Return of function after intracranial suture of the
trochlear nerve

Case report

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An excellent functional result was obtained after microsuture of a trochlear nerve which was inadvertently divided during the course of a craniotomy. Successful intracranial suture of this nerve has not previously been reported. Ophthalmoscopic detection of excyclotorsion of the eye on the side of the trochlear nerve palsy is discussed, along with its value in the differential diagnosis of acquired vertical diplopia.

KEY WORDS □9 cranial nerve □9 trochlear nerve □9 nerve suture □9 nerve regeneration

The fourth (trochlear) cranial nerve was inadvertently disrupted during the surgical slipping of a superior cerebellar artery aneurysm in a 37-year-old woman. The stumps of this trochlear nerve were trimmed and approximated with epineural sutures, and full recovery of the postoperative fourth cranial nerve palsy occurred within 5 months. We are unaware of previously reported successful intracranial anastomosis of the trochlear nerve, and present this patient to encourage attempts at primary surgical repair at the time of the cranial nerve injury.

Case Report

This 37-year-old right-handed woman was admitted to the hospital because of a subarachnoid hemorrhage. She subsequently underwent a right temporal craniotomy at which a right superior cerebellar artery aneurysm was successfully clipped by a subtemporal approach. At the time of operation, the aneurysm clip did not disengage from the applicator initially and the right trochlear nerve was inadvertently divided during an attempt to free the clip. The nerve was divided 3 mm proximal to the point at which it penetrated the dura. Under high magnification, the thin epineurium was seen to be ragged at the point at which it had been torn. Each stump was then trimmed by approximately 0.5 mm and an epineural anastomosis was performed using 10-0 monofilament nylon suture.

At the time of discharge, moderate underaction of the right superior oblique muscle was observed along with overaction of its antagonist, the right inferior oblique muscle. On prism cover testing, 8 diopters of right hypertropia was present in the primary position of gaze and this right hypertropia increased to 10 diopters during left horizontal gaze and to 14 diopters on right head tilting. With the patient sitting and looking straight head, extorsion of the right eye was noted by a report of subjective intorsion of the visual image using the double Maddox rod test and Bagolini striated lenses.

Extorsion of this eye was visualized during the fundus examination. The patient was placed in a sitting position and asked to look straight ahead so that a plane passing through both pupils was parallel to the horizon. The center of the small circle of light from the direct ophthalmoscope was then placed on the fovea and moved nasally and horizontally to see if the center of the light crossed the lower one-half of the optic disc (the normal anatomical relationship). While this normal relationship was seen in the left eye, the horizontal line drawn from the fovea nasalward in the right eye passed below the optic disc, indicating excyclotorsion and a superior oblique palsy on this side (Fig. 1).

Within 5 months following suturing of the severed ends of the trochlear nerve, the superior oblique palsy had resolved with full recovery of the vertical deviation of the eyes and a return of the right optic disc to its normal anatomical relationship with the fovea.

Discussion

This case shows that intracranial suture of a divided trochlear nerve is technically feasible, despite the fact that the fourth cranial nerve has the smallest diameter of the cranial nerve trunks. Although intracranial repair of such nerves as the facial nerve is commonly
successful, we and others have been unable to find previous reports of successful intracranial repair of any of the oculomotor cranial nerves (the third, fourth, or sixth cranial nerves).

Except for the technical problem of obtaining accurate end-to-end approximation of a relatively small structure, the trochlear nerve should be particularly amenable to suture. This nerve is a purely motor nerve, which obviates the problem of regenerating motor axons growing down sensory tubules. Furthermore, it supplies only one muscle, the superior oblique muscle, thereby eliminating functional compromise due to aberrant regeneration and synkinesis.

A useful clinical observation of the fourth cranial nerve palsy in our patient was the elevation of the right optic disc so that the inferior disc margin was above the fovea rather than being on a horizontal level with the inferior half of the optic disc (its normal anatomical position). Such torsion of the eye in vertical strabismus was first described in 1856 by von Graefe and subsequently noted by other authors. The elevation of the optic disc on the side of a superior oblique palsy can be appreciated during direct ophthalmoscopy and can be documented with fundus photography. The elevation of the optic nerve head is a sign of extorsion of the eye that results from paralysis of the major ocular intorter (the superior oblique muscle) which is not fully compensated for by remaining ocular intorter (the superior rectus muscle). Thus, the extorters of the eye (the inferior oblique and inferior rectus muscles) become relatively unopposed, resulting in extorsion of the eye around its sagittal axis (through the fovea) with consequent elevation of the optic disc. This finding deserves emphasis in evaluating patients with acquired vertical diplopia not caused by orbital disease in that extorsion of the globe is rarely seen in other common causes of acquired vertical diplopia (such as skew deviation, myasthenia gravis, and third nerve palsy).

References


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