

**Poltava State Medical University
Department Otorhinolaryngology**

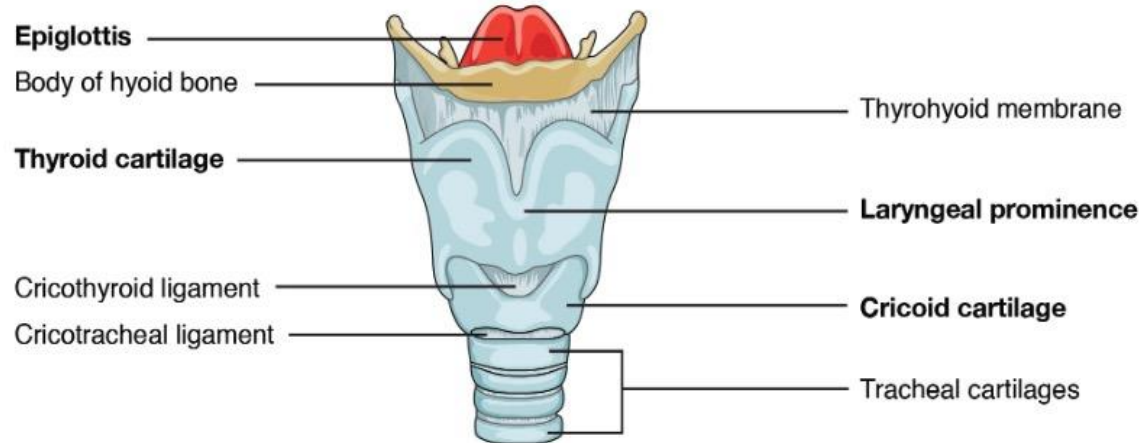
**Acute and Chronic
Diseases of Larynx
Laryngeal Edema and Stenosis**

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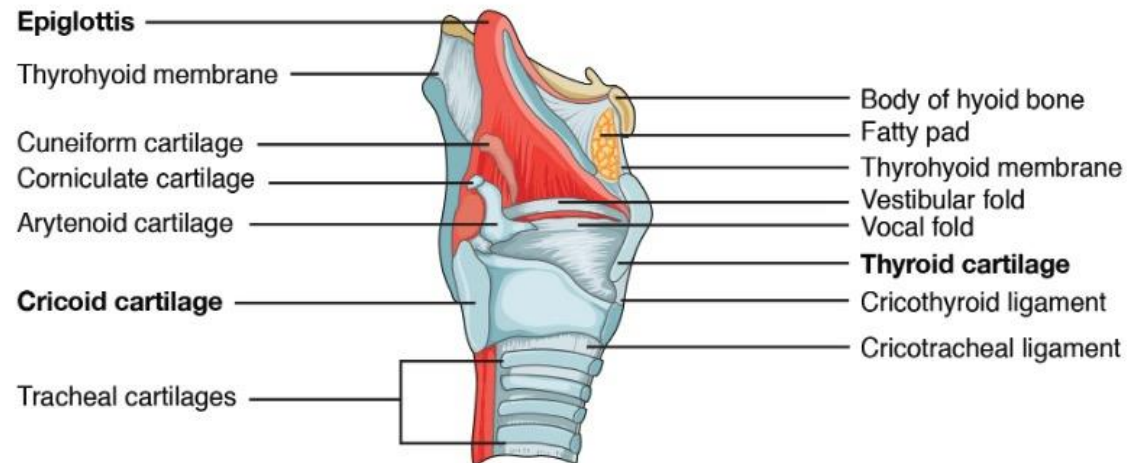
Larynx (Voice Box)

- cylindrical space located in the neck at the level of the C3–C6 vertebrae
- made up of 9 cartilages that are connected by membranes, ligaments, and muscles and that house the vocal cords
- has three main functions:
 - breathing
 - creating vocal sounds (phonation)
 - preventing food and other particles from getting into lower respiratory system

Anatomy of the Larynx



Anterior view



Right lateral view

Movements of the Larynx

Respiration

In quiet respiration:

- Arytenoid cartilages are abducted
- Laryngeal inlet is open
- Rima glottidis is open and triangle-shaped

In forced inspiration:

- Arytenoid cartilages are rotated laterally
- Vocal folds are abducted
- Rima glottidis is open wider

Phonation

- Arytenoid cartilages and vocal folds are adducted
- Air is forced through rima glottidis

