

Critically Appraised Topic: Prehospital Medicine Rotation

Nicholas Sowers

PICO: In the prehospital patient population, does adjunctive use of low dose ketamine with a narcotic provide equal or better analgesia with an acceptable side effect profile?

Search: Pubmed Clinical Queries: Search terms 'prehospital' AND 'ketamine'.

Results: 22 publications

The majority of search results involved review papers or studies reflecting the use of prehospital Ketamine either as an anesthetic agent or to facilitate airway management rather than using low dose Ketamine as an analgesic agent.

Selected Papers:

1. Jennings, P., et al. (2012). Morphine and Ketamine is superior to Morphine alone for out of hospital trauma analgesia: a randomized controlled trial. *Annals of Emergency Medicine*. Vol 59(6): 497-503
2. Johansson, P., et al (2009). The effect of combined treatment with morphine sulphate and low-dose ketamine in a prehospital setting. *Scandinavian Journal of Trauma*. 17(61): 5 pages

Johansson Paper

This was a prospective prehospital clinical cohort study conducted in Sweden in which adult patients having sustained bony fractures and experiencing acute pain were randomized to receive either intravenous Morphine (0.2mg/kg) or Morphine (0.1mg/kg) and low dose Ketamine (0.2mg/kg). Drugs were administered by nurses working in the prehospital setting and