Thyroid gland & Root of the neck

OUTLINE

Thyroid gland
- Location & superficial feature
- Blood supply & Venous drainage
- Relationship of its vessels and related nerves

Root of the neck
- Relationships within the region
- Neurovascular structures

Lymphatic Drainage of Neck
- its isthmus lies on the 2\textsuperscript{nd} to 4\textsuperscript{th} tracheal rings
Thyroid ---capsules

False & True capsule

Human Anatomy by Regions

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The Relations of Thyroid Gland

(A) Anterior view
- Sternohyoid muscle (turned up)
- Thyroid cartilage
- Sternohyoid muscle
- Cricoid cartilage
- Thyroid gland (right lobe)
- Isthmus
- Trachea
- Esophagus

(B) Posterior view
- Superior thyroid artery
- Superior pole
- Left parathyroid glands
- Inferior thyroid artery
- Thyrocervical trunk
- Recurrent laryngeal nerves

Key
- Endocrine layer
- Respiratory layer
- Alimentary layer
Important Relationship of Thyroid Gland

- medially
  - larynx, trachea, pharynx, esophagus, external & recurrent laryngeal nerves
- posteriorly
  - parathyroid gland

- anteriorly
  - infrahyoid muscles & SCM
- posterolaterally
  - carotid sheath & its contents

(D) Transverse CT scan through lobes of thyroid gland
(E) Transverse MRI study through thyroid isthmus

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- left & right lobes
- isthmus
- pyramidal lobe

Thyroid – external feature

- Epiglottic cartilage
- Thyrohyoid membrane
- Thyroid cartilage
- Cricothyroid ligament
- Cricoid cartilage
- Cricotracheal ligament
- Left lobe of thyroid gland
- 1st tracheal ring
- Lesser horn of hyoid
- Greater horn of hyoid
- Superior thyroid notch
- Laryngeal prominence
- Superior pole
- Inferior pole
- Trachea
- Esophagus

Alimentary layer: Esophagus
Respiratory layer: Trachea
Endocrine layer: Parathyroid gland, Thyroid gland
Capsule and septa of thyroid gland

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- Upper pole of its lobe extends upward to oblique line of thyroid cartilage
- Lower one downward to level of 6th tracheal ring
- Isthmus lies in front 2 to 4 tracheal rings
- Pyramid lobe is usually to left of median plane
Pyramidal Lobe & Accessory Thyroid Gland

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Parathyroid glands & thyroid gland
- superior parathyroid glands
- inferior parathyroid glands
- superior thyroid artery
- inferior thyroid artery
- Superior, middle & inferior thyroid veins
Thyroid arteries

**Superior thyroid a.** arises from ECA & reaches gland at its upper pole. On its way to gland, STA runs accompanied with **external laryngeal n.**

**Inferior thyroid artery**: branch of the thyrocervical trunk, posterior to the carotid sheath to reach the posterior aspect of the gland. Before arrived to gland it runs across **recurrent laryngeal n.**
Related nerves

- superior laryngeal nerve
  - internal branch
  - external branch
- recurrent laryngeal nerve
• form plexus between its two capsules
• Superior & middle thyroid veins empty into IJV
• inferior one into brachiocephalic v.
Root of the neck

- The area between the thorax and neck.
- It opens into the superior thoracic aperture.
- The jugular notch opposite posteriorly to disc between the T1 & T2
- Laterally by the first pair of ribs and their costal cartilages
- Anteriorly by manubrium
- Posteriorly by the body of T1 & T2 vertebrae
CLINICAL NOTES

Cervical Rib Syndrome

Cervical Rib

Subclavian artery and vein
Cervical rib
Clavicle
2nd rib
Forked 3rd rib
Scalen muscle insertion
Cervical rib
Anterior scalene
Brachial plexus
Subclavian artery
Brachiocephalic trunk
Sternum
Costal cartilage
First rib

Cervical Rib Syndrome

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Structures in the root of the neck

- Viscera organs: trachea and esophagus.
- Carotid sheath and its contents.
- Brachial plexus and subclavian vessels.
- Phrenic nerve.
- Structures in triangle of the vertebral artery: vertebral a.
- Sympathetic trunk of neck.
- Apex of lungs, cervical pleura and sibson fascia.
- Cervical vertebrae & related muscles.

The Transition between Root of Neck & Mediastinum.
apex of lungs, cervical pleura & sibson fascia
Prevertebral Muscles

(A) Anterior view

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Action and Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longus colli</td>
<td>Flexes neck with rotation (torsion) to opposite side if acting unilaterally</td>
</tr>
<tr>
<td>Longus capitis</td>
<td>Anterior tubercles of C3–C6 transverse processes; Anterior rami of C1–C3 spinal nerves</td>
</tr>
<tr>
<td>Rectus capitis</td>
<td>Flexes head</td>
</tr>
<tr>
<td>posteriormuscles</td>
<td>Flexes head and helps stabilize it</td>
</tr>
<tr>
<td>Levator scapulae</td>
<td>Lateral flexes and rotates head and neck to same side, acting bilaterally, extends head and neck</td>
</tr>
</tbody>
</table>

(B) Lateral view

Structures in the root of the neck

Human Anatomy by Regions
• Originate from transverse process of cervical vertebrae

• **Scalenus anterior** inserts onto upper surface of 1st rib

**Structures in the root of the neck**

**Scalene & scalenus space**

- Scalene space: the scalenus anterior and medius and 1st rib.

