MEDICAL EDUCATION RESOURCE

Prevertebral and Paravertebral Regions

Prevertebral and Paravertebral Regions

Introduction

The prevertebral and paravertebral regions are located **anterior and lateral to the cervical vertebral column**. These regions contain important **muscles, arteries, veins, and nerves** that form part of the **deep structures of the neck** and are covered by the **prevertebral fascia**.

Prevertebral Muscles

The **prevertebral muscles** lie directly in front of the cervical vertebrae and are responsible for **flexion of the head and neck**.

- **Longus Colli:** Flexes neck and rotates it to opposite side.
- **Longus Capitis:** Flexes head and neck forward.
- **Rectus Capitis Anterior:** Flexes head at the atlanto-occipital joint.
- **Rectus Capitis Lateralis:** Flexes head laterally.

All prevertebral muscles are supplied by **ventral rami of cervical spinal nerves**.

Vertebral Artery

- **Origin:** Arises from the **first part of the subclavian artery**.
- **Course:**

    - **Cervical part:** Ascends through **foramina transversaria** of C6–C1 vertebrae.
    - **Atlantic part:** Winds around the atlas.
    - **Intracranial part:** Pierces dura and arachnoid, enters the **foramen magnum** to form the **basilar artery** with its fellow.
- **Relations:** Lies **posterior to carotid sheath**, accompanied by vertebral vein and sympathetic plexus.
- **Branches:**
    - Spinal branches
    - Muscular branches
    - Posterior meningeal branches
    - Medullary and cerebellar branches
- **Termination:** Unites with opposite vertebral artery at **lower border of pons** forming **basilar artery**.

Dissection

Expose vertebral artery by reflecting the sternocleidomastoid and longus colli; identify the **foramen transversarium of C6** as entry point and note its relation with **cervical sympathetic chain** and **inferior thyroid artery**.

Scalenovertebral Triangle

- **Boundaries:**

    - **Medial:** Longus colli muscle
    - **Lateral:** Scalenus anterior
    - **Base:** First part of subclavian artery
- **Contents:**
    - Vertebral artery and vein
    - Sympathetic trunk
    - Thoracic duct (on left side)
    - Inferior thyroid artery and vein

This small but clinically vital space is where **aneurysm or catheter insertion** complications may affect the vertebral artery or sympathetic chain.

Development of Vertebral Artery

- Develops from **longitudinal anastomosis between cervical intersegmental arteries**.
- The **proximal part** arises from the **7th intersegmental artery** (as part of the subclavian artery).
- The **distal part** originates from the **cranial connections** of upper six intersegmental arteries that later regress.

Clinical relevance:

- Anomalies in this development may result in **asymmetry** or **duplication** of vertebral arteries.

- Vertebrobasilar insufficiency may result from kinking or compression of the artery in cervical spondylosis.

Trachea

Introduction

- **Trachea** is a **fibrocartilaginous tube** that extends from the **cricoid cartilage (C6 vertebra)** to the **level of the sternal angle (T4–T5)**, where it divides into **right and left principal bronchi**.

- It acts as the **air passage between the larynx and bronchi**.

Relations in the Neck

- **Anteriorly:**
    - Isthmus of thyroid gland (2nd–4th tracheal rings)
    - Inferior thyroid veins
    - Jugular venous arch
    - Sternohyoid and sternothyroid muscles
    - Pretracheal fascia and skin
- **Posteriorly:**

- Oesophagus (close contact, allowing tracheoesophageal reflexes)

- **Laterally:**
  - Lobes of thyroid gland
  - Common carotid arteries

Structure

- Composed of **15–20 C-shaped hyaline cartilaginous rings**, open posteriorly.
- The posterior gap is closed by **trachealis muscle** (smooth muscle).
- **Mucous membrane:** lined by **pseudostratified ciliated columnar epithelium with goblet cells**.
- Submucosa contains **seromucous glands**.

