# Ketamine in the ED: Medical Politics Versus Patient Care

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**The safe and effective use of ketamine for sedation/analgesia by emergency physicians has been validated in the medical literature. Nonetheless, arbitrary restrictions of this medication to anesthesia practitioners have prohibited emergency physician use in some locations. We explore the scientific evidence related to the use of ketamine by emergency physicians for sedation/analgesia, the history of sedation, the operational definitions of conscious sedation and dissociative anesthesia, and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) related standards. We conclude that ketamine sedation/analgesia offers many specific advantages for emergency patients and that it is safely administered by emergency physicians in the appropriately monitored setting. (Am J Emerg Med 1999;17:722-725. Copyright © 1999 by W.B. Saunders Company)**

An editorial in *Anaesthesia* written in 1971, referring to the unique sedative/analgesic effects and excellent safety profile of ketamine,asked, "Is this the famous stone that turneth all to gold?"[1] Since then, the long and positive clinical experience with this agent in the United States,[2,3] its prevalent use for sedation/analgesia in the developing world,[4-8] and favorable field-use experience[9-11] have validated the effectiveness and safety of ketamine. Despite the proven value of ketamine, emergency physicians (EPs) at some institutions are still prohibited from utilizing this medication in the emergency department (ED). This commentary explores issues related to the use of ketamine for procedural sedation by EPs.

## HISTORY OF SEDATION

As early as the Middle Ages, surgeons applied "soporific sponges" containing opium and other herbs to their patient's nasal mucosa to provide sedation/analgesia (Theodoric of Cervia, Cyrurgia, Venice, 1498). Over the last few decades, the practice of sedation/analgesia in the ED has evolved rapidly through several generations of medications and practice parameters. Until the late 1980s, EPs usually administered medications with long half-lives to accomplish procedural sedation. The commonly used "lytic cocktail" (meperidine, promethazine, and thorazine) was often inadequate; the therapeutic margin of the "cocktail" is narrow and respiratory compromise is too common.[12-14] The safety profile, pharmacokinetics, and effectiveness of other early agents, such as chloral hydrate, were also found to be unsuitable for ED use.[15,16]

Appropriate patient monitoring and procedural methodologies, as well as standards for recovery and discharge, required further education, acceptance, and dissemination in the emergency community. This need for uniform standards, training, and documentation drove an expansion of the emergency medicine core curriculum to more formally cover sedation/analgesia.[17,18] Although a newer generation of agents, such as midazolam and fentanyl, offer the advantage of shorter medication half-life, the incidence of respiratory compromise has been reported as remarkably significant.[19,20] Far from achieving the goal of optimum sedation/analgesia, "In every major study done to evaluate the management of pain in the hospital setting, our methods of pain have been 'weighed in the balance and found wanting.' "[21] This shortcoming may be more pronounced in pediatric emergency care. Authorities have reported that pain and fear are often poorly controlled during therapeutic procedures on children in the ED; furthermore, they are less likely to receive any analgesia.[22,23] The search for more optimum agents continues as EPs become more familiar with other agents, such as ketamine, propofol, and etomidate.

Advantages of ketamine sedation/analgesia over more conventional agents have been cited and reviewed.[24] The unrestricted use of sedative agents for airway management by EPs has been supported by the American College of Emergency Physicians (ACEP) in policy position: "Appropriate sedative and induction agents should be immediately available in the ED and accessible to all physicians who perform RSI (rapid-sequence intubation) in the ED."[25] In a February, 1998 survey by e-mail, EPs at 198 institutions replied that they had used ketamine for procedural sedation in their departments.[26] Nevertheless, a significant number of institutions still prohibit EPs, credentialed in sedation/analgesia and airway management, from utilizing ketamine and other agents such as propofol and etomidate.

