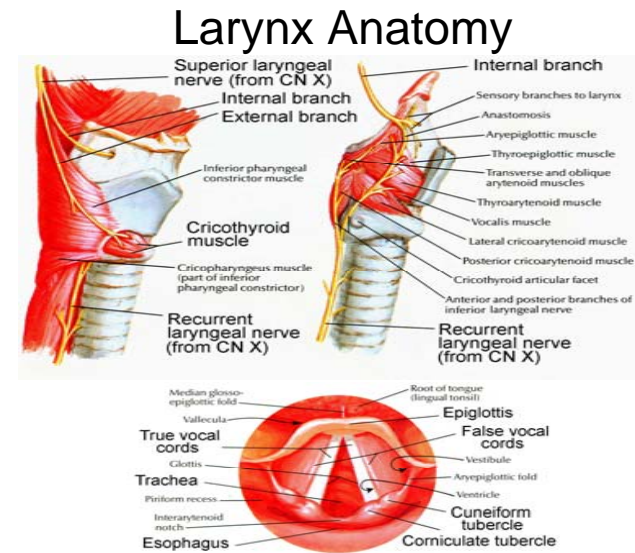


Laryngospasm & Aspiration



Larynx Anatomy: Innervation

Nerve	Motor	Sensory
Recurrent Laryngeal (from CN X)	Thyroarytenoid (tensor) Lateral Cricoarytenoid (adductor) Transverse Arytenoid (adductor) Posterior Cricoarytenoid (abductor, tensor)	Subglottic mucosa
Superior Laryngeal (from CN X)		
• Internal branch	None	Epiglottis/BOT Supraglottic mucosa
• External branch	Cricothyroid (adductor)	Anterior subglottic mucosa

Does bilateral recurrent laryngeal nerve injury produce the same defect as succinylcholine?

Laryngospasm

Definition

- Occlusion of the glottis and laryngeal inlet by the action of the laryngeal muscles.

Predisposing Factors

- Stage 2 of anesthesia (excitement/delirium)
- Light anesthesia relative to surgical stimulation
- Mechanical irritants to the airway
 - Blood or secretions
 - Airway suctioning or instrumentation
- GERD
- Upper respiratory tract infection (0.85-5% incidence)

Laryngospasm

Prevention

- Ensure adequate anesthetic depth before manipulation
- Clear secretions before extubation
- Topicalize larynx with local anesthetic
- Muscle relaxants

Management

1. Jaw thrust, head tilt, oral or nasal airway
2. CPAP via bag-mask ventilation with 100% O₂
3. Suction oropharynx
4. Succinylcholine 10-20 mg IV, maintain airway with bag-mask or ETT until spontaneously breathing
5. Prepare for surgical airway
6. Monitor for postobstructive negative pressure pulmonary edema (NPPE)

Negative Pressure Pulmonary Edema

Causes

- Laryngospasm
- Upper airway obstruction/ETT obstruction
- Incidence of 0.1% of anesthetics

Risk Factors

- Laryngospasm
- Young (20-40 years), healthy (ASA I-II), male (80%)

Presentation

- Laryngospasm, chest wall retraction
- Frothy, serosanguinous or bloody airway secretions
- ↓S_pO₂, ↑ET_{CO2}, hypotension, large P_(A-a) gradient
- CXR with pulmonary edema

Negative Pressure Pulmonary Edema

Pathogenesis

- Negative intrathoracic pressure (up to 100 cmH₂O)
- ↑RV preload → ↑pulmonary hydrostatic pressure
- ↑RV preload → interventricular septum shift → LV diastolic dysfunction → ↑PCWP
- Hypoxia, hypercapnea, acidosis → HPV & ↑PVR
- Stress response → ↑SVR and ↑LV afterload
- Alveolar-capillary membrane leak → protein loss

Treatment

- Supportive care (O₂, IPPV, PEEP/CPAP)
- Conservative management until process reverses; consider volume and/or pressors PRN.
- Lasix is usually NOT helpful.

Pulmonary Aspiration

Predisposing Conditions

- Full stomach or unknown NPO status (e.g. trauma)
- Intra-abdominal process (bowel obstruction, ileus, inflammation)
- Gastroparesis (narcotics, DM, uremia, EtOH, infection)
- GE junction incompetence (GERD, hiatal hernia, scleroderma)
- Pregnancy, obesity
- Neuromuscular disease processes
- Difficult intubation and/or prolonged bag-mask ventilation

Pulmonary Aspiration

Prevention

- Follow NPO guidelines for routine elective cases
- Use metoclopramide, H₂-blockers, and antacids in high-risk patients
- Consider awake, regional anesthetic
- Consider awake, upright intubation and/or RSI
- If present, leave NGT to suction
- Apply cricoid pressure until ETT position confirmed
- Minimize bag-mask PPV and/or keep pressure <20 cmH₂O
- Extubate after recovery of protective reflexes

NPO Guidelines

Ingested Material	Minimum Fasting Period
Clears	2 hours
Breast Milk	4 hours
Formula	6 hours
Non-human Milk	6 hours
Light Meal	6 hours
Fatty Meal	6-8 hours

- There is no evidence for the routine use of metoclopramide, H₂-blockers, proton pump inhibitors, antiemetics, or anticholinergics in preventing aspiration or in reducing its morbidity/mortality.
- If given preoperatively, only nonparticulate antacids should be used.

Pulmonary Aspiration

Aspiration Pneumonitis

- Sterile, chemical pneumonitis caused by aspiration of acidic and particulate material
- Highest risk in patients with gastric volume >25 ml and pH <2.5.
- Aspiration does NOT always cause pneumonia!

Management

- Place patient in head-down position
- Immediately suction pharynx and trachea before PPV
- 100% O₂, intubate, apply PEEP or CPAP
- Supportive care - monitor for chemical PNA/ARDS
- Possible bronchoscopy for removal of particulate matter, if suspected
- Antibiotics are not necessary unless subsequent infection develops
- Steroids are not indicated.

References

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