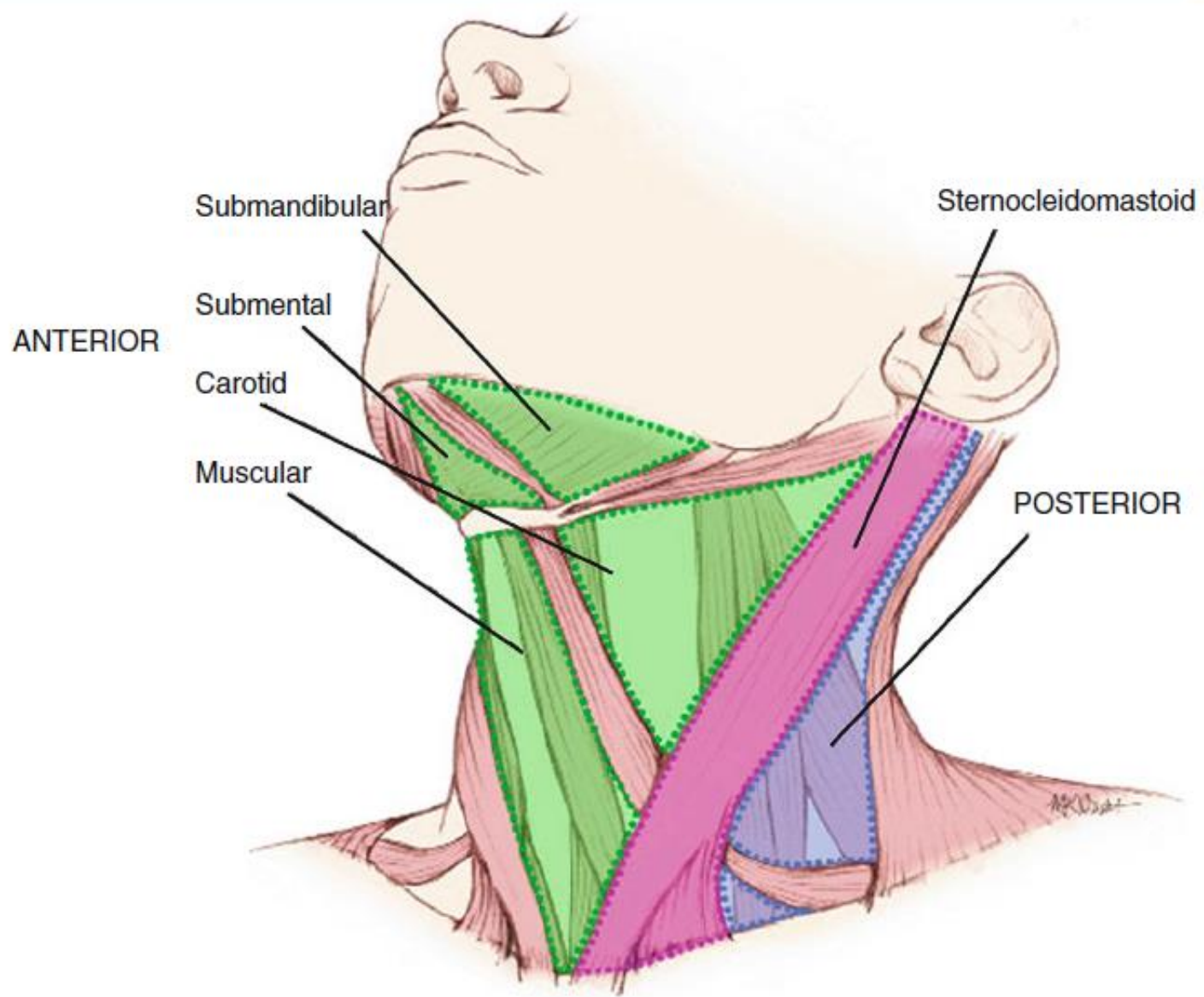


# **Clinical Anatomy of the Neck**

**Dr. P. Mandela**

*2017*



Digastric muscle (anterior belly)

Mylohyoid muscle

Stylohyoid muscle

External carotid artery

Internal carotid artery

Thyroid cartilage

Sternocleidomastoid (SCM) muscle

Cricoid cartilage

Sternothyroid muscle

Brachial plexus

Trapezius muscle

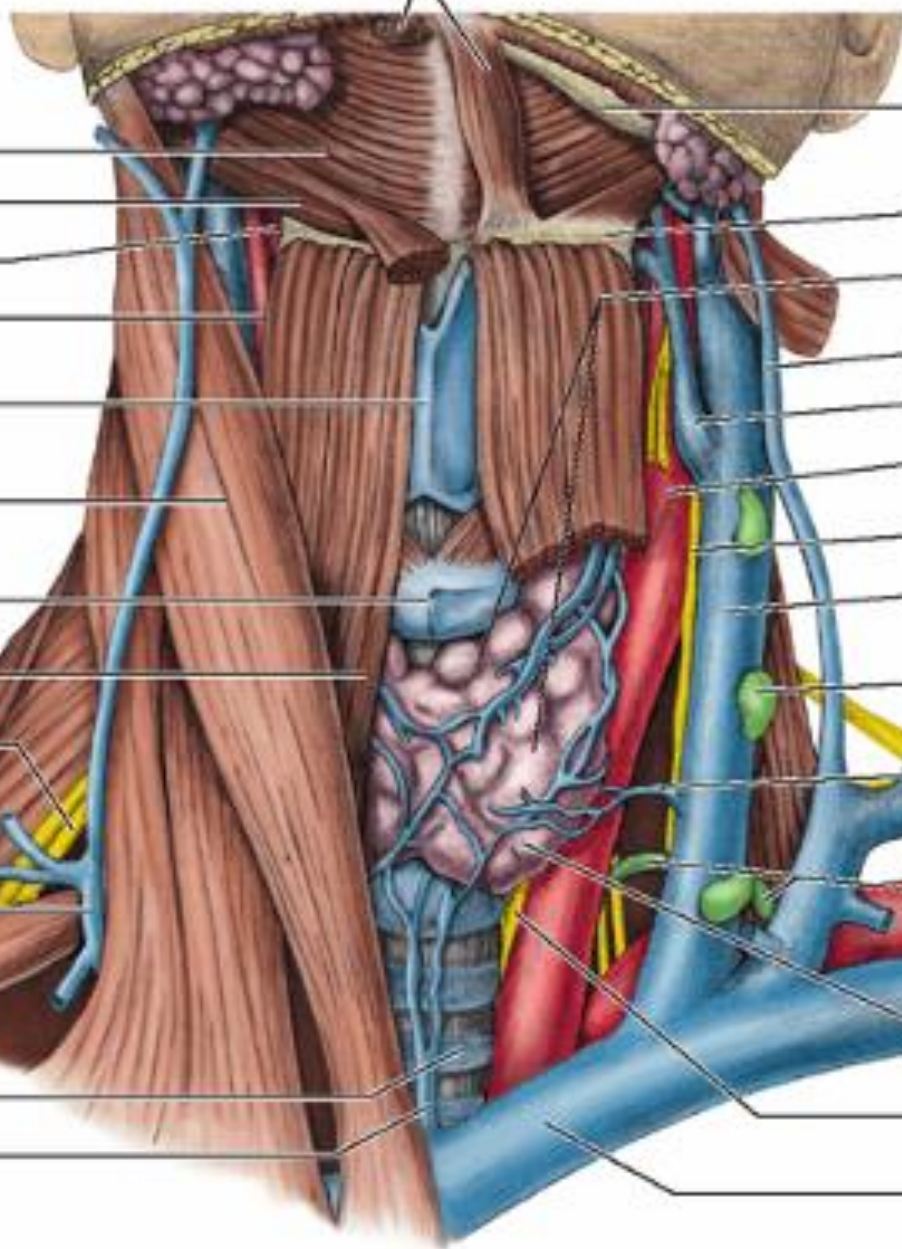
External jugular vein (EJV)

Omothyoid muscle (inferior belly)

Trachea

Inferior thyroid vein

**Anterior view**



Mandible

Hyoid bone

Thyroid gland

External jugular vein

Superior thyroid vein

Common carotid artery

Left vagus nerve

Internal jugular vein (IJV)