Blood Supply

- **Arterial:** Inferior thyroid arteries
- **Venous:** Inferior thyroid veins
- **Lymphatic drainage:** Pretracheal and paratracheal nodes
- **Nerve supply:**
  - Parasympathetic: Recurrent laryngeal nerves
  - Sympathetic: Cervical sympathetic chain

Clinical Anatomy of Trachea

- **Tracheostomy:** Surgical opening through 2nd–4th tracheal rings to establish airway.
- **Tracheitis:** Inflammation from infection or intubation.
- **Tracheal deviation:** Seen in lung collapse (toward affected side) or pleural effusion (away from affected side).
- **Foreign body entry:** More common into **right bronchus** due to its vertical alignment.
- **Compression symptoms:** Enlarged thyroid or retrosternal goiter can cause **dyspnoea and stridor** by pressing trachea.

Oesophagus

Introduction

- A **muscular tube**, about **25 cm long**, extending from **cricoid cartilage (C6)** to **cardiac end of stomach (T11)**.
- The **cervical part (about 5 cm)** lies between the trachea and vertebral column.

Relations in the Neck

- **Anteriorly:** Trachea
- **Posteriorly:** Prevertebral fascia and longus colli

- **Laterally:**
  - Right recurrent laryngeal nerve (on right side)
  - Thoracic duct and left recurrent laryngeal nerve (on left side)
  - Lobes of thyroid gland

Structure

- **Muscle:**
  - Upper 1/3 ? striated
  - Middle 1/3 ? mixed
  - Lower 1/3 ? smooth
- **Epithelium:** Non-keratinized stratified squamous
- **Constricted sites:**
  1. Cricoid (C6)
  2. Aortic arch level (T4)
  3. Left bronchus crossing (T5–T6)
  4. Diaphragmatic (T10)

Clinical Anatomy of Oesophagus

- **Dysphagia:** Difficulty swallowing from stricture or carcinoma.
- **Oesophageal varices:** Portal hypertension leads to dilation of lower oesophageal veins.
- **Reflux oesophagitis (GERD):** Acid regurgitation due to defective lower sphincter.
- **Tracheo-oesophageal fistula:** Congenital defect due to incomplete separation of trachea and oesophagus.
- **Instrumentation hazard:** Cervical oesophagus can be injured during endoscopy due to its proximity to trachea.

Joints of the Neck

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1. Atlanto-Occipital Joints

- **Type:** Synovial, ellipsoid (biaxial).
- **Articulating surfaces:**
  - Condyles of occipital bone with superior articular facets of atlas (C1).
- **Ligaments:**
  - Anterior & posterior atlanto-occipital membranes.
- **Movements:**
  - Flexion and extension (nodding “yes”).
  - Lateral flexion (slight).

- **Nerve supply:** C1 spinal nerve via suboccipital nerve.

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2. Atlanto-Axial Joints

Three separate articulations between atlas (C1) and axis (C2):

- **Median joint:** Dens of axis with anterior arch of atlas (pivot type).
- **Two lateral joints:** Between articular facets (plane type).

Ligaments:

- Transverse ligament of atlas
- Alar ligaments
- Apical ligament of dens
- Cruciform ligament
- Tectorial membrane (continuation of posterior longitudinal ligament)

Movements:

- Rotation of head (“no” movement).
- Occurs around vertical axis through dens.

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3. Joints between Cervical Vertebrae

- **Type:** Plane synovial (between articular processes).

- **Intervertebral joints:** Secondary cartilaginous (between vertebral bodies).
- Allow flexion, extension, rotation, and lateral bending of neck.

Clinical Anatomy of Joints of the Neck

- **Atlanto-occipital dislocation:** Fatal due to medullary compression.
- **Atlanto-axial dislocation:** Seen in rheumatoid arthritis, trauma, or Down syndrome due to laxity of **transverse ligament**.
- **Whiplash injury:** Sudden hyperextension ? injury to ligaments and muscles.
- **Fracture of dens (odontoid process):** May compress spinal cord or medulla.
- **Degenerative changes:** Osteophytes in uncovertebral joints cause **cervical spondylosis**, leading to **radiculopathy**.