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## KETAMINE AND DISSOCIATIVE ANESTHESIA

King's text *Primary Anesthesia* describes ketamine's actions as "a most useful state of dissociative anesthesia. The trance-like state with superb sedation and analgesia is unique to this agent . . . his airway is remarkably preserved. . . ."[27] The term dissociative anesthesia is derived from the profound feeling of dissociation from the environment that the patient experiences. The pharmacological basis for preservation of brainstem function, and thus respiratory function, is that ketamine acts primarily on the cerebral cortex and limbic system.[28] Many specific advantages of ketamine sedation/analgesia have been cited. Ketamine is a strong analgesic, thereby its use may avert the landmark obliteration that can occur with local anesthetics.[29] Ketamine is associated with improved respiration, bronchodilation, and ventilator compliance; generally favorable hemodynamic effects; and good patient amnesia.[30-35] We believe that ketamine sedation/analgesia reduces the risk of accidental needlesticks for both the patient and the staff. Increased parental satisfaction with the care of pediatric patients undergoing procedures in the ED has been related to the use of ketamine by survey.[29] Several series have validated the safe use of ketamine for sedation by EPs.[36-39] Intramuscular and other nonintravenous methods of administration eliminate the need for intravenous access, sparing the child another painful and traumatic procedure.[39] Oral, rectal, and nasal routes of administration have been used with safety and efficacy outside of the operating room.[40-42] To quote King's text, "Not surprisingly, this remarkable drug has made many operations possible that would otherwise have been impossible if you have no recovery ward and patients have to recover in their own beds. Ketamine is remarkably safe and is certainly the safest anaesthetic if you are inexperienced."[27]

## DEFINITIONS AND THE CONTINUUM OF ANESTHESIA

Where should the line be drawn between sedation/analgesia and general anesthesia? This has been a subject of contentious debate.[43-45] A commonly accepted definition of general anesthesia requires that there is a partial or complete loss of protective reflexes resulting in the inability to independently maintain an airway.[46] The preservation of respiratory drive and reflexes during ketamine administration clearly violates this definition. Anesthesia texts have defined intramuscular ketamine as "sedation and analgesia . . . dependent on the dose."[47] Similarly, according to the American Association of Anesthesiologists, "Sedation and analgesia describes a state that allows patients to tolerate unpleasant procedures while maintaining adequate cardiorespiratory function and the ability to respond purposefully to verbal command and/or tactile stimulation."[45] Because ketamine affects the cerebral cortex and limbic system, patients on ketamine do not respond rapidly to stimuli; they are dissociated from the environment but not unconscious. An effect on the brainstem may ensue with higher doses of ketamine; however, loss of protective reflexes is distinctly rare with doses used in the ED.[39] In Green's[39] large series, a zero incidence of aspiration during ketamine sedation/analgesia was reported. Although the incidence of emesis was 6.7% in the Green series,[39] no aspiration was reported. No case report of aspiration during ketamine sedation/analgesia in the ED has been published in the literature (as of Medline search January 4, 1999, keywords: ketamine and aspiration), again validating the presence of protective reflexes. Hence, there is no basis for an argument that ketamine is a typical general anesthetic agent which thereby should be restricted to anesthesia practitioners.

Dosage ranges of anxiolytic, sedating, and anesthetic effects of many conventional agents can be small and variable. Indeed, in view of the potentially narrow margin between deep sedation and light general anesthesia with the use of conventional agents, it has been proposed that ketamine offers the best practical, safe, and effective alternative.[48] Ketamine is currently used as a "first line agent for sedation" in many busy pediatric emergency departments.[49] All patients receiving sedating doses of any medication should be carefully and uniformly monitored. Practitioners of sedation and support staff must have training and experience in airway management and resuscitation.[50] There is evidence to support the premise that the guidelines for monitoring for dissociative anesthesia should be the same as those for conventional sedation and analgesia.[39,46,51] The incidence of other serious adverse reactions during ketamine sedation/analgesia is extremely low.[16,39,41,52-59]

In an effort to operationally define sedation, the North American Society of Pacing and Electrophysiology (NASPE) provided a consensus document which was endorsed by the American College of Cardiology.[57] Therein, intravenous sedation was defined based on the patients ability to respond purposefully to verbal or physical stimuli.[58] The "SED" scoring system, a variation of the Aldrete system,[59] was used to define the endpoints of intravenous sedation as patients with a SED score between 3 and 8.[57] Pharmacological agents proposed as appropriate for use in intravenous sedation by the NASPE included, but were not limited to, propofol, methohexital, etomidate, and combinations of these and other medications.[57] As long as the patient's SED score remained 3 or higher, independent of the type of medication used, the consensus opinion was that the sedation/analgesia endpoint had not been violated.[57] We believe this functional definition is consistent with clinical practice. If patients are given excessive doses of medication of any type, they will exceed practice guidelines. In emergency medicine practice, the patient sedated with ketamine rarely attains a SED score below 5 or 6, as the airway and respiration are preserved and they are not unconscious.

