Anatomy Head and Neck: The Ventral Neck Muscles

Medical students must be informed as early as possible about this very important muscle group and additionally to origin, attachment and function they also have to be aware of innervation and possible pathologies. In medical terminology, this muscle group is also listed as prevertebral muscles, whereby only certain muscles actually fall into this subgroup. Regarding the segmental innervation there are different statements in literature which is also important to know. For medical students it is, therefore, to be recommended to take the most current version of muscle tables for learning assistance.

The superficial (platysma) of the ventral neck muscles

The platysma belongs to the subgroup of muscles supplied by cranial nerves and covers almost entirely the neck’s anterior surface. Its origin is the fascia that covers the pectoralis major and the deltoid. Hence, the platysma has contact to the shoulder girdle and the thorax and has, thus, major impact on the associated osseous structures.

The platysmas’ base runs caudal to the oblique line of the mandible.

Additionally, fibrous elements can insert in the mentalis muscle or the depressor anguli oris muscle. Therefore, the platysma belongs functional to the mimic muscles.
The innervation takes place by the facial nerve (ramus colli). The lower jaw is pulled in caudal direction as well as the corners of the mouth and the lower lip due to contraction of the platysma. The mandible as punctum fixed leads merely to tension of the neck skin. In case of a fascial nerve paresis the platysma tenses only on the healthy side after asking the patient to pull down the corners of the mouth.

The prevertebral muscles of the ventral neck muscles

The prevertebral muscles belong to the ventral neck muscles' group. They include rectus capitis anterior, longus capitis and longus colli which are located in pairs on the left and on the right side of the spine.

They rest directly on the spine as the deepest layer and connect the vertebral bodies with transverse processes of the cervical spine as well as the basilar ossis occipital on the ventral side.

In case of a pathological hyperextension the prevertebral muscles are massively irritated, for example, during a whiplash which often results in painful contractures. These are both medically as well as physiotherapeutic very difficult to treat.
Rectus capitis anterior muscle

The rectus capitis anterior arises from the massa lateralis atlantis and inserts at the basilar ossis occipital. Due to its course it supports the head’s forward leaning when it receives its active innervation by the cervical plexus (C1).

Longus capitis muscle

The longus captitis’ origin is the anterior tubercles of the transverse processes of C3–C6. Its base is identical with that of the rectus capitis anterior (basilar ossis occipital). Thus, its function is also the same with regard to the head’s bending forward. This muscle can also cause a lateral flection of the head due to the unilateral innervation by the cervical plexus (C1–C4).

Longus colli muscle

The longus colli possesses three groups of fibers that are to distinguish: pars recta, pars obliqua inferior pars obliqua superior. The joint innervation is possible through the cervical plexus (C2–C6). In case of a unilateral innervation the cervical spine is lateral inflected and rotated to the innervated side, while the bilateral innervation results in a ventral flection of the cervical spine.

The pars recta arise from the ventral surface of C5-Th3 corpi and insert at the ventral surfaces of C2-C4 corpi.

The Th1-Th3 corpi are the origins of the pars oblique while the anterior tubercle base is the transverse processes of C5-C6. The fibers of the pars superior oblique arise
from the **anterior tubercles** of the **transverse processes of C2–C5** and attach to the **tuberculum anterius atlantis**.

The **scalene muscles (scalenus muscles) of the ventral neck muscles**

The scalene muscles – also called scalenus muscles or scalenus group – continue the intercostal muscles in the cranial direction. **The group consists of four muscles:** anterior scalene, middle scalene muscle, posterior scalene and middle scalene minimus, whereby the latter is not existent in any person.

In the clinic, it is important to know the **scalenus aperture** is located between the anterior scalene and the middle scalene muscle. **The brachial plexus and the subclavian artery pass through the scalenus aperture.**

In case of retroversion of the arm incarceration of these sensitive structures can occur when the osseous starting points converging too strong. These symptoms can be treated by a manual therapy or physiotherapy, for example.

Regarding the function physicians should know that **textbooks only describe scalene muscles as auxiliary muscles of inspiration**, even though these are already activated during normal inspiration by fixing and raising the ribs.

