Accessory nerve

The spinal accessory nerve (also called accessory nerve) is the eleventh cranial nerve (CN XI).

Classically the 11th cranial nerve (CN XI, or accessory nerve) is described as having a cranial and a spinal root, the latter arising from the upper segments of the spinal cord through a number of very fine rootlets. According to classical knowledge, the cranial root gives motor innervation to the vocal cords, whereas the spinal root provides the motor innervation of the sternocleidomastoid muscle (SCM) and of the upper portions of the trapezius muscle (TZ). The specific function of each of the rootlets of the spinal component is not well known.

Parts

Is composed of two parts, the cranial part and the spinal part.

The Cranial part (accessory portion) is the smaller of the two. Its fibers arise from the cells of the nucleus ambiguus and emerge as four or five delicate rootlets from the side of the medulla oblongata, below the roots of the vagus. It runs laterally to the jugular foramen, where it interchanges fibers with the spinal portion or becomes united to it for a short distance; here it is also connected by one or two filaments with the jugular ganglion of the vagus. It then passes through the jugular foramen, separates from the spinal portion and is continued over the surface of the ganglion nodosum of the vagus, to the surface of which it is adherent, and is distributed principally to the pharyngeal and superior laryngeal branches of the vagus. Through the pharyngeal branch it probably supplies the musculus uvulae and levator veli palatini. Some few filaments from it are continued into the trunk of the vagus below the ganglion, to be distributed with the recurrent nerve and probably also with the cardiac nerves.

The Spinal part

(spinal portion) is firm in texture, and its fibers arise from the ventral horn cells in the cord between C1 and C5. The fibres emerge from the cord laterally between the anterior and posterior spinal nerve roots to form a single trunk, which ascends into the skull through the foramen magnum. It then exits the skull through the jugular foramen, through which it passes, lying in the same sheath of dura mater as the vagus, but separated from it by a fold of the arachnoid.

In the jugular foramen, it receives one or two filaments from the cranial part of the nerve, or else joins it for a short distance and then separates from it again. As it exits from the jugular foramen, it runs backwards then descends obliquely behind the digastric and stylohyoid muscles to the upper part of the sternocleidomastoid; it pierces this muscle, and courses obliquely across the posterior triangle of the neck, to end in the deep surface of the trapezius muscle. As it traverses the sternocleidomastoid it gives several filaments to the muscle, and joins with branches from the second cervical nerve. In the posterior triangle it unites with the second and third cervical nerves, while beneath the trapezius it forms a plexus with the third and fourth cervical nerves, and from this plexus fibers are distributed to the muscle. Most consider the cranial part of the eleventh cranial nerve to be functionally part of the vagus nerve. Functions

The accessory nerve is responsible for the motor innervation of the sternocleidomastoid and trapezius

muscles.

The sternocleidomastoid acts in elevation of the thoracic cage and shoulder girdle, or, with fixation of the limb, will act in lateral flexion of the head to the shoulder on the same side and rotate the head to direct the chin upward to the opposite side. The trapezius muscle is one of several muscles that elevate the shoulder girdle and retract the girdle dorsally. Injury

Injury

Injury to the accessory nerve presents clinically as:

Inability to shrug one's shoulders, due to the paralysis of the trapezius muscle. Inability of head rotation due to paralysis of the sternocleidomastoid muscle. Clinical landmarks

The spinal accessory nerve can be identified entering the deep surface of the sternocleidomastoid muscle 4cm or more below the mastoid process. It can be located at Erb`s point just superior to where the greater auricular nerve surfaces from the deep neck. The spinal accessory nerve can also be located readily in the lateral neck at the point where it disappears under the deep surface of the trapezius muscle, roughly two finger-breadths superior to the clavicle at the anterior margin of the trapezius muscle.

The sternocleidomastoid muscles originate from the sternum and clavicle and insert on the mastoid process. Each one rotates the head to the opposite side of the body, that is, away from the side of the muscle; tilts the head to the same side of the body. Acting together the sternocleidomastoid muscles flex the neck and bring the head forward and down.

The trapezius muscle originates on the occiput and the spinous processes of the cervical and thoracic vertebrae and inserts on the clavicle and scapula. Some controversy centers on whether all or part of the muscle is supplied by the spinal accessory nerve; many believe only its upper portion is supplied by the eleventh nerve. When the head is fixed, the trapezius elevates the shoulders. When the scapula is fixed, it draws the head ipsilaterally; jointly the trapezii pull the head back so the face is upward.

The accessory nerve is a cranial nerve that controls the sternocleidomastoid muscle and trapezius muscles. As part of it was formerly believed to originate in the brain, it is considered the eleventh of twelve cranial nerves, or simply cranial nerve XI.

Traditional descriptions of the accessory nerve divide it into two parts: a spinal part and a cranial part.

However, because the cranial component rapidly joins the vagus nerve, becoming an integral part of said nerve, modern descriptions often consider the cranial component to be part of the vagus nerve and not part of the accessory nerve proper.

For this reason, in contemporary discussions of the accessory nerve, the common practice is to dismiss the cranial part altogether, referring to the accessory nerve specifically as the spinal accessory nerve.

The spinal accessory nerve provides motor innervation from the central nervous system to two muscles of the neck: the sternocleidomastoid muscle and the trapezius muscle. The

sternocleidomastoid muscle tilts and rotates the head, while the trapezius muscle has several actions on the scapula, including shoulder elevation and adduction of the arm.

Range of motion and strength testing of the neck and shoulders can be measured during a neurological examination to assess function of the spinal accessory nerve. Limited range of motion or poor muscle strength are suggestive of damage to the spinal accessory nerve, which can result from a variety of causes. Injury to the spinal accessory nerve is most commonly caused by medical procedures that involve the head and neck.

The accessory nerve is derived from the basal plate of the embryonic spinal segments C1–C6.