Aspiration Pneumonitis Requiring Intubation After Procedural Sedation and Analgesia: A Case Report

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Emergency department (ED) procedural sedation and analgesia is widely and routinely performed; serious complications are rare. We describe the first reported case of aspiration during procedural sedation in the ED. Although our patient required endotracheal intubation and critical care admission, there was no adverse long-term outcome. Given that there were no apparent predisposing factors, we believe it is crucial for emergency physicians to routinely anticipate the possibility of such a complication during each sedation event. [Ann Emerg Med. 2007;49:462-464.]

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INTRODUCTION

Procedural sedation and analgesia involves the use of sedatives, analgesics, and dissociative agents to facilitate short and often painful procedures. At our tertiary care institution, procedural sedation and analgesia in the emergency department (ED) is performed frequently (approximately 80 times per month). Adverse events, including hypoxemia and hypotension, are rare.[1] We present the first reported case of aspiration pneumonitis requiring intubation as a result of procedural sedation and analgesia in the ED.

CASE REPORT

A 65-year-old woman presented to the ED with left ankle pain after slipping while trying to get into her car. She had a deformed left ankle, with a normal neurovascular examination result. She was alert and oriented and had no other injuries. Her vital signs were blood pressure 157/77 mm Hg, pulse rate 85 beats/min, respiratory rate 14 breaths/min, and SaO$_2$ 96% on room air. She weighed approximately 75 kg. There was a smell of ethanol, but the patient was fully coherent and able to give an adequate medical history and respond appropriately to all questions. The patient's medical history consisted only of hypertension, treated with candesartan.

Radiographs of the left ankle showed a trimalleolar fracture, with a disrupted mortise and subluxation of the talus. The patient received morphine 5 mg intravenously for analgesia and was referred for a consultation to the orthopedic service, which treated the patient an hour later.

After orthopedic assessment, a decision was made to improve the position of the fracture in the ED and then place her on the waiting list for open reduction and internal fixation in the operating room. A routine airway assessment revealed a Mallampati 2 score, no dentures, and normal mouth opening, as well as normal neck mobility. An ECG showed normal sinus rhythm, with a pulse rate of 92 beats/min. Five hours before orthopedic assessment, she had eaten a large meal with alcohol.

According to the hospital procedural sedation and analgesia policy, oxygen saturation, blood pressure, and cardiac monitoring were initiated. As per protocol, a nonrebreather facemask connected to 100% O$_2$ was placed on the patient. Her vital signs were blood pressure 152/77 mm Hg, pulse rate 100 beats/min, respiratory rate 14 breaths/min, and SaO$_2$ 100%. For procedural sedation and analgesia, she received 100 μg of fentanyl intravenously; 3 minutes later, she received titrated intravenous doses of propofol at 20- to 40-mg increments, to a total of 120 mg. The ankle was manipulated and splinted. Postprocedure, her vital signs were blood pressure 118/65 mm Hg, pulse rate 101 beats/min, respiratory rate 14 breaths/min, and SaO$_2$ 96%. However, repeated radiographs showed no improvement in the angulation or displacement of the ankle. Because she did not have a successful reduction, her tachycardia may have been due to ongoing pain or have been a compensatory reflex response to the lower blood pressure caused by the procedural sedation and analgesia medications. She was not given any intravenous fluids.

Twenty minutes after the patient received her procedural sedation and analgesia medications, one of her family members

reported to the nurse that the patient was "wheezing," which was not substantiated on physical examination. The patient had no complaint of dyspnea or chest pain, and there was no associated emesis. Her SaO_2 was 95%, and her respiratory rate was 14 breaths/min. The orthopedic physician ordered a chest radiograph, which was read as normal. This reading was later confirmed by the radiologist. The episode of alleged wheezing was considered erroneous, and no further action was taken based on it.

A second procedural sedation and analgesia was performed 1 hour later in an attempt to improve the reduction of the fracture. The reduction was performed by the orthopedic physician, and the emergency physician was not present. The patient remained asymptomatic, with the following vital signs: blood pressure 118/62 mm Hg, pulse rate 95 beats/min, respiratory rate 14 breaths/min, and SaO_2 95%. She had had no further oral intake while in the ED, and this second procedural sedation and analgesia began approximately 6 hours after the patient's last meal. She was given 100 μg of fentanyl and 60 mg of propofol intravenously within 1 minute. Her vital signs remained unchanged. Ten minutes after administration of the propofol bolus and without warning, the patient vomited into the oxygen mask and aspirated a large amount of vomitus. Her SaO_2 decreased to 86% on 100% O_2, and her blood pressure decreased to 86/57 mm Hg, with a pulse rate of 98 beats/min. The emergency physician was urgently summoned. The patient's airway was immediately suctioned, and her breathing was assisted with bag-valve-mask ventilation. With assisted ventilation, her SaO_2 level increased to 97%, and her blood pressure improved to 135/55 mm Hg. However, when she again received room air, her SaO_2 level rapidly decreased to 84%. She was found to have high-pitched inspiratory and expiratory wheezes throughout her lung fields.

