


Case Report

Nebu Venti Method of Intraoperative Bronchospasm Management

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Bronchospasm occurring under anaesthesia requires prompt diagnosis and treatment. This is especially of relevance when the patient has a pre-existing pulmonary pathology such as chronic obstructive pulmonary disease or bronchial asthma. Inhaled beta 2 agonists are the first line treatment that is delivered via the endotracheal tube in such patients, However, the delivery of such a therapeutic agent has its drawbacks due to the inadequate delivery of bronchodilator agent and volatile anaesthetic agent. In this article we describe a method to deliver the bronchodilator agent without interruption of the delivery of the volatile anaesthesia intra operatively.

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1. Introduction

Bronchospasm continues to be one of the dreaded complications occurring in anaesthesia, either during induction or during the procedure. It is known to contribute to 7% anaesthesia-related deaths in France [1]. 9% of asthmatic patients will experience intraoperative bronchospasm during general anaesthesia. 28% of claims regarding anaesthesia-related brain damage or death can be attributed to adverse respiratory events [2].

Bronchospasm can be categorised into two types based on its precipitating factors: allergic and non-allergic. Allergic bronchospasm typically presents with dermatological symptoms, prolonged episodes of desaturation, and shock. Non-allergic bronchospasm occurs following intubation or instrumentation of the airway. Cutaneous manifestations and cardiovascular shock seen in allergic bronchospasm and is not seen in Non Allergic Bronchospasm [3].

Intraoperative Bronchospasm can be identified by increased peak airway pressures, decreased tidal volumes, ronchi, desaturation or hypoxemia [4].

Inhaled beta-2 agonists like albuterol via the endotracheal tube are the first line therapy in patients undergoing surgery. When the patient is intubated it is difficult to time the actuation of the metered dose inhaler with respiration. The inhaled drugs also have the tendency to precipitate on the wall of the ETT [5]. What is required is a method of Beta-2 agonist delivery that does not interfere with the ventilatory mechanism intraoperatively.

Here, we present to you a case of intraoperative Bronchospasm managed by the Nebu Venti system of Bronchospasm.

2. Case Report

A 64 year old male patient weighing 60 kg presented with history of headache and drowsiness. The patient was a known hypertensive on Tablet Telmisartan 40 mg OD. The patient was evaluated in the Neurosurgical ICU and found to have a right sided Basal Ganglia Bleed, and a midline shift of 7 mm. In view of deteriorating consciousness and midline shift, the patient was posted for emergency decompressive craniotomy.

The patient was induced with inj. Fentanyl 100 mcg, inj. Propofol 130 mg and Rocuronium 50 mg and intubated with size 8.0 OETT and fixed at 22 cm. The intubation was difficult since the patient had restricted neck extension which made visualization of the vocal cords difficult. This required bougie and external laryngeal manoeuvre such as cricoid pressure to be used. The Intubation was confirmed by auscultation (bilateral air entry) and End Tidal CO₂ measurement.

The patient developed bronchospasm 5 minutes post intubation as indicated by increased peak airway pressure (35 cm H₂O), upsloping of the end tidal CO₂ curve and bilateral ronchi on auscultation.

We utilized the Nebu Venti system of intra operative bronchospasm management.

We inserted the canister of the Salbutamol Nebulizer into the barrel of the 50 ml syringe, with the nozzle of the canister facing the hub of the syringe. We then inserted the plunger back into the syringe.

We connected the 50 ml syringe to the gas sampling Elbow Connector [6], and delivered 4 puffs of Salbutamol via the metered dose inhaler (400 mcg) Figure 1. The bronchospasm was found to be resolved by the reduction in the ronchi on auscultation and restoration of the normal end tidal CO₂ curve.



Figure 1: Usage of the Nebu Venti system to treat Intraoperative Bronchospasm. Here the operator (Anaesthesiologist) directly connects the nozzle of the 50ml syringe containing the salbutamol cannister to the gas sampling port of the elbow connector and directly delivers the salbutamol from the metered dose inhaler to the endotracheal tube

3. Discussion

Certain drugs are used for the treatment of intraoperative bronchospasm such as Dexmedetomidine, Lidocaine, Magnesium, Sevoflurane, cortico steroids, Ketamine and Anti-cholinergics (ipratropium bromide) [5]. However, the immediate first line treatment is the administration of inhaled Beta-2 agonists.

During Bronchospasm gas trapping and increased airway pressures in the thorax may occur. The “dynamic hyperinflation syndrome” may occur due to the patient being unable to exhale fully prior to the ventilator pumping another tidal volume breath into the lungs. There may progressive rise of intrapulmonary pressure with each breath leading to increased intrathoracic pressure. The venous return to the heart may be impaired and the patient may suffer from systemic hypotension. This is the reason why immediate treatment of Bronchospasm is desired [5].

The aim in such a condition is to ensure adequate oxygenation while at the same time lowering intrathoracic pressure below venous return pressure, to allow for adequate venous return to the right heart and the maintenance of an adequate cardiac output [5].

By the Nebu Venti System of bronchospasm management, we are ensuring continuity of ventilation via the closed circuit while simultaneously treating Bronchospasm. We use existing equipment present in the operation theatre to treat the condition without any undue expenditure.

4. Conclusion

The regular methods of treatment of bronchospasm involve disconnecting the ventilatory circuit and delivering the puff using the metered dose inhaler via the endotracheal tube. This may lead to complications such as inadequate anaesthetic delivery where the patients may be inadequately anesthetized or wake up during surgery, leading to emergence awareness [7]. Escaping anaesthetic gases can also contaminate the operating room environment when the ventilatory circuit is suddenly disconnected while delivering the bronchodilator puffs [8]. The Nebu Venti method offers a viable alternative to the above without abruptly disconnecting ventilation by directly connecting the 50 ml syringe via the luer lock to the gas sampling port of the elbow connector. This ensures prompt treatment of the intraoperative bronchospasm using existing equipment.

Article Information

Disclaimer (Artificial Intelligence): The author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.), and text-to-image generators have been used during writing or editing of manuscripts.

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