



Intranasal midazolam for rapid sedation of an agitated patient

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Abstract

Rapidly, establishing a difficult intravenous access in a dangerously agitated patient is a real challenge. Intranasal midazolam has been shown to be effective and safe for rapidly sedating patients before anesthesia, for procedural sedation and for control of seizure. Here, we report a patient in intensive care unit who was on mechanical ventilation and on inotropic support for management of septic shock and who turned out extremely agitated after accidental catheter removal. Intravenous access was successfully established following sedation with intranasal midazolam, using ultrasound guidance.

Keywords: Difficult intravenous access, intensive care unit, intranasal midazolam

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Introduction

Accidental catheter removal (ACR) in critically ill patients can be associated with potentially life-threatening complications due to interruption of vital drug therapy such as inotropes/vasopressors or anti-epileptic medications.^[1] Establishing new intravenous access in such patients is an emergency procedure, but it can be challenging or even carry the risk of accidental needle stick injury to health care personnel, especially in dangerously agitated patients or in patients with ongoing seizure activity.^[2] Other route of administration of drugs may be imperative. Here, we present a patient, who was on vasoactive agents, had ACR, following which the patient was dangerously agitated. The case was successfully and rapidly sedated with intranasal midazolam without significant hemodynamic effects, followed by definitive intravenous access. To the best of our knowledge, there are very few reports mentioning

the used of intranasal midazolam for rapid sedation in a difficult scenario.^[3]

Case Report

A 24-year-old lady weighing around 50 kg was being managed in intensive care unit (ICU) with the diagnosis of refractory status epilepticus. She had the history of repeated hospital admission for seizure attacks, requiring repeated intravenous access. During the current hospital admission, due to difficult peripheral intravenous access, she had her central vein catheterized. Her seizure was controlled on four anti-epileptic medications, including intravenous levetiracetam, sodium valproate and phenytoin. During her prolonged ICU stay, she developed septic shock following ventilator associated pneumonia (VAP). She was coagulopathic with platelet count of 48,000/cu mm and prothrombin time of 21 s with international normalized ratio of 1.75. She was on intravenous nor-adrenaline support at 0.2 µg/kg/min to maintain the mean arterial pressure (MAP) above 65 mmHg. She was on intravenous Colistin and tigecycline for multidrug resistant VAP. She was on mechanical ventilatory support on volume assist control mode of ventilation at fraction of inspired oxygen of 0.5 and positive end-expiratory pressure of 10 cm of H₂O. She was receiving intravenous midazolam 2 mg as

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required to maintain the Richmond Agitation Sedation Scale (RASS) of zero. She was delirious and agitated off sedation.

During her routine nursing care, there was ACR when she was turned by the side of the bed. Over the next couple of minutes, she became progressively agitated to the point of RASS +3 to +4. Her MAP decreased to 50 mmHg. Attempts to establish peripheral intravenous access was unsuccessful. Ten milligram of midazolam (5 mg in each nostril) was instilled. Two physicians had to hold the head still for intranasal administration. It was successful in first attempt, so other routes like rectal administration were not considered. After 8–9 min, her RASS dropped to one, but her MAP did not drop further. Peripheral intravenous access was established by the consultant intensivist using ultrasound guidance. Her MAP was temporarily stabilized with intermittent Phenylephrine boluses, and further sedation was administered as required. Central venous access was reestablished through right internal jugular approach under ultrasound guidance. Her septic shock progressively improved, she was weaned off the ventilator and was extubated 5 days later.

Discussion

Accidental catheter removal is not uncommon and ranges between 0% and 7.5% of catheters and between 0 and 1.2/100 catheter-days.^[1] This patient was on mechanical ventilation, inotropic support, anti-epileptic medications and benzodiazepines for sedation. So, establishing another intravenous access urgently was a priority. She was a known case of difficult intravenous cannulation. As she was getting dangerously agitated and hypotensive, the task was a real challenge.

Midazolam easily crosses the nasal mucosa and the blood-brain barrier, resulting in a rapid rise in both the plasma and cerebrospinal fluid concentration.^[4] Intranasal midazolam at the dose of 0.2 mg/kg has been shown to be effective and safe for premedication of children before surgery.^[5] In a study where intranasal midazolam was used for outpatient sedation for echocardiography in infants, the average time to peak plasma concentration and maximal effect was 10 min.^[6] Cardiovascular stability was excellent and there was no respiratory depression when intranasal midazolam at the dose of 0.2 mg/kg was followed by rectal Ketamine at 0.9 mg/kg for diagnostic and short surgical procedures.^[7] In a study by Lahat *et al.*, intranasal midazolam at the dose of 0.2 mg/kg was as effective as intravenous diazepam for controlling febrile seizure in children presenting to pediatric emergency department.

There was no significant side effects observed and the mean time to control seizure was significantly sooner in midazolam group than the diazepam group (6.1 vs. 8.0 min).^[8] Intranasal route has also been described for rapidly sedating extremely agitated and frightened adult patient for intravenous access.^[3] It has also been described in critically ill burned pediatric patient without intravenous access. Central venous catheterization was successfully carried out following sedation with intranasal midazolam.^[9]

We chose intranasal route of midazolam for rapid sedation as the studies demonstrate its efficacy and safety. Intramuscular route was avoided because of coagulopathy. Midazolam was chosen as it is a cheap and readily available drug at bedside, even in resource limited ICU. Intranasal route has also been successfully used for administration of drugs like naloxone in scenarios where intravenous administration is impossible or undesirable. It conferred the added benefit of avoiding the risk of possible needle-stick injury to health care professionals especially when attempting intramuscular injection in dangerously agitated patient.^[10] Ultrasound guidance was used for intravenous access as it was shown to increase success and required less time to cannulate in difficult access patients when compared to traditional approach of palpation and landmark guidance.^[11] Subsequent internal jugular venous cannulation was also performed under real-time ultrasound guidance as this technique was shown to reduce complications in high-risk patients like those with bleeding disorders, with previous catheter and uncooperative patients.^[12] Use of nonbenzodiazepines such as dexmedetomidine for routine sedation could have reduced delirium and agitation in this patient.^[13]

To summarize, intranasal midazolam coupled with bedside real-time ultrasonography can be helpful to rapidly sedate and to promptly and safely establish intravenous access in a challenging and urgent scenario in ICU.

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