Effort closure

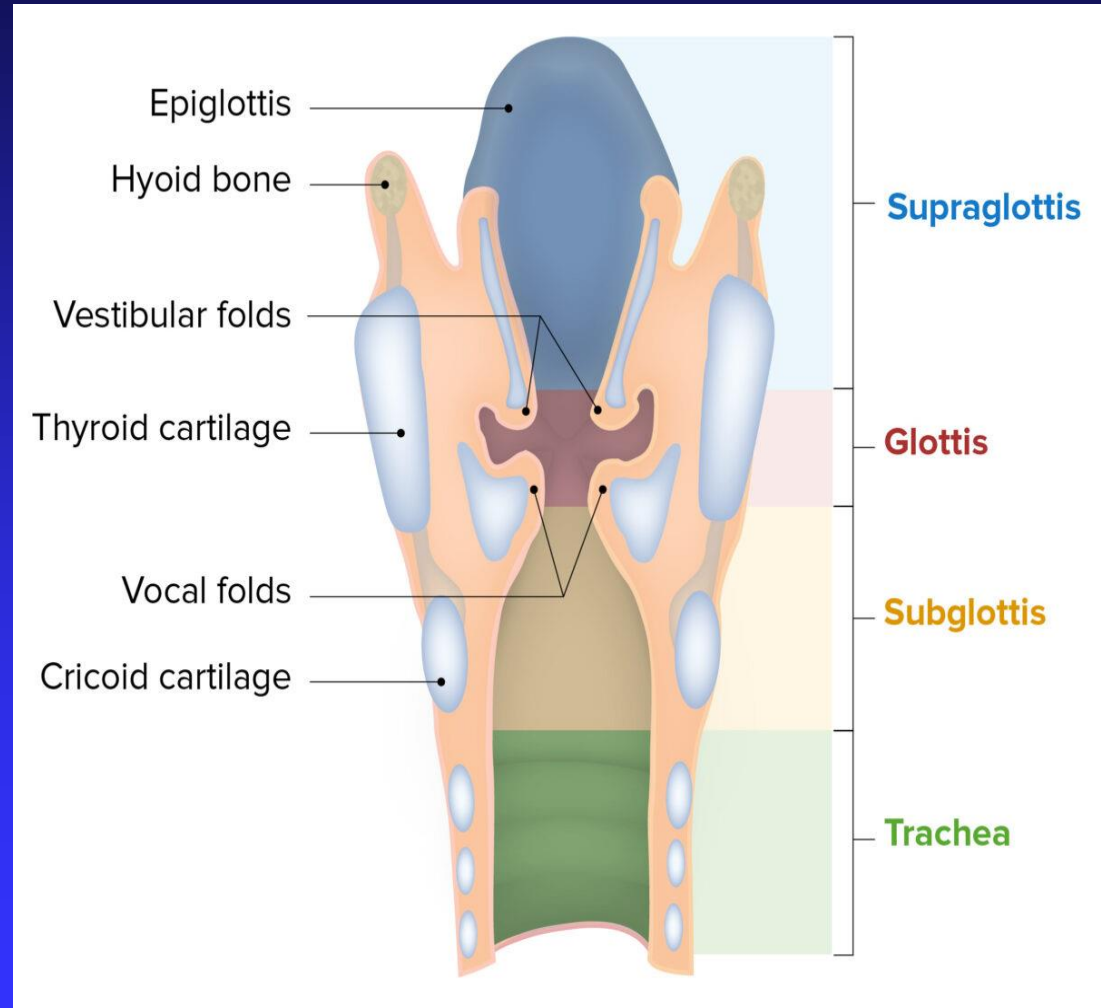
Rima glottidis is completely closed

Swallowing

- Laryngeal inlet is narrowed
- Rima glottidis is closed
- Larynx moves up and forward
- Epiglottis swings downward

Subdivisions of the Larynx

- **Supraglottis** (vestibule): extends from the entrance of the larynx to the vestibular folds
- **Glottis**: extends from the vestibular folds to the vocal folds
- **Subglottis**: extends from the vocal folds to the lower margin of the cricoid cartilage



Acute Laryngitis

catarrhal inflammation
of mucosa, submucosa
and internal muscles
of larynx



Acute Laryngitis

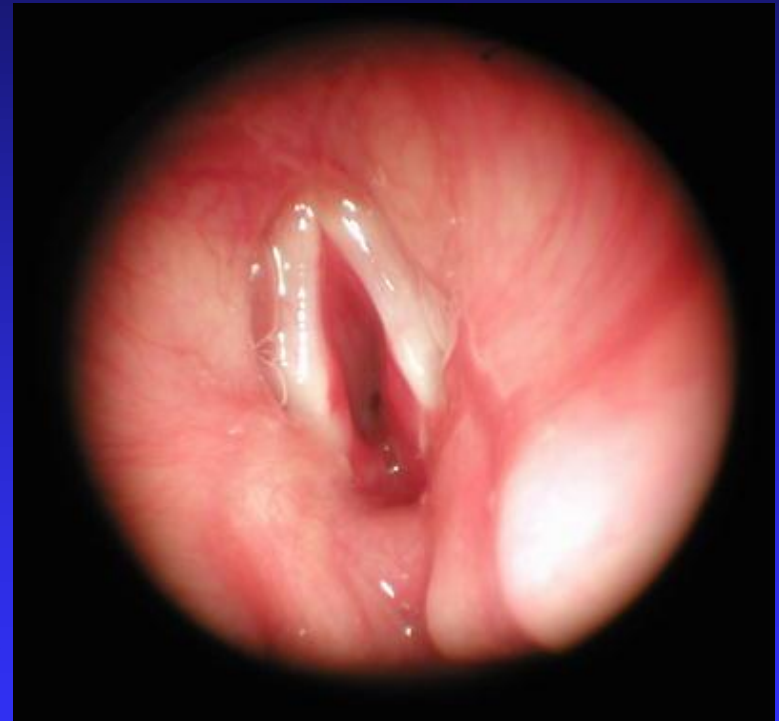
- etiology respiratory viruses, bacterial (coccal) flora
- provoke`s factors:
 - thermal factor
 - alcohol, smoking
 - overload of voice
 - dust, gases etc