Paravertebral Region

- Lies **lateral to the prevertebral region**, containing:
  - **Scalene muscles**
  - **Cervical plexus** and **phrenic nerve**
  - **Cervical pleura**

Scalene Muscles

Types

There are **three main scalene muscles**:

1. **Scalenus anterior**
2. **Scalenus medius**
3. **Scalenus posterior**

(A small fourth muscle, scalenus minimus, may be present.)

Origins and Insertions

- **Scalenus anterior:**
  - *Origin:* Anterior tubercles of transverse processes of C3–C6
  - *Insertion:* Scalene tubercle on 1st rib (between subclavian artery and vein)
- **Scalenus medius:**
  - *Origin:* Posterior tubercles of transverse processes of C2–C7
  - *Insertion:* Upper surface of 1st rib, behind subclavian artery groove
- **Scalenus posterior:**
  - *Origin:* Posterior tubercles of transverse processes of C4–C6
  - *Insertion:* Outer surface of 2nd rib

- **Scalenus minimus (if present):**
    - *Origin:* Anterior border of C7 transverse process
    - *Insertion:* Inner border of 1st rib and dome of cervical pleura

Nerve Supply

- Ventral rami of **C3–C8 cervical nerves**

Actions

- **Elevate ribs** (1st and 2nd) during inspiration
- **Flex neck laterally** and **rotate to opposite side**
- **Stabilize neck** along with other cervical muscles

Dissection Points

- Scalenus anterior is a **key surgical landmark**.
- **Anterior relations:**
    - Phrenic nerve (covered by prevertebral fascia)
    - Internal jugular vein
    - Sternocleidomastoid muscle
    - Clavicle

- **Posterior relations:**
    - Brachial plexus
    - Subclavian artery
    - Scalenus medius
    - Cervical pleura (covered by suprapleural membrane)

Cervical Pleura

Description

- Dome-shaped part of **parietal pleura** covering the **apex of the lung**.
- Projects into the root of the neck about **5 cm above the first costal cartilage** and **2.5 cm above the medial third of the clavicle**.
- Strengthened by **suprapleural membrane (Sibson's fascia)**, derived partly from **scalenus minimus**.

Relations

- **Anterior:** Subclavian artery, scalenus anterior
- **Posterior:** Neck of 1st rib, sympathetic trunk, superior intercostal artery and vein, 1st thoracic nerve
- **Lateral:** Scalenus medius, lower trunk of brachial plexus

- **Medial:** Vertebral bodies, oesophagus, trachea, left recurrent laryngeal nerve, thoracic duct (on left), great vessels of neck

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Cervical Plexus

Formation

- Formed by **ventral rami of C1–C4 cervical nerves**.
- Each ramus divides into ascending and descending branches to form **three loops**.

Position

- Lies deep to **sternocleidomastoid** and **prevertebral fascia**, on **levator scapulae** and **scalenus medius**.

Branches

1. **Cutaneous Branches:**
    - Lesser occipital (C2)
    - Great auricular (C2, C3)
    - Transverse cervical (C2, C3)
    - Supraclavicular (C3, C4)
2. **Muscular Branches:**
    - To infrahyoid muscles (via ansa cervicalis)

- To prevertebral muscles
- To levator scapulae

3. **Phrenic Nerve:**
   - Chief branch, from **C3, C4, C5**

> **Phrenic Nerve**

Course

- **Origin:** Mainly from C4 with contributions from C3 and C5.
- Descends **on scalenus anterior**, covered by prevertebral fascia.
- Enters thorax between **subclavian artery and vein**.
- **Right nerve:** Passes in front of root of right lung.
- **Left nerve:** Passes in front of root of left lung, crossing aortic arch.