## JOINT COMMISSION POSITION ON SEDATION/ANALGESIA

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) provided new standards relating specifically to sedation/analgesic procedures in the *1994 Accreditation Manual for Hospitals, Volumes 1 and 2*.[60,61] JCAHO operating procedure (O.P.) 1.2.3. defines anesthesia as "the administration (in any setting, by any route, for any purpose) of a general, spinal or other major regional anesthesia or sedation (with or without analgesia) for which there is a reasonable expectation that, in the manner used, the sedation/analgesia will result in the loss of protective reflexes for a significant percentage of a group of patients." Although a "loss of protective reflexes" and "significant

percentage" were not specifically defined by the JCAHO[62] in our opinion, protective reflexes are conventionally known to be cough, gag, and laryngeal reflexes. The maintenance of the patient's ability to ventilate adequately is an essential goal of sedation/analgesia in the ED. Those patients requiring intubation or bag-valve mask ventilation have probably lost protective reflexes. A "significant number," defined grossly in terms of statistical significance, is 5 out of 100 patients. The literature validates the extremely low incidence of bag-valve-mask assist after ketamine administration in the ED. In Green et al's[39] series of 1,022 patients, only 2 patients required positive pressure ventilation for a duration of 20 seconds or less. The incidence of apnea for as long as 40 seconds' duration is extremely low.[63] Patients given conventional agents will violate JCAHO Standard LD 1.6 when protective reflexes are lost. However, neither JCAHO nor any published standard mandates the presence of an anesthesiologist for sedation/analgesia in general. When we sent a query to JCAHO on this issue, both the physician liaison and the administrative standards liaison replied that the Standards neither implied nor intended that EPs be prohibited from the use of any specific medication for sedation/analgesia (JCAHO Administrators of Standards, personal communication, December 1998). A video and leaflet produced by JHACO in 1996 provides education concerning sedation/analgesia, but likewise recommends no restriction of specific medications to anesthesiologists or anesthetists (Anesthesia and Conscious Sedation: Issues and Answers. Joint Commission Videoconference Series [with booklet] Oakbrook Terrace, IL, JCAHO 1996). Similarly, the conclusion of the NASPE Panel was "IV sedation does not require the presence of anesthesia services with the attendant potential scheduling difficulties, additional personnel, and equipment in the procedure room. . . ."[57]

## CONCLUSION

This debate over practice rights in emergency medicine is not new or unique. During the first years of thrombolysis, it was not uncommon for cardiologists to express anxiety concerning EP-guided therapy. However, in time, a new era of collaboration ensued based on commitment to improve patient outcome. Today, neurologists and EPs work together to treat stroke patients. Notwithstanding the common ground between anesthesia and emergency medicine, sedation/analgesia and airway management is too often littered by political conflicts rather than advanced by collaboration. Emergency medicine is, by its very nature, an eclectic field. Historically, controversies related to practice overlaps have been resolved by EPs demonstrating clinical competency, proper education, and training. We believe that it is the province of individual departments, department chairs, and medical directors to present their physicians for unrestricted credentialing in sedation/analgesia based on similar requirements for all procedures. The selection of medications should be decided by clinical indications and safety profiles.

An exclusion of ketamine from the armamentarium of the EP is based neither on operational definitions of general anesthesia nor on evidence related to safety profile. The debate over ketamine as an anesthetic agent is more semantic than scientific.[39] The important issues are: (1) whether ketamine can be used safely in the ED; (2) if it offers specific advantages; (3) how should we assess, select, monitor, and recover patients; and (4) what education and quality reviews are required. In our opinion, these issues have already been successfully addressed by EPs. Input and collaboration from our anesthesia colleagues is desirable; however, arbitrary restrictions of emergency formularies by anesthesia departments are inappropriate. We believe that issues relating to medical politics and a misinterpretation of JCAHO standards have confounded proper scientific discussion.

Progress in emergency medicine is sometimes heralded by conflict with other specialties when common ground is explored and developed. However, integration of the medical advances, techniques, and procedures from other disciplines into the core practice of emergency medicine is essential and inherent to the specialty. When the benefit to the patient is apparent, as in ketamine sedation/analgesia, it is incumbent upon EPs to forge forward remaining ever vigilant of medicine's double-edged sword. We believe that the available scientific evidence in no way supports a restriction of ketamine administration to anesthesiologists only. The emergency patient should not be deprived of such obvious benefits.[64]

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