Cranial Nerve XI: Accessory Nerve

16

One sentence: The accessory nerve, or CN XI, is a motor nerve that stems from the brainstem and cervical cord, and it is involved in complex eye tracking movements.

Genetic testing	NCV/ EMG	Laboratory	Imaging	Biopsy
	+		+	

Symptoms

Weakness of the shoulder and shoulder drop. Damage to the accessory nerve can cause shoulder pain of variable severity over the shoulder and scapula.

Signs

Trapezius muscle weakness causes shoulder drop, atrophy of trapezius muscle. Inability to lift the shoulder and raise the arm above the horizontal plane. If affected, atrophy and weakness of the sternocleidomastoid muscle and impaired head rotation to the opposite side. Scapular winging (medial margin).

Specific Qualities

Motor: Most of the motor supply to the trapezius muscle is derived from the accessory nerve, with contribution from the cervical plexus [1].

Sensory:

Autonomic:

Special senses:

Other: The accessory nerve is the only cranial nerve which enters and exits the skull. Anatomically, a distinction between the brainstem and spinal fibers is made. The "transitional nerve" is involved in laryngopharyngeal innervation. The sternocleidomastoid muscles have a prominent role in oculomotor tracking (Fig. 16.1).

W. Grisold et al., *The Cranial Nerves in Neurology*, https://doi.org/10.1007/978-3-031-43081-7_16

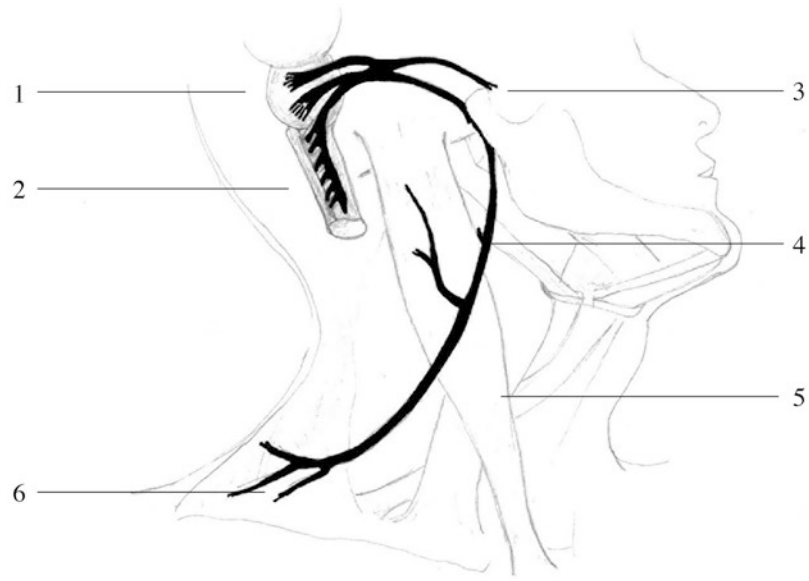

Fig. 16.1 Accessory nerve. *1* cranial roots, *2* spinal roots, *3* branch to soft palate, *4* accessory nerve, *5* sternocleidomastoid muscle, *6* trapezius muscle

Location of Lesion

Central: The "central" unilateral supranuclear lesions tend to cause mild and transient weakness, as the accessory nerve nuclei receive bilateral cortical input. Hemispheric lesions rarely cause a clinically relevant CN XI paresis.

"Dissociated weakness" of the sternocleidomastoid and trapezius muscles have been reported in brainstem lesions.

Intracranial within the skull: Infections; tumors, e.g., schwannoma.

Exit of the skull: At the jugular foramen: Lesions occur in association with the glossopharyngeal and vagus nerves, e.g., Vernet's syndrome, local tumors, schwannomas, metastasis, sarcoidosis, and Collet–Sicard syndrome.

A lesion at the cervicomedullary junction produces a weakness of the ipsilateral sternocleidomastoid and weakness of the *contralateral* trapezius.

Outside of the skull: Injury to the neck: Biting, blunt trauma, carotid endarterectomy, coronary bypass surgery, radiation, shoulder blows, shoulder dislocation, stretch/hyperextension injury, strangulation, variants of neuralgic amyotrophy.

Combination with Other CN

CN IX, X in base of the skull lesions or tumors.

Causes and Frequency

Dystonia: A cervical lesion of the CN XI can result in cervical dystonia or torticollis (in addition to the more common cause of centrally caused dystonia).

Iatrogenic: Surgery in the neck (posterior cervical triangle), deep cervical lymph node removal, "neck dissection procedures," shunt implantation (Fig. 16.2), fibrosis following radiotherapy, shoulder support in the Trendelenburg position.

Neoplastic: Collet–Sicard syndrome, ENT tumors, base of skull metastases (all tumors, in particular multiple myeloma, prostate, ENT, and

Fig. 16.2 Accessory lesion below the left sternocleidomastoid muscle (after a shunt procedure). *1* atrophy of the trapezius muscle, *2* prominent difference in shoulder rounding, lower position of clavicula

Hodgkin's disease). Neurolemmoma, nerve sheath tumors. Spinal tumors, retrograde infiltration from adjacent tumors [2].

Torticollis: [3].

Trauma: [4], strangulation [5]. War and combat: Blunt and penetrating injuries to the neck, fractures of the jugular foramen.

