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CASE REPORT

Intranasal sedation for cerebrospinal fluid collection in pediatrics: case report

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Abstract

Sedation in pediatrics has grown in recent decades, as ethical principles point out that pain relief and patient comfort should be offered whenever necessary. Intranasal administration thus appears as a timely non-parenteral route of sedation in procedures for patients without venous access. We report a case of intranasal sedation successfully performed in a patient under diagnostic investigation of limb paralysis, who had no venous access and was anxious about the need for invasive diagnostic procedures. Intranasal sedation represents a route of administration of sedative drugs outside the operating room to perform minor procedures in pediatric patients when provided with appropriate safety precautions.

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INTRODUCTION

There has been a growing number of sedation and analgesia for short painful procedures in pediatrics in the last two decades. This fact stems from the development of new drugs, as well as the emerging role of pediatricians working in the most diverse subspecialties[1]. A study carried out at the emergency department of the University of Cambridge's Addenbrooke Hospital showed that sedation is performed in every 250 visits in this service[2], showing the enormous potential of the use of sedatives in pediatric emergency services.

Ethical principles, as well as the best available evidence, determine that comfort for the patient and pain relief must be provided in diagnostic and therapeutic interventions carried out in children, to minimize stress for patients, parents and the healthcare team[1].

Peripheral venous (IV) access frequently used in the administration of sedatives is one of the most common sources of pain in hospitalized children and is consistently associated with distress. As a possible alternative to intravenous drugs, the intranasal (IN) route has become increasingly popular due to its ease of administration, reduced suffering, no risk of injuries and complications of venipuncture[3]. In addition, the rich vascular supply of the nasal mucosa promotes rapid drug absorption, avoiding the first-pass hepatic metabolism observed in the oral route, which increases the drug's bioavailability and decreases the onset of action[4].

In this sense, we present a case report of successful intranasal sedation in an anxious student without venous access, with the purpose of performing a lumbar puncture outside the operating room.

CASE REPORT

A 10-year-old male student was admitted to the pediatric ward of our service to investigate an acute case of paralysis in the left lower limb. He was in good general condition, oriented, although he showed apprehension and anxiety about the hospitalization and potential procedures necessary in the case investigation. Only symptomatic patients were prescribed orally. Due to the neurological condition, CSF puncture was indicated, which aggravated the anxiety of the patient and his mother. Aiming to provide comfort and analgesia in view of the situation presented, it was decided to perform sedation intranasally, using a specific atomizer (LMA MAD Nasal, Teleflex, Fort Worth, TX, USA - figure 1).

After fasting for 6 hours, he was initially instilled (figure 2A) Ketamine at a dose of 4 mg/kg (solution for injection, concentration 50.0 mg/mL-Ketamine S, Cristalia, São Paulo, Brazil). After 3 minutes, midazolam was administered at a dose of 0.2 mg/kg (solution for injection, concentration of 3 mg/mL - Dormire, Cristalia, São Paulo, Brazil). There was a progressive sedative effect, and within seven minutes the patient was in moderate sedation, and the procedure was started. He was continuously monitored using pulse oximetry. The patient was

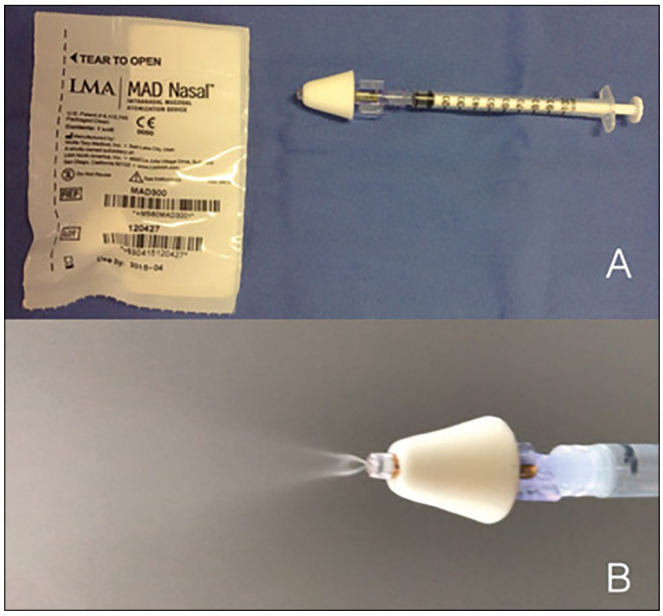


Figure 1. Nasal atomizer (MAD - mucosal atomizer device) for intranasal sedation (A). Demonstration of the atomization of a fine cloud of particles 30 to 100 micrometers in size (B).

