Case report

A life-threatening complication at non-operating room anesthesia (NORA): - Negative pressure pulmonary edema after minimal dose of sedation in a postoperative case of reconstructive maxillofacial surgery

Abstract

Patients with reconstructive maxillofacial surgery and flap cover have high risk of upper airway obstruction due to reconstructive surgery and the risk is further increased during sedation. A brief understaning of the mechanism and its preparedness to deal with the situation is the key for a better outcome. Management of anesthesia at remote location or Non-operating room anesthesia (NORA) itself is a challenge to the anesthesiologist in view of limited staff with less experience and also lack of advanced airway gadgets. In such a scenario, administration of even minimal sedative medication can be life threatening. We report a case of negative pressure pulmonary edema in a 57 year old aged patient who has come to hospital for follow up and was advised MRI. As patient was not cooperative, sedation was given with the intention to complete the MRI but landed up in respiratory distress. We managed in terms of negative pressure pulmonary edema, ventilated overnight and extubation was done next day. Patient was stable and discharged on third day.

Keywords: Remote location, sedation, Negative pressure pulmonary edema, reconstructive maxillofacial surgery

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Introduction

Anaesthesia at remote location is a challenge as it is risky for the patient and needs judicious management of sedation.[1] Negative pressure pulmonary edema (NPPE) following upper airway obstruction has been reported after general anesthesia and even after maxillofacial reconstructive surgery.[2-4] The incidence of NPPE as a complication of anesthesia is around 0.05-0.1% and even may exceed 12% in cases with upper airway obstruction.[5] In operation theatres, the occurrence of respiratory distress will be attended at the earliest due to the immediate availability of senior staff and adequate and measures can be implemented at the earliest to prevent further complications like NPPE. The same complication can lead to death if not anticipated, and if not attended at the proper time, if such a situation occurs at remote location.[1,5,6] So, planning of sedation at remote location preparedness for managing such incidents makes the things easy and many complications can be avoided.

Case report

A male patient aged 57 year came to OPD (Out Patient Department) for MRI face and neck as a follow up. The patient had psychiatric issues and was on antidepressants; therefore to have still images, the procedure demanded sedation after obtaining informed consent. The patient was a case of squamous cell carcinoma of lower alveolus and had h/o previous surgery for the same. The first surgery was done in 2019. As the tumor was extensive, wild local excision with segmental mandibulectomy and modified radical neck dissection was done and pectoralis major myocutaneous flap cover was given. The patient had tracheostomy following surgery for 15 days. He received chemo and radiotherapy post operatively. The patient had recurrence after 2 years and underwent wide local excision and skin grafting in the second sitting. The patients was tracheostomised for the surgery and decannulation was again done after 15 days. He did not have any other comorbidities and was not on any other medications. The recent call was for sedation on urgent basis as patient was not cooperative for MRI. Standard monitors were attached before proceeding for sedation. Vitals were stable. Premedication was done with intravenous glycopyrrolate 0.2 mg, ondansetron 4mg and then fentanyl 40 µg added with ketofol (ketamine 10 mg with propofol 20 mg). The procedure was uneventful, and overall, he required only once repeat dose of ketofol, with the same concentration. The patient was later shifted to recovery room for observation with stable vitals.

After half an hour, patient had a drop in saturation to 78%, became less responsive and started to have bradycardia to 42/min. Immediately, oxygenation started with bag and mask, and simultaneously atropine 0.6 mg was administered intravenously. The saturation improved but in view of less responsiveness and stridor while breathing, intubation was done. Pink frothy secretions were observed through endotracheal tube, leading to diagnosis of negative pressure pulmonary edema. Patient was managed with overnight ventilation under sedation with diuretics and one dose of hydrocortisone 100 mg. Next morning, the patient was weaned to pressure support ventilation and then extubated after Extubation criteria was fulfilled. On 3rd day, the patient was discharged with stable condition.

Discussion

NPPE is an anticipated post stridor following emergence from general anaesthesia.[2,3,7] NPPE begins with a significant upper airway obstruction, and pathophysiology lies with the explanation that the inspiratory efforts to overcome the obstruction generate highly negative intra pleural and alveolar pressures, resulting in fluid shifts due to the high pressure gradient. Clinical presentation includes-, respiratory distress in the form of tachypnea, stridor and use of accessory muscle of respiration followed by decreased oxygen saturation, with pink frothy sputum and chest radiograph abnormalities.[7] As NPPE develops, auscultation usually reveals crackles and occasional wheezes. Pulmonary edema causes both impaired diffusion of oxygen and ventilation/perfusion mismatching, leading to sudden and possibly severe hypoxemia. The management consists of primarily to relieve the airway obstruction and correction of hypoxemia. Diuretic may be added to correct pulmonary edema unless the patient is hypovolemic. Effective airway management and immediate treatment with oxygen and diuretics is sufficient in most cases of NPPE. The use of continuous positive airway pressure or noninvasive positive pressure ventilation can be used but persistent airway obstruction may necessitate an artificial airway, and acute respiratory failure would require artificial ventilation with oxygen and appropriate levels of PEEP.[7] There are incidences of NPPE after emergence of general anesthesia and even after oral and maxillofacial surgery but if it occurs at remote locations can be catastrophic.[1,4,6] The problems with the mentioned case and management as described:

A. The problems with the remote location- Less and inexperienced staff and lack of advanced airway gadgets, post anesthesia area less monitored.

B. Airway problems following maxillofacial reconstructive surgery.

a. Anticipated airway management difficulty – both ventilation and intubation- so need proper planning, selection of agents for sedation and continuous monirtoring.

b. Flap reconstruction leads to lack of tongue support and leads to fall in laryngeal inlet along with oral tissue following sedation. Hence, avoiding sedation, proper counseling and positioning patients in lateral position or placing nasal airways will avoid airway obstruction if at all any sedation is used. The use of continuous positive airway pressure (CPAP) throughout sedation and post-procedure prevents obstructive sleep apnea (OSA), laryngospasm or airway collapse. Most of these patients will be on CPAP post maxilla facial surgery though this patient did not give any specific such history.[2,4]

c. Sedation and over sedation gap – Judicious use of sedation and avoiding over sedation along with strict vigilance after shifting till full recovery is required. Recognition of complication at the earliest as NPPE if identified at proper time has good prognosis.[1,6]

d. Continued monitoring in post MRI suit or shifting to equipped unit for anticipated problematic cases.[6]

Sometimes, history of obstructive sleep apnea contributes significantly to negative pressure pulmonary edema in the post anesthesia period. Elderly patients with history of OSA and post maxilla facial surgery are especially at risk.[2,8,9] The continuation of continuous positive airway pressure (CPAP) during sedation may avoid precipitation of complications.[2] So, early identification of the factors contributing to NPPE will avoid unnecessary complications. Early diagnosis and timely management of NPPE with the available advanced airway gadgets avoids any dreadful outcome. CPAP is a very useful preventive modality in such cases during and post procedure at NORA.

Conclusion

Patients with maxillofacial reconstructive surgery coming for diagnostic modalities at remote location should be given specific attention and needs meticulous management strategy and close monitoring till recovery.

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