Deep cervical lymph node

Middle thyroid vein

Brachial plexus

Thoracic duct

Subclavian vein

Thyroid gland

Recurrent laryngeal nerve

Left brachiocephalic vein

# Skin of the Neck

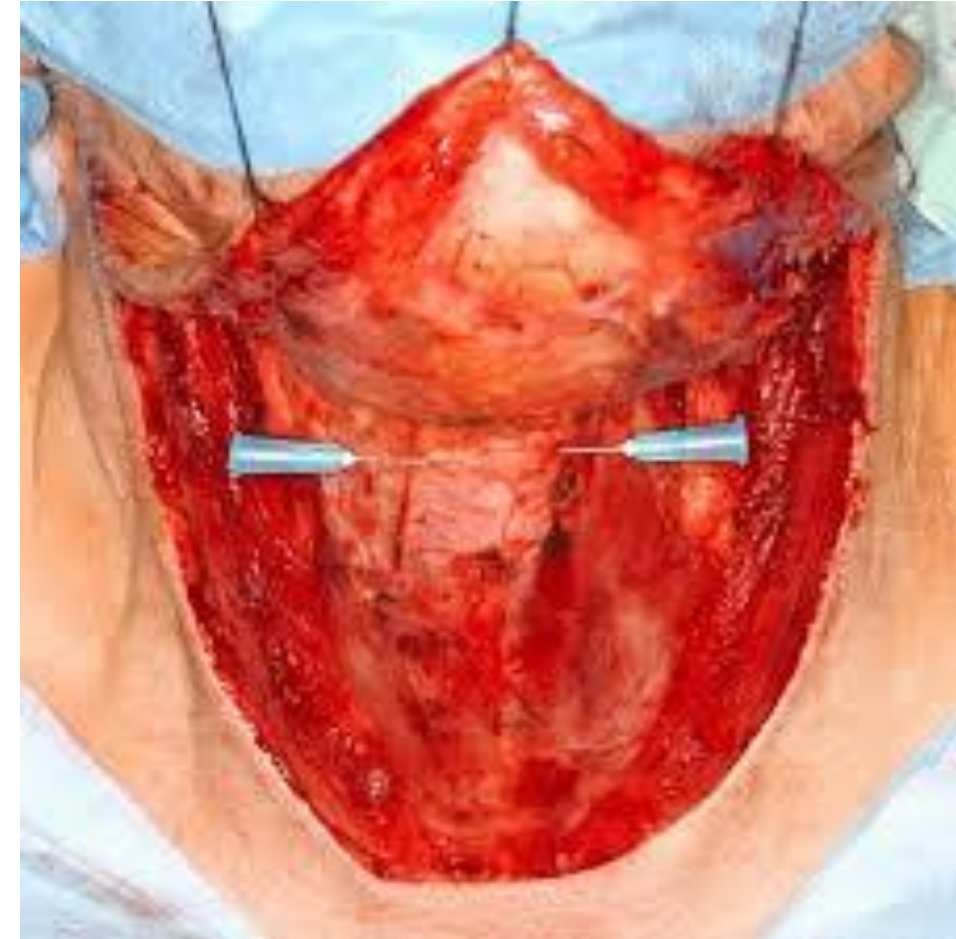
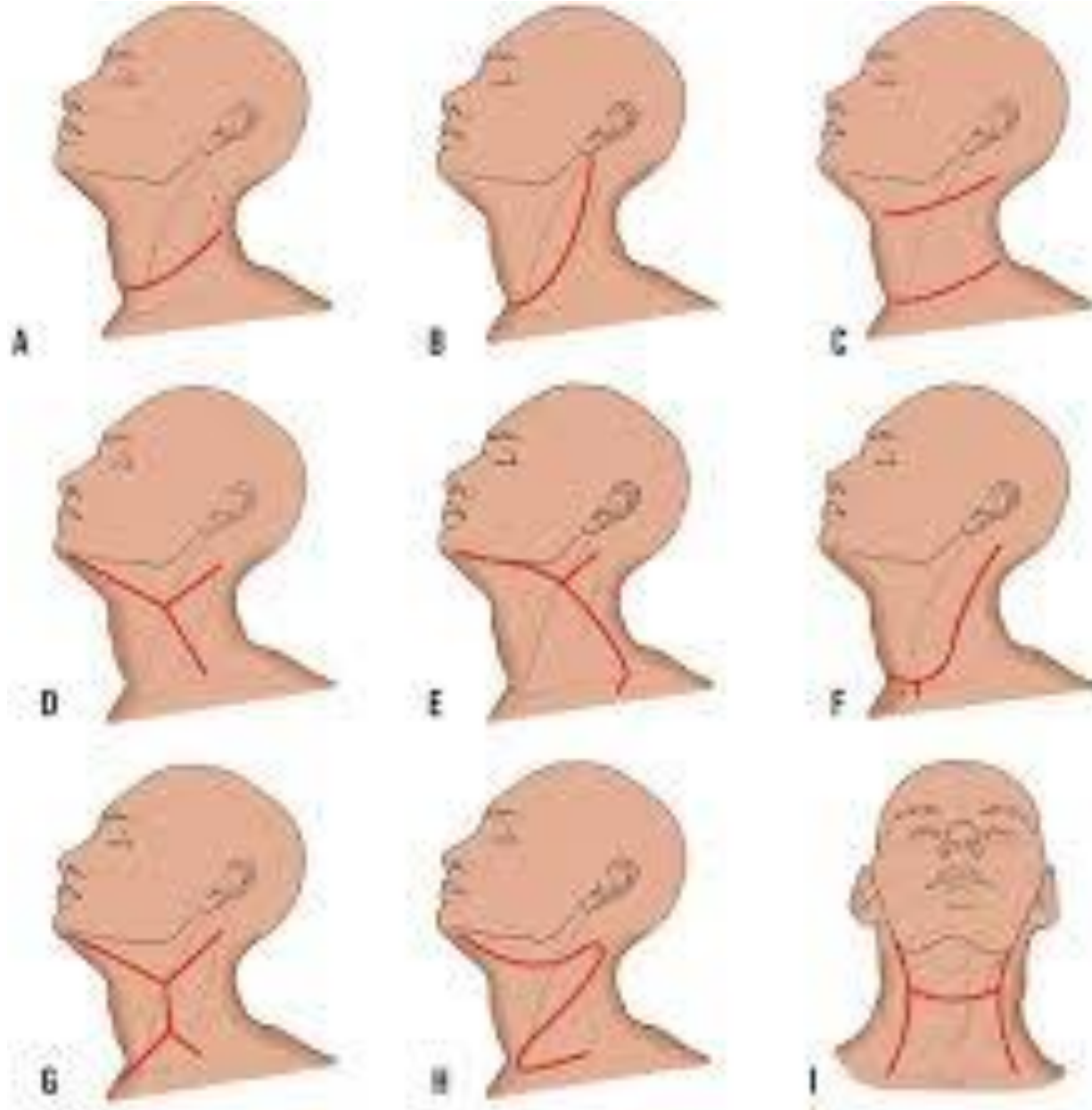
- Normally under tension, with variation in direction of greatest tension.
  - in the living face these lines often coincide with **wrinkle lines**.
  - Lines of greatest tension have been termed '**relaxed skin tension lines**',
  - Surgical incisions are made **along** these lines for minimal postoperative scarring.
  - Susceptible individuals are more prone to **keloid scarring** in the head and neck region.
- Cutaneous vascular supply and lymphatic drainage
  - from the facial, occipital, posterior auricular and subclavian arteries.
  - form a rich network within platysma and in the subdermal plexus,
  - account for the viability of the various skin flaps raised during block dissection of the neck

# Skin Tension Lines





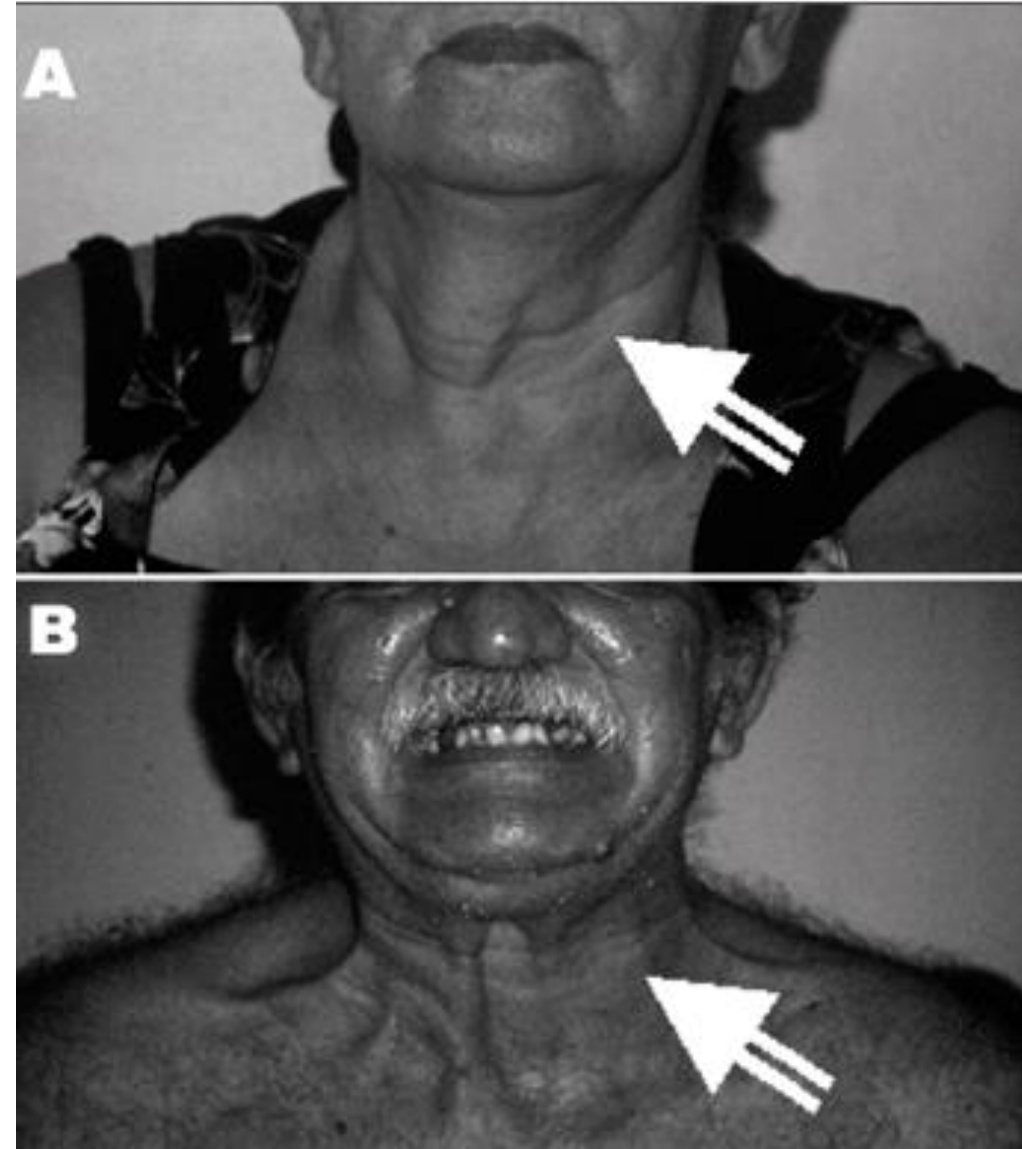
# Surgical Incisions



Gluck-Sorenson U-shape Apron Incision

# Paralysis of the Platysma

- Anatomical basis
  - results from injury to the cervical branch of the facial nerve
  - causes the skin to fall away from the neck in slack folds.
- Prevention
  - preserve the cervical branch of the facial nerve.
  - careful suturing of the skin and edges of the platysma.
- Clinical significance
  - the skin wound is distracted (pulled in different directions) by the contracting platysma muscle fibers,
  - a broad ugly scar may develop.