- The brachial plexus and subclavian a. pass through the space.
Structures on the anterior aspect of scalenus anterior

Structures vertically:
- carotid sheath & contents in the sheath
- phrenic nerve (most lateral)
- sympathetic trunk of cervical part (medial)

Structures transversely:
- subclavian v.
- transverse cervical a.
- suprascapular a.
Veins of the Root of Neck

Subclavian Vein

- Direct continuation of axillary vein at outer border of 1st rib.
- Usually only one tributary: external jugular vein
Termination of lymphatic trunks

Venous Angle

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Subclavian Vein Puncture

Internal Jugular Vein Puncture
Structures posterior to the scalenus anterior

- subclavian artery
  - divided into 3 parts by the scalenus anterior.
  - At outer border of 1st rib, it continues as axillary artery.
- brachial plexus
  - upper, middle, lower trunks lie superior to subclavian artery
Branches of the subclavian artery

- Vertebral artery, internal thoracic artery, and thyrocervical trunk from the first part
- Costocervical trunk from the second part
- Dorsal scapular artery, often arising from the third part
Vertebral triangle

- **boundary**
  - Base is the 1st part of subclavian a
  - **Content: vertebral a.**
Branches of the subclavian artery
Brachial plexus

- Three trunks—superior, middle, and inferior
- Three anterior divisions—superior, middle, and inferior
- Spinal ganglion (dorsal root ganglion)
- Anterior ramii
- Three posterior divisions
- Coracoclavicular ligament
- Coracoacromial ligament
- Pectoralis minor
- Costoclavicular ligament
- Articular disc of sternoclavicular joint
- Terminal branches
- Radial nerve
- Median nerve
- Ulnar nerve
- Musculocutaneous nerve
- Dorsal scapular nerve
- Subclavian artery
- Subclavian vein
- Lateral pectoral nerve
- Musculocutaneous nerve
- Median nerve
- Ulnar nerve
- Thoracodorsal nerve

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Sympathetic trunk & phrenic n.

Horner syndrome

Sympathetic trunk & phrenic n.
Structures in the root of the neck

- Esophagus
- Sympathetic trunk
- Ascending cervical artery
- Carotid tubercle (C6 vertebra)
- Anterior ramus C6
- Vertebrobasilar artery
- Anterior ramus C5
- Inferior thyroid artery
- Dorsal scapular artery
- Anterior scalene
- Anterior scalene
- Trachea
- Dorsal scapular artery
- Inferior thyroid artery
- Thyrocervical trunk
- Vertebrobasilar artery
- Thoracic duct
- Subclavian artery
- Subclavian vein
- Right common carotid artery
- 1st rib
- Cervical parietal pleura
- Right brachiocephalic vein
- Brachiocephalic trunk
- Inferior thyroid vein
- Thymic branch of inferior thyroid artery
- Thyroid gland
- Internal jugular vein
- Internal thoracic artery
- Phrenic nerve
- Internal thoracic vein
- Left brachiocephalic vein
- Left vagus nerve
- Left common carotid artery
- Left vagus nerve (CN X)
- Left subclavian artery
- Vertebral vein
- Phrenic nerve
- Left subclavian vein
- Right subclavian vein
- Right subclavian artery
lymphatic drainage of the neck

- Superficial lymph nodes
- Deep cervical lymph nodes
- Jugular trunks

right lymphatic duct/thoracic duct

1. Submental and submandibular lymph nodes.
2. Upper lateral lymph nodes.
3. Middle lateral lymph nodes.
4. Lower lateral lymph nodes.
5. Lymph nodes in the posterior cervical triangle.
6. Anterior cervical lymph nodes (anterior group of cervical nodes).

Nuchal
Jugulofacial venous junction
Parallel to internal jugular vein
Along the accessory nerve
Axillary
Submental-submandibular
Laryngotracheal-thyroideal
Jugulo-subclavian venous junction
Retroauricular lymph nodes
Occipital lymph nodes
Superficial parotid lymph nodes
Mastoid lymph nodes
Deep parotid lymph nodes
Anterior superficial cervical lymph nodes
Lateral superficial cervical lymph nodes

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submandibular lymph nodes
lymphatic drainage of the neck
Typical cases

• 患者，女性，36岁，颈部前方有一包块，主诉体重下降且精神紧张。家人抱怨该患者易急躁、激动和哭泣。

• 查体：颈部两侧各检查到一个肿块，位于喉下方。从后方触诊可感觉肿大的甲状腺，可随吞咽上下移动。其他体征：眼球突出、脉搏加快、手指震颤、手掌潮湿。

• 诊断：甲状腺功能亢进。

• 治疗：药物治疗无效，对患者进行了部分甲状腺切除。术后患者出现声音嘶哑。

• 问题：1. 肿大的甲状腺随吞咽上下移动的解剖学基础是？
2. 由于患者甲状腺肿大，可能受压迫的神经为？
3. 为什么要进行部分甲状腺切除？
4. 患者出现声音嘶哑的原因可能是什么？