Symptoms of Acute Laryngitis

- good common state of patient or small indisposition
- temperature normal or a little rises
- feeling of dryness, burning, tickling, foreign body in larynx
- cough is dry, then moist
- hoarseness (dysphonia)

Acute Laryngotracheobronchitis (Croup)

- primarily pediatric viral infection (parainfluenza virus, respiratory syncytial virus, rhinovirus, enterovirus, influenza, adenovirus)
- affects subglottic, trachea, bronchi
- "barky" or a seal-like, croupy nonproductive cough worsens at night cough, hoarse voice and high pitched inspiratory stridor (can cause stenosis)



Treatment of Acute Laryngotracheobronchitis

- directed at reducing the edema, thinning the secretions and in severe case - establishing an airway
- intensive humidification and hydration help thin the secretions and soften the crusts
- if symptoms increase - aerosolized epinephrine and high-dose corticosteroids are used
- if airway obstruction develops - intubations or tracheostomy is required to secure the airway
- antibiotics are indicated for secondary bacterial infection

Laryngeal Quinsy

- acute heterospecific inflammation of lymphadenoid tissue of larynx
- bacterial (coccal) etiology
- considerable worsening of the common state, high temperature
- palpation of larynx can be painful, the regional lymphatic nodes of neck are multiplied, and become painful at palpation
- hyperemia and infiltration of mucosa of epiglottis, aryepiglottis and vocal folds

Treatment of Laryngeal Quinsy

- powerful antibacterial therapy
- dehydratational therapy is obligatory as there is the threat of development of stenosis
- also prescribe intravenously 40% sol. of glucose, 10% sol. of calcium of chloride, 60-90 mgs of prednisolone, diuretics, antihistamines

Phlegmonous Laryngitis

- acute purulent inflammation of mucosa, submucosa, muscles, ligaments, sometimes perichondrium and cartilages with possible abscess formation
- bacterial (coccal) etiology
- general weakness, malaise, broken, pharyngalgias, fervescence, hoarseness, sometimes respiratory disorders

Treatment of Phlegmonous Laryngitis

- powerful antibacterial therapy
- corticosteroids
- dehydratational therapy
- opening of an abscess
- at the developing acute stenosis - urgent tracheostomy

Chondroperichondritis of Larynx

- inflammatory of perichondrium and cartilage of larynx
- pain in the area of larynx, painful swallowing, increase temperature, hoarseness, sometimes respiratory disorders
- some increasing of volume of neck, smoothness of contours of larynx, acute pain at palpation, fluctuation and cervical lymphadenitis
- hyperemia, edema and infiltration of mucosa, mobility of one or both halves of larynx is failed

Vocal Cord «Singer's» Nodules

- result of repetitive overuse or misuse of the voice
- callous-like growths develop in the midpoint of the vocal folds



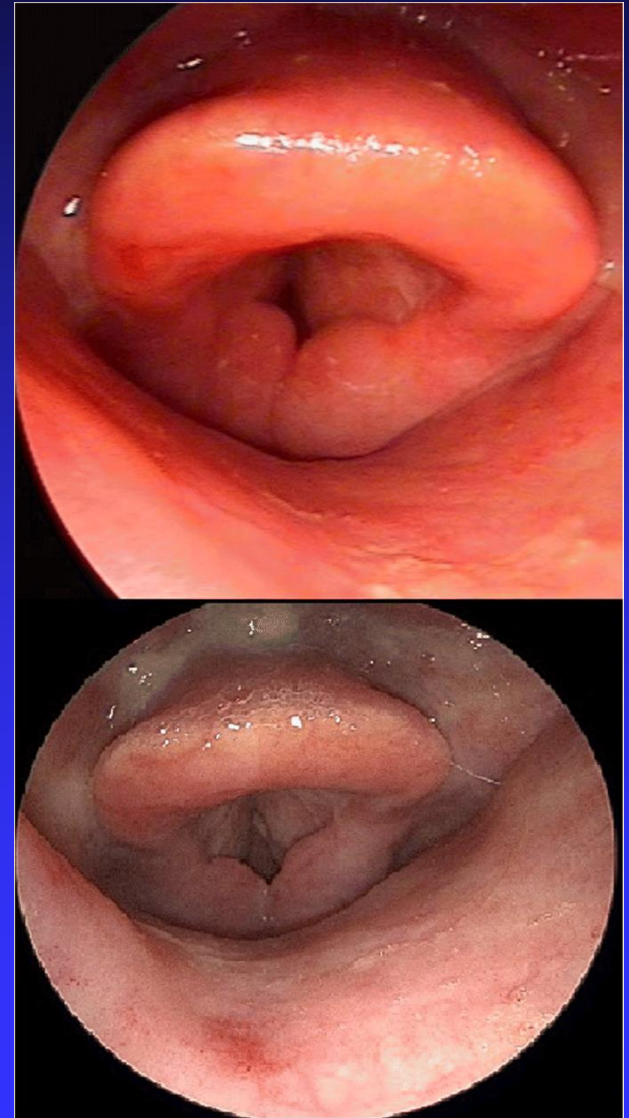
Reinke's Edema

- polypoid degeneration of one or both vocal folds
- formed as a result of the expansion of the subepithelial spaces
- risk factors are tobacco use, voice overuse and laryngopharyngeal reflux