# Congenital Torticollis

- results from a fibrous tissue tumor (L. fibromatosis colli) of the SCM before or shortly after birth.
- causes the head to tilt toward, and the face to turn away from, the affected side
- Clinical significance
  - the position of the infant's head necessitates a breech delivery.
  - Injury to SCM when an infant's head is pulled too much during a difficult birth, tearing its fibers (**muscular torticollis**)
- Anatomical Basis
  - Formation of a hematoma with entrapment of a branch of the spinal accessory nerve (CN XI) which denervates part of the SCM.
  - The stiffness and twisting of the neck results from fibrosis and shortening of the SCM.
- Solution
  - Surgical release of the SCM from its inferior attachments to the manubrium and clavicle inferior to the level of CN XI



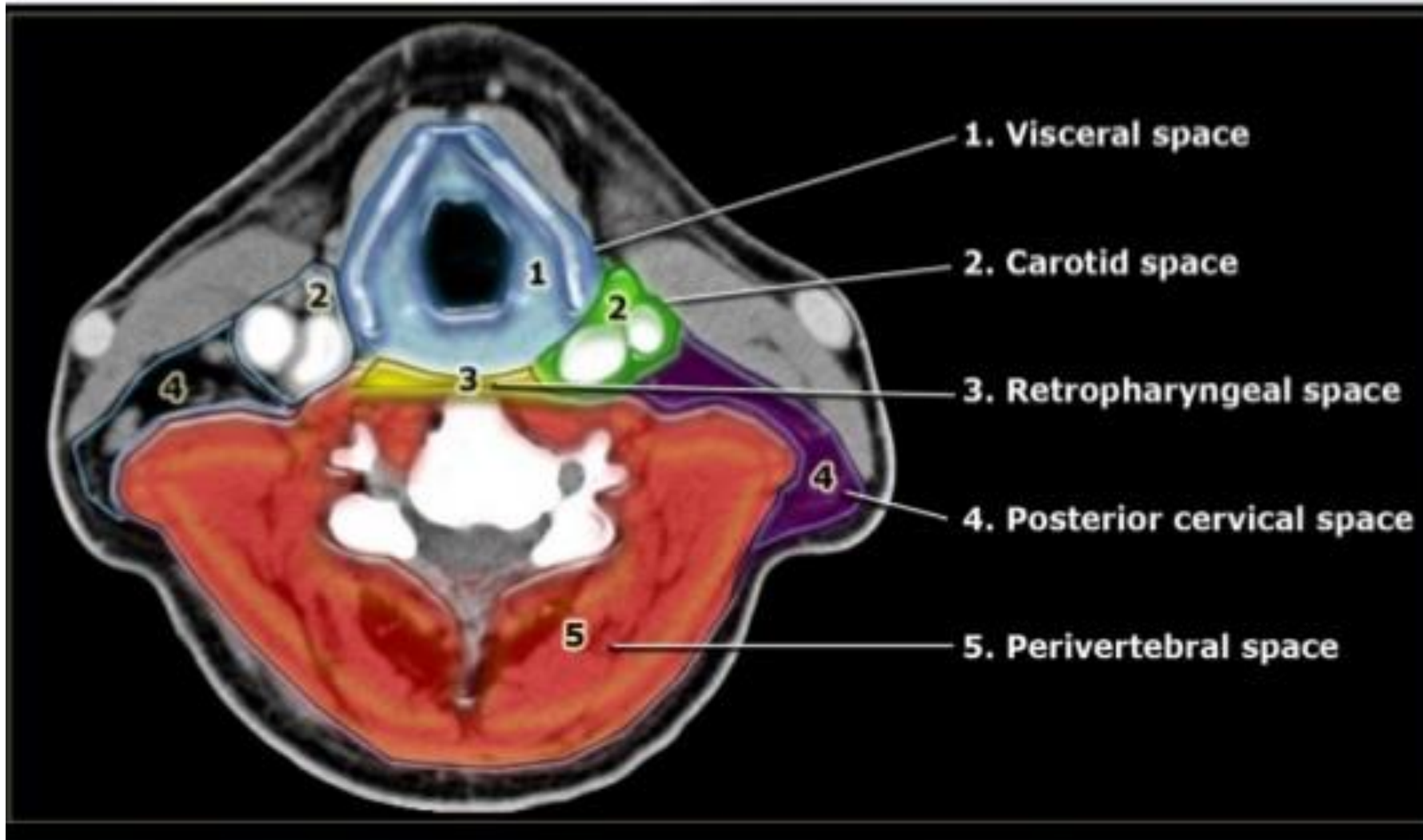
# Spasmodic Torticollis

- Clinical significance
  - cervical dystonia (abnormal tonicity of the cervical muscles) usually begins in adulthood.
- Anatomical basis
  - It may involve any bilateral combination of lateral neck muscles, especially the SCM and trapezius.
- Characteristics
  - sustained turning, tilting, flexing, or extending of the neck
  - Shifting the head laterally or anteriorly can occur involuntarily
  - The shoulder is usually elevated and displaced anteriorly on the side to which the chin turns.

# Torticollis – muscular & spasmodic



# Spaces in the Neck



- Clinical Significance
  - Spread of infections
  - Spread of tumours
  - Mass effects
- Anatomical basis
  - Extents
  - Connections
  - Planes
  - Contents
    - Vessels
    - Nerves
    - viscera

# Suprahyoid Neck Spaces

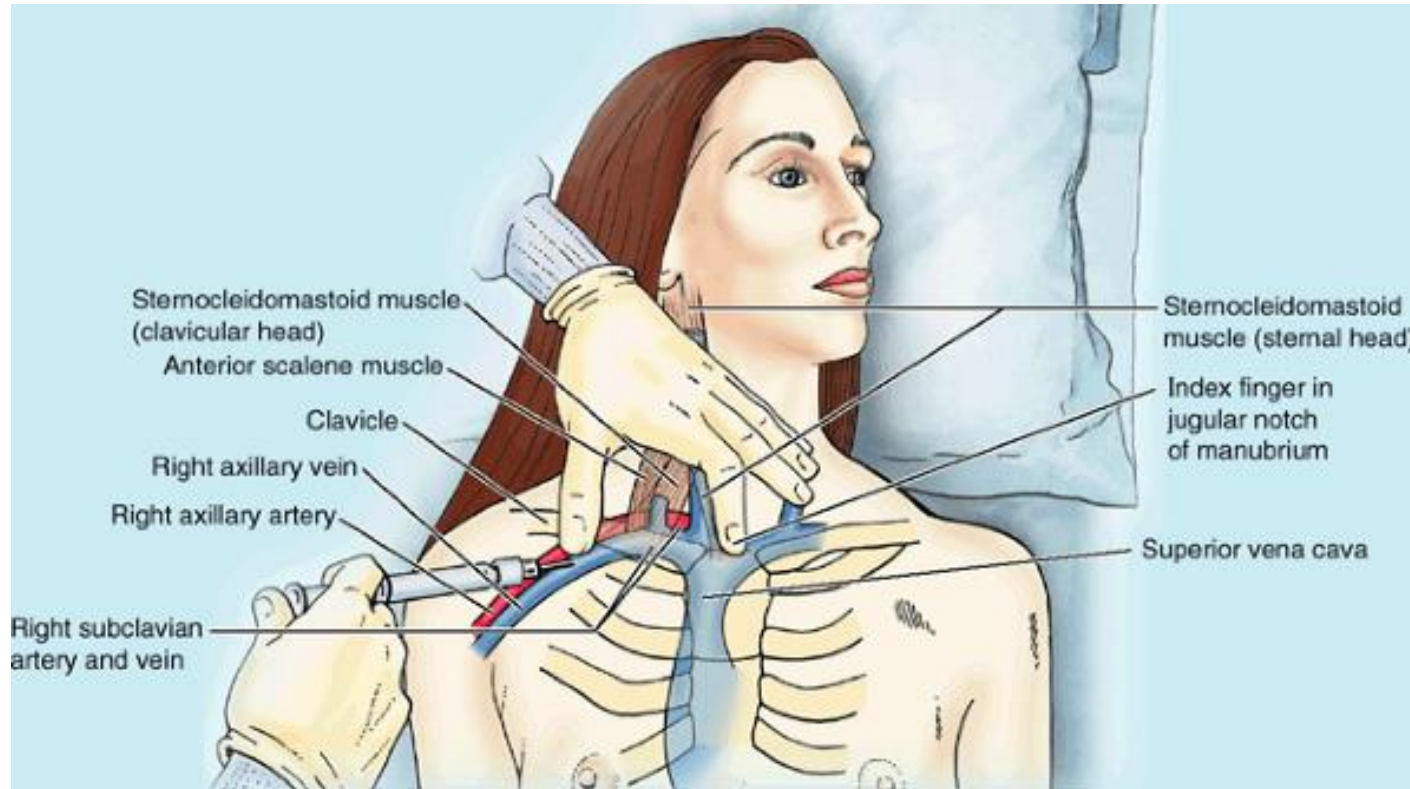
- Pharyngeal Mucosal Space
- Parapharyngeal Space
- Masticator Space
- Parotid Space
- Carotid Space
  - Long space from skull base to arch of aorta
- Retropharyngeal Space
  - Long space from skull base to about T3 level in chest
- Danger Space
  - A potential space composed of fat, extends down to the mediastinum
- Perivertebral Space



# Infrahyoid Neck Spaces

- These spaces continue largely unchanged from above the hyoid:
  - Carotid Space
  - Retropharyngeal Space
  - Danger Space
  - Perivertebral Space
- Two new major spaces
  - Visceral Space
  - Posterior Cervical Space

# Subclavian Vein Puncture - Infraclavicular Approach



- Landmarks
  - middle part of the clavicle
  - jugular notch in the manubrium
  - sternoclavicular joint
- Anatomical basis
  - The needle puncture is inferior to middle of the clavicle and is advanced medially toward the jugular notch until the right venous angle
  - Here the internal jugular and subclavian veins merge to form the brachiocephalic vein.
- Clinical Significance
  - puncture the pleura and lung, resulting in pneumothorax.
  - If inserted too far posteriorly, it may enter the subclavian artery.

