating from Vertebral Artery Stenosis Caused by a Hypertrophied Uncovertebral Joint

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We report a case of cerebellar infarction originating from vertebral artery stenosis caused by a hypertrophied uncovertebral joint. A 38-year-old man presented with sudden onset of headache, dizziness, and dysarthria. The magnetic resonance imaging scan of the brain revealed acute infarction in the right cerebellar hemisphere in the territory of the posterior inferior cerebellar artery (PICA) and superior cerebellar artery (SCA). Magnetic resonance, 3-dimensional computed tomographic, and conventional angiography revealed severe right vertebral artery stenosis by extrinsic compression of the hypertrophied right C5–C6 uncovertebral joint. The diagnosis was acute cerebellar infarction, which was probably caused by embolism from the right vertebral artery stenosis that was caused by the hypertrophied C5–C6 uncovertebral joint. C5–C6 anterior discectomy and fusion were performed together with direct uncovertebral joint decompression. Postoperative 3-dimensional computed tomographic angiography revealed improvement in antegrade filling in the right vertebral artery. The imaging findings for this patient and the pathogenesis of cerebellar infarction for our patient are discussed. **Key Words:** Cerebellar infarction—osteophyte—uncovertebral joint—vertebral artery stenosis.

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Approximately 1 in 4 ischemic strokes occurs in the territory of the posterior or vertebrobasilar cerebral circulation, and 20% to 25% of these are thought to be caused by vertebral artery stenosis.^{1,2} Vertebral artery stenosis is caused by intrinsic lesions, such as atherosclerosis, vasculitis, or dissection of the vessel wall, and extrinsic lesions, such as neoplasm, infection, fibrous banding, extrinsic compression related to spinal fracture/dislocations, or

osteophyte impingement and compression.^{1,3} Osteophytic spurs that arise from uncovertebral joints can compress from the anteromedial aspect of the vertebral artery. This type of vertebral artery compression tends to be exacerbated by neck rotation or extension.^{4,5} It can cause vertebrobasilar stroke and transient ischemic attacks, although it has better prognosis than carotid territory ischemic events.⁶ We report the case of a patient with cerebellar infarction that started because of compression of the proximal right vertebral artery by a hypertrophied uncovertebral joint at the C5 to C6 level.

Case Report

A 38-year-old man visited the emergency room at our hospital because of the sudden onset of headache, dizziness, and dysarthria for 1 hour before the visit. The neurologic examination revealed impaired cerebellar function and transient right hemiparesis. Head turning

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Received August 9, 2011; revision received September 24, 2011; accepted September 27, 2011.

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1052-3057/\$ - see front matter

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doi:10.1016/j.jstrokecerebrovasdis.2011.09.019

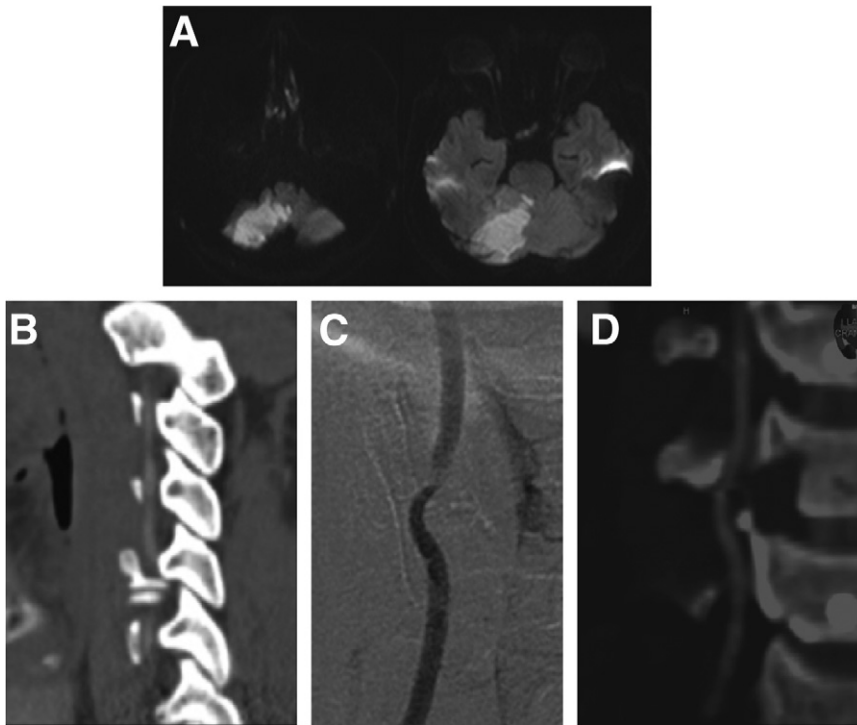


Figure 1. (A) Diffusion-weighted magnetic resonance imaging reveals a diffusion-restricted lesion in the right cerebellar hemisphere in the territory of the posterior inferior cerebellar artery (PICA) and the superior cerebellar artery (SCA), which suggests acute infarction. (B) Sagittal reconstructed 3-dimensional computed tomographic angiography image reveals severe right vertebral artery stenosis via extrinsic compression of the hypertrophied right C5–C6 uncovertebral joint. (C) Conventional angiography of the right vertebral artery shows approximately 62% luminal stenosis at the C5–C6 level. (D) Postoperative coronal reconstructed 3-dimensional computed tomographic angiography image reveals improvement in the antegrade filling in the right vertebral artery at the C5–C6 level.