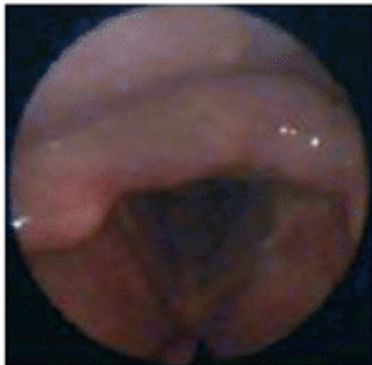





Edema of Larynx

- not an independent disease (manifestation of other pathological processes)
- may have inflammatory and noninflammatory nature
- can cause stenosis



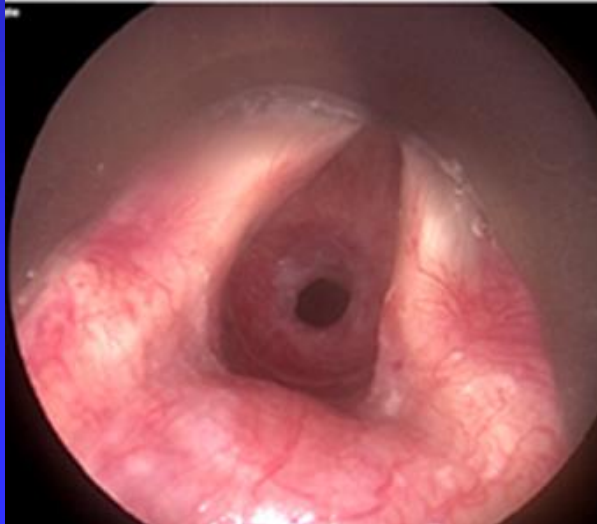
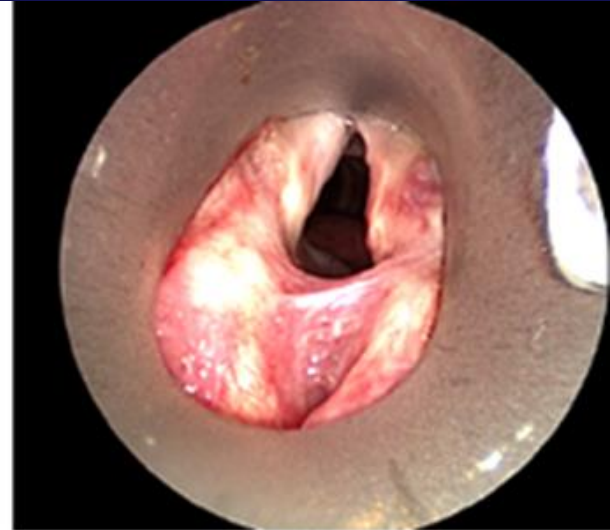
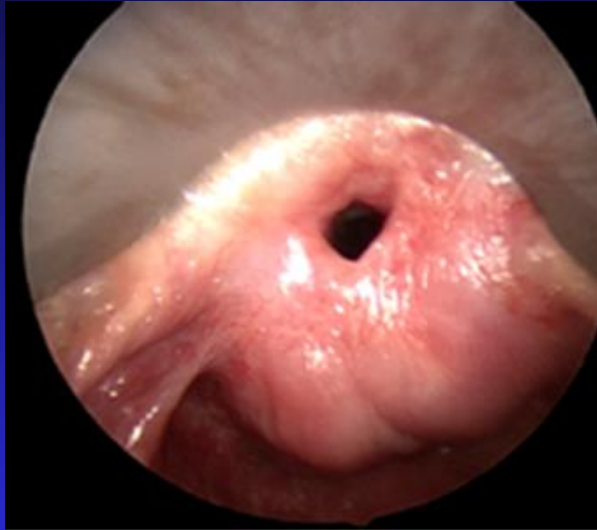
Classification of laryngeal edema

			
25% obstruction of the supra-larynx	50% obstruction of the supra-larynx	75% obstruction of the supra-larynx	90% obstruction of the supra-larynx
<ul style="list-style-type: none">- Few symptoms	<ul style="list-style-type: none">- Moderate symptoms	<ul style="list-style-type: none">- Severe symptoms	<ul style="list-style-type: none">- Acute threat to life
LOC-1	LOC-2	LOC-3	LOC-4
<ul style="list-style-type: none">- Monitoring	<ul style="list-style-type: none">- Monitoring	<ul style="list-style-type: none">- Tracheostomy if needed	<ul style="list-style-type: none">- Securing of the airways- Nasal fiberoptic intubation- Tracheostomy under local anesthesia