# Intravenous access to External Jugular Vein



# Prominence of the External Jugular Vein

- Purpose
  - May serve as an internal barometer.
- Anatomical basis
  - Normal EJV pressure usually visible above the clavicle for only a short distance.
  - venous pressure rises (e.g. in heart failure), prominent vein throughout its course along the side of the neck.
- Clinical Significance
  - Diagnostic signs of heart failure, SVC obstruction, enlarged supraclavicular lymph nodes, increased intrathoracic pressure.





# Severance of the External Jugular Vein

- Surface Anatomy
  - along the posterior border of the SCM where it pierces the roof of the lateral cervical region (e.g., by a knife slash)
- Clinical significance
  - Negative intrathoracic pressure sucks air into the vein resulting in a venous air embolism
- Anatomical basis
  - Lumen is held open by the tough investing layer of deep cervical fascia



# Lesions of the Spinal Accessory Nerve

- Causes

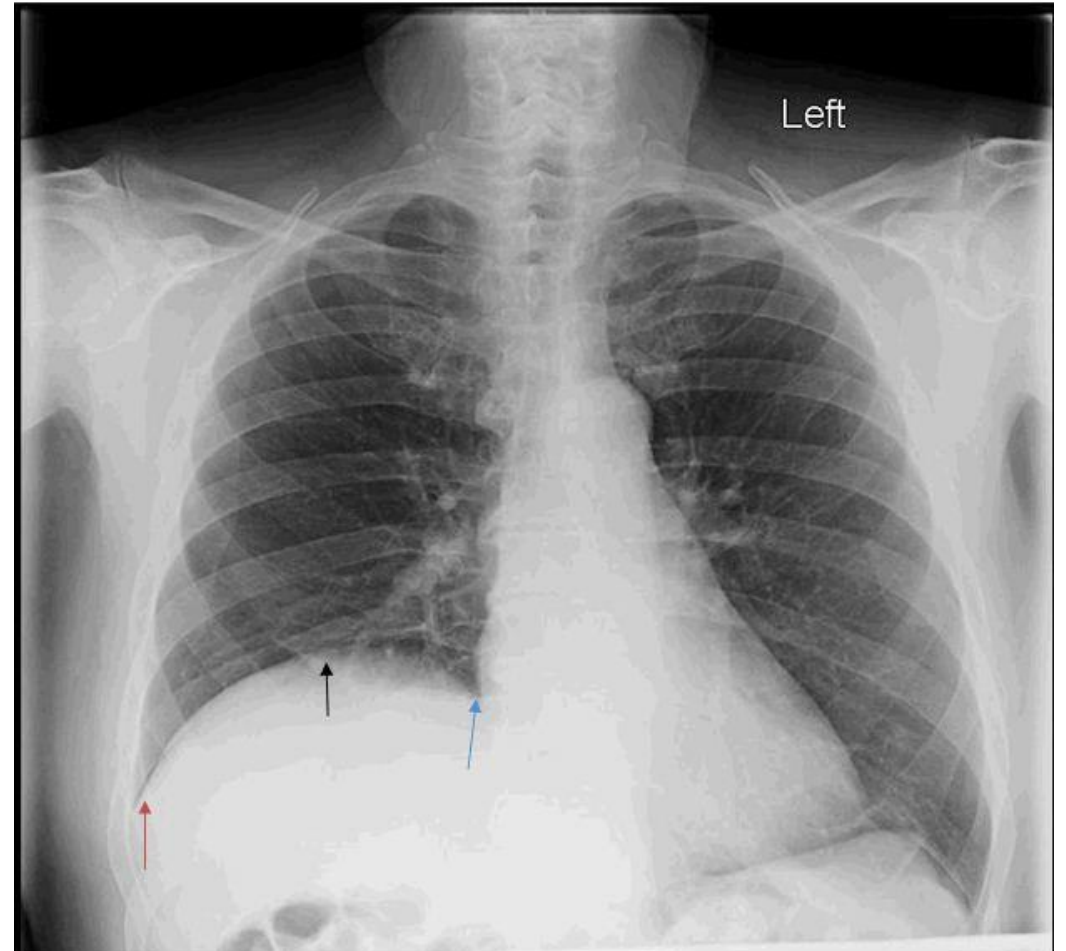
- Penetrating trauma, such as a stab or bullet wound.
- Surgical procedures in the lateral cervical region.
- Tumors at the cranial base
- cancerous cervical lymph nodes.
- Fractures of the jugular foramen where CN XI leaves the cranium.

- Clinical picture

- a unilateral lesion usually does not produce an abnormal position of the head.
- weakness in turning the head to the opposite side against resistance.
- weakness and atrophy of the trapezius, impairing neck movements.
- inability to elevate and retract the shoulder
- difficulty in elevating the upper limb superior to the horizontal level.
- Reduced normal prominence in the neck produced by the trapezius
- Drooping of the shoulder

# Phrenic Nerve Injury

- Results in paralysis of the corresponding half of the diaphragm
- A **phrenic nerve block** produces a short period of paralysis of the diaphragm on one side (e.g., for a lung operation).
- A **surgical phrenic nerve crush** (e.g., compressing the nerve injuriously with forceps) produces a longer period of paralysis (sometimes for weeks after surgical repair of a diaphragmatic hernia).
  - accessory phrenic nerve must also be crushed



# Nerve Blocks in the Lateral Cervical Region

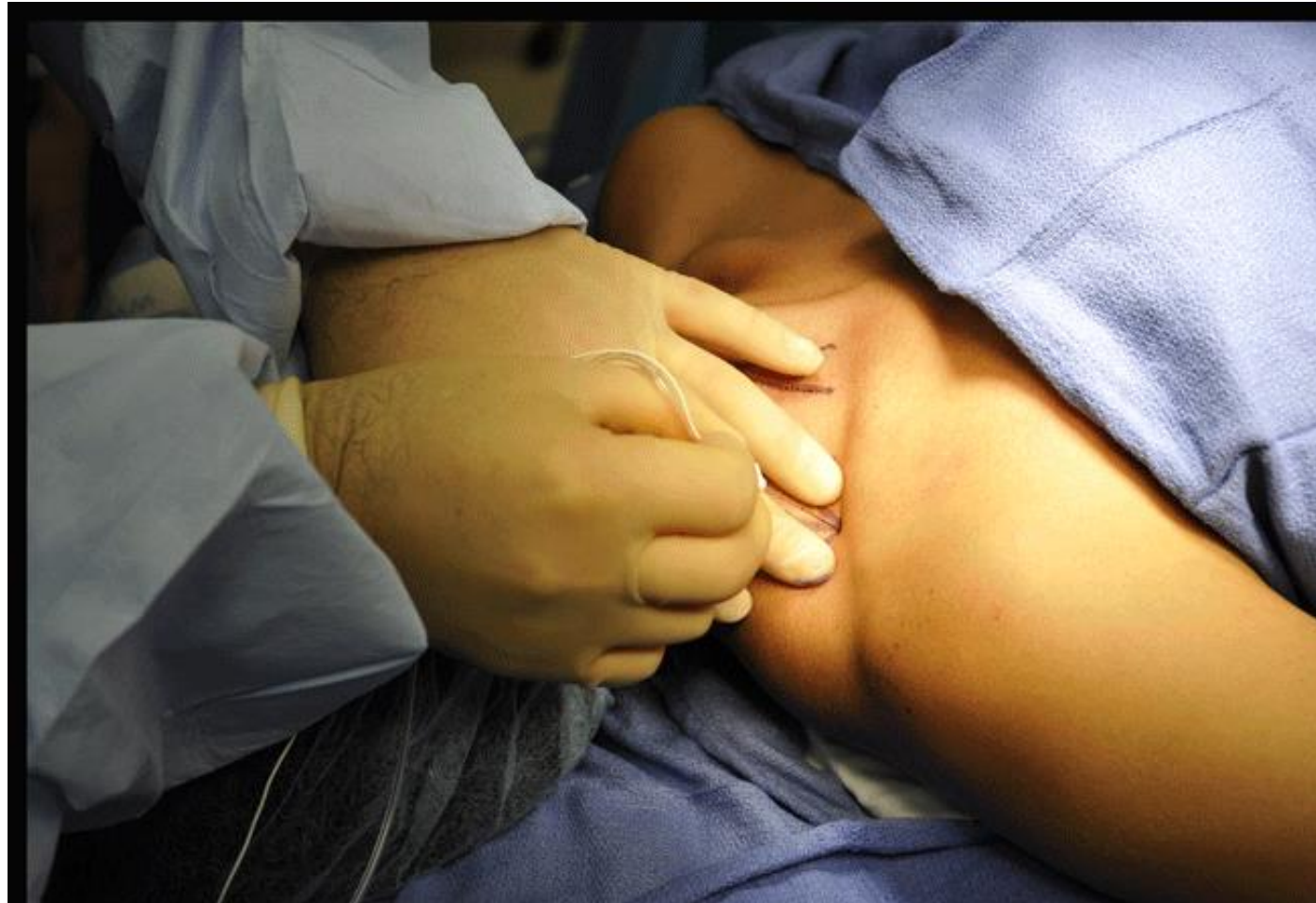


- Regional anesthesia - cervical plexus block
  - injected at several points along the posterior border of the SCM, mainly **the nerve point** of the neck
- Anesthesia of the upper limb – a supraclavicular brachial plexus block
  - injected around the supraclavicular part of the brachial plexus, superior to the midpoint of the clavicle.

Why is this procedure NOT performed on persons with pulmonary or cardiac disease?

