

مادة أسس التخدير 1 الكورس الاول

Anesthetic crisis

Bronchospasm

Sawa University

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كلية التقنيات الصحية والطبية

Department of Anesthesia

قسم تقنيات التخدير

.Second .. Stage

.المرحلة الثانية

...محاضرة رقم 9

نظري

Lecture No.9

Theoretical

استاذ المادة : د. حسن جساب البركي

Bronchospasm:

Review of Anatomy and Etiology of Bronchospasm

The Lower Airways

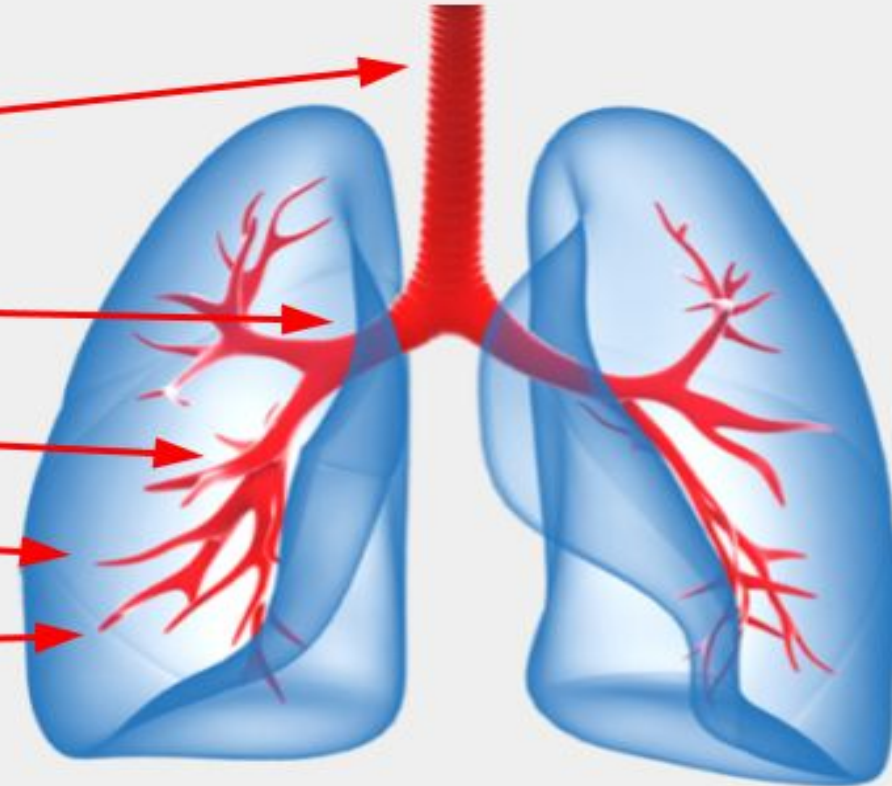
Trachea

Bronchus

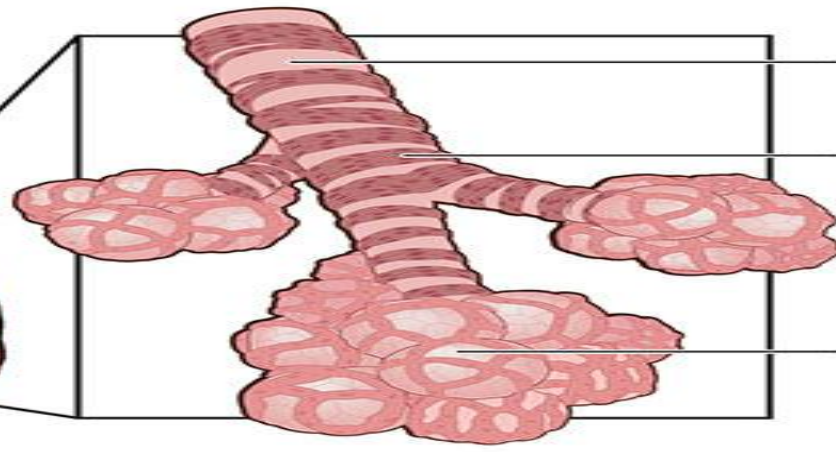
Bronchiole

Terminal Bronchiole

Alveolus



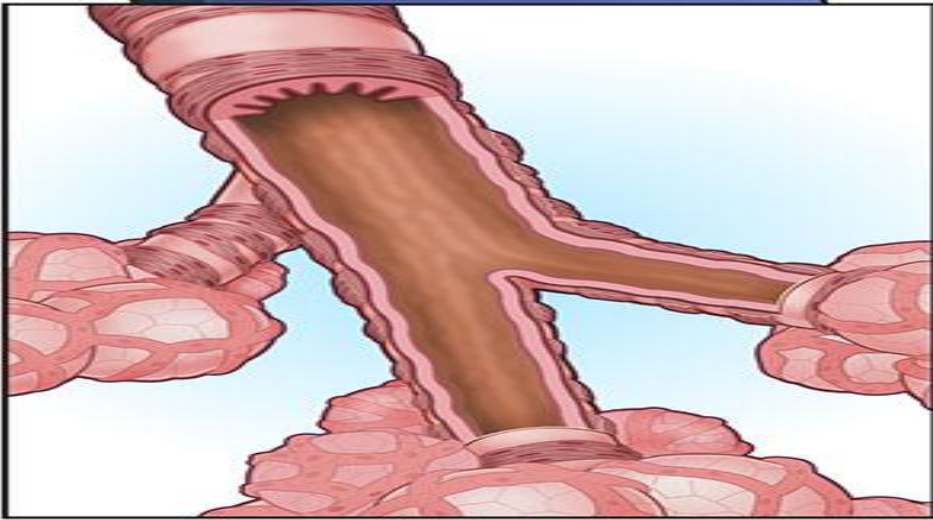
Bronchospasm



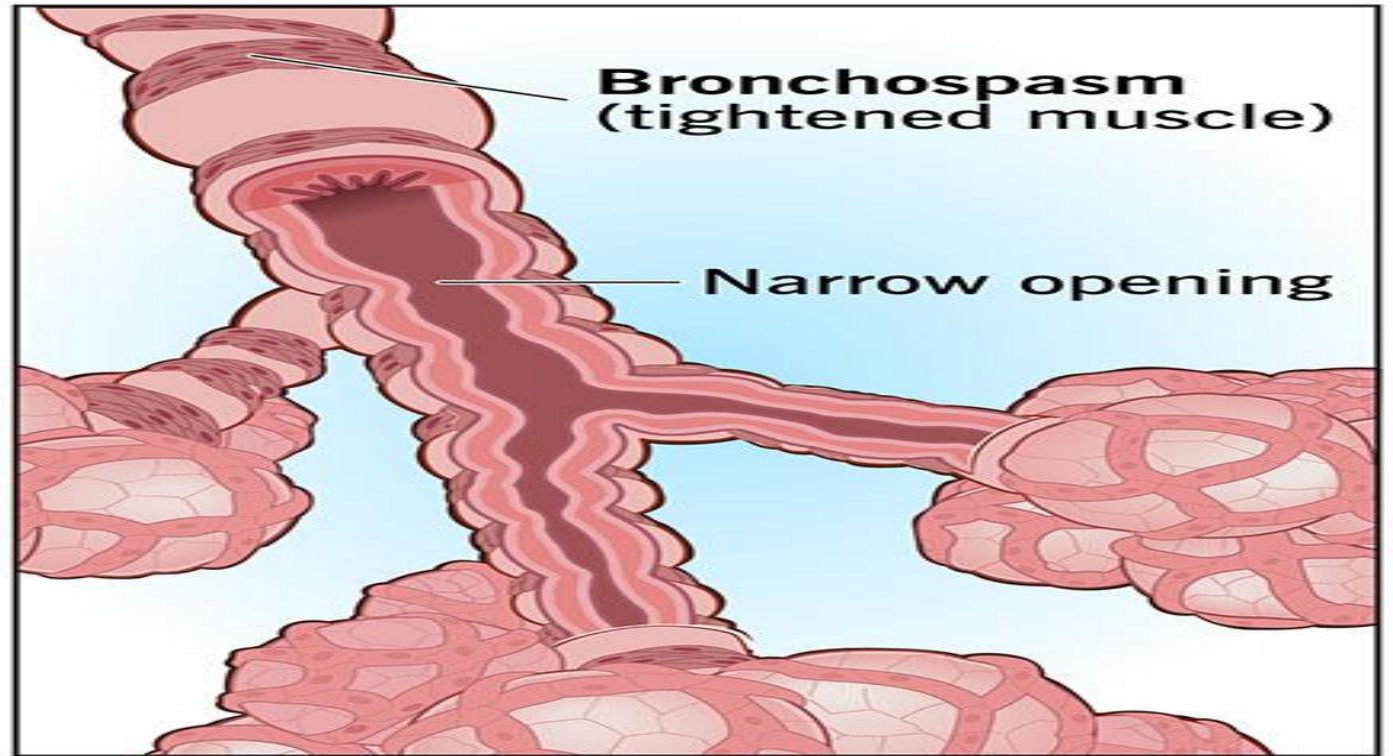
Bronchiole

Smooth muscle (relaxed)

Aveoli (air sacs)



Normal airway



Bronchospasm (tightened muscle)

Narrow opening

Constricted airway

Bronchospasm

Usually manifests during anesthesia as :

- *An expiratory wheeze*
- *Prolonged expiration and/or increased inflation pressures during intermittent positive pressure ventilation (IPPV).*
- *Wheeze may be audible either with or without auscultation, but can only be present*

□ *If there is gas flow in the patient's airways.*

Thus, in cases of severe bronchospasm, the chest may be silent on auscultation and the diagnosis may rest on correct assessment of increased inflation pressures.

