Accessory nerve palsy following carotid endarterectomy

Report of two cases

Karl W. Swann, M.D., and Roberto C. Heros, M.D.

Department of Neurosurgery, Massachusetts General Hospital, Boston, Massachusetts

Two patients who had an accessory nerve palsy following carotid endarterectomy are presented. Both patients had high carotid bifurcations necessitating unusually high retraction and dissection. The ipsilateral accessory nerve was injured in the anterior cervical triangle in both cases. It is believed that vigorous lateral retraction of the superior aspect of the sternocleidomastoid muscle led to a stretch injury of the nerve. The symptoms completely resolved in both patients within 6 months.

KEY WORDS
accessory nerve  nerve injury  carotid endarterectomy  cranial nerve

Two patients in the clinical practice of one of the authors (R.C.H.) have suffered an accessory nerve palsy following carotid endarterectomy. Such injuries are seemingly extremely rare since, to our knowledge, the recent English literature contains only one report of accessory nerve palsy following carotid endarterectomy.13 We describe these two additional cases and present a hypothesis of the pathogenesis of this injury.

Case Reports

Case 1

This 65-year-old woman presented with episodic dysphasia and right hand weakness. An arteriogram showed significant left internal carotid artery (ICA) stenosis and she underwent left carotid endarterectomy. The carotid artery bifurcation was at the level of the C-2 vertebral body. At no time during the operation was the accessory nerve visualized. Approximately 1 week postoperatively, the patient noticed gradually worsening "stiffness" in the left shoulder, accompanied by pain radiating diffusely into the upper arm. She was unable to raise the left arm above horizontal; an electromyogram showed denervation of the left sternocleidomastoid and trapezius muscles. All symptoms resolved in 6 months without any surgical intervention.

Case 2

This 55-year-old man had episodic weakness of the left hand and arm and severe right ICA stenosis. A right carotid endarterectomy was undertaken. The operation was difficult because the bifurcation was at the level of the upper margin of the C-2 vertebral body and the plaque extended almost to the base of the skull. Vigorous high retraction of the anterior aspect of the sternocleidomastoid muscle was required for adequate exposure. Four days following surgery, the patient noted pain and "stiffness" in the right shoulder. He was unable to elevate the right arm above horizontal. An electromyogram 6 weeks postoperatively showed denervation of the right sternocleidomastoid and trapezius muscles. Three months later, follow-up electromyography revealed reinnervation of both. Six months later, he was asymptomatic.

Discussion

Nerve injuries are reported to account for approximately 20% of complications of carotid endarterectomy.8,11 Recent reviews discuss injuries to the hypoglossal, marginal mandibular, vagus, glossopharyngeal, and laryngeal nerves following carotid endarterectomy.1-4,5,8-10,14,16,17 However, although injury of the accessory nerve during surgery in the posterior cervical
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The normal course of the accessory nerve deep to the internal carotid artery and under the sternocleidomastoid muscle (SCM) is indicated by dashes. It can be seen how vigorous retraction superiorly on the SCM might lead to traction injury of the accessory nerve since the nerve runs within the muscle fibers in that location.

The accessory nerve is usually not visualized during carotid endarterectomy. It exits the base of the skull via the jugular foramen and passes posterior to the stylohyoid and digastric muscles, ventral to the internal jugular vein, and posterior to the ICA. It then pierces and innervates the sternocleidomastoid muscle superiorly. Traveling diagonally under the superior aspect of the sternocleidomastoid muscle, the nerve passes inferiordy across the posterior triangle to innervate the trapezius muscle. 7

Accessory nerve injury manifests itself clinically as weakness in abducting the shoulder above horizontal, mild scapular winging at rest, variable weakness of the sternocleidomastoid muscle, drooping of the shoulder, and a dull ache or "stiffness" in the shoulder. 5,13,15 Sunderland 13 attributed the symptom of shoulder aching to traction on the brachial plexus caused by the drooped shoulder.

Clinical and electrophysiological involvement of both the sternocleidomastoid and trapezius muscles ipsilaterally indicates injury to the accessory nerve in the anterior cervical triangle, prior to the departure of fibers innervating the sternocleidomastoid. Both of our patients and the previously reported patient 13 had electrophysiological evidence of accessory nerve injury in the anterior triangle. Furthermore, both of our patients had high carotid artery bifurcations (no comment is made regarding the level of bifurcation or plaque extension in the previously reported case 13). We postulate that lateral retraction high on the anterior border of the sternocleidomastoid muscle, which sometimes is necessary in cases of a high bifurcation or a long plaque, can lead to accessory nerve injury by stretching the nerve which is tethered to the sternocleidomastoid muscle (Fig. 1). Alternatively, the accessory nerve can be damaged during dissection by scything under the sternocleidomastoid muscle instead of proceeding directly to the carotid sheath.

Ipsilateral accessory nerve palsy is a potential complication of carotid endarterectomy. We cannot account for the virtual absence of discussion of this entity in the literature. It may be that most patients sustain only mild injuries that remain subclinical, or that those who do experience symptomatic shoulder ache and weakness are dismissed as having an orthopedic syndrome. Situations, such as a high carotid artery bifurcation or a long ICA plaque, that require vigorous retraction or extensive dissection high on the sternocleidomastoid muscle may predispose to this injury. Since we cannot be sure of the mechanism of injury in our cases, we have no definitive recommendation as to how to avoid this type of complication; however, we suspect that using the minimal amount of lateral retraction of the sternocleidomastoid muscle consistent with adequate exposure will minimize the chances of accessory nerve injury. Fortunately, as is the case with most nerve injuries during carotid endarterectomy, the clinical course of our patients suggests that, in the absence of frank nerve transection, full clinical recovery eventuates.

References


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Address reprint requests to: Roberto C. Heros, M.D.,
Director of Cerebrovascular Surgery, Massachusetts General Hospital, Boston, Massachusetts 02114.