Laryngeal Stenosis

partial or total (congenital or acquired)
narrowing of the endolaryngeal airway
different ethiology that may affect the
supraglottis, glottis or subglottis

Laryngeal Stenosis



Etiology of Laryngeal Stenosis

1. Trauma

- External
blunt
penetrating
- Internal
intubation
post tracheostomy
post surgery
post radiotherapy
thermal/chemical burns

2. Allergy (angioneurotic edema)

3. Acute and chronic infection diseases:

epiglottitis,
laryngo-trachea-bronchitis
tuberculosis or syphilis of larynx
scleroma
diphtheria etc

4. Foreign body

5. Benign tumors

- Intrinsic (papilloma/chondroma, nerve sheath tumor)
- Extrinsic (thyroid, hypopharynx tumor)

6. Malignant tumors

- Intrinsic (cancer/sarcoma)
- Extrinsic (thyroid, hypopharynx malignancy)

7. Systemic disease (nephritis, heart failure, myxedema, Wegener's granulomatosis, relapsing polychondritis)

8. Disorders of laryngeal innervation (bilateral paralyzes of n. recurrens)

Laryngeal Stenosis

- can present as a life-threatening hypoxemia and hypercapnia
- main symptom - inspiratory stridor (high-pitched noisy respiration)
- most important step in initial evaluation is determining whether an airway needs to be established immediately

Diagnosis of Laryngeal Stenosis

- main points in history: timing, age, past medical history, other systemic, ability to sleep lying down
- pulse oximetry demonstrates obstruction
- hypercapnia and acidosis are early signs of hypoventilation
- cyanosis, anxiety, respiratory effort on inspection
- nasal flaring, neck retractions, accessory muscle using

Diagnosis of Laryngeal Stenosis

- complete head and neck exam: nose, oral cavity, pharynx
- main - larynx exam (direct, indirect, optic laryngoscopy)
- radiology is generally not very useful for diagnostic
- management related to diagnosis and urgency

Classification

Cotton-Myer system of grading
(percent obstruction for adult subglottic stenosis)

grade 1	<50 %
grade 2	50-70 %
grade 3	71-99 % (minimal lumen)
grade 4	complete obstruction

Classification

Bogdasarin-Olson posterior glottic stenosis

- type 1 - vocal process adhesion
- type 2 - post commissure stenosis with interarytenoid plane scarring
- type 3 - post commissure stenosis with ankylosis of unilateral cricoarytenoid joint
- type 4 - post commissure stenosis with bilateral cricoarytenoid joint ankylosis

Classification

McCaffrey (clinical status of subglottic/tracheal stenosis)

- grade 1 - subglottic/tracheal stenosis <1cm long
- grade 2 - subglottic stenosis <1 cm within cricoid ring without glottic/tracheal extension
- grade 3 - subglottic lesion with extension up to upper trachea but no glottic involvement
- grade 4 - glottic involvement with fixation/paralysis of one/both vocal folds

Classification

by formation time

- fulminant
- acute
- subacute
- chronic

Classification

1. Compensatory
2. Subcompensatory
3. Decompensatory
4. Terminal (asphyxia)

Treatment of Laryngeal Stenosis

depends on the cause and stage

- intravenous: glucose 40% 20,0; sol. calcii chloridi 10% 10,0; sol. acidi ascorbinici 5% 5,0; sol. euphyllini 2,4 % 5,0-10,0; sol. dexamethasone 8 mg
- intramuscular: sol. dimedroli 1% 2,0; sol. pipolpheni 2,5% 2,0)
- diuretics
- inhalations by water-wet oxygen
- foreign body removal, dissection of abscess etc
- at 3th (decompensatory) stage – urgent artificial renewal of patency of respiratory tract: intubation or tracheostomy
- at 4th (asphyxia) stage – urgent conicotomy or cricoconicotomy

Treatment of Laryngeal Stenosis

1. Compensatory – conservative, sometimes surgical to eliminate the cause
2. Subcompensatory – conservative, sometimes surgical to eliminate the cause
3. Decompensatory – emergency tracheostomy
4. Terminal (asphyxia) – emergency coniotomy or cricoconiotomy