Branches

- **Motor:** Diaphragm
- **Sensory:** Central diaphragm, mediastinal pleura, pericardium

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Clinical Anatomy

- **Scalene syndrome:** Compression of **brachial plexus and subclavian artery** between scalenus anterior and medius ? pain and numbness in upper limb.
- **Pneumothorax (apical):** Penetrating neck injury may tear **cervical pleura**, collapsing the lung apex.
- **Phrenic nerve palsy:** Paralysis of diaphragm ? elevation of hemidiaphragm on X-ray.
- **Cervical plexus block:** Used for **regional anesthesia** in neck surgeries.

Facts to Remember

- The **scalene muscles** form an important landmark in the neck —
  - **Subclavian artery** passes **behind** the **scalenus anterior**.
  - **Subclavian vein** passes **in front** of the **scalenus anterior**.
  - **Brachial plexus** lies **between scalenus anterior and medius**.
- The **phrenic nerve** lies **on the anterior surface of scalenus anterior**, deep to prevertebral fascia.
  - On the **right**, it crosses the **subclavian artery**.
  - On the **left**, it crosses the **first part of the subclavian artery** and **aortic arch** in thorax.

- The **cervical pleura (cupula)** projects **2.5 cm above the medial third of the clavicle**.
    - It is strengthened by **Sibson's fascia (suprapleural membrane)** derived partly from **scalenus minimus** and **transverse process of C7**.
- The **cervical plexus** lies on **levator scapulae** and **scalenus medius**, beneath **sternocleidomastoid**.
    - Cutaneous branches emerge around the **midpoint of posterior border of sternocleidomastoid** ("nerve point of the neck").
- The **phrenic nerve** carries **motor fibers to the diaphragm** and **sensory fibers** from the **pericardium, pleura, and peritoneum (central part)**.
- A small muscular slip, **scalenus minimus**, may be present and is attached to the **1st rib and dome of pleura**.
- The **cervical plexus block** is given at the **nerve point of neck**, useful for anesthesia during neck and thyroid surgeries.

Clinicoanatomical Problems

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1. A patient presents with pain and tingling in the arm, especially when lifting objects overhead. On examination, the radial pulse disappears when the arm is abducted. What is the likely cause?

Diagnosis: *Scalene (Thoracic Outlet) Syndrome*

Explanation:

- Caused by **compression of the brachial plexus and subclavian artery** between **scalenus anterior and medius muscles**.

- Common causes include cervical rib, fibrous band, or hypertrophy of scalene muscles.
- Symptoms: numbness, paresthesia, and weakness of upper limb with absent pulse on arm elevation.

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2. During a supraclavicular incision for brachial plexus block, the patient develops dyspnoea and elevated hemidiaphragm on X-ray. Which nerve was likely injured?

Answer: *Phrenic nerve (C3, C4, C5)*

Explanation:

- Injury or block of the phrenic nerve causes **paralysis of the diaphragm** on the same side.
- On imaging, the affected hemidiaphragm appears **raised** due to loss of tone.

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3. A stab wound just above the clavicle causes sudden respiratory distress and collapse of one lung. Explain the anatomical reason.

Diagnosis: *Cervical (Apical) Pneumothorax*

Explanation:

- The **cervical pleura** and **apex of the lung** extend above the **clavicle**.
- Penetrating wounds or misplaced subclavian vein catheterization may rupture pleura ? air enters pleural cavity ? **lung collapse**.

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4. A patient with carcinoma of thyroid presents with shoulder pain and paralysis of diaphragm. Which structure might have been involved?

Answer: *Phrenic nerve*

Explanation:

- The phrenic nerve lies close to the **lateral lobe of thyroid** and may be compressed by tumor, inflammatory enlargement, or during thyroidectomy.
- This results in **referred pain to shoulder (C4 dermatome)** and **diaphragmatic paralysis**.

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5. During neck surgery, the surgeon asks for identification of a nerve crossing the anterior scalene muscle. Which nerve is it?