Because it was thought that her respiratory status was continuing to deteriorate, a rapid sequence intubation was performed with 15 mg of etomidate and 80 mg of succinylcholine. A repeat chest radiograph revealed an endotracheal tube in satisfactory position and patchy areas of parenchymal opacity in the mid and lower lung zones bilaterally, consistent with her clinical picture of aspiration. A blood alcohol level drawn after intubation was 74 mg/dL, close to the 80 mg/dL legal blood alcohol limit for driving in Canada.

This patient was admitted to the ICU, where she remained intubated and ventilated for 12 hours. She was gradually weaned off oxygen and began receiving room air the following day. She underwent an uncomplicated open reduction and internal fixation of her ankle 2 days after her initial fracture. A telephone follow-up 3 months postinjury showed that she still had some occasional ankle discomfort but no pulmonary concerns.

DISCUSSION

Procedural sedation and analgesia has become standard of care in EDs and is associated with few significant complications.[2-5] Before this case report, there had been no published case of aspiration related to ED procedural sedation and analgesia.[6] From the anesthesia literature, specific factors known to increase the risk of aspiration in the operating room include conditions predisposing to gastroesophageal reflux, a higher American Society of Anesthesiologists physical status classification (greater than American Society of Anesthesiologists II), extremes of age, and decreasing levels of consciousness, for example, from head trauma, alcohol ingestion, or deeper levels of sedation.[6]

Multiple studies have now shown that prolonged preprocedural fasting does not decrease the incidence of adverse events.[7-10] Patients fasting for 2 hours have the same gastric volume and pH as those who have fasted longer.[6] In fact, prolonged fasting may even increase the volume and decrease the pH of gastric juices, thereby perhaps worsening outcomes in the event of an aspiration.[11] However, the American Society of Anesthesiologists consensus guidelines still recommend 2 hours of fasting for clear fluids and 6 hours of fasting for solids.[12] Our patient had not ingested any liquids or solids in the 5 hours before her first procedural sedation and analgesia. However, she did consume alcohol with her meal. Sedation depth follows a continuum, ranging from anxiolysis to general anesthesia. The deeper the sedation, the higher the presumed likelihood of loss of protective airway reflexes and aspiration. When sedatives, such as alcohol, have already been ingested or when multiple sedations are performed, the physician has to be especially attentive to the possible cumulative effect of sedatives on the patient's level of consciousness.

Although our patient did have some alcohol with her meal, she was alert and oriented before each procedural sedation and analgesia. The involved house staff did not identify any specific contraindications to procedural sedation and analgesia. In retrospect, a number of factors, including recent alcohol consumption, her advanced age, her episode of purported wheezing, and repeated sedation, may have increased her risk of aspiration. However, her vital signs were stable up until the aspiration, and none of these factors would have reliably predicted aspiration.

For patients who require emergency procedural sedation and analgesia (eg, alkali burns to the eye or fractures with vascular compromise) yet are at risk of aspiration, a number of options are available. Some authors have advocated the use of ketamine[6] because, as a dissociative agent, ketamine does not decrease protective airway reflexes. However, North American experience with ketamine is largely in the pediatric population. Ketamine use in the adult population is still limited and is used in less than 3% of procedural sedation and analgesia procedures in our adult ED.[1] For other high-risk patients, alternatives include procedural sedation and analgesia in a more controlled setting, such as the operating room, or nerve and hematoma blocks. It is always essential to balance the urgency of the procedure with the risks involved. In this case in which definitive operative fixation was required, the need for neutral alignment in the face of a normal neurovascular examination result is arguable.

Despite predictive risk factors and careful selection of patients undergoing procedural sedation and analgesia, there will be instances when unexpected complications arise.

Procedural sedation and analgesia guidelines[2,3] should be followed, ensuring that adequate house staff skilled in airway management are present, patient assessments are thorough, monitoring and documentation of vital signs is done, resuscitation equipment is nearby, and discharge criteria are clear. It should be stressed to non-ED services that the physician ordering the procedural sedation and analgesia has ultimate responsibility over the patient's sedation, analgesia, and cardiorespiratory monitoring and support. Expertise in carrying out the procedure requiring procedural sedation and analgesia is not enough. Extreme vigilance and preparation are necessary to ensure that ED procedural sedation and analgesia is safe.

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