NEGATIVE PRESSURE PULMONARY EDEMA:ROLE OF FLUCTUATING HORMONES

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LEARNING OBJECTVES

1. Causes of NPPE
2. Management of NPPE.

INTROUCTION

Negative pressure pulmonary edema (NPPE) or post-obstructive pulmonary edema is a rare but potentially fatal cause of acute respiratory failure that occurs due to intense inspiratory effort against an obstructed upper airway. This inspiratory effort leads to very negative pressure in the airways and causes fluid to extravasate in the interstitial and alveolar spaces [1]. Patients are usually treated conservatively with diuresis, supplemental oxygen, non-invasive positive pressure ventilation, or in some cases endotracheal intubation with mechanical ventilation. The resolution of edema is usually rapid and most patients have complete resolution of edema within 24 to 48 hours. Common causes of NPPE include tumors, infections of upper airway, or laryngospasm. NPPE is also described in the immediate post-operative period following extubation after general anesthesia and is caused by laryngeal edema, iatrogenic vocal cord paralysis, laryngospasm, or airway obstruction caused by tongue or soft tissues. We are presenting an unusual case of NPPE in a young female.

CASE PRESENTATION

This is a case of a 33-year-old female who was admitted for elective total thyroidectomy for Graves' disease. She was taking methimazole. Her pre-op TSH was <0.005 ulU/mL and her free T4 was elevated (1.89 ng/dL). Surgery was without any complications and the patient was successfully extubated.

Shortly after extubation, she started having difficulty breathing. Vocal cords were visualized using a flexible fiberoptic bronchoscope and both the vocal cords were open that excluded injury to recurrent laryngeal nerve during the procedure. Her oxygen saturation dropped to as low as 54%. Immediate bag and mask ventilation was started that improved oxygen saturation to 90%. She was started on supplemental oxygen via non-rebreather mask and immediate chest x-ray was done that revealed bilateral infiltrates consistent with pulmonary edema. She was given a dose of intravenous furosemide and NIPPV ordered but she stayed on non-rebreather oxygen. She gradually improved and oxygen was weaned down. A follow up chest x-ray the next day confirmed the resolution of pulmonary edema and she was discharged home the next evening.

CXR after the patient desaturated following extubation

DISCUSSION

NPPE is caused by intense inspiratory effort against an obstructed upper airway. In adults, most cases of NPPE is reported in the context of post-extubation laryngospasm following surgery [2]. The incidence of NPPE is higher in young healthy adults who are able to generate higher negative intrathoracic pressure with highest incidence in healthy adult males [3]. There are also reported cases that relate fluctuations in hormone levels in the perioperative period in surgeries involving general anesthesia. These hormonal fluctuations can make the patient vulnerable to laryngospasm and may lead to pulmonary edema in the post-operative period [4]. In the case we discussed earlier, the patient's thyroid hormones were not within normal limits particularly TSH being very low which might have caused transient laryngospasm and subsequent pulmonary edema. Pre-operative hormone stabilization is as important as post-operative care in vulnerable population. Limited case studies are available relating hormonal fluctuations with NPPE and further case studies may be helpful in understanding these effects more clearly.

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