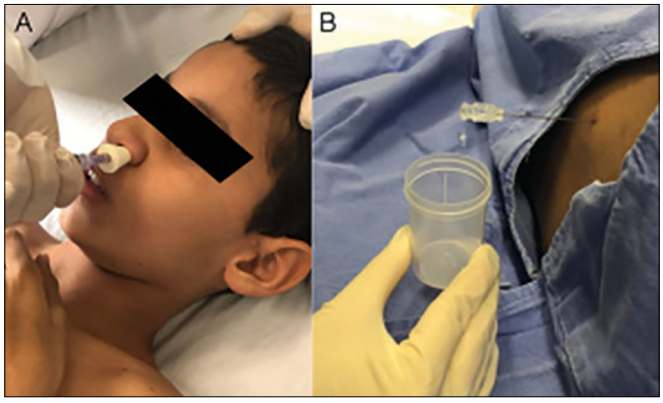


Figure 2. Comfortable intranasal ketamine instillation in the patient in the supine position (A). Lumbar cerebrospinal fluid puncture with collection of clear and colorless cerebrospinal fluid (B).

then placed in horizontal lateral decubitus with flexed head and flexed knees, with adequate antisepsis and puncture between the L3 and L4 intervertebral spaces, with the collection of 2 ml of clear and colorless cerebrospinal fluid in each vial (figure 2B). The procedure was uneventful. The patient's oxygen saturation remained above 95% throughout the procedure. After 42 minutes of observation, the patient already met the criteria for discharge from anesthesia and was able to return to his infirmary bed.

DISCUSSION

This case report highlighted the use of intranasal sedation in pediatrics, with safety, comfort and effectiveness for a procedure in a hospital setting.

Anxiety in children, inherent to the process of hospitalization and performance of procedures, is a common event in pediatrics[6], possibly associated with painful or traumatic events previously experienced. This fact can generate reactive behaviors that make it difficult or impossible to perform the appropriate techniques in invasive procedures in pediatrics[7].

Following this line of reasoning, given the case described, we chose to use ketamine and midazolam, administered intranasally, since the patient did not have venous access at the time of the procedure. Similarly, a previous study proposed performing procedures associated with mild pain and high anxiety (lumbar puncture, suture, peripheral venipuncture, nasofibroscopy, dental procedures, gastrostomy and tracheostomy changes) under sedation and analgesia with ketamine and midazolam , together with providing comfort and local anesthesia[8]. Bahetwar et al (2011) demonstrated that this association administered intranasally at a dose of 4 mg/kg (ketamine) and 0.2 mg/kg (midazolam) had a total success rate of 84.0% in sedation for performance of procedures[4]. The administration of such medications in sequence (ketamine followed by midazolam) is justified by the fact that the analgesic effect of ketamine has onset of action in just 3 minutes, which minimizes the pain classically associated with intranasal midazolam (Prehospital analgesia using nasal administration of S-ketamine—the case series). Other sedative drugs, such as dexmedetomidine, can also be used through this route[10].

The safety of sedation in pediatrics depends on the systematic checking of several fundamental aspects, in particular: pre-sedation assessment (ASA classification, airway assessment), appropriate fasting for elective procedures (clear fluids/water: 2 hours; breast milk: 4 hours; bottles and light meals: 6 hours), extensive knowledge of pharmacology, pharmacokinetics and preparation of drugs and their antagonists, and material for adequate care in possible complications[5].

In cases of deep sedation or respiratory depression, the intranasal use of flumazenil is recommended to antagonize benzodiazepines. It is a lipophilic agent with approximately 50% bioavailability. A pharmacokinetic study showed that the adequate plasma concentration of flumazenil was reached within 2 minutes after intranasal instillation, with a half-life of approximately 75 minutes[11].

Intranasal sedation, when performed under appropriate safety precautions, represents a non-parenteral route of administering sedative drugs outside the operating room for short-term procedures in pediatric patients.

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