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Bild: “Scheme of muscles of neck” von Olek Remesz. Lizenz: CC BY-SA 2.5
Scalenus anterior muscle

The anterior muscle arises from the **anterior tubercles of the C3-C6 transverse processes** and inserts at the **scalenus tubercle of the first rib**. Its innervation is ensured by the **cervical plexus (C4/5–C7)**. In case of a unilateral innervation the cervical spine is lateral inflected, while a bilateral innervation causes a flexion of the cervical spine as well as the raising of the first rib.

Scalenus medius muscle

The origins of the scalenus medius muscle are the **posterior tubercles of the C1/2–C7 transverse processes** and its base is in the dorsal direction from the sulcus arteriae subclaviae of the first as well as proportionate of the second rib. In case of a unilateral innervation through the **cervical plexus (C3/4–C8)** a lateral flexion of the cervical spine takes place while the result is raising the first rib as well as the second rib proportionately during bilateral innervation.

Scalenus minimus muscle

This muscle is not always applied and has its origin at the **anterior tubercle of the C6/7 transverse process**. It inserts on the inner edge of the first rib **dorsal of the anterior scalene muscle and the pleural cupula**, which stabilizes the muscle functionally and, therefore, belongs to the inspiration muscles. Furthermore, it supports the lateral flexion of the cervical spine. Its innervation is effected by the **cervical nerve VIII (C8)**.

Further important muscles near the ventral neck muscles

Regarding the anatomy of the human head-neck region, there are further major muscles located in the area of the ventral neck which, however, are assigned to other muscle groups. In pre-clinic (preliminary examination) the **sternocleidomastoid muscle and the rectus capitis lateralis** are listed as ventral neck muscles due to their localization, even if they are assigned to different subgroups.

The **rectus capitis lateralis** belongs to the subgroup of secondary respectively immigrated ventrolateral muscles, while the **sternocleidomastoid muscle** is one of the head muscles’ subgroup with base on the shoulder girdle respectively belongs to the cranial nerve-supplied muscles.

Rectus capitis lateralis muscle

The rectus capitis lateralis muscle evolutionary complies with an anterior intertransversarius muscle. Its origin is the **processus transversus atlantis** and it inserts at the **pars basilaris of the occipital bone, lateral to the occipital condyles**. The **cervical plexus (ramus ventralis C1)**-mediated innervation results in a lateral flexion in the atlanto-occipital articulation.

Sternocleidomastoid muscle

The sternocleidomastoid muscle has two origins. The origin of the **medial/sternal head**
is the manubrium sterni, while the origin of the lateral/clavicular head is the medial third of the clavicle. Both parts insert together at the mastoid process of the temporal bone and the superior nuchal line of the occipital bone.

It is innervated by the spinal accessory nerve (cranial nerve XI). In case of a unilateral innervation the cervical spine and head are lateral inflected as well as rotated to the opposite side. During a bilateral innervation the head joints are dorsal extended and, therefore, the head is raised. In some sources the sternocleidomastoid muscle is called “head-nodder”, which is wrong, since it has no maximally inflected component.

Hence, the function of this muscle is a popular examination topic in medical studies as well as the training of physiotherapists. Furthermore, it is a breath auxiliary muscle on inspiration during bilateral innervation.

Popular exam questions about the ventral neck muscles

The solutions are below the sources.

1. What is not the function of the sternocleidomastoid muscle?
   A. Auxiliary respiratory muscles of inspiration
   B. Dorsal extension of the head joints
   C. Lateral flexion of the cervical spine
   D. Mutual rotation of the cervical spine
   E. Flexion of the cervical spine

2. Which two scalenus muscles form the scalenus aperture?
   A. Anterior scalene and middle scalene muscle
   B. Middle scalene and posterior scalene muscle
   C. Posterior scalene and scalene minimus muscle
   D. Anterior scalene and posterior scalene muscle
   E. Middle scalene and scalene minimus muscle

3. Which cranial nerve supplies the platysma?
   A. Accessory nerve (cranial nerve XI)
   B. Facial nerve (cranial nerve VII)
   C. Trigeminal nerve (cranial nerve V)
   D. Hypoglossal nerve (cranial nerve XII)
   E. Olfactory nerve (cranial nerve I)

References


Correct answers: 1E, 2A, 3B

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