did not produce any symptoms. The patient did not have a history of neck injury or excessive neck movement. The magnetic resonance imaging (MRI) scan of the brain revealed acute infarction in the right cerebellar hemisphere in the territory of the posterior inferior cerebellar artery (PICA) and superior cerebellar artery (SCA; Fig 1A). Magnetic resonance angiography (MRA) revealed stenosis of the right vertebral artery with relative hypoplasia and patency of both SCAs. Three-dimensional computed tomographic (3D-CT) angiography revealed right vertebral artery stenosis via extrinsic compression of the hypertrophied right C5–C6 uncovertebral joint (Fig 1B). Conventional angiography of the right vertebral artery revealed approximately 62% luminal stenosis at the C5–C6 level (Fig 1C). The diagnosis was acute cerebellar infarction that was probably caused by embolism from the right vertebral artery stenosis that was caused by the hypertrophied C5–C6 uncovertebral joint. A definite filling defect was not observed in the right SCA during angiography, which suggests an embolus—therefore, the reperfusion state of the right SCA was evaluated.

Tissue plasminogen activator (TPA) infusion was initially administered via the venous route. The patient's symptoms dramatically improved. He was also administered antiplatelet agents. Surgical decompression was performed for definite treatment during the fourth week after the ictus.

Direct uncovertebral joint decompression was performed during surgery. A large osteophyte that had displaced the vertebral artery in the foramen transversarium was carefully drilled away. Intra- or postoperative complications were not observed. Postoperative 3D-CT

angiography revealed improvement in antegrade filling in the right vertebral artery at the C5–C6 level (Fig 1D). The patient was discharged on postoperative day 11, and his preoperative symptoms improved, as observed during his follow-up examination 8 months later.

Discussion

Only 2 cases of embolic infarction originating from vertebral artery stenosis caused by an osteophyte located at an uncovertebral joint have been reported.^{7,8} Surgery was performed to resect the osteophyte. The vertebral arteries were decompressed and the postoperative course was uneventful. The right vertebral artery, which was a nondominant vertebral artery in our patient, was unlike the findings reported for the previous 2 cases. Nevertheless, the subject presented with cerebellar infarction in the territory of his right PICA, which is the direct branch of the vertebral artery, and in his right SCA, which is the branch of the basilar artery. The cerebellar infarction was suspected to be caused by an embolism. However, embolism-related abnormal laboratory findings, such as dehydration, polycythemia, and coagulation disorder, were not noted.

Spondylotic osteophytic spurs that arise from an uncovertebral joint can compress the anteromedial aspect of the vertebral artery.³ These cervical osteophytic spurs are reported to be caused by fibrous thickening of the tendons from the longus colli and scalenus anterior muscles.⁴

Vertebral artery compression caused by spondylotic disease is not uncommon in the elderly, but is only likely to become symptomatic when both vertebral arteries are

compromised or when there is an embolism. Unlike the previous 2 cases in which the patients were >60 years of age, the patient in our report was much younger (38 years of age). He did not have a history of neck injury or excessive neck movement. Osteophytes at uncovertebral joints are reported to compress the vertebral artery during head rotation.⁴ Dynamic imaging was not performed for our patient. Although osteophytic compression had lasted for a long time, there was no history of ischemia before the onset of symptoms. It is thought that his dominant left vertebral artery supplied sufficient blood to the brain.

In the studies reporting the previous 2 cases, the degree of vertebral artery stenosis was not described. Our patient had approximately 62% luminal stenosis in the conventional angiogram. Stenosis between 50% and 70% or more in the angiographically measured vessel lumen is believed to be significant in terms of the risk of embolism and the stroke etiology.¹

The vertebral levels that are most frequently affected by uncovertebral joint hypertrophy are the fifth and sixth (56%), fourth and fifth (24%), and sixth and seventh cervical vertebral levels (20%), in that order.³ Vertebral artery stenosis occurred at the C5–C6 level in our patient.

When cerebellar infarction is diagnosed, the underlying vascular pathology must be evaluated. The 3 most commonly used modalities for cerebrovascular imaging are CT angiography, MRA, and conventional angiography. Of these modalities, CT angiography is widely available and can be performed rapidly. 3D reconstructed CT images can clearly show the extent of osteophyte formation and its relationship with the vertebral artery. Preoperative 3D-CT angiography can provide a proper surgical plan.^{1,2,9}

In summary, the careful evaluation of CT angiography with 3D reconstruction provides valuable information, such as the underlying vascular pathology and a proper surgical plan for cerebellar infarction in patients with cervical spondylotic spurs.

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