

Intubation after physiological optimization in the emergency department

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ABSTRACT

Emergency departments witness all sorts of unprecedented types of patients with respiratory compromise. Airway management must be done expeditiously in dire situations. It's a well-known fact that patients are not well optimized for intubation as soon as they land up in an emergency. There might have a myriad of comorbidities to be addressed. Amongst various, we have discussed intubation in patients with increased intracranial pressure, patients with shock, patients with acidosis, and patients with respiratory failure. To have a better understanding of the physiological status of patients, reviewed 18 articles, and retrieved a synopsis from the abstract and conclusion. Here we have discussed the physiological optimization of patients based on current recommendation.

Keywords: Intubation, difficult airway

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The need for intubation in a sick patient in the emergency department is unpredictable and often promptly required.¹ Tracheal intubation in the emergency department as compared to the elective setting has adverse outcomes due to several factors.² Patients often land up in emergency in respiratory compromise, crashed airway or with difficult airway i.e. critically ill patients who have derangement beyond inadequate airway or hypoxemia, which contribute to physiological difficult airway and are associated with an adverse outcome like cardiac arrest, hypoxic brain injury and even death.³ Physiological derangements increase the risk of hypoxemia and hemodynamic deterioration while reducing the patient tolerance to repeated and prolonged intubation attempts.⁴ These patients should be considered high risk and need physiological optimization and readiness to minimize adverse outcomes.⁵ Hence our topic of discussion is the optimization of physiological conditions in a myriad of conditions like patients with raised intracranial pressure, patients with shock, patients with respiratory failure, and patients with acidosis crashing in the emergency department.

An increase in intracranial pressure can elicit a reflex sympathetic response due to intubation and laryngeal reflex while securing the airway, further increasing ICP and deteriorating neurological status.⁶ Performing manual in-line stabilization ensure safe endotracheal intubation or the use of video and flexible fiberoptic laryngoscopy.⁶ Induction with etomidate is recommended in patients with raised ICP ketamine can be considered in patients with hypotension while avoiding muscle relaxants whenever possible.⁷ Common medications used for pre-medication are lidocaine at 1.5 mg/kg, esmolol at 1-2 mg/kg and fentanyl at 2-3 ug/kg. Similarly induction agent that do not adversely affect cerebral perfusion pressure like etomidate, propofol and thiopental can be used.⁸ In a patient with ICP, due to intracranial hemorrhage, recommended systolic blood pressure is 140 mm of Hg whereas in ischemic brain injury there is no clear evidence regarding optimal blood pressure control and advice against intervention unless systolic blood pressure is over 220 mm of Hg.

In a patient with shock, rapid sequence intubation or positive pressure ventilation increases the burden of shock due to decreased cardiac output and increasing oxygen debt leading to organ dysfunction and coagulopathy.⁹ Hence hemodynamic compromise and cardiac arrest should be managed with fluid, blood, and

vasopressor before induction and intubation.¹⁰ That patient in hemorrhagic shock with intact airways and who can maintain adequate oxygenation strategy of delayed intubation should be strongly advised.¹¹ Pre-intubation shock index (pulse rate/ systolic blood pressure) greater than 0.9 has been identified as a predictor of post-intubation hypotension and mortality.¹² On RCT between ketamine- lidocaine combination vs ketamine alone full dose for rapid sequence endotracheal intubation in a patient with septic shock, Lidocaine-ketamine combination showed less incidence of hypotension compared to ketamine full-dose.¹³

Patients with respiratory distress in acidosis is next common presentation to Emergency Department. Inability to mount an adequate ventilator response to metabolic acidosis with an increased likelihood of respiratory failure will require ventilator support.¹⁴ Apneic period during intubation and paralysis may lead to sudden and further decrease in pH resulting in hemodynamic collapse, dysrhythmia or bradycardia.¹⁵ For the patient with acidosis underlying cause of acidosis should be reversed, apneic time should be reduced, one should match at least the pre-intubation respiratory rate to approximate minute ventilation to post intubation respiratory rate and one should check blood gas shortly.¹⁰ Evidence suggesting bronchodilators, ketamine and He-O₂ may be employed in-patient with acidosis.¹⁶

In a patient with respiratory failure strong predictor of complication during and post intubation are pre intubation saturation, thus pre oxygenation to improve pre-intubation SpO₂ to reduce risk of desaturation and apneic oxygenation must be done.¹⁰ A PaO₂/FIO₂ below 200 mm Hg and a high tidal volume greater than 9 mL/kg were the two strong predictors of intubation under noninvasive ventilation.¹⁷ Helmet NIV has been compared with HFNC resulting in greater improvement in oxygenation, reduction in dyspnea and respiratory effort as an alternative to invasive airway.¹⁸ In a study conducted by frat et al, combined treatment with lidocaine and salbutamol and awake intubation can be recommended in patient with respiratory failure.¹⁷

The morbidity and mortality of patients in post intubation phase depends on the pre intubation status of the patient. Optimization of physiological status beforehand will decide on the overall outcome of patient. Physicians must follow and optimize physiology beforehand to the process of airway management taking a systems-based

approach to mitigate the risk of harm to the patient.

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