Positional Occlusion of the Vertebral Artery: A Rare Cause of Embolic Stroke

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Summary. A young, previously healthy patient developed embolic occlusions of the posterior cerebral, superior cerebellar, and posterior inferior cerebellar arteries. This patient also demonstrated positional occlusion of the left vertebral artery which may have been the etiology for his embolic stroke.

Key words: Stroke - Positional occlusion of the vertebral artery - Emboli

Turning of the head has been noted to produce occlusion of the contralateral vertebral artery at the C1-C2 level [1]. If both vertebral arteries have adequate blood flow the individual is normally asymptomatic. In patients with compromise of the opposite vertebral artery from cervical spondylosis or atherosclerotic disease, turning of the head may produce vertebrobasilar insufficiency. This report concerns a young patient who demonstrated complete occlusion of the vertebral artery upon turning the head and suffered embolic strokes involving the posterior cerebral artery (PCA), superior cerebellar artery (SCA), and posterior inferior cerebellar artery (PICA). We believe that stasis in the vertebral artery, secondary to positional occlusion, produced small thrombi that embolized in major blood vessels, of the posterior circulation.

Case Report

A healthy 19-year-old male experienced intermittent bifrontal headaches and colored flashing lights in his right visual field 2 weeks before admission. On the day before admission he noted the sensation of "the room spinning around" associated with nausea and vomiting. On admission, the neurological examination disclosed right homonymous inferior quadrantanopia, lateral and upbeat nystagmus, and listing to the right on tandem gait and Romberg tests. A computed tomographic (CT) scan demonstrated no abnormality. The patient's headache and dizziness slowly resolved and he was discharged after 2 days.

Approximately 24h after his first admission the patient returned to the hospital complaining of a strange sensation over the left side of his body. On examination he had a complete right homonymous hemianopsia, left dysmetria, and dysdiadokinesia. Nystagmus was noted on lateral gaze bilaterally.

Two weeks later, the patient noted the acute onset of inability to walk, numbness on the right side of the body and the left side of the face, diplopia, nausea, vomiting, and slurred speech. Neurological examination showed vertical nystagmus and left ataxia. A CT scan revealed infarction of the left cerebellar hemisphere. An emergency arteriogram (Fig.1) demonstrated emboli in the proximal left PCA, SCA, and PICA. Slow flow was also noted in the left vertebral artery at the C1-C2 level with the head turned obliquely to the right (Fig. 2).

Over the next 24h the patient rapidly deteriorated and became obtunded with decerebrate posturing. CT scan (Fig. 3) displayed acute obstructive hydrocephalus with obliteration of the fourth ventricle. An emergency suboccipital craniotomy was performed with partial resection of the left cerebellar hemisphere and decompression of the foramen magnum.

The pathological findings in the operative specimen were of multiple infarcts both acute and long standing. There was no evidence of vasculitis. An extensive workup for the etiology of the emboli was completely negative and included a nuclear medicine cardiac shunt study, echocardiogram, multiple blood cultures, and collagen vascular studies.
Fig. 1. Left vertebral arteriogram (AP) demonstrating emboli in the proximal left PCA (large arrow); SCA (small arrow); and PICA (arrowhead). Note reflux into contralateral right vertebral artery.

Fig. 2. Left vertebral injection (RPO) showing area of contrast washout by muscular collaterals at C1-C2. Decreased flow in left vertebral artery was visualized during angiographic sequence.

The patient gradually improved following operation and was discharged on anticoagulants with residual ataxia and listing to the right.

Six months after operation he was readmitted for repeat vertebral angiography. The left PCA and SCA had recanalized. The left PICA was suboptimally visualized. This study, however, was remarkable for total occlusion of the left vertebral artery at the C1-C2 level when the head was turned approximately 60° to the right (Fig. 4a). The patient was completely asymptomatic in this position, even though the contrast column remained stagnant in the vertebral artery (Fig. 4b). When the head was placed in the neutral position contrast flowed rapidly into the basilar artery and transiently down the codominant right vertebral artery (Fig. 4c). In retrospect this situation occurred during the first arteriogram when slow flow as noted in the vertebral artery while the head was held in the oblique position.

At present, the patient is neurologically stable and is no longer on anticoagulant medication.

Discussion

It is well recognized that the vertebral artery, on the contralateral side to which the head is turned, may be occluded in three separate locations:

1. The intervertebral foramen above C5-C6,
2. the atlantoaxial joint, and
3. the occipitomental joint [2-6]. If both vertebral arteries have adequate flow, the patient remains asymptomatic when one vertebral artery is positionally occluded. If the ipsilateral vertebral artery is hypoplastic and the lumen of the contralateral vertebral artery is decreased by cervical spondylosis or atheromatosis, symptoms of vertebrobasilar insufficiency or infarction may be produced [7-11]. Ischemia and infarction of the brainstem have been reported follow-