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OVERVIEW OR DRUG CHOICE IN RAPID SEQUENCE INTUBATION IN BRONCHIAL ASTHMA PATIENT

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Abstract:
The choice of drug used to facilitate endotracheal intubation in Asthmatic patients during rapid sequence induction (RSI) may have an impact on survival. Ketamine is commonly used in the hemodynamically unstable patient although it has been associated with side effects. This review sought to investigate which induction agents is preferable, and safer for RSI in asthmatic patients. PubMed, Embase, and the Cochrane Library were systematically searched to the end of 2020, for relevant studies to our concerned topic. ketamine is the only available drug that has an analgesic effect itself. All other induction agents are usually combined with an opioid that must be considered a confounding factor, as its more way safe agent in bronchial asthma patients than other agents.

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INTRODUCTION:

Asthma is a diffused obstruction of airways that may present as shortness of breath, wheezing, and coughing. It is one of the most common chronic illnesses, which presently affects 300 million people all over the world and this number is predicted to rise to 100 million in 2025 [1,2].

The asthmatic patient undergoing surgery is at risk for perioperative morbidity and mortality. A large retrospective review revealed that the incidence of intraoperative bronchospasm and laryngospasm was surprisingly low, ~1.7%, although complications were more frequent in older patients and those with active asthma [3].

Rapid sequence intubation (RSI) traditionally involves the sequential administration of a sedative and neuromuscular blocking agent (**Figure 1**) [4]. The sedative agent makes the individual subconscious; the neuromuscular obstructing representative produces muscle relaxation, which boosts laryngeal sight, reduces intubation-associated difficulties, and also enhances the possibility of intubation success [5]. RSI is one of the most typical method of emergency situation intubation, used in roughly 85% of ED intubationsand 75% of critical care unit intubations [6]. Although both medications are carried out in quick succession, to our understanding the order of drug administration is not based on empiric data [7].

While management of the sedative representative first prevails and also enhances the possibility of adequate sedation before neuromuscular clog, sedatives can create hypoventilation and apnea [8]. If hypoventilation or apnea come before the beginning of neuromuscular blockade, the person sustains both an enhanced danger of hypoxemia and also a prospective delay between apnea onset and optimal intubating conditions (i.e., complete muscular tissue leisure). On the other hand, administration of the neuromuscular blocking representative first may better straighten the onset of apnea caused by the sedative representative with the start of optimum intubating problems, consequently decreasing unnecessary apnea time. While some advocate against this strategy for worry of person awareness while under neuromuscular clog, it has been examined in the operating area setting [9].
RSI is utilized in circumstances where a patient needs intubation and is at risk for ambition. For operative people, this includes individuals who have actually not fasted in accordance with the American Culture of Anesthetic Technique Standards for Preoperative Fasting [10]. The majority of people that call for intubation in the emergency department (ED) and critical care unit (ICU) ought to be thought about to have a complete stomach, and also a lot of would certainly get a RSI. Terrible injury prevents gastric draining and is associated with stomach acid secretion; so in spite of an ideal not eating interval, most medical professionals would certainly take into consideration these clients to require RSI [11].

This review aimed to discuss and emphasize the proper management of asthmatic patient during rapid sequence intubation, weather as emergency or preoperative evaluation.

METHODOLOGY:

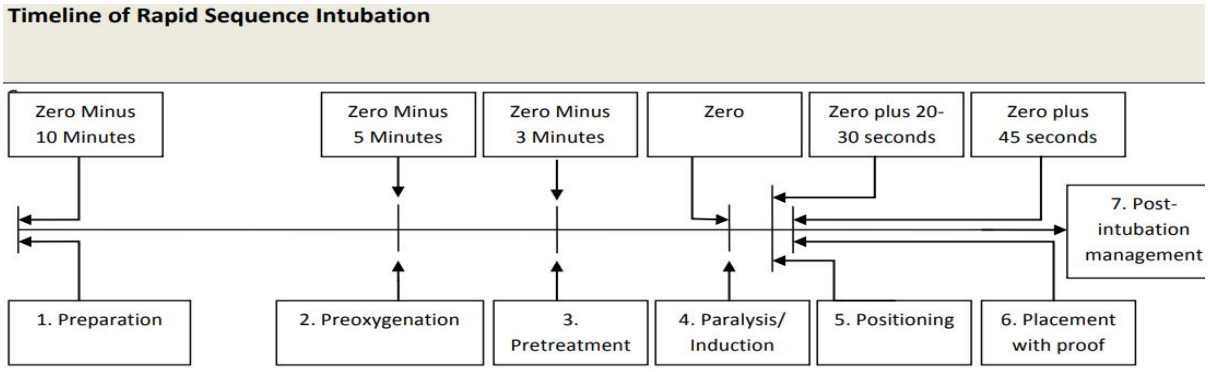
MEDLINE, EMBASE, Google Scholar, and Cochrane data bases (from their inception to Jan 2020) using key words “ketamine”, “asthma”, “bronchospasm”, “bronchodilator”, and “rapid sequence intubation” were searched to identify the reports on the use of best premedication as suitable in bronchial asthma in case of rapid sequence intubation, and manual review of article bibliographies was done. Relevant databases were searched for the ongoing trials discussing the concern topic. Limitation to only human subject published in English language only.

