Resolution of Isolated Unilateral Hypoglossal Nerve Palsy Following Microvascular Decompression of the Intracranial Vertebral Artery

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Isolated hypoglossal nerve palsy due to mechanical compression from a vascular lesion is very rare. We present a case of a 32-year-old man who presented with spontaneous abrupt onset dysarthria, swallowing difficulty and left-sided tongue atrophy. Brain computed tomographic angiography and magnetic resonance imaging of the brainstem demonstrated an abnormal course of the left vertebral artery compressing the medulla oblongata at the exit zone of the hypoglossal roots that was relieved by microvascular decompression of the offending intracranial vertebral artery. This case supports the hypothesis that hypoglossal nerve palsy can be due to nerve stretching and compression by a pulsating normal vertebral artery. Microvascular decompression of the intracranial nerve and careful evaluation of the imaging studies can resolve unexpected isolated hypoglossal nerve palsy.

Key Words: Hypoglossal nerve paresis - Microvascular decompression - Vertebral artery.

INTRODUCTION

Hypoglossal nerve palsy (HNP) is a fairly common finding in neurological disease. However, isolated HNP due to mechanical compression from a vascular lesion is very rare. We present a case of isolated unilateral HNP that occurred spontaneously and was relieved by microvascular decompression of the offending intracranial vertebral artery (VA).

CASE REPORT

A 32-year-old man presented with spontaneous abrupt onset of dysarthria as well as difficulty in moving his tongue and swallowing food. This was preceded by a month-long history of progressive swallowing discomfort and feeling generally unwell. There was no history of neck trauma, manipulation, or vigorous exercise. He had no significant past medical history. The results of the general physical examination of the patient were unremarkable. He showed normal pharyngeal sensation and a brisk bilateral gag reflex. His tongue deviated to the left side on protrusion (Fig. 1). Neurological examination revealed only left hypoglossal nerve palsy with ipsilateral atrophy without signs of other cranial nerve palsies, pyramidal signs, or Horner syndrome. Cerebellar function was normal, and no symptoms and signs of brain stem compression or increased intracranial pressure were observed. Laboratory examination, including inflammatory markers and CSF studies, were performed. Normal full blood count, erythrocyte sedimentation rate, and C-reactive protein ruled out an infectious cause. Negative viral serology confirmed these findings. General immunology and autoimmunity tests excluded an autoimmune cause. Renal function tests, liver function tests, and random blood glucose were all normal. Cerebro-
spinal fluid (CSF) analysis and culture were performed to rule out intracranial pathology. These were unremarkable. Computed tomography (CT) of the brain and the base of the skull was unremarkable. Magnetic resonance imaging (MRI) scans demonstrated the left VA to be more prominent than the right VA and closely approximated to the lateral aspect of the medulla (Fig. 2). There was no evidence of brainstem infarction and spaceoccupying lesion on MRI. We believed that there was a high probability that the VA was responsible for the twelfth nerve palsy and surgical exploration was performed. We performed retrosigmoid craniotomy in the lateral position by a far-lateral approach. The left intradural vertebral artery and the twelfth nerve were exposed.

The VA was confirmed as normal and the twelfth nerve was seen to be stretched and compressed around the VA. The trunk of the hypoglossal nerve was stretched and extremely thin. A Teflon felt was inserted between the hypoglossal nerve and the left VA (Fig. 3). At follow up 3 month later, further improvement in tongue movement was observed (Fig. 4).

**DISCUSSION**

The hypoglossal nerve is a pure motor nerve that innervates intrinsic as well as extrinsic muscles of the tongue. It can be divided into five segments: medullary (nuclear), cisternal (extramedullary intracranial), skull base (the segment which passes through the hypoglossal nerve canal), nasopharyngeal/oropharyngeal carotid (in close vicinity to the glosopharyngeal and vagus nerves as well as to the internal carotid artery) and sublingual (where its branches terminate innervating lingual muscles).

The hypoglossal nerve can be damaged anywhere along its course. Supranuclear disease affecting the nerve results in paralysis of the tongue contralateral to the side of the lesion. Deviation of the tongue will occur away from the side of the lesion. Fasciculation and atrophy of the tongue are absent. When disease affects the hypoglossal nerve at the nuclear or infranuclear level, the clinical signs and symptoms are ipsilateral. There is deviation of the tongue toward the side of the lesion, with associated atrophy of the intrinsic and extrinsic tongue musculature and fasciculation of the tongue.

The hypoglossal nucleus in medullary segment may be affected by a variety of disorders, including medullary infarction, hemorrhage, neoplasms, and multiple sclerosis. Neoplasms may be primary (most often glioma) or secondary. Less common diseases may be involved, such as syringobulbia, poliomyelitis, botulism, and amyotrophic lateral sclerosis. Lying in the premedullary cistern, the rootlets of the hypoglossal nerve may be affected by a variety of pathological processes. The vertebral arteries close to the nerve rootlets, which may be compressed by a vertebral aneurysm or by dolichoectasia. Direct extension of neoplasm of the skull base may lead to nerve dysfunction.

Tumors, both benign and malignant, and trauma may damage the hypoglossal nerve as it traverses the skull base. Basal skull fractures may extend to involve the hypoglossal canal or the occipital condyle, resulting in an isolated or complex palsy of the hypoglossal nerve. Tumors of the skull base may affect the hypoglossal canal by expansion or destruction. Metastatic tumors and prima-
isolated unilateral HNP caused by the expanding hematoma of a dissecting carotid artery\cite{1,2}. However, in our case, the offending vessel was a normal artery, the site of contact was the root exit zone, the vertebral artery crossed the nerve perpendicularly, and the nerve was stretching and compressed by the pulsating normal vertebral artery similar to hemifacial spasm or trigeminal neuralgia. Isolated twelfth nerve palsy due to a vessel compression mechanism has rarely been demonstrated to our knowledge and this possibility is not usually included in the differential diagnosis of this condition.

MRI has a crucial role in the diagnostic approach. MR angiography, CT angiography, or digital subtraction angiography (DSA) could also be good additional tests. We suggest that MRI focusing on the hypoglossal nerve pathway should be obtained to localize the lesion in the event of suspected isolated HNP.

The symptoms of intracranial nerve paresis due to vessel compression usually improve or disappear spontaneously or after medical treatment, but unexpected isolated hypoglossal nerve palsy may require surgical treatment with microvascular decompression.

CONCLUSION

This case supports the notion that, in any case of unexplained isolated hypoglossal nerve palsy, nerve stretching and compression from a pulsating normal VA should be considered. Careful evaluation of imaging studies and microvascular decompression of the intracranial nerve can resolve the unexpected isolated hypoglossal nerve palsy.

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