Answer: *Phrenic nerve.*

Explanation:

- The phrenic nerve descends **on the anterior surface of scalenus anterior**, deep to the prevertebral fascia and sternocleidomastoid.
- It serves as an important landmark in neck dissections.

Frequently Asked Questions — Paravertebral Region

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1. Name the muscles forming the scalene group.

Answer: Scalenus anterior, scalenus medius, scalenus posterior, and sometimes **scalenus minimus** (accessory slip).

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2. What are the actions of the scalene muscles?

Answer:

- Elevate **first and second ribs** during inspiration.

- Flex the **neck laterally** and **rotate it** to the opposite side.
- Help stabilize the **cervical spine**.

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3. Which important structures lie between the scalenus anterior and scalenus medius?

Answer:

- **Brachial plexus (trunks)**
- **Subclavian artery**

This space is called the **interscalene (scalene) triangle**.

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4. What structures lie in front of the scalenus anterior?

Answer:

- Phrenic nerve (on its surface)
- Subclavian vein (in front of lower part)
- Transverse cervical and suprascapular veins
- Sternocleidomastoid muscle

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5. What is the relation of the subclavian vessels to the scalenus anterior?

Answer:

- **Subclavian artery** passes **behind** the muscle.
- **Subclavian vein** passes **in front** of it.

6. What are the boundaries of the scalenovertebral triangle?

Answer:

- **Medially:** Longus colli
- **Laterally:** Scalenus anterior
- **Base:** First part of subclavian artery

Contents: Vertebral artery and vein, thoracic duct (left side), sympathetic trunk, inferior thyroid artery.

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7. What is the cervical pleura (cupula)?

Answer:
The **dome-shaped parietal pleura** that covers the **apex of the lung** and projects into the root of the neck above the **first rib**.
It is reinforced by **Sibson's fascia (suprapleural membrane)**.

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8. What is Sibson's fascia and what is its importance?

Answer:
A **thickened layer of prevertebral fascia** covering the **cervical pleura**, derived partly from **scalenus minimus** and the **transverse process of C7**.
It **protects the lung apex** from injury in the root of the neck.

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9. What is the cervical plexus?

Answer:
Formed by **ventral rami of C1–C4 spinal nerves**, lying deep to sternocleidomastoid on levator scapulae and scalenus medius.
Provides **cutaneous and muscular branches** to the neck.

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10. What is the “nerve point of the neck”?

Answer:
The **midpoint of the posterior border of sternocleidomastoid**, where all **cutaneous branches of cervical plexus** emerge.
It is the site for **cervical plexus block** in anesthesia.

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11. What is the origin and course of the phrenic nerve?

Answer:

- **Origin:** Mainly from **C4**, with contributions from **C3 and C5**.
- **Course:** Descends **on scalenus anterior**, passes **between subclavian artery and vein**, and enters thorax to supply the **diaphragm**.

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12. What are the branches of the phrenic nerve?

Answer:

- **Motor:** To diaphragm
- **Sensory:** To pericardium, mediastinal pleura, and diaphragmatic peritoneum

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13. What is the root value of the phrenic nerve?

Answer: C3, C4, and C5 — *“C3, 4, 5 keeps the diaphragm alive.”*

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14. What is the effect of injury to the phrenic nerve?

Answer:

- **Paralysis of the diaphragm** on the same side

- **Elevation of hemidiaphragm** on chest X-ray
- **Dyspnoea** and referred pain to shoulder (C4 dermatome)

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15. What is the clinical significance of the scalene muscles?

Answer:

- Serve as **key landmarks** in neck dissections.
- **Scalene syndrome** may compress the **brachial plexus and subclavian artery**, producing pain, paresthesia, and loss of pulse on arm elevation.

Multiple Choice Questions — Paravertebral Region

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1. The scalenus anterior muscle is innervated by —
A. Dorsal rami of cervical nerves
B. Ventral rami of cervical nerves
C. Accessory nerve
D. Phrenic nerve
? **Answer:** B. Ventral rami of cervical nerves
Explanation: All scalene muscles are supplied by ventral rami of **C3–C8**.