DISCUSSION:

Pathophysiology of Bronchial asthma:

Asthma implies a wide phenotype range of severity, chronicity, determination, as well as feedback to treatment. The intensity of the condition process is associated with the extent of respiratory tract inflammation, which regulates hyperresponsiveness, the degree of blockage, and symptomatology. Bronchoconstriction arises from contraction of bronchial smooth muscular tissue generated by a myriad feasible stimulation, consisting of inherent variables, allergens, exercise, anxiety, or cold air. Vagal as well as sympathetic elements directly modulate airway tone. Inflammatory oedema as well as mucous plugging worsen air flow restriction as well as progressively impair the feedback to bronchodilator treatment. Air passage remodelling, enlarging, as well as abnormal communications between the hurt air passage epithelium and also the lung mesenchyme give resistance to corticosteroid therapy also [12]. Air passage smooth muscle mass changes have actually been linked in persistent, badly responsive bronchospastic illness' both as a mechanical and as an inflammatory moderator [13]. The immunologic-inflammatory pathways involved in the pathogenesis of bronchial asthma are complicated and consist of lymphocytes (both Th1 and also Th2), immunoglobulin E, eosinophils, neutrophils, pole cells, leucotrienes, as well as cytokines. These

pathways are triggered as well as modified by external as well as environmental elements such as irritants, breathing infections, smoke, and occupation-related exposure [12,13]. Thus, asthma ultimately represents a dynamic interaction between host and environmental factors (**Figure 2**).



1. **Preparation** – Assemble all necessary equipment, drug, etc.
2. **Preoxygenation** – Replace the nitrogen in the patient's functional reserve with oxygen – "nitrogen wash out – oxygen wash in"
3. **Pretreatment** – Ancillary medications are administered to mitigate the adverse physiologic consequences of intubation
4. **Paralysis with induction** – Administer sedative induction agent via IV push, followed immediately by administratio of paralytic via IV push
5. **Positioning** – Position patient for optimal laryngoscopy; Sellick's maneuver, if desired, is applied now
6. **Placement with proof** – Assess mandible for flaccidity; perform intubation, confirm placement
7. **Post-intubation management** – Long-term sedation/analgesia/paralysis as indicated

Figure 1: Rapid Sequence Intubation sequence

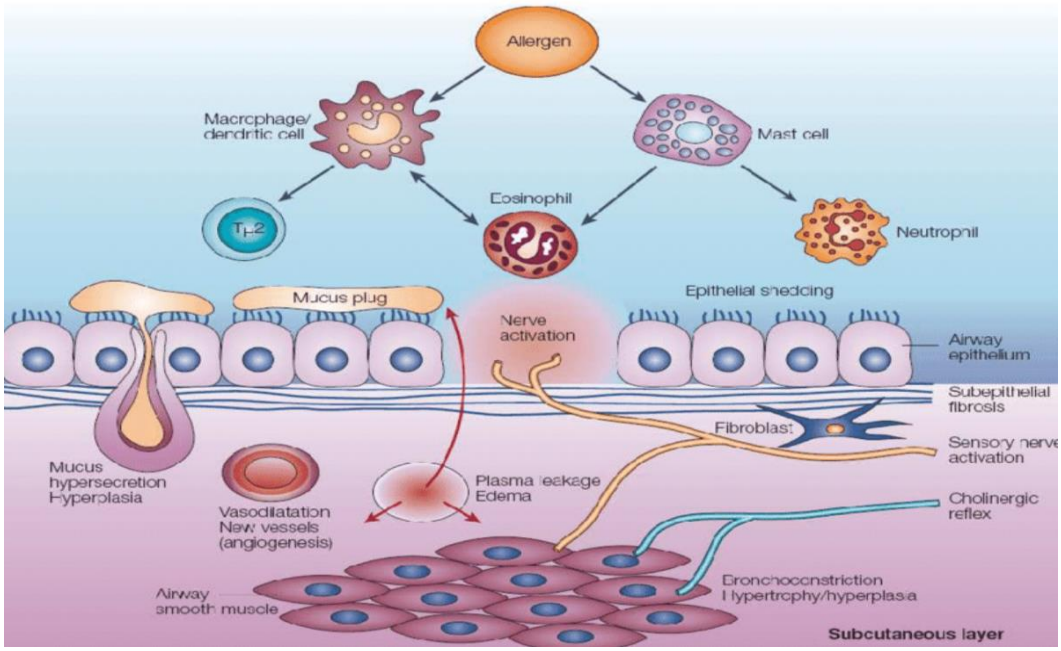


Figure 2: Pathophysiology of asthma and bronchospasm

Premedications are administered to attenuate the anxiety and potentially negative physiological responses that can occur during tracheal intubation [14]. Optimal timing of premedications depends on the abnormal physiological response of concern. Typical premedications include the following: midazolam, fentanyl, atropine, and lidocaine [15].

