

"Neck"

-> The neck is the region of the body that lies between:

- The lower margin of the mandible above
- The suprasternal notch and the upper border of the clavicle below

-> The cervical part of the vertebral column:

- Is convex forward
- Supports the skull
- Forms the bony longitudinal axis of the neck

» Hyoid Bone and Muscles

-> The hyoid bone:

- Moves relatively freely
 - Anchors the tongue
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- A mass of extensor muscles lies posterior to the vertebrae
 - A smaller group of flexor muscles sits anteriorly

» Viscera and Neurovascular Structures of the Neck

-> Anterior central region of the neck -> contains parts of the respiratory system:

- Larynx
- Trachea

-> Posterior central region of the neck -> contains parts of the alimentary system:

- Pharynx
- Esophagus

-> At the sides of these structures:

- Vertically running carotid arteries
 - Internal jugular veins
 - Vagus nerve
- Deep cervical lymph nodes

» Skin and Superficial Fascia

-> Natural lines of cleavage of the skin:

- Are constant
- Run almost horizontally around the neck

-> Are clinically important:

- An incision along a cleavage line heals as a narrow scar
- An incision that crosses the lines heals as a wide or heaped-up scar

-> The superficial fascia of the neck:

- Forms a thin layer

-> It encloses:

- Cutaneous nerves
- Platysma muscle
- Superficial veins
- Superficial lymph nodes

» Cutaneous Nerves

-> Posterior rami of cervical nerves C2 to C5 supply:

- Skin overlying the trapezius muscle on the back of the neck
- Back of the scalp as high as the vertex

-> The greater occipital nerve:

- Is a branch of the posterior ramus of the second cervical nerve

-> The first cervical nerve:

- Has no cutaneous branch

-> Anterior rami of cervical nerves C2 to C4:

- Supply the skin of the front and sides of the neck
 - Do so through branches of the cervical plexus
 - These branches emerge from beneath the posterior border of the sternocleidomastoid muscle

» Lesser Occipital Nerve (C2)

- Hooks around the accessory nerve
- Ascends along the posterior border of the sternocleidomastoid muscle

-> Supplies the skin over:

- The lateral part of the occipital region
- The medial surface of the auricle

» Great Auricular Nerve (C2 and C3)

- Ascends across the sternocleidomastoid muscle

-> Divides into branches that supply the skin:

- Over the angle of the mandible
- On the parotid gland
- On both surfaces of the auricle

» Transverse Cutaneous Nerve (C2 and C3)

- Emerges from behind the middle of the posterior border of the sternocleidomastoid muscle

- Passes forward across the sternocleidomastoid muscle

-> Divides into branches that supply the skin on:

- The anterior surface of the neck
 - The lateral surface of the neck
- (From the body of the mandible to the sternum)

» Supraclavicular Nerves (C3 and C4)

- Emerge from beneath the posterior border of the sternocleidomastoid muscle
- Descend across the side of the neck

-> Pass onto:

- The chest wall
- The shoulder region
- Down to the level of the second rib

» Medial Supraclavicular Nerve

- Crosses the medial end of the clavicle
- Supplies the skin as far as the median plane

» Intermediate Supraclavicular Nerve

- Crosses the middle of the clavicle
- Supplies the skin of the chest wall

» Lateral Supraclavicular Nerve

- Crosses the lateral end of the clavicle

-> Supplies the skin over the:

- Shoulder
- Upper half of the deltoid muscle
- Posterior aspect of the shoulder (as far down as the spine of the scapula)

» Platysma

- A thin, broad, clinically important muscular sheet

- Embedded in the superficial fascia

-> Although located mainly in the neck, the platysma is:

- One of the facial muscles
- Derived from the first pharyngeal arch
- Innervated by the facial nerve

<- Neck Muscles ->

» Strap Muscles of the Neck

-> Include:

- Sternocleidomastoid muscle
 - Muscles anterior to it
- Inferior belly of the omohyoid
- Characterized as elongated bands

» Suprahyoid Muscles (Located superior to the hyoid bone)

- Anterior belly of digastric
- Posterior belly of digastric
 - Mylohyoid
 - Geniohyoid
 - Genioglossus
 - Stylohyoid