□ **Other signs include:**

□ low oxygen saturation

□ change in capnogram

□ hypoventilation and hypotension.

Causes:

1. During induction of anesthesia:

- Bronchospasm due to airway irritation
- Anaphylaxis
- Misplacement of endotracheal tube
- Aspiration of gastric contents
- Pulmonary oedema (following failed intubation)
- Unknown, possibly allergy

2. During maintenance of anesthesia:

- Anaphylaxis (or severe allergy)
- Endotracheal tube or ventilator problem
- Aspiration, laryngeal mask or mask anesthesia

3. During emergence or recovery phase of anesthesia:

- Pulmonary oedema
- Anaphylaxis/allergy
- Accidental extubation
- Extubation spasm
- Aspiration
- Unilateral bronchospasm and pulmonary oedema(cause not determined)
- No defined cause

Management of bronchospasm :

Once the signs of bronchospasm appear, think of:

- Anaphylaxis.

Allergy to drugs, IV fluid and latex.

- Airway manipulation, irritation, secretions and soiling.

- Esophageal or endobronchial intubation.

- Pneumothorax

- Inadequate anesthetic depth or failure of anesthetic delivery system

Emergency management of bronchospasm :

- ❑ 100% oxygen
- ❑ Stop stimulation and surgery
- ❑ Deepen anesthesia
- ❑ If intubated exclude esophageal or endobronchial position
- ❑ If mask or laryngeal mask consider laryngospasm, regurgitation, vomit and aspiration
- ❑ Give adrenaline or salbutamol

If you cannot ventilate via endotracheal tube, consider:

- Misplaced tube , kinked tube , blocked tube or circuit
- pneumothorax,
- Aspiration
- Anaphylaxis
- pulmonary oedema.

Consider possible obstruction distal to the tube:

- Try to push a small tube past it or push the obstruction down one bronchus and ventilate the other lung
- Magnesium sulphate (1.2–2 g i.v.) can be helpful in difficult cases; it is cheap, available, and also can suppress tachyarrhythmias

Further management OF BRONCHOSPASM:

- Bronchodilators
- Chest x-ray
- Admission to the ICU.

Recommended dosage of drugs: -

Salbutamol 0.5% 1ml (5mg) solution nebulized for adult or aerosol puffer, 2 puffs (0.1mg/puff)

Adrenaline 0.001 mg/kg bolus (0.01 ml/kg of 1:10 000 solution). Repeat bolus, or begin infusion 0.00015mg/kg/min

Bronchospasm during anesthesia

SUSPICION OF BRONCHOSPASM

- Switch to 100% oxygen
- Ventilate by hand
- Stop administration of suspected agents: β -blockers, NSAIDs, neostigmine, antibiotics, neuromuscular blockers, latex
- Call for help

FIRST-LINE DRUG THERAPY

β 2-agonist: Salbutamol

- Metered dose inhaler: 6-8 puffs repeated as necessary
- Nebulized: 5 mg repeated as necessary
- IV: 250 mcg slow IV, followed by 5 mcg/min up to 20 mcg/min

SECOND-LINE DRUG THERAPY

Anticholinergics	Ipratropium bromide: 4-8 puffs or 0.5 mg nebulized 6 hourly
Magnesium sulphate	50 mg/kg IV over 20 min (max 2 g)
Hydrocortisone	200 mg IV 6 hourly
Steroids	Methylprednisolone: 125 mg IV Dexamethasone: 8 mg IV
Bronchodilating anesthetics	Ketamine bolus 10-20 mg, infusion 1-3 mg/kg/hour
Epinephrine	Nebulized: 5 mls 1-1000 IV: 10 mcg to 100 mcg, titrated to response

IMMEDIATE MANAGEMENT

Prevent hypoxia & reverse bronchoconstriction

- Deepen anesthesia: volatiles > ketamine (only bronchodilating agent) > propofol
- Consider alternative causes of high airway pressure: endobronchial intubation, kinked circuitry, excessive tidal volume, small diameter tracheal tube, obesity, etc.
- Check tube position and exclude blocked/misplaced tube
- Exclude laryngospasm and consider aspiration in non-intubated patients
- Avoid dynamic hyperinflation with appropriate ventilation: longer expiratory time, low/normal respiratory rates, permissive hypercapnia

SECONDARY MANAGEMENT

Provide ongoing therapy and address underlying cause

- Optimize mechanical ventilation
- Consider aborting the surgery
- Request & review chest X-ray
- Transfer patient to ICU
- Apply ECMO with severe bronchospasm and refractory to all

Any questions?

*Thank
You*