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2. The subclavian artery passes —
A. In front of scalenus anterior
B. Behind scalenus anterior
C. Between scalenus anterior and medius
D. In front of scalenus medius
? **Answer:** B. Behind scalenus anterior
Explanation: The subclavian artery lies **posterior** to scalenus anterior; the **vein lies anterior**.

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3. The brachial plexus lies between which two muscles?

A. Sternocleidomastoid and trapezius

B. Scalenus anterior and medius

C. Scalenus medius and posterior

D. Longus colli and scalenus anterior

? **Answer:** B. Scalenus anterior and medius

Explanation: The trunks of the brachial plexus occupy the **interscalene space**.

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4. The phrenic nerve descends over which muscle in the neck?

A. Longus colli

B. Scalenus anterior

C. Scalenus medius

D. Sternocleidomastoid

? **Answer:** B. Scalenus anterior

Explanation: The phrenic nerve runs **vertically on the anterior surface** of scalenus anterior.

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5. The root value of the phrenic nerve is —

A. C2, C3, C4

B. C3, C4, C5

C. C4, C5, C6

D. C2, C4, C6

? **Answer:** B. C3, C4, C5

Mnemonic: *“C3, 4, 5 keep the diaphragm alive.”*

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6. The cervical pleura extends above the clavicle by —

A. 1 cm

B. 2.5 cm

C. 5 cm

D. 7 cm

? **Answer:** B. 2.5 cm

Explanation: The cupula projects about **2.5 cm above the medial third of the clavicle**.

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7. Sibson’s fascia (suprapleural membrane) is derived from —

A. Pretracheal fascia

B. Prevertebral fascia

C. Investing layer of deep cervical fascia

D. Buccopharyngeal fascia

? **Answer:** B. Prevertebral fascia

Explanation: Sibson's fascia is a thickened extension of prevertebral fascia that strengthens the cervical pleura.

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8. Which of the following statements about the phrenic nerve is true?

A. Passes behind subclavian artery

B. Lies anterior to scalenus medius

C. Provides motor supply to diaphragm

D. Crosses behind root of the lung

? **Answer:** C. Provides motor supply to diaphragm

Explanation: The phrenic nerve runs in front of lung root and supplies **motor fibers to diaphragm**.

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9. The cervical plexus is formed by ventral rami of —

A. C1–C3

B. C1–C4

C. C2–C5

D. C3–C6

? **Answer:** B. C1–C4

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10. The nerve point of the neck is located —

A. At the posterior border of trapezius

B. At the midpoint of the posterior border of sternocleidomastoid

C. Behind the scalenus anterior

D. Above the clavicle

? **Answer:** B. Midpoint of posterior border of sternocleidomastoid

Explanation: All cutaneous branches of cervical plexus emerge from this point.

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11. Injury to the phrenic nerve causes —

A. Vocal cord paralysis

B. Drooping of shoulder

C. Elevation of diaphragm on same side

D. Constriction of pupil

? **Answer:** C. Elevation of diaphragm on same side

Explanation: Paralysis of the diaphragm due to loss of phrenic supply results in raised hemidiaphragm.

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12. Which of the following muscles may reinforce the cervical pleura?

A. Scalenus anterior

B. Scalenus medius

C. Scalenus minimus

D. Longus capitis

? **Answer:** C. Scalenus minimus

Explanation: When present, scalenus minimus gives fibers to the **suprapleural membrane (Sibson's fascia)**.

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13. In scalene syndrome, which structures are compressed?

A. Subclavian vein and thoracic duct

B. Subclavian artery and brachial plexus

C. Common carotid artery and vagus nerve

D. Internal jugular vein and phrenic nerve

? **Answer:** B. Subclavian artery and brachial plexus

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14. Which nerve lies on the anterior surface of scalenus anterior?