» Infrahyoid Muscles (Located inferior to the hyoid bone)

- Omohyoid
- Sternohyoid
- Sternothyroid
- Thyrohyoid

» Deep Neck Muscles

- Scalenus anterior
- Scalenus medius
- Scalenus posterior
 - Longus colli
 - Longus capitis

» Sternocleidomastoid Muscle

-> On contraction:

- Appears as an oblique band crossing the side of the neck
- Extends from the sternoclavicular joint to the mastoid process of the skull

-> Divides the neck into:

- Anterior triangle
- Posterior triangle

» Anterior Border of Sternocleidomastoid
Covers:

- Carotid arteries
- Internal jugular vein
- Deep cervical lymph nodes

- Thyroid gland

» Structures Covering the
Sternocleidomastoid Superficially:

- Skin
- Fascia
- Platysma muscle
- External jugular vein

» Structures Related to the Deep Surface of
the Posterior Border:

- Cervical plexus of nerves
 - Phrenic nerve
- Upper part of the brachial plexus

» Scalenus Anterior Muscle

- Deeply placed
- Direction: Descends almost vertically from the vertebral column to the first rib

» Important Anatomical Relations

> Anteriorly

- Carotid arteries
 - Vagus nerve
- Internal jugular vein
- Deep cervical lymph nodes
- Transverse cervical artery
 - Suprascapular artery
- Phrenic nerve (bound to anterior surface by prevertebral layer of deep cervical fascia)

> Posteriorly

- Cervical pleura
 - Origin of the brachial plexus
 - Second part of subclavian artery
- Scalenus medius muscle lies behind scalenus anterior

> Medially

- Vertebral artery
- Vertebral vein
- Sympathetic trunk
- Thoracic duct (on left side only)

> Laterally

- Emerging branches of the cervical plexus
 - Roots of the brachial plexus
- Third part of subclavian artery

» Interscalene Triangle

> Formed by:

- Adjacent edges of scalenus anterior and medius muscles
 - First rib

> Contents Passing Through the Triangle

- Subclavian artery
- Roots of the brachial plexus

> Clinical Significance

-> Narrowing of the triangle (e.g., due to extra muscle slips or cervical rib) may:

- Compress neurovascular contents
- Lead to ischemia and/or nerve dysfunction in the upper limb

> Structures Outside the Triangle (Not Affected by Compression)

- Subclavian vein
- Transverse cervical artery
- Suprascapular artery
- Phrenic nerve

» Summary Table

MUSCLE	ORIGIN	INSERTION	NERVE SUPPLY	ACTION
Platysma	Deep fascia over pectoralis major and deltoid	Body of the mandible and angle of the mouth	Facial nerve cervical branch	Depresses the mandible and angle of the mouth
Sternocleidomastoid	Manubrium sterni and medial third of the clavicle	Mastoid process of the temporal bone and occipital bone	Spinal part of accessory nerve and C2 and 3	Two muscles acting together extend the head and flex the neck; one muscle rotates the head to the opposite side
Digastric				
Posterior belly	Digastric notch on the mastoid process of the temporal bone	Intermediate tendon (held to hyoid by fascial sling)	Facial nerve	Depresses the mandible or elevates hyoid bone
Anterior belly	Body of the mandible		Nerve to mylohyoid	
Stylohyoid	Styloid process	Body of hyoid bone	Facial nerve	Elevates hyoid bone
Mylohyoid	Mylohyoid line of body of the mandible	Body of hyoid bone and fibrous raphe	Inferior alveolar nerve	Elevates floor of the mouth and hyoid bone or depresses the mandible
Geniohyoid	Inferior mental spine of the mandible	Body of hyoid bone	First cervical nerve	Elevates hyoid bone or depresses mandible
Sternohyoid	Manubrium sterni and clavicle	Body of hyoid bone	Ansa cervicalis; C1, 2, and 3	Depresses hyoid bone
Sternothyroid	Manubrium sterni	Oblique line on lamina of thyroid cartilage	Ansa cervicalis; C1, 2, and 3	Depresses the larynx
Thyrohyoid	Oblique line on lamina of thyroid cartilage	Lower border of body of hyoid bone	First cervical nerve	Depresses hyoid bone or elevates the larynx
Omohyoid				
Inferior belly	Upper margin of scapula and suprascapular ligament	Intermediate tendon (held to clavicle and first rib by fascial sling)	Ansa cervicalis; C1, 2, and 3	Depresses hyoid bone
Superior belly	Lower border of body of hyoid bone			
Scalenus anterior	Transverse processes of third, fourth, fifth, and sixth cervical vertebrae	First rib	C4, 5, and 6	Elevates first rib; laterally flexes and rotates cervical part of the vertebral column
Scalenus medius	Transverse processes of upper six cervical vertebrae	First rib	Anterior rami of cervical nerves	Elevates first rib; laterally flexes and rotates cervical part of the vertebral column
Scalenus posterior	Transverse processes of lower cervical vertebrae	Second rib	Anterior rami of cervical nerves	Elevates second rib; laterally flexes and rotates cervical part of the vertebral column