Tracheostomy

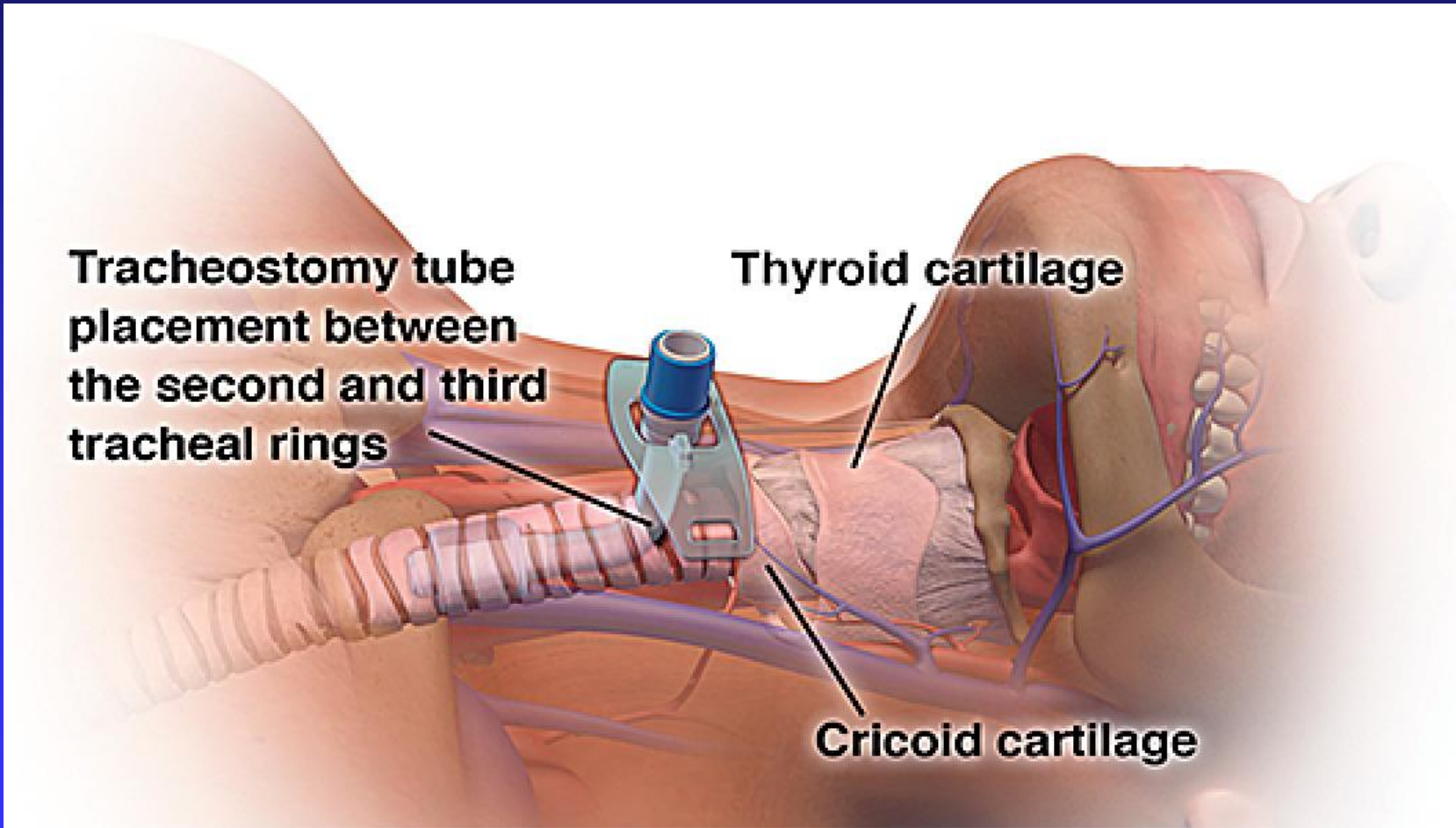
- indication:
 - decompensatory stage of laryngeal stenosis (emergency)
 - sanation or draining of respiratory tract (planned)
 - prolonged intubations (planned)
- classification (by it relation to the isthmus of thyroid gland):
 - upper
 - middle
 - lower