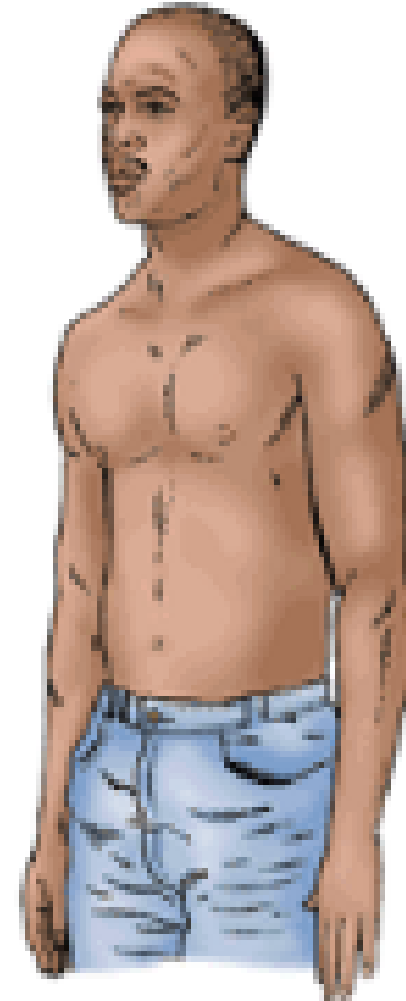


# Supraclavicular Nerve Block



# Injury to the Suprascapular Nerve

- Anatomical basis
  - fractures of the middle third of the clavicle.
  - loss of lateral rotation of the humerus at the glenohumeral joint.
- Clinical picture
  - the relaxed limb rotates medially into the *waiter's tip position*
  - The ability to initiate abduction of the limb is also affected.



# Ligation of the External Carotid Artery

- Purpose
  - to control bleeding from one of its relatively inaccessible branches.
- Clinical significance
  - decreases blood flow through the artery and its branches but does not eliminate it.
- Anatomical basis
  - Blood flows in a **retrograde** direction from the other side through communications between its branches and across the midline.
  - the descending branch of the occipital artery provides the main **collateral circulation**
    - anastomosing with the vertebral and deep cervical arteries.



# Surgical Dissection of the Carotid Triangle

- Purpose
  - surgical approach to the carotid system of arteries.
- Anatomical basis
  - provides access to the IJV, the vagus and hypoglossal nerves, and the cervical sympathetic trunk.
- Clinical significance
  - Damage or compression of the vagus and/or recurrent laryngeal nerves may produce an alteration in the voice because these nerves supply laryngeal muscles.

# Carotid Pulse

- Surface anatomy
  - in a groove between the trachea and the infrahyoid muscles.
  - Usually easily palpated just deep to the anterior border of the SCM at the level of the superior border of the thyroid cartilage.
  - Is routinely checked during cardiopulmonary resuscitation (CPR).
- Clinical Significance
  - Absence of a carotid pulse indicates cardiac arrest.





# Carotid Sinus Hypersensitivity

- Is exceptional responsiveness of the carotid sinuses in various types of vascular disease
- external pressure on the carotid artery may cause
  - slowing of the heart rate,
  - a fall in blood pressure,
  - cardiac ischemia
  - fainting (syncope) from sudden and critical decrease in cerebral perfusion
- Clinical Significance
  - Checking carotid pulse is not recommended for people with cardiac or vascular disease.
  - Alternate sites, such as the radial artery at the wrist, should be used

# Internal Jugular Pulse

- Surface Anatomy
  - pulsations are transmitted through the surrounding tissue and may be observed beneath the SCM superior to the medial end of the clavicle.
- Anatomical basis
  - Because there are no valves in the brachiocephalic vein or the superior vena cava, a wave of contraction passes up these vessels to the inferior bulb of the IJV.
  - The pulsations are especially visible when the person's head is inferior to the lower limbs (the Trendelenburg position).
- Clinical Significance
  - The internal jugular pulse increases considerably in tricuspid valve disease because of increase in pressure in the pulmonary circulation and the right side of the heart.
  - Use the right IJV because it runs a straighter, more direct course to the right atrium than does the left

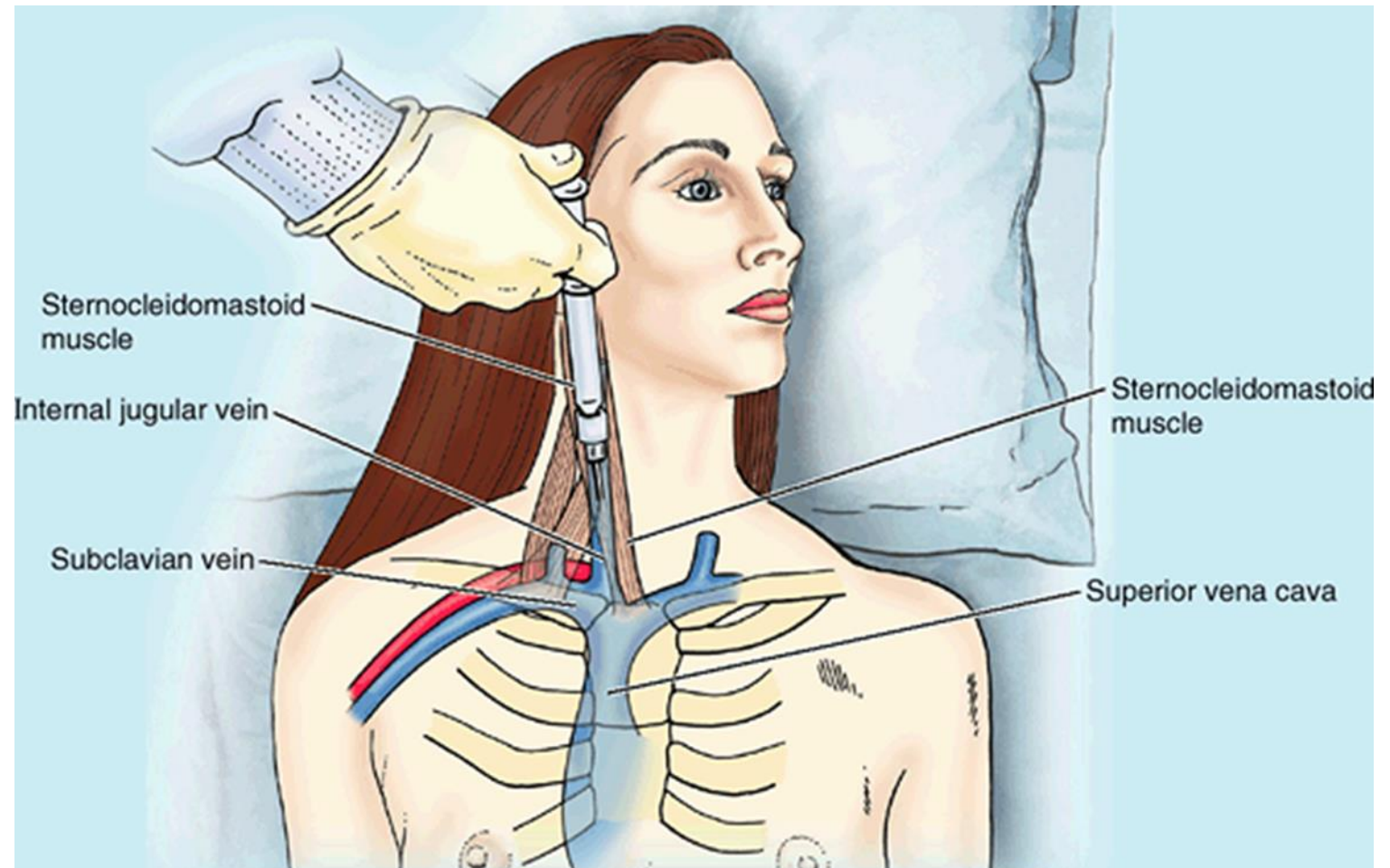
# Internal Jugular Vein Puncture

- Surface Anatomy

- palpate the common carotid artery and insert the needle into the IJV just lateral to it at a 30° angle
- aim at the apex of the triangle between the sternal and the clavicular heads of the SCM (**lesser supraclavicular fossa**)
- directed inferolaterally

- Clinical Significance

- Catheterization for central lines



# Lesion of the Cervical Sympathetic Trunk

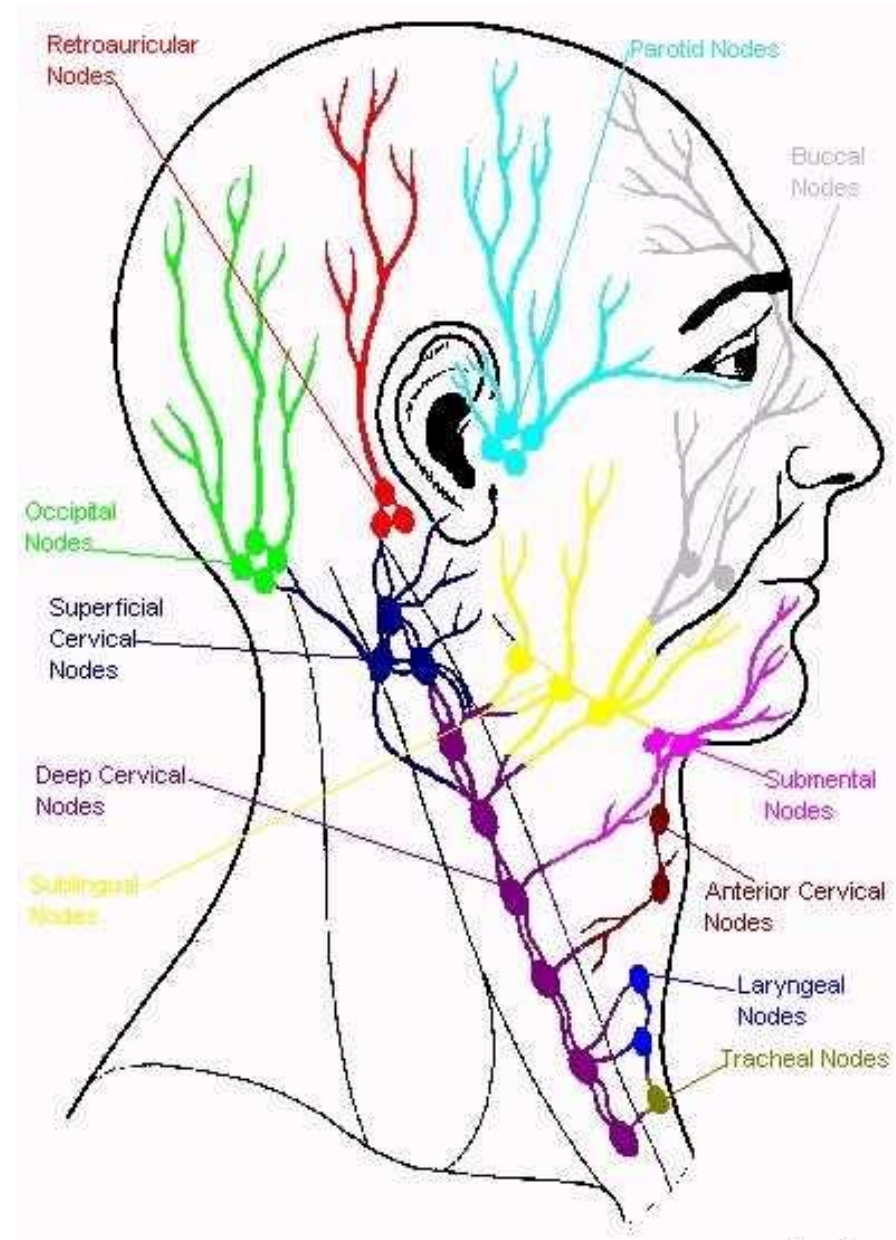
## Symptom

## Anatomical basis

Contraction of the pupil (miosis)	resulting from paralysis of the dilator pupillae muscle
Drooping of the superior eyelid (ptosis)	resulting from paralysis of the smooth (tarsal) muscle intermingled with the striated muscle of the levator palpebrae superioris.
Sinking in of the eye (enophthalmos)	possibly caused by paralysis of the smooth (orbitalis) muscle in the floor of the orbit.
Vasodilation and absence of sweating on the face and neck (anhidrosis)	caused by lack of a sympathetic (vasoconstrictive) nerve supply to the blood vessels and sweat glands.



