



Lidocaine Nebulization in the Treatment of Acute Severe Refractory Bronchial Asthma

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Abstract:

Status asthmaticus is an acute exacerbation of asthma that remains unresponsive to initial treatment with bronchodilators. Status asthmaticus can vary from a mild form to a severe form with bronchospasm, airway inflammation, and mucus plugging that can cause difficulty in breathing, carbon dioxide retention, hypoxemia, and respiratory failure. Typically, patients present a few days after the onset of a viral respiratory illness, following exposure to a potent allergen or irritant, or after exercise in a cold environment. Lidocaine is a local anaesthetic that blocks voltage gated sodium channels in neurons and cardiac cells, and is used as a short acting local anaesthetic and anti-arrhythmic agent. Interestingly lidocaine also inhibits the function of non-excitabile cells, particularly inflammatory cells, such as neutrophils, eosinophils, macrophages, mast cells and TH2 cells, raising the promising possibility of its alternative clinical applications in the control of chronic inflammatory diseases, including asthma. We report a case of a 70 year old Asian male patient, suffering from bronchial asthma, admitted with acute exacerbation with fever, impaired consciousness, loose motions and vomiting. The patient had developed herpes zoster ophthalmicus one week back. During the course of hospital stay, the patient developed status asthmaticus not responding to the conventional management, and was managed with nebulised 2% lidocaine resulting in a considerable improvement in signs and symptoms. In addition, the patient also got relief from the pain of herpes zoster ophthalmicus.

Key words: Lidocaine, Bronchial Spasm, Herpes Zoster Ophthalmicus, Pain, Anesthesia, Humans.

Introduction

Acute severe asthma previously referred to as status asthmaticus is an acute exacerbation of asthma that does not respond to standard treatments of bronchodilators (inhalers) and steroids [1]. Symptoms include chest tightness, rapidly progressive dyspnea

(shortness of breath), dry cough, accessory muscles involvement, labored breathing and wheezing. It is a life-threatening episode of airway obstruction considered a medical emergency. Complications include cardiac and/or respiratory arrest [1].

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Case Report

70 year old male, a known case of bronchial asthma on metered dose inhaler of salbutamol and ipratropium bromide was admitted to our medical emergency with chief complaints of fever, impaired consciousness, loose motions and vomiting. On examination the patient was found to be drowsy and irritable with a Glasgow coma scale (GCS) of 11 with Eye response (E) of 3, Verbal response (V) of 3 and Motor response (V) of 5. He had a regular pulse rate of 82 beats per minute, a blood pressure of 120/70 mm Hg and a respiratory rate of 18 breaths/minute with a cyanotic appearance. His tongue was dry, and he had a body temperature of 38.7°C. Examination of the chest revealed a bilateral decreased air entry with wheeze. The examination of cardiovascular system and the abdomen were unremarkable. Other physical findings were vesicular eruptions over the left side of the forehead, involving the left eye and ipsilateral sub-conjunctival haemorrhage. This was associated with pain which increased on breathing. The investigations revealed a Hb of 12.9 gm%, a white blood cell count of 14810/ μ L (polymorphs-65%, lymphocytes-25%), a platelet count of 75,000/ μ L, a urea of 52 mg%, serum creatinine of 1.2, a blood sugar level of 82 mg%, sodium of 136 meq/L and a potassium of 3.7 meq/L. Cerebrospinal fluid analysis showed a white blood cell count of 300/ μ L (neutrophils-70%, lymphocytes-30%), red blood cell count of 900/ μ L without xanthochromia.

The patient was started on inhaled oxygen, a nasogastric tube was placed and feeding started. A condom catheter was also placed. The patient received intravenous ceftriaxone 1 gm 12 hourly, vancomycin 1 gm 8 hourly and acyclovir 500 mg 8 hourly. The patient continued on salbutamol and ipratropium nebulization.

On the first night of admission patient's GCS dropped to 7 (E2V2M3) and saturation fell

to 78%. The patient was intubated and put on mechanical ventilation. The patient remained in our ICU on mechanical ventilation for three days. Post extubation, the patient remained hemodynamically stable with a heart rate of 79 beats per minute, blood pressure of 140/83 mm Hg, an Spo2 of 96% (on venturi mask) and a respiratory rate of 30/min. However, air entry was decreased bilaterally with diffuse wheeze. Other systemic examination was normal.

The patient continued on the standard treatment in the form of nebulized ipratropium bromide and salbutamol combination and intravenous (IV) hydrocortisone (100 mg q 6 hourly). But the patient continued to have episodes of bronchospasm. The patient also received non-conventional treatment in the form of injectable magnesium sulphate (2 gm IV). But this did not help his bronchospasm. Ultimately nebulised lidocaine (2 mg/kg) was added every 4 hours. Following the addition, the patient showed considerable improvement in signs and symptoms. His tachypnoea decreased, breathing improved and patient also felt a relief in his herpes zoster pain. The patient showed gradual improvement and chest signs improved subsequently. The patient was shifted from the ICU and discharged from the hospital after a few days.

Discussion

Local anaesthetics block voltage-gated sodium channels in peripheral nerves causing reversible inhibition of impulse transmission and blockade of neuronal function in a circumscribed area of the body. Lidocaine is largely used in clinic as a short-acting local anaesthetic and antiarrhythmic agent [2]. Interestingly, lidocaine also inhibits the function of non-excitabile cells, particularly inflammatory cells, such as neutrophils, eosinophils, macrophages,

mast cells and TH2 cells, raising the promising possibility of alternative clinical applications on the control of chronic inflammatory diseases, including asthma [3-7].

Eosinophils are expected to play a pivotal role in the pathogenesis of asthma and studies on the putative beneficial effect of nebulized lidocaine in adults and children with asthma have been carried out. Administration of nebulized lidocaine four times daily in 20 adult patients with severe asthma, who had side effects of exogenous hypercortisolism, allowed for the complete elimination of steroid treatment in 13 of 20 patients [3]. A pilot study involving six pediatric patients with severe asthma added support to the interpretation that nebulized lidocaine in doses of 40 to 100 mg (0.8 to 2.5 mg/kg/ dose) four times daily had indeed steroid-sparing actions [1].

The successful use of nebulised lidocaine in our patient with acute severe asthma lends further credence to the fact that lidocaine when used as an inhaled agent helps relieve resistant bronchospasm not responding to the conventional therapy. Hence, lidocaine may be added to the treatment regimen of refractory acute severe asthma.

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