

## **LARYNGOSPASM**

### **Definition:**

Laryngospasm is the sustained closure of the vocal cords. It results in the partial or complete loss of the patient's airway.

### **Pathophysiology:**

Laryngospasm is essentially a protective airway reflex that acts to prevent aspiration. The reflex has afferent fibers arising in superior laryngeal and recurrent laryngeal nerves and efferent fibers carried by the recurrent laryngeal nerve innervating three laryngeal muscles mainly involved in laryngospasm: the lateral cricoarytenoids, the thyroarytenoids and the cricothyroid. The most common cause is airway manipulation.

### **Predisposing factors:**

- Patient related factors: Passive tobacco smoke exposure and hyperreactive airway., The risk doubles in infants and increases three times in children less than 3 months old.
- Anaesthesia related factors: Insufficient depth of anaesthesia, Inhalational induction with Desflurane or Isoflurane, use of Thiopental and Ketamine, airway irritation from secretions, blood, or malposition airway devices.
- Surgical factors: Airway surgeries, gastrointestinal endoscopy, and lower urinary tract procedures due to the activation of the Breuer-Lockhart reflex.

### **Presentation:**

Clinical signs include inspiratory stridor, paradoxical respiratory movements, suprasternal and supraclavicular retractions and rapidly decreasing oxygen saturation. Patient may develop bradycardia secondary to hypoxia.

### **Management:**

#### **Prevention:**

- Maintain adequate depth of anaesthesia.
- Use of a supraglottic airway device instead of endotracheal intubation during general anaesthesia in susceptible patients.
- Avoid premature stimulation of the patient and/or airway. The "No touch technique" has been described in literature which involves

avoidance of any kind of stimulation to the patient till the patient is completely awake.

- During emergence, airway secretions should be adequately cleared by suctioning before extubation.
- Use of i.v. lidocaine 1-2 mg/kg two minutes before extubation or topicalisation of the airway with the same agent has proven to be effective in prevention of laryngospasm in children.
- Patients should be extubated either in a deep plane of anaesthesia or fully awake but not in-between.

### **Treatment:**

Prompt recognition and early correction is essential to re-establish ventilation and oxygenation as soon as possible

- 100% O<sub>2</sub>, apply CPAP via mask and increase the depth of anaesthesia with an intravenous agent e.g. i.v. Propofol at sub-hypnotic dose of 0.5-0.8mg/kg. Suction secretions if required. Use of an oral airway may trigger laryngospasm but in case of an already established laryngospasm it may help in provision of CPAP.
- If laryngospasm cannot be aborted by mask CPAP administer Succinylcholine 0.1mg/kg IV in conjunction with atropine 0.02mg/kg IV if patient has bradycardia. In case IV access is not available intramuscular Succinylcholine can be given however it slow to act via this route.
- Succinylcholine can be replaced with Rocuronium i.v. at the dose of 1.2 mg/kg.
- Various maneuvers have been described to be used as an adjunct: The application of gentle pressure in the thoracic midline at a rate of 20-25 compressions per minute can reverse the spasm. The second maneuver is the Larson's Maneuver. It consists of pressure application between the posterior branch of the mandible and the anterior mastoid process.

### **Complications of laryngospasm:**

*Immediate complications:*

Hypoxia, Bradycardia, Cardiac arrest.

*Delayed complications:*

Negative pressure pulmonary edema, aspiration pneumonitis.

*Reference:*

1. Hernández-Cortez E. Update on the management of laryngospasm. *Anestesia en México*. 2018 Aug;30(2):12-9.
2. Silva CR, Pereira T, Henriques D, Lanca F. Comprehensive review of laryngospasm. Update in Anaesthesia: *Journal of Anesthesia & Critical Care*. 2020;35:15-8.
3. Li L, Zhang Z, Yao Z, Wang H, Wang H, An H, Yao J. The impact of laryngeal mask versus other airways on perioperative respiratory adverse events in children: A systematic review and meta-analysis of randomized controlled trials. *International journal of Surgery*. 2019 Apr 1;64:40-8.
4. Kristofy A. Prevention and treatment of laryngospasm in the pediatric patient: a literature review. *AANA journal*. 2019 Apr 1;87(2):145-51.
5. Qi X, Lai Z, Li S, Liu X, Wang Z, Tan W. The efficacy of lidocaine in laryngospasm prevention in pediatric surgery: a network meta-analysis. *Scientific reports*. 2016 Sep 2;6(1):32308.
6. Xie M, Li XK, Peng Y. Magnesium sulfate for postoperative complications in children undergoing tonsillectomies: a systematic review and meta-analysis. *Journal of Evidence-Based Medicine*. 2017 Feb;10(1):16-25.