# Lymphatics of the Neck





# Cystic Lesions in the Neck



Cystic Hygroma



Branchial cyst



Thyroglossal duct cyst



Multiple cysts



Branchial fistula



Subepidermal lipoma

# Solid Masses in the Neck



Thyroid Nodule



Submandibular sialadenitis



Goiter

# Ectopic Thyroid Gland

- Anatomical basis
  - Failure to descend from the embryonic origin in the tongue,
- Result
  - Lingual thyroid gland
  - High location in the neck at or just inferior to the hyoid.
- Clinical significance
  - If in the median plane of the neck it is the only thyroid tissue present.
  - May be associated with a thyroglossal duct cyst





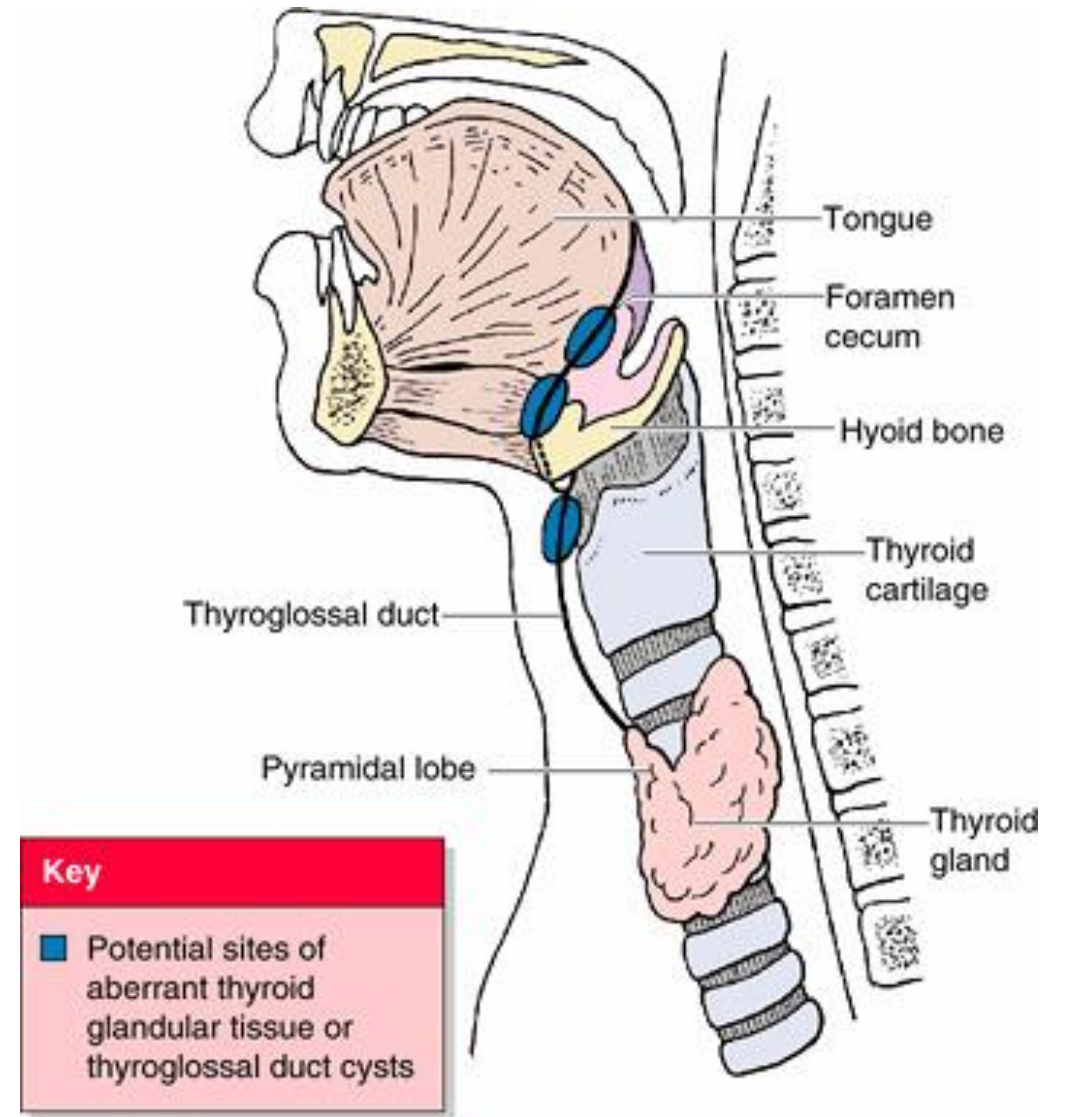
# Cervical Pain

- Inflamed lymph nodes
- Muscle strain
- Protruding intervertebral discs
- Enlarged cervical lymph nodes may indicate a malignant tumor in the head
- Most chronic cervical pain is caused by bony abnormalities (e.g., cervical osteoarthritis)
- By trauma



# Accessory Thyroid Glandular Tissue

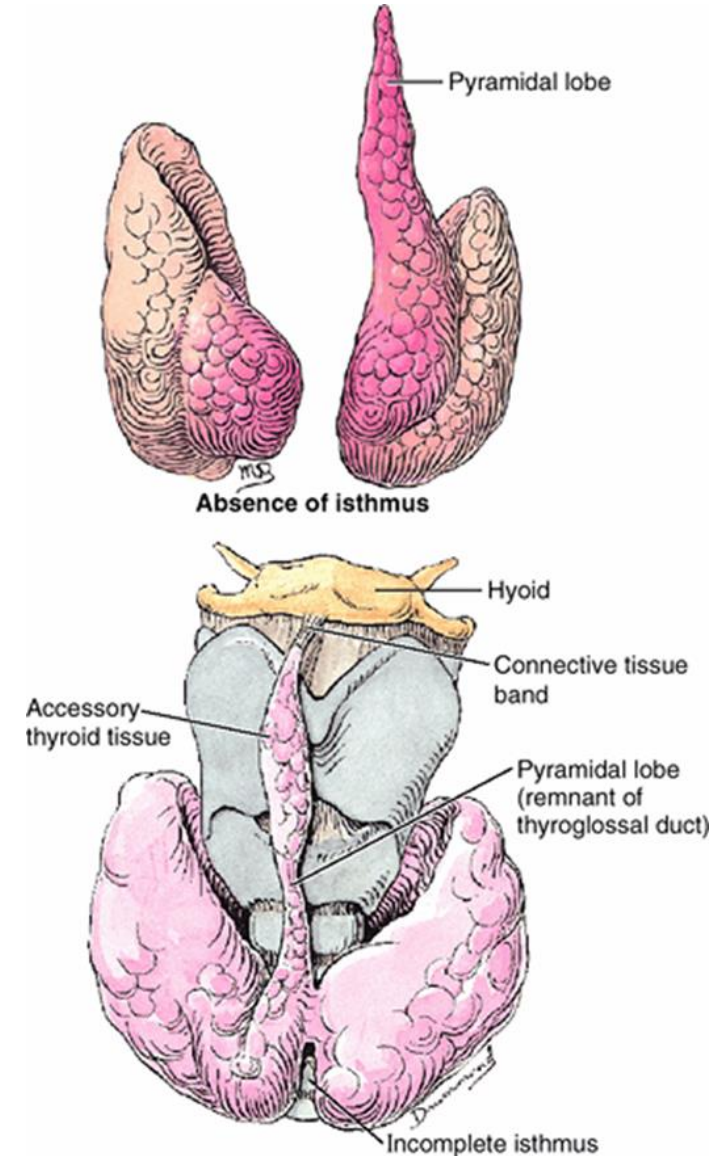
- Anatomical basis
  - portions of the thyroglossal duct persist to form thyroid tissue.
- Sites
  - anywhere along the embryonic course of the thyroglossal duct
- Clinical significance
  - may be functional but is often of insufficient size to maintain normal function if the thyroid gland is removed.





