

## MANAGEMENT OF CRISES DURING ANESTHESIA AND SURGERY. PART III: Bronchospasm & Laryngospasm

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**Bronchospasm** usually manifests during anaesthesia 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<sup>1</sup>. Other signs include; low oxygen saturation, change in capnogram, hypoventilation and hypotension<sup>2</sup>.

Causes:

1- During induction of anaesthesia:

- \*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 anaesthesia:

- \*Anaphylaxis (or severe allergy)
- \*Endotracheal tube or ventilator problem
- \*Aspiration, laryngeal mask or mask anaesthesia
- \*Pneumothorax
- \*Pulmonary oedema
- \*Profuse bronchial mucus
- \*Drug induced
- \*No defined cause

3- During emergence or recovery phase of anaesthesia:

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

*Management:*

Once the signs of bronchospasm appear, think of:

- \*Anaphylaxis. Allergy to drugs, IV fluid and latex.
- \*Airway manipulation, irritation, secretions and soiling.
- \*Oesophageal or endobronchial intubation.
- \*Pneumothorax
- \*Inadequate anaesthetic depth or failure of anaesthetic delivery system.

*Emergency management*

- \*100% oxygen
- \*Stop stimulation and surgery
- \*Deepen anaesthesia
- \*If intubated exclude oesophageal or endobronchial position
- \*If mask or laryngeal mask consider laryngospasm, regurgitation, vomit and aspiration
- \*Give adrenaline or salbutamol.
- \*If you can not ventilate via endotracheal tube consider: Misplaced,

kinked, blocked tube or circuit, pneumothorax, aspiration, anaphylaxis and 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<sup>3</sup> (1.2–2 g i.v.) can be helpful in difficult cases; it is cheap, available, and also can suppress tachyarrhythmias

#### *Further management:*

\*Bronchodilators, Chest x-ray and admission to the ICU.

\*Recommended dosage of drugs:

-Salbutamol 0.5% 1ml (5mg) solution nebulised 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.

**Laryngospasm** is a form of airway obstruction that is so common and different that most anaesthesiologists consider it to be a separate entity. The risk is greater in certain subgroups such as children with asthma or airway infections or those undergoing oesophagoscopy or hypospadias repair, and adults undergoing anal surgery<sup>4</sup>. In recognition of the fact that laryngospasm is a distinct entity, other forms of airway obstruction have been considered<sup>5</sup>. While laryngospasm occurs relatively frequently and is nearly always easily recognized and handled, it has the potential to cause morbidity and mortality, especially if managed poorly. Laryngospasm occasionally presents atypically and may be precipitated by factors which are not immediately recognized, increasing the potential for patient harm and further complications such as pulmonary aspiration and post-obstructive pulmonary oedema. This latter complication is especially

significant as it may cause serious morbidity, and the patient may require intubation, ventilation and management in an intensive care setting<sup>6</sup>. Risk factors include difficult intubation, nasal, oral or pharyngeal surgical site; and obesity with obstructive sleep apnoea; however, it may occur unexpectedly in any patient<sup>7</sup>.

#### *Signs:*

\*Inspiratory stridor/airway obstruction.

\*Increased inspiratory efforts/tracheal tug.

\*Paradoxical chest/abdominal movements.

\*Desaturation, bradycardia, central cyanosis.

#### *Precipitating causes of laryngospasm:*

\*Airway manipulation

\*Blood/secretions in the pharynx

\*Regurgitation/vomiting

\*Surgical stimulus

\*Moving patient

\*Irritant volatile agent

\*Failure of anaesthetic delivery system

\*Unable to determine

#### *Management:*

\*Cease stimulation/surgery

\*100% Oxygen

\*Try gentle chin lift/jaw thrust

\*Request immediate assistance

\*Deepen anaesthesia with an IV agent

\*Visualize and clear the pharynx/airway

\*Suspect aspiration

\*Suspect airway obstruction

\*Try mask CPAP/IPPV, if this is unsuccessful, Give suxamethonium unless contraindicated, Give atropine unless contraindicated. Again, try mask CPAP/IPPV

Intubate and ventilate

#### *Notes*

1- About 77% of cases were clinically obvious, 14% presented as airway obstruction, 5% as regurgitation, 4% as desaturation.

- 2- The cricothyroid muscle is the only tensor of the vocal cords. Gentle stretching of this muscle may overcome moderate laryngospasm. In applying jaw thrust, gentle pressure should be exerted on the angle of the mandible, and not on soft tissues.
- 3- Try 20% of the induction dose; this may be all that is needed
- 4- Suxamethonium: Delay in relieving severe laryngospasm was associated

with post-obstructive pulmonary oedema and were managed with suxamethonium without intubation.

0.5mg/kg IV to relieve laryngospasm

1.0–1.5mg/kg IV for intubation.

4.0mg/kg IM for intubation (if no IV access).

5- Atropine: 0.01mg/kg. as bradycardia may occur

## REFERENCES

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