<- Neck Triangles ->

- The sternocleidomastoid (SCM) divides the neck into two large triangles:

-> Anterior triangle

-> Posterior triangle

- The strap muscles (infrahyoid and suprahyoid) help define further subdivisions

- These triangles organize neurovascular and glandular structures and are surgical landmarks

» Anterior Triangle

> Boundaries:

-> Anterior: Midline of the Neck

-> Posterior: Sternocleidomastoid

-> Superior: Lower margin of body of mandible

-> Roof:

- Skin
- Superficial fascia
- Platysma
- Investing layer of deep fascia
- Cervical branch of facial nerve
- Transverse cutaneous nerve

> Divisions of Anterior Triangle

- Submental
- Digastric
- Carotid
- Muscular

i) Submental Triangle

> Boundaries

-> Anterior: Midline of neck

-> Lateral: Anterior belly of digastric

-> Inferior: Hyoid bone

-> Floor: Mylohyoid

> Contents

- Submental lymph nodes
- Anterior jugular vein

ii) Digastric Triangle

> Boundaries

- > Anterior: Anterior belly of digastric
- > Posterior: Posterior belly of digastric and stylohyoid
- > Superior: Lower body of border of mandible
- > Floor: Mylohyoid and Hyoglossus

> Contents

- Submandibular gland
- Submandibular lymph nodes
- Facial artery and vein
- Nerve and vessels to mylohyoid
- Hypoglossal nerve

iii) Carotid Triangle

> Boundaries

-> Superior: Posterior belly of digastric

-> Inferior: Superior belly of omohyoid

-> Posterior: Anterior border of sternocleidomastoid

-> Floor: Thyrohyoid, middle and inferior constrictor muscles of pharynx

> Contents

- Bifurcation of common carotid
- Branches of external carotid (except posterior auricular)
- Lingual, facial and superior thyroid veins
- Hypoglossal, internal and external laryngeal nerves
- Superior root of ansa cervicalis
- Lymph nodes

iv) Muscular Triangle

> Boundaries

- > Anterior: Midline of the neck
- > Superior: Superior belly of omohyoid
- > Inferior: Sternocleidomastoid
- > Floor: Sternohyoid and sternothyroid

> Contents

- Parts of larynx, pharynx, trachea, esophagus, thyroid and parathyroid glands
 - Their vessels and nerves
 - Lymph nodes

» Posterior Triangle

> Boundaries

- > Anterior: Posterior border of sternocleidomastoid
- > Posterior: Anterior border of trapezius
- Inferior: Clavicle

> Subdivisions & Their Boundaries

i) Occipital Triangle

- > Anterior: Sternocleidomastoid
- > Posterior: Trapezius
- > Inferior: Inferior belly of omohyoid

> Contents:

- Occipital artery
- Spinal accessory nerve (CN XI)
- Trunks of brachial plexus

ii) Omoclavicular (Subclavian) Triangle

- > Anterior: Sternocleidomastoid
- > Superior: Inferior belly of omohyoid
- > Inferior: Clavicle

> Contents:

- Subclavian artery (third part)

» Deep Cervical Fascia

- Supports the muscles, vessels, and viscera of the neck

-> In certain areas, it is condensed to form well-defined fibrous sheets:

- Investing layer
- Pretracheal layer
- Prevertebral layer

-> Also condensed to form:

- Carotid sheath
- Axillary sheath

» Investing Layer (Investing Deep Fascia)

- A thick layer that encircles the neck.