Others: Motor neuron disorders, neck surgery (Fig. 16.3); spinal tumors and syringomyelia.

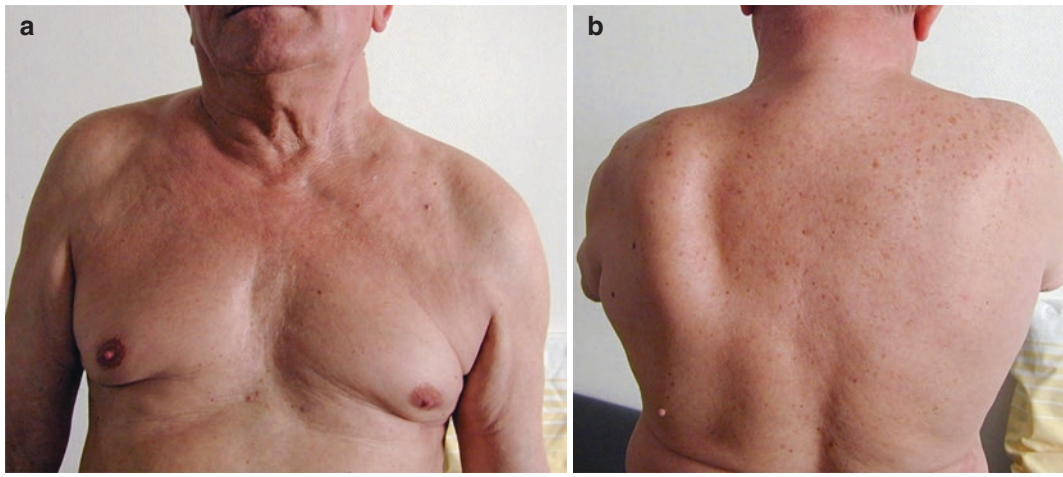

Fig. 16.3 Left accessory nerve palsy, following carotid resection: (**a**) note the unilateral atrophy of the trapezoid muscle and (**b**) the winging of the scapula with the abduction of the medial scapular border

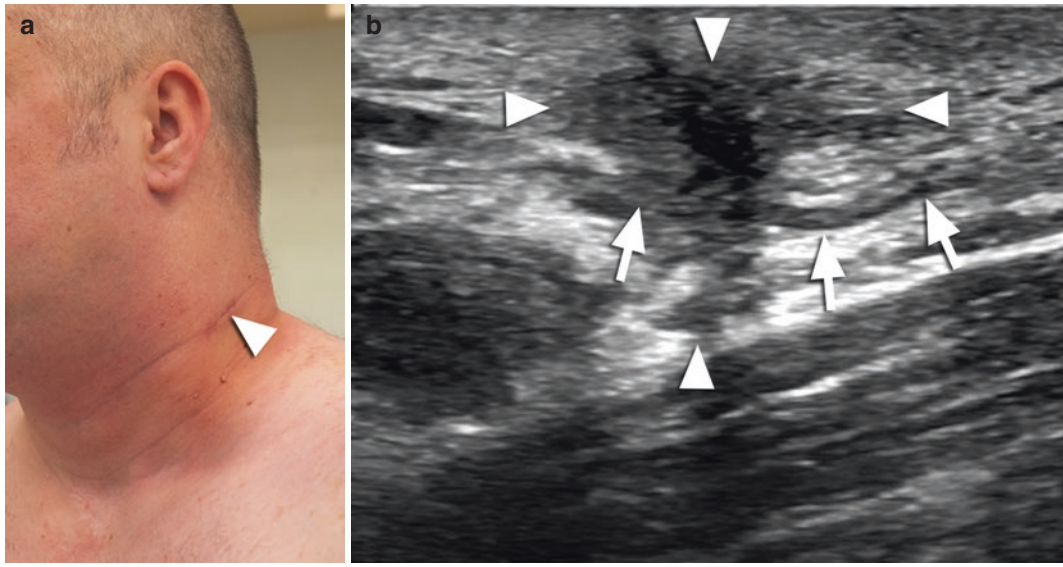

Fig. 16.4 Ultrasound of the accessory nerve. (**a**) A complete loss of function of the trapezius muscle occurred after diagnostic surgical lymph node removal. (**b**) Ultrasound examination revealed a scar tissue formation (arrowheads) surrounding the accessory nerve (arrows), which is intact

Main investigations

Clinical and electrophysiology diagnosis.

Sternocleidomastoid muscle: Impaired head rotation.

Trapezius muscle: Upper, middle, and lower parts of the trapezius muscle must be examined separately. Upper and middle part lesions may produce winging of the scapula.

NCV: Stimulation of the nerve at the posterior aspect of the sternocleidomastoid muscle.

EMG: Sternocleidomastoid, trapezoid upper, middle, and lower part.

Imaging: MR of neck and shoulder muscles.

Ultrasound: The sternocleidomastoid muscle can be visualized in ultrasound (Fig. 16.4).

Therapy

Nerve grafting (bridge): Reconstruction of the spinal accessory nerve with [6]; operations are not effective in long-standing scars; orthotic devices are not effective. The nerve is also used as a transferable nerve in neurotization and reinnervation [7].

Prognosis: Uncertain; recovery is slow and often incomplete. Further exploration is warranted if no improvement occurs after closed trauma.

References

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