Preoperative evaluation

Preoperative evaluation as well as treatment is the vital to effective administration of the client with bronchial asthma. When asthma is well controlled, it possibly gives no additional risk for perioperative problems; when it is inadequately controlled, it often does [15]

Progressive intense bronchoconstriction swiftly results in increased job of breathing (WOB), reduced air flow, air capturing, dynamic devaluation, air flow- - perfusion (V/Q) inequality, boosted lung vascular resistance (PVR), as well as appropriate ventricular overload [15].

The forced expiratory quantity in the first second of expiration (FEV1) is considerably decreased throughout energetic bronchospasm. The forced important capability (FVC), expiratory get quantity (ERV), inspiratory ability, as well as forced expiratory circulation between 25% as well as 75% of the FVC (FEF25 - 75%) are likewise decreased, whereas recurring quantity, functional recurring capacity, as well as complete lung capacity are enhanced. All these indices can return in the direction of typical in between bronchospastic assaults. The vibrant compliance of the lungs reduces as a result of air capturing, and also accessory muscle mass (scalene and also sternocleidomastoid) are recruited to protect the tidal quantity (Vt) despite boosted ERV. Quickly, intrinsic and external recoil of the lungs is not able to overcome airway obstruction, demanding energetic exhalation utilizing intercostal, abdominal, and also diaphragmatic muscular tissues. The WOB considerably enhances, along with oxygen intake (VO2) and co2 production (VCO2), whereas the O2 supply as well as CO2 elimination lessen. Eventually, this might cause myocardial oxygen inequality (discussed later). In serious bronchospasm, blood gas abnormalities take place therefore of V/Q inequality [16]. Variable airway obstruction leads to areas of run-away inflation and also hypoinflation, which can be matched initially by hypoxic lung vasoconstriction (HPV) [10,14]. Nonetheless, inflammatory (as well as restorative) vasodilation quickly turns around HPV and also hypoxaemia results. In the onset of bronchospasm, hyperventilation results in respiratory system alkalosis. Increasing air trapping and also respiratory muscular tissue exhaustion lead to increasing CO2 retention; 'normalization' of the Paco2 really mirrors decompensation and also shows a requirement for immediate substantive healing treatment. Once hypercapnia supervenes, the problem can wear away to standing asthmaticus, with a high morbidity and also death. Extreme dynamic air trapping may cause so much hyperinflation that cardiac filling is restricted by 'pulmonary tamponade', ultimately resulting in pulseless electrical activity [15].

Ketamine as proper premedication for RSI:

The optimal drug for RSI is required to have a rapid onset of action and a short half-life. The slow onset of action (60–90 seconds) as well as elimination of midazolam (1–4 hours) makes it less attractive in the acute situation compared to propofol and etomidate that induce anesthesia within 15–45 seconds, and ketamine within 30 seconds [16]. Furthermore, the drug should have negligible hemodynamic effects and decrease ICP for patients with head injuries. This is the case for both ketamine and etomidate, although ketamine was previously believed to be poorly suited for patients with increased ICPs [17]. However, a review from 2006 argues that the original studies examining ketamine's effect on ICP actually showed that cerebral perfusion was improved in patients receiving ketamine. Another study on pediatric intensive care unit patients with preexisting intracranial hypertension showed that ketamine effectively decreased ICP and prevented ICP elevations during stressful interventions [18]. Although propofol is a frequently used induction agent, concerns exist regarding its potential hypotensive effects. Whether dosage reduction is necessary may therefore be important to consider, for example, in the elderly patient with preexisting hypotension [19,20]. A retrospective study from 2015 compared RSI with etomidate and reduced dosages of propofol and found no statistically significant impact on the hemodynamics of normotensive and hypertensive trauma patients. When evaluating studies on RSI, it is therefore highly important to take the given dosages into consideration, assuming 1 size does not fit all [21].

CONCLUSION:

The incidence of asthma is increasing worldwide, but morbidity and mortality are decreasing as a result of renovations in medical care. Although the occurrence of extreme perioperative bronchospasm is reasonably low in asthmatics undertaking anaesthesia, when it does occur it can be life-threatening. The keys to a straightforward perioperative program are assiduous

interest to detail in preoperative assessment, and maintenance of the anti-inflammatory and bronchodilatory routine through the perioperative duration. Possible trigger representatives must be recognized and prevented. Several consistently made use of anaesthetic agents have a salutary effect on respiratory tract constraint. Nonetheless, intense bronchospasm can still take place, especially at induction and introduction, and also should be promptly as well as systematically handled. ketamine is the only readily available medicine that has an analgesic effect itself. All other induction representatives are normally incorporated with an opioid that needs to be considered a confounding element.

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