-> Splits to enclose:

- Trapezius muscle
- Sternocleidomastoid muscle

» Pretracheal Layer (Pretracheal Fascia; Thyroid Capsule)

- A thin layer attached above to the laryngeal cartilages.

-> Surrounds:

- Thyroid gland
- Parathyroid glands

- Forms a sheath for the thyroid and parathyroid glands.

- Encloses the infrahyoid muscles.

» Prevertebral Layer (Prevertebral Fascia)

-> A thick layer that passes like a septum across the neck:

- Behind the pharynx and esophagus
- In front of the prevertebral muscles and the vertebral column

- Forms the fascial floor of the posterior triangle.

-> Extends laterally:

- Over the first rib
- Into the axilla to form the axillary sheath

» Carotid Sheath

-> A local condensation of:

- Prevertebral layer
- Pretracheal layer
- Investing layer of the deep fascia

-> Surrounds:

- Common carotid artery
- Internal carotid artery
- Internal jugular vein
- Vagus nerve
- Deep cervical lymph nodes

» Axillary Sheath

-> All anterior rami of the cervical nerves that emerge in the interval between:

- Scalenus anterior muscle
- Scalenus medius muscle

- These rami lie at first deep to the prevertebral fascia.
- As the subclavian artery and brachial plexus emerge in the interscalene triangle:
- They carry with them a sheath of the fascia.
- This extends into the axilla and is called the axillary sheath.

» Cervical Ligaments

> Stylohyoid Ligament

- Connects the styloid process to the lesser cornu of the hyoid bone

> Stylomandibular Ligament

- Connects the styloid process to the angle of the mandible

> Sphenomandibular Ligament

- Connects the spine of the sphenoid bone to the lingula of the mandible

> Pterygomandibular Ligament (Raphe)

- Connects the hamular process of the medial pterygoid plate to the posterior end of the mylohyoid line of the mandible

-> Gives attachment to:

- Superior constrictor muscle
 - Buccinator muscle

<- Root of the Neck ->

- The root of the neck is the area immediately above the inlet into the thorax

- The scalenus anterior muscle is a key structure for understanding this region

-> Notable structures in this region:

- Subclavian blood vessels
 - Thoracic duct

> Subclavian Artery

-> Right subclavian artery:

- Arises from the brachiocephalic artery
- Originates behind the right sternoclavicular joint
- Passes upward and laterally as a gentle curve behind the scalenus anterior muscle
- At the outer border of the first rib, becomes the axillary artery

-> Left subclavian artery:

- Arises from the arch of the aorta in the thorax
- Ascends to the root of the neck
- Arches laterally in a manner similar to the right subclavian artery

> Subclavian Vein

- Begins at the outer border of the first rib as a continuation of the axillary vein
- At the medial border of the scalenus anterior, joins the internal jugular vein to form the brachiocephalic vein

> Thoracic Duct

- Begins in the abdomen at the upper end of the cisterna chyli
 - Enters the thorax through the aortic opening in the diaphragm
 - Ascends through the posterior mediastinum, gradually inclining to the left
 - In the superior mediastinum:
 - Passes upward along the left margin of the esophagus
- > At the root of the neck:
- Continues to ascend along the left margin of the esophagus
 - Reaches the level of the transverse process of the seventh cervical vertebra
 - Bends laterally behind the carotid sheath
 - At the medial border of the scalenus anterior, turns downward
 - Drains into the beginning of the left brachiocephalic vein

- However, it may end in the terminal part of the subclavian or internal jugular veins

"Neck Clinicals"

» Clinical Identification of the Platysma

- Platysma seen as a thin sheet of muscle just beneath the skin
- Visible by having the patient clench jaws firmly

-> Muscle extends from:

