**The Hypoglossal Nerve in Carotid Arterial Reconstructions**

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Abstract: The importance of hypoglossal nerve in performing carotid arterial reconstructions has been illustrated by two case reports. Unilateral palsy is troublesome but bilateral damage may result in upper airway obstruction. Simple surgical maneuvers consisting of division of the sternocleidomastoid artery and vein and freeing up of the descendens hypoglossus permit nontraumatic retraction of the nerve, avoiding tongue paralysis.

Additional Key Words: sternocleidomastoid artery and vein, internal carotid aneurysms, carotid bifurcation plaques, descendens hypoglossus, palsy.

Carotid arterial reconstructions will undoubtedly be performed with increasing frequency in the light of the published results of the Joint Study of Extracranial Arterial Occlusion, suggesting that strokes are preventable by prophylactic carotid endarterectomy. Although the technical maneuvers of reconstruction are not complex, they must be performed with precision and good exposure. The hypoglossal nerve, because of its intimate relationship to the internal carotid artery, may limit exposure since it crosses the internal carotid artery at various levels in different individuals, from just above the carotid bifurcation to as high as the level of the anterior belly of the digastric muscle. Frequently, in order to visualize the uppermost extent of carotid bifurcation plaques, to deal with internal carotid kinks or internal carotid aneurysms the hypoglossal nerve may be retracted, resulting in temporary paralysis of one-half of the tongue. Unilateral palsy is merely troublesome, resulting in difficulty with speech, tongue biting during mastication of food, and difficulties in swallowing for as long as four months postoperatively. Bilateral palsy, however, which can be anticipated in view of the frequency of bilateral carotid reconstructions, can pose a life-threatening situation by producing upper airway obstruction. The problem is illustrated by the following case histories.

**Case Reports**

**CASE 1**

A 52-year-old man was admitted to the New York University Hospital in 1960 with transient left cerebral dysfunction and bilateral high-grade carotid stenoses. Under local anesthesia, right carotid endarterectomy and roof patch vein angioplasty were performed. The hypoglossal nerve was retracted cephalad and medially because of its low course in the neck. One week later the left side was similarly reconstructed. The patient complained immediately postoperatively of difficulty in breathing except while sitting up with the head anteflexed. Phrenic nerve palsy was ruled out by fluoroscopy of the diaphragms. It was then noted that the patient could only weakly protrude the tongue. For the ensuing four weeks he slept in the upright posture until recovery occurred.

**CASE 2**

A 64-year-old man was admitted to the New York University Hospital in 1961 with mild right and left brain dysfunction and occlusion of both internal carotid arteries and the right vertebral. Exploration of the right carotid under local anesthesia revealed fibrous organization of thrombus in the internal carotid artery. Flow could not
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be restored. The hypoglossal nerve required retraction during the procedure. One week later
the left carotid was similarly explored under general anesthesia, with identical findings. The
endotracheal tube was removed before the patient was fully awake while in the supine position.
Upper airway obstruction occurred immediately. The patient was reintubated and the tube removed
only after he was fully awake and able to sit up. It was noted then that the tongue could be only
weakly protruded from the mouth. Full tongue recovery subsequently occurred within one month.

In the light of these two observations early in our experience, occurrence of hypoglossal palsy
on the first side of anticipated bilateral reconstructions has constituted a contraindication to surgery
on the second side until recovery has occurred.

A technique for mobilizing the nerve without injury was found when it was noted that it is
prevented from being easily moved cephalad and medially by the descendens hypoglossus as well as
by a small artery and a small vein which cross the cephalad surface of the main nerve (fig. 1).

The artery is the sternocleidomastoid branch of the external carotid artery which originates on
its anterior wall just above the carotid bifurcation, courses almost truly cephalad parallel to its parent
vessel and then loops over the hypoglossal nerve at a 90° or smaller angle. The vein is usually just
cephalad to the artery and passes between internal and external carotid arteries to reach the internal
jugular vein.

Division of these two usually small vessels (fig. 2) with dissection of the descendens hypoglossus to the lowermost extent of the wound permits the hypoglossal nerve to be displaced medially and cephalad by retracting the digastric muscle or the areolar tissue superficial to the nerve, thereby exposing the internal carotid artery.

Since this maneuver has been employed the incidence of hypoglossal palsy has been reduced
to less than 1% in the last more than 100 carotid reconstructions performed.

**Discussion**

Attention is drawn to the sternocleidomastoid artery and vein since they appear to be inadequately described in most Anglo-American textbooks of anatomy. Piersal (de. Huber) and a number of German texts described it accurately. Prior to the need for atraumatic surgical exposure of the internal

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**FIGURE 1**

Diagrammatic representation of the usually encountered relationship between the sternocleidomastoid artery and vein during carotid endarterectomies.
Division of the sternocleidomastoid artery and vein and mobilization of the descendens hypoglossus permit atraumatic retraction of the hypoglossal nerve.

References


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