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Piyush Upadhyay

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CASE REPORT

Role of ketamine in refractory status asthmaticus: a case report

Piyush Upadhyay

Department of Pediatrics, Sri Ram Murti Smarak Institute of Medical Sciences, Bareilly, U.P, India

Abstract:
Patients experiencing severe asthma exacerbations occasionally deteriorate to respiratory failure requiring endotracheal intubation and mechanical ventilation. Mechanical ventilation in this setting exposes the patients to substantial iatrogenic risk and should be avoided if at all possible. This case suggests that intravenous ketamine given in a dissociative dose may be an effective measure to avoid mechanical ventilation in pediatric patients with severe asthma exacerbations.

Keywords: Ketamine, Status asthmaticus
Corresponding author: *Piyush Upadhyay*, *Sri Ram Murti Smarak Institute of Medical Sciences, Bareilly, U.P, India*
e-mail: piyushdrpeds.com@gmail.com

Introduction

Ketamine had been used effectively and safely for procedural sedation in children for many years. It has powerful bronchial relaxant effect and has been shown to improve pulmonary compliance [1] and decrease airway resistance in patients with obstructive airway disease [2]. The bronchodilator effect of ketamine is postulated to be due to catecholamine release and inhibition of catecholamine reuptake processes, thus acting as sympathomimetic agent resulting in bronchial relaxation [2]. Ketamine has been used in acute severe asthma in adults and children [3-9] and rarely used in infants [8,9].

Case report

A 10 yrs old boy presented to pediatric emergency with life threatenning attack of asthma.He was a newly registered case of asthma in our asthma clinic and was on preventers. His compliance was poor. The patient was started on oxygen, nebulized levosalbutamol and ipratropium by face mask device, subcutaneous epinephrine, i.v. hydrocortisone, i.v. MgSO4, i.v. aminophylline infusion as per protocol. A chest radiograph showed hyperinflated lungs with no focal consolidation and no pneumothorax. Thirty minutes into the above-mentioned treatment respiratory score deteriorated, the patient seemed to be getting tired, with a decreased respiratory rate, no improvement in air exchange, and still no audible wheezing on chest auscultation. While setting up for rapid sequence intubation, stat arterial blood gases were obtained and showed pH 7.23; pCO 2 62; pO2 86; HCO 3 26; and oxygen saturation 94%. In an attempt to avoid intubation and mechanical ventilation, we administered ketamine 0.75 mg/kg i.v/45 min after initiation of levosalbutamol treatment with a one minute onset of a dissociative state recognized by decreased responsiveness and nystagmus. The patient's respiratory rate

decreased to 20 breaths/minute and lung auscultation revealed bilateral improvement in air movement with audible wheezing. The patient woke up in 10 minute, had an oxygen saturation of 100%, and was able to speak three to four words at a time. About 30 minute after administration of the ketamine bolus, the patient reported worsening shortness of breath. The oxygen saturation decreased to 90%, and physical examination demonstrated bilateral decreased air movement and decreased wheezing. A second ketamine bolus of 0.75 mg/kg was administered intravenously, followed by continuous ketamine drip of 0.15 mg/kg/h with a one minute onset of a dissociative state that lasted approximately 10 minute. The patient's respiratory status showed marked improvement after the second bolus, as evidenced by increased bilateral air entry and loud audible wheezing. Upon awakening from the dissociative state, the patient reported significant improvement in her shortness of breath and was able to speak in five- to six-word sentences. Thereafter i.v. infusion of ketamine at the rate of 1mg/kg/minute was started. The ketamine infusion rate was increased to 0.15mg/kg/minute to maintain the improvement. At this dose he improved further; respiratory distress and wheezing decreased and oxygen saturation increased gradually. The aminophylline and ketamine infusions were tapered off gradually in 72 hours. Need of intubation and mechanical ventilation was obviated. No side effects of ketamine were noted during the course of therapy. He was shifted out of PICU after four days of stay and was discharged from hospital after another five days. Patient is now doing well on inhalers and asthma is well controlled.

Discussion

Betts, et al. [3] first reported use of ketamine in an asthmatic child in 1971. Since then, there are case reports/series and a few observational studies and randomised control trial related to use of ketamine for acute exacerbation of asthma in pediatric age group . In these studies ketamine had been used for both nonventilated [3-6] and ventilated [7-9] children with benefits and there were either no or minor side effects. Ketamine has been used mostly for acute exacerbation of asthma, for patients who failed standard therapy except for study by Youssef-Ahmed, et al. [8] where it was also used for ventilated patients with severe bronchospasm due to Respiratory Syncytial Virus bronchiolitis (n=4) and bacterial pneumonia (n=2). Ketamine, when used in nonventilated patients, obviated the need for mechanical ventilation [3-6], as seen in index case also.

To summarize, the use of ketamine in a child with refractory life threatening asthma attack was not only successful it obviated the need for intubation and mechanical ventilation. Well designed large randomized control trials are needed before recommending ketamine routinely for moderate to severe bronchospasm refractory to standard treatment in pediatric patients as many individual reports have accumulated which supports its life saving role.

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