- Body of the mandible
- Downward over the clavicle
- Onto the anterior chest wall

» Platysma Tone and Neck Incisions

-> In neck lacerations or surgical incisions:

- Subcutaneous layer with platysma must be carefully sutured

-> Reason:

- Platysma tone can pull on scar tissue
- May result in broad, unsightly scars

» Platysma Innervation and Mouth Distortion

-> Platysma innervated by:

- Cervical branch of facial nerve

-> Nerve pathway:

- Emerges from lower end of parotid gland
 - Travels forward to platysma
 - Sometimes crosses lower border of mandible
- Supplies depressor anguli oris muscle

> Clinical significance:

- Skin lacerations over mandible or upper neck affecting platysma
- May distort shape of mouth

» Sternocleidomastoid Muscle and Protection from Trauma

- Sternocleidomastoid is a strong, thick muscle crossing the side of the neck

- Protects underlying soft structures from blunt trauma

-> In suicide attempts by throat cutting:

- Individual first extends the neck
- Makes several horizontal cuts with a knife

-> Extension of cervical vertebral column and head at atlanto-occipital joint:

- Causes carotid sheath with large blood vessels to slide posteriorly beneath the sternocleidomastoid

-> For desired result with head and neck fully extended:

- Several attempts may be needed
- Success only when larynx and greater part of sternocleidomastoid are severed

-> Common wound sites:

- Immediately above and below the hyoid bone

» Congenital Torticollis

- Most cases due to excessive stretching of sternocleidomastoid during difficult labor
- Hemorrhage occurs into the muscle
- Detected as small, rounded "tumor" in early weeks after birth

-> Later changes:

- Tumor invaded by fibrous tissue
- Tissue contracts and shortens the muscle

-> Effects:

- Mastoid process pulled down toward sternoclavicular joint of same side
 - Cervical spine flexed
- Face looks upward to opposite side

-> If untreated:

- Asymmetrical growth changes in face
- Cervical vertebrae may become wedge shaped

» Spasmodic Torticollis

- Results from repeated chronic contractions of sternocleidomastoid and trapezius muscles

- Usually psychogenic in origin

-> In severe cases:

- Section of spinal part of accessory nerve may be necessary

» Clinical Significance of Neck Deep Fascia

-> Deep fascia forms distinct sheets:

- Investing layer
- Pretracheal layer
- Prevertebral layer

- These fascial layers are easily recognizable by the surgeon during operation

» Fascial Spaces

-> Between denser layers of deep fascia:

- Loose connective tissue forms potential spaces

-> Clinically important spaces include:

- Visceral space
- Retropharyngeal space
- Submandibular space
- Masticatory space

» Importance of Deep Fascia and Fascial Spaces

-> Organisms from:

- Mouth
 - Teeth
 - Pharynx
 - Esophagus
- Can spread among fascial planes and spaces

-> Tough fascia determines:

- Direction of infection spread
- Path taken by pus

-> In the retropharyngeal space:

- Blood, pus, or air can spread downward into superior mediastinum of thorax

» Acute Infection of Neck Fascial Spaces

- Dental infections most commonly involve lower molar teeth
- Infection spreads medially from mandible into:
 - Submandibular space
 - Masticatory space
- Tongue is pushed forward and upward
- Further spread may involve visceral space:
 - Can lead to edema of vocal cords
 - May cause airway obstruction

» Ludwig Angina

- Acute infection of submandibular fascial space

- Commonly secondary to dental infection

» Chronic Infection of Neck Fascial Spaces

-> Tuberculous infection of deep cervical lymph nodes:

- Causes liquefaction and destruction of one or more nodes

- Investing layer of deep fascia initially limits pus

-> Later, fascia eroded at one point:

- Pus passes into less restricted superficial fascia

- Results in dumbbell or collar-stud abscess

-> Clinician may detect superficial abscess

- Must not forget presence of deeply placed abscess

» Pleura and Lung Injuries in the Root of the Neck

- Cervical dome of pleura and apex of lung extend into root of neck on each side
- Covered by suprapleural membrane
 - Lie behind subclavian artery
- Penetrating wound above medial end of clavicle may involve apex of lung