Tracheostomy

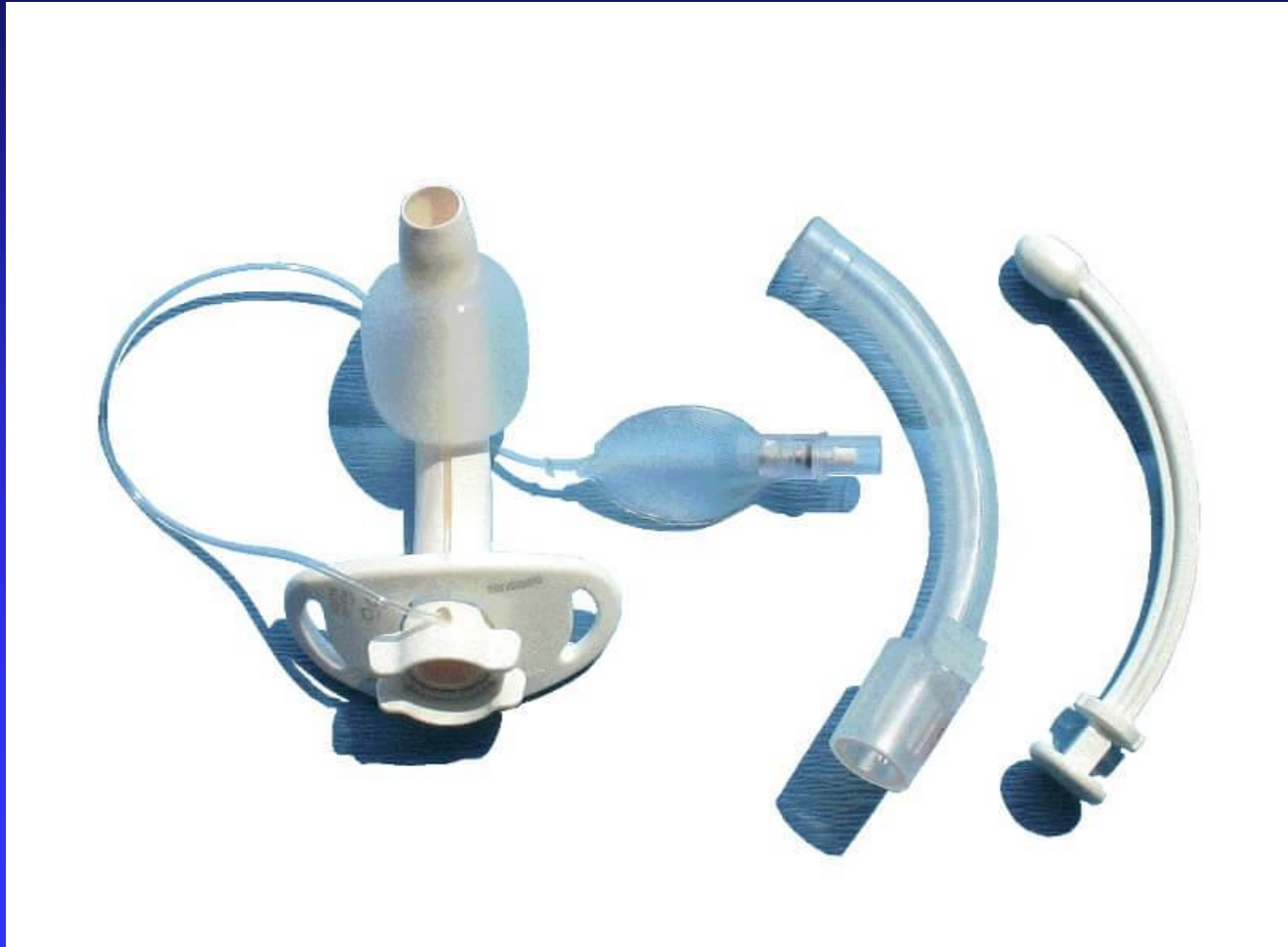
**Tracheostomy tube
placement between
the second and third
tracheal rings**

Thyroid cartilage

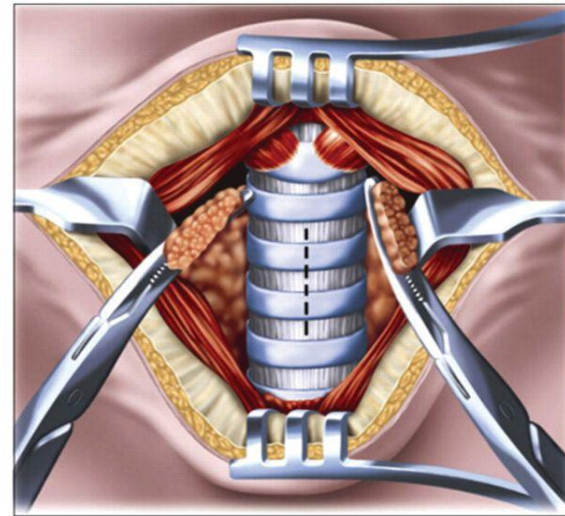
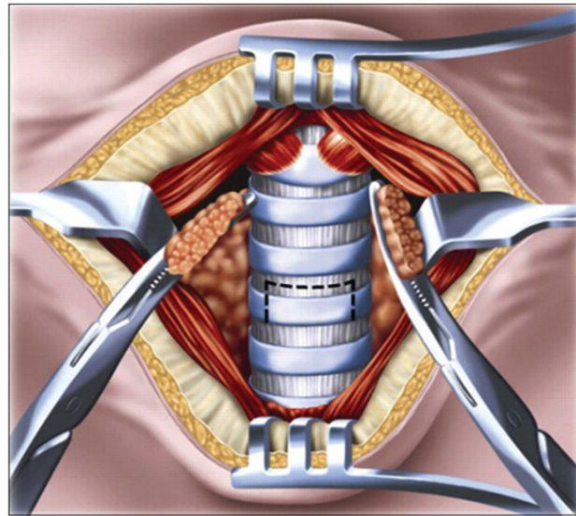
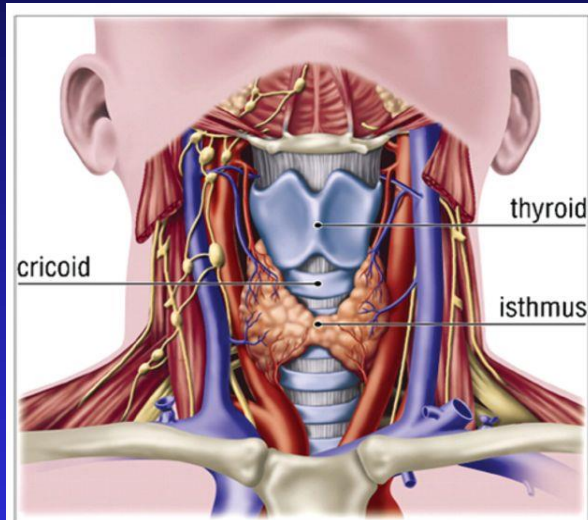
Cricoid cartilage



Tracheostomy Tube



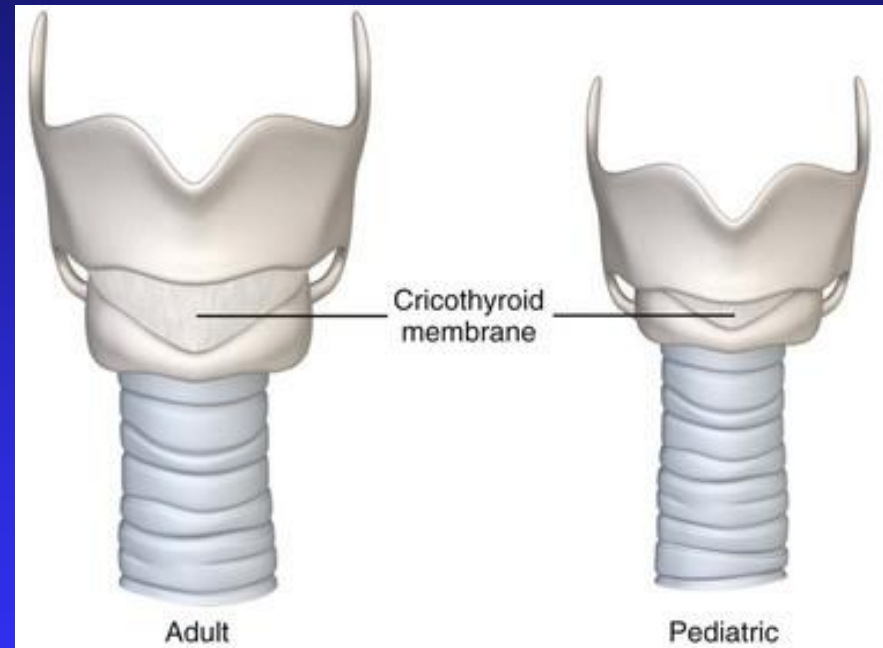
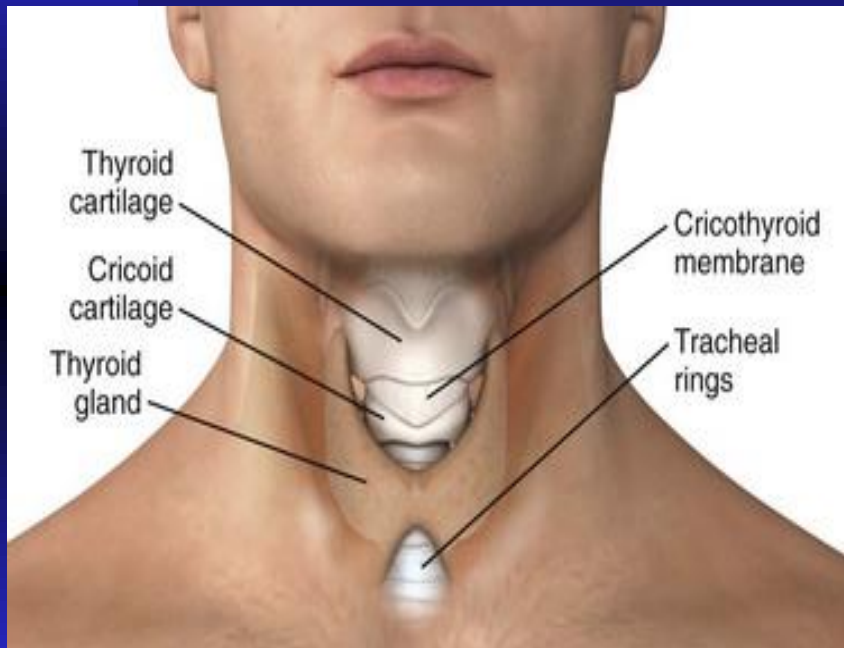
Middle Tracheostomy



Coniotomy and Cricoconiotomy

- also called cric, thyrocricotomy, cricothyroidotomy, inferior laryngotomy, emergency airway puncture etc
- an incision made through the skin and cricothyroid membrane/cricoid cartilage to establish airway
- performed as a last resort in cases when intubation is impossible or not enough time for a tracheostomy
- this technique is temporizing measure until airway can be established

Cricothyroid Membrane



Cricothyrotomy

SURGICAL CRICOTHYROTOMY: RAPID FOUR-STEP TECHNIQUE

1



If possible, extend the neck to better expose the trachea. Palpate the depression over the cricothyroid membrane with your nondominant hand.

2



Make a 1.5-cm single horizontal stab incision through the skin, subcutaneous tissue, and cricothyroid membrane.

3



Using the scalpel blade as a guide, pick up the cricoid cartilage with the tracheal hook and provide traction in the caudal direction to stabilize the trachea.

4



Place a No. 4 cuffed tracheostomy tube or a 6.0 cuffed endotracheal tube through the opening.

Coniotomy Set

Emergency access to airways by ventilation
cannula and integrated scalpel



Thank you for attention!