A. Vagus

B. Hypoglossal

C. Phrenic

D. Accessory

? **Answer:** C. Phrenic

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15. The cervical plexus lies over which muscles?

A. Longus capitis and longus colli

B. Levator scapulae and scalenus medius

C. Scalenus anterior and medius

D. Splenius capitis and semispinalis capitis

? **Answer:** B. Levator scapulae and

Viva Voce — Paravertebral Region

Q1. What are the scalene muscles and where are they located?
They are **three paired muscles** — scalenus anterior, medius, and posterior — situated **on the lateral aspect of the neck**, connecting cervical vertebrae to the first two ribs.

Q2. What is the action of the scalene muscles?
They **flex the neck laterally**, **rotate it**, and assist in **inspiration** by elevating the first and second ribs.

Q3. What structures pass between the scalenus anterior and scalenus medius?
The **subclavian artery** and **trunks of the brachial plexus**.

Q4. What structure passes in front of the scalenus anterior?
The **subclavian vein**.

Q5. Which nerve runs on the surface of scalenus anterior?
The **phrenic nerve**.

Q6. What is the root value of the phrenic nerve?
C3, C4, and C5 — *"C3, 4, 5 keeps the diaphragm alive."*

Q7. What is the motor and sensory distribution of the phrenic nerve?

- **Motor:** Diaphragm
- **Sensory:** Central diaphragmatic pleura, pericardium, and diaphragmatic peritoneum

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Q8. What happens when the phrenic nerve is injured?

- **Diaphragmatic paralysis** on the same side
- **Elevation of the hemidiaphragm** on X-ray
- **Dyspnoea** (difficulty in breathing) and **referred pain** to the shoulder (C4 dermatome)

Q9. What is the cervical plexus and where is it situated?
Formed by **ventral rami of C1–C4**, lying deep to **sternocleidomastoid** on **levator scapulae** and **scalenus medius**.

Q10. Name the cutaneous branches of the cervical plexus.

- Lesser occipital (C2)
- Great auricular (C2, C3)
- Transverse cervical (C2, C3)
- Supraclavicular (C3, C4)

Q11. What is the "nerve point of the neck"?
The **midpoint of the posterior border of sternocleidomastoid** where the **cutaneous branches of cervical plexus** emerge.

Q12. What is the cervical pleura?
The **apical extension of parietal pleura** that rises **above the first rib** into the root of the neck. It covers the **apex of the lung**.

Q13. How is the cervical pleura strengthened?
By the **suprapleural membrane (Sibson's fascia)** derived from **prevertebral fascia** and partly from **scalenus minimus**.

Q14. What are the relations of cervical pleura?

- **Anteriorly:** Subclavian artery
- **Posteriorly:** Neck of first rib and sympathetic chain
- **Medially:** Trachea, oesophagus, thoracic duct (on left)
- **Laterally:** Scalenus medius and lower trunk of brachial plexus

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Q15. What is scalene (thoracic outlet) syndrome?
Compression of the **brachial plexus and subclavian artery** between **scalenus anterior and medius**, leading to **pain, numbness, and weakness** of the upper limb, and loss of pulse when the arm is elevated.

Q16. Which muscle may give rise to Sibson's fascia?
Scalenus minimus (when present).

Q17. What is the clinical importance of the nerve point of the neck?
It is used for **cervical plexus block** in surgical anesthesia during thyroidectomy and other neck surgeries.

Q18. Which structure lies anterior to the cervical pleura and may be injured in subclavian vein puncture?
Subclavian vein. Accidental injury may cause **pneumothorax** by puncturing the pleura.

Q19. Which side is the thoracic duct related to the cervical pleura?
On the **left side**, the thoracic duct arches above the pleura to open into the **junction of left subclavian and internal jugular veins**.

Q20. What is the developmental origin of the diaphragm?
From **septum transversum**, **pleuroperitoneal membranes**, **dorsal mesentery of oesophagus**, and **body wall mesoderm**.