

Reducing Postoperative Coughing with Intravenous Lidocaine

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Structured Abstract

Background

The physiological act of coughing is the body's natural defense system against foreign materials and aspiration. Even though coughing serves as a beneficial mechanism, there are negative surgical consequences associated with excessive post-extubation coughing, such as severe hypertension, tachycardia, myocardial ischemia, arrhythmias, negative pressure pulmonary edema, surgical site bleeding, and hematoma formation. Intravenous (IV) lidocaine contains chemical properties that attenuate the sympathetic response to intubation. The theory behind the use of IV lidocaine on emergence stems from the idea that if lidocaine can blunt certain side effects during intubation, then lidocaine can attenuate those same effects during emergence and extubation.

A 61-year-old male, 76 kg male presented for a robotic right inguinal hernia repair procedure. His relevant past medical and surgical history included hypertension and a left partial nephrectomy. On induction, the patient was pre-oxygenated with 100% oxygen at 8 L/min to reach an expired oxygen concentration of 90% and administered fentanyl 100 mcg IV, lidocaine 100 mg IV, propofol 140 mg IV, and rocuronium 50 mg IV sequentially. Direct laryngoscopy was performed with a Macintosh 3 blade, grade I view, and endotracheal tube size 8.0 inflated with 10 mL of air. On emergence, the patient received neuromuscular blocker reversal and lidocaine 20 mg IV two minutes before the final deep fascia incision closure. Extubation occurred eight minutes after the emergence dose of lidocaine was given. The patient was extubated without airway complications and transferred to the post-anesthesia care unit on a simple face mask at 6 L/min and stable vital signs. One hour after the patient arrived in the recovery room, there was no presence of an excessive cough, sore throat, or hemodynamic instability.

Clinical Question

Does the administration of IV lidocaine attenuate coughing and the associated consequences in the postoperative setting?

Evidence Based Discussion

Lidocaine is an aminoamide local anesthetic that suppresses myelinated A and unmyelinated excitatory nerve fiber spike frequency, amplitude, and conduction time in the airway while reducing the presence of neuropeptides and neural discharge from peripheral nerve fibers. IV lidocaine has an onset of 30 to 45 seconds, peak effect at 1 to 2 minutes, and a half-life of 90 minutes. Researchers have found that lidocaine can minimize the presence of cough and sore throat for up to 24 hours after extubation, reduce postoperative opioid requirements, and shorten the hospital length of stay by 8 hours. The recommendation for IV lidocaine on emergence is 0.5 mg/kg to 2 mg/kg and

given at 2 minutes before extubation. Some researchers have further elaborated that that 1 mg/kg provides a post-extubation cough suppression rate of 100%. Cough suppression minimizes the risks of postoperative airway complications.

Translation to Practice

The administration of IV lidocaine on emergence should be assessed on a case-by-case basis. While lidocaine can provide certain benefits during emergence and extubation, the anesthesia provider must take into consideration the pros and cons of its utilization. Lidocaine has been associated with prolonged extubation times ranging from 1 to 3 minutes when compared to a placebo group. Even though the patient in the case study received less than the recommended IV lidocaine dose and did not experience post-extubation airway complications, there could be other factors that contributed to the lack of postoperative sore throat, such as an appropriate sized endotracheal tube or the administration of intraoperative dexamethasone IV. Lidocaine on emergence can provide advantageous outcomes in for patients who are at a higher risk for postoperative complications associated with coughing. Future research is necessary to determine a narrower recommended dose range, precise timing of administration, and lidocaine's effect when given with adjunctive medications in order to provide the most effective cough attenuation.

Keywords: coughing, lidocaine, postoperative complications

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