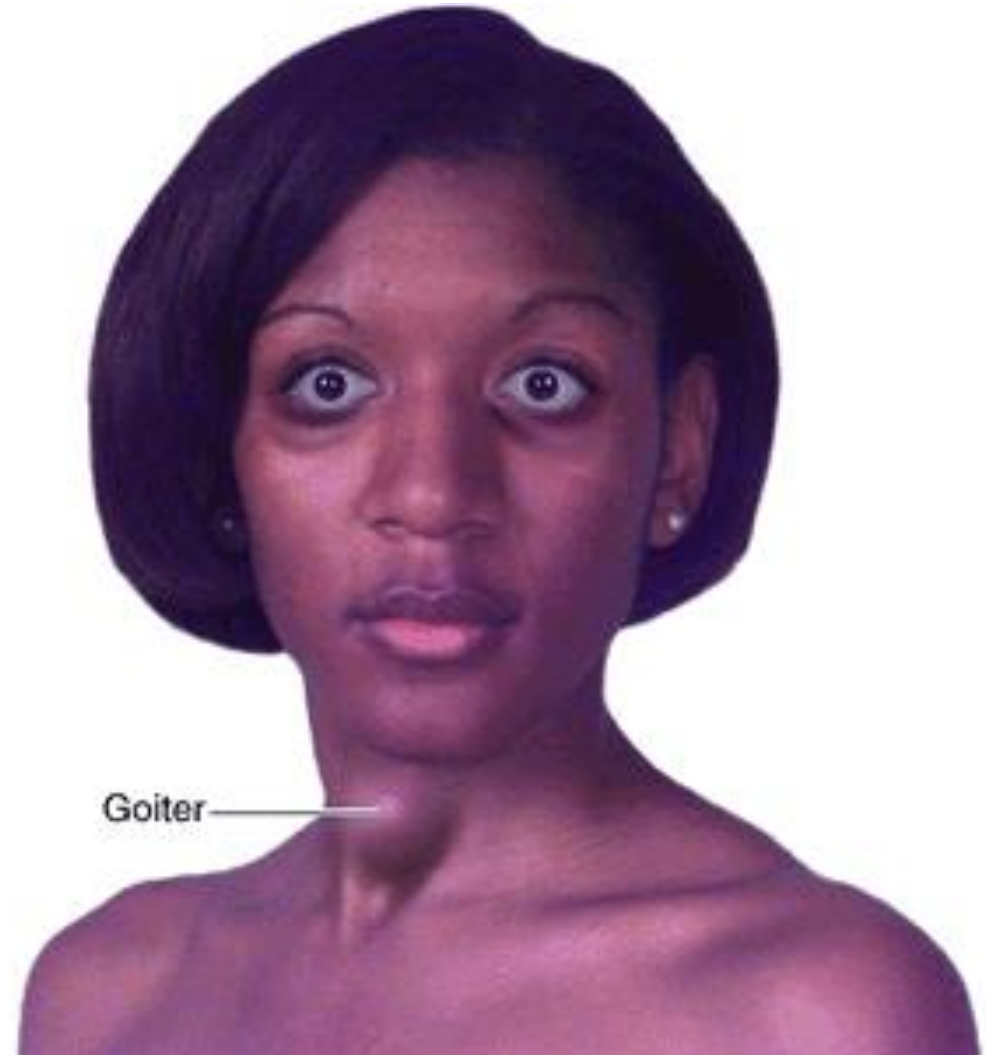
# Pyramidal Lobe of the Thyroid Gland

- Anatomical basis
  - remnants of the epithelium and connective tissue of the thyroglossal duct.
- Clinical significance
  - In approximately 50%
  - The isthmus may be incomplete
  - May have a band of connective tissue containing accessory thyroid tissue continue from the apex of the pyramidal lobe to the hyoid.



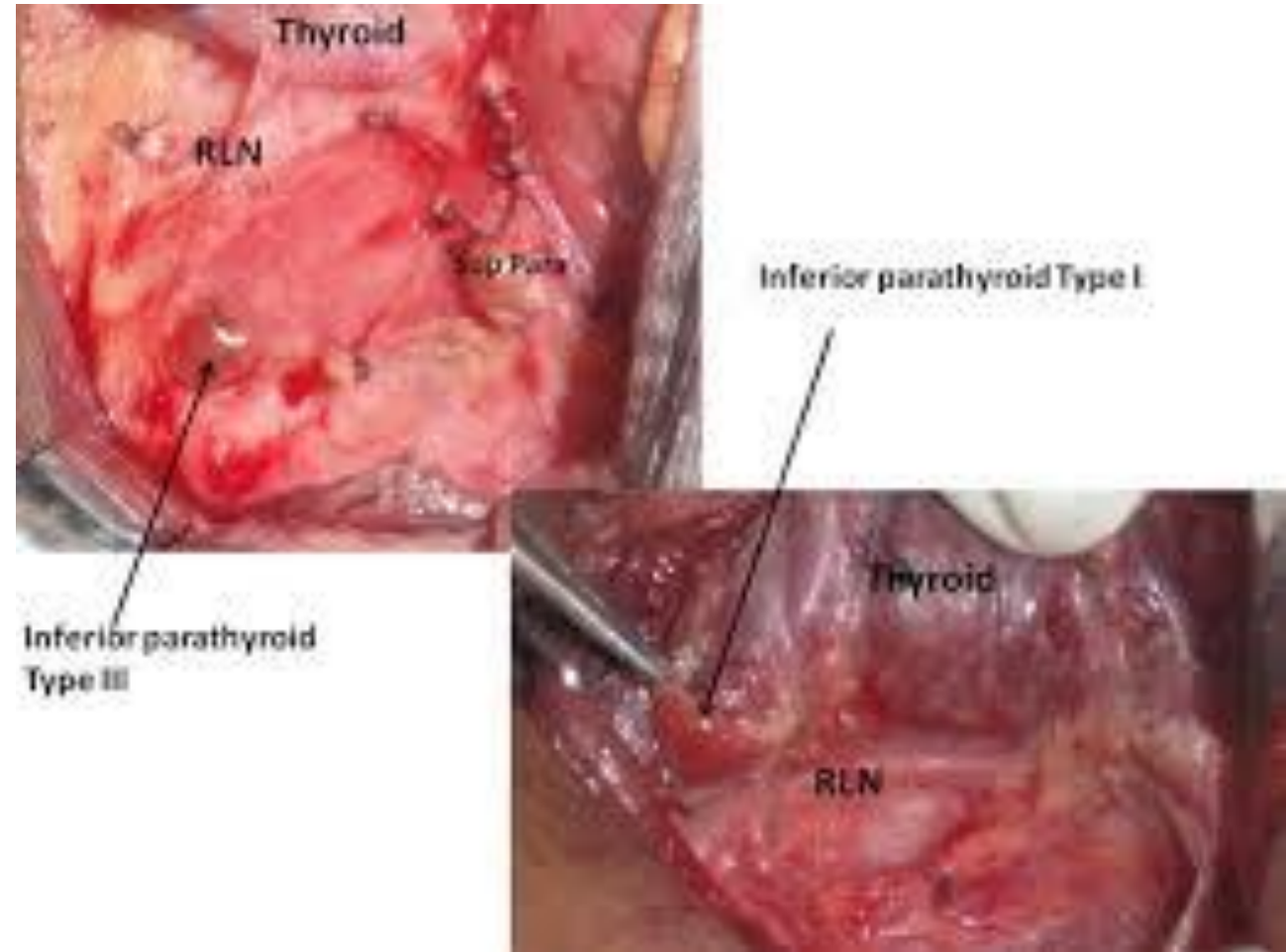
# Enlargement of the Thyroid Gland

- Clinical significance
  - swelling in the neck
  - compress the trachea, esophagus, and recurrent laryngeal nerves
- Anatomical basis
  - Enlargement is anteriorly, posteriorly, inferiorly, or laterally.
  - Substernal extension of a goiter is also common.

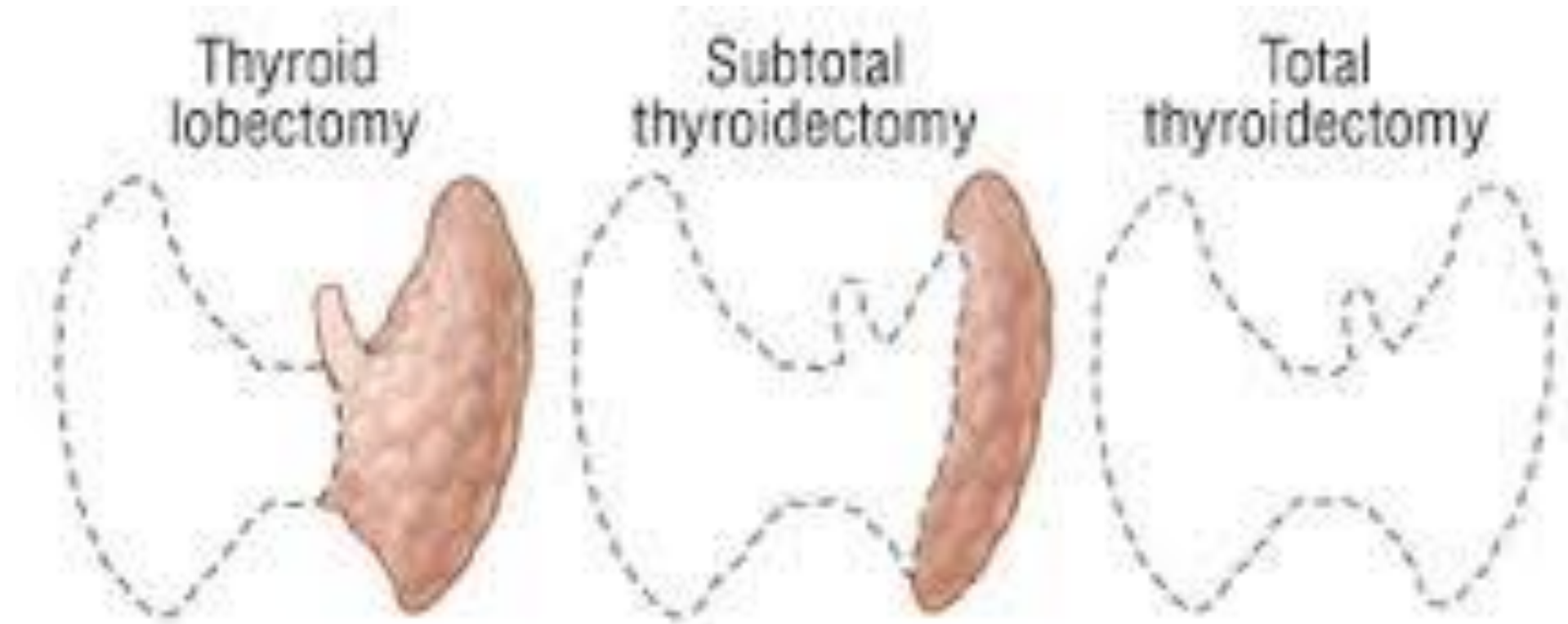


# Inadvertent Removal of the Parathyroid Glands

- Anatomical basis
  - variable position puts them in danger of being damaged or removed during surgical procedures in the neck
- Clinical significance
  - results in tetany, a severe neurologic syndrome characterized by muscle twitches and cramps.
  - decreased serum calcium levels.
  - laryngeal and respiratory muscles are involved, failure to respond immediately with appropriate therapy can result in death.
- Solution
  - Preserve the posterior part of the lobes of the thyroid gland
  - Carefully isolate them with their blood vessels intact before removal of the thyroid gland.
  - may also be transplanted



# Thyroidectomy





# Injury to the Recurrent Laryngeal Nerves

- Anatomic position
  - Near the inferior pole of the thyroid gland
- Anatomic basis
  - the right recurrent laryngeal nerve is intimately related to the inferior thyroid artery and its branches
  - may cross anterior or posterior to branches of the artery, or it may pass between them.
- Surgical significance
  - Because of this close relationship, the inferior thyroid artery is ligated some distance lateral to the thyroid gland, where it is not close to the nerve.
- Clinical significance
  - Hoarseness is the usual sign of unilateral recurrent nerve injury
  - temporary aphonia or disturbance of phonation (voice production)
  - laryngeal spasm may occur





# Fracture of the Hyoid

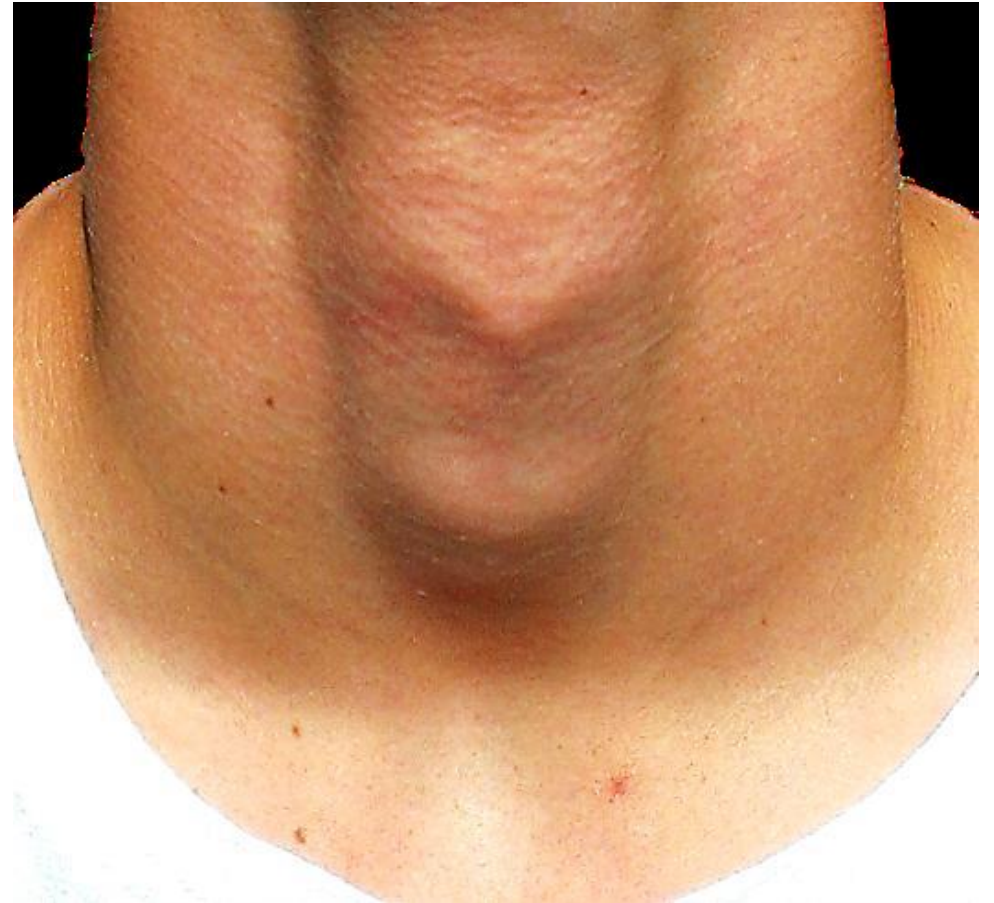
- Cause
  - manual strangulation by compression of the throat
- Result
  - Depression of the body of the bone onto the thyroid cartilage.
- Clinical significance
  - Difficulty swallowing because of inability to elevate the hyoid and move it anteriorly beneath the tongue
  - maintenance of the separation of the alimentary and respiratory tracts difficult
  - ? aspiration pneumonia.



# Cricothyroidotomy

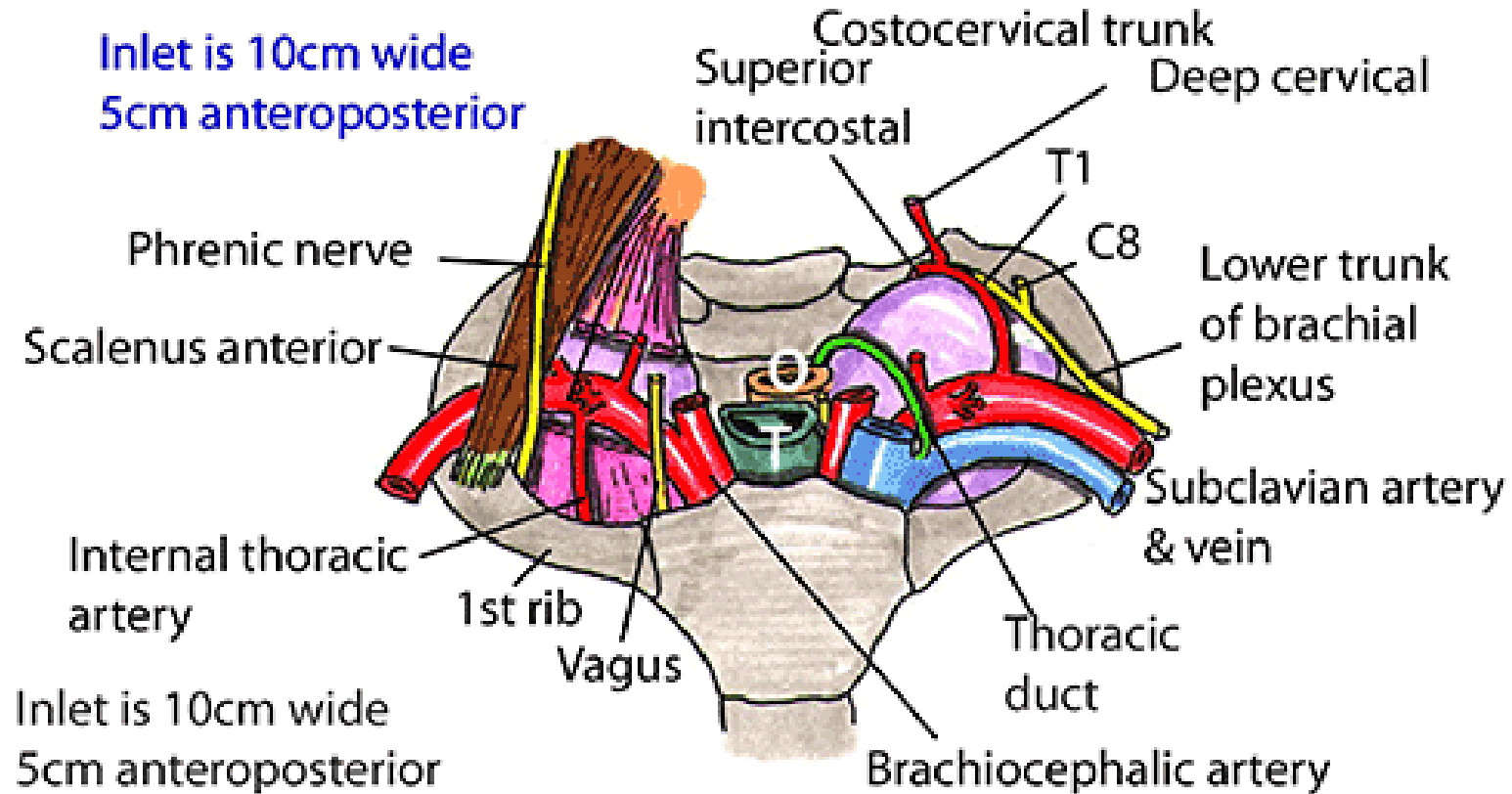
- Clinical significance
  - to obtain an airway when other more routine methods are ineffective or contraindicated
- Anatomical basis
  - Cricothyroid membrane is easily penetrable from the skin
- Surgical options
  - Open
  - needle

Surface Anatomy



Post-Cricothyroidotomy Complications	Anatomical Cause
Thyrohyoid membrane incision	Failure to identify correct membrane
Intraoperative/postoperative bleeding	Nipping of the thyroid isthmus.
Subglottic stenosis	Pressure effect of long-term use (>72 hours) of tube
Dysphonia/hoarseness	Cord and/or tracheal cartilage damage
Laryngeal damage	Pressure effects of an oversized tube and excessive traction on the thyroid cartilage during insertion.
Tube misplaced in bronchus	Insertion of too much of tube length so as to enter the right main bronchus.
Pulmonary aspiration	Lack of upper airway by suction and positioning.
Tracheal stenosis	Pressure effect of high pressure balloon cuff
Recurrent laryngeal nerve injury	Stay in midline and avoid the posterior subglottic wall
Oesophageal perforation or tracheo-oesophageal fistula	incision or insertion of the needle deeply after entering the subglottic space.
Tracheo-left brachiocephalic vein fistula	Use of high-pressure cuff.
Fracture of thyroid cartilage	An oversized tube

# Thoracic Inlet/outlet Syndrome



Dome of pleura is covered by suprapleural membrane (Sibson's fascia).  
Held up by scalenus minimis (pleuralis) from transverse process of C7  
Extends 4cm above middle of medial third of clavicle and first rib, BUT  
NOT above neck of first rib

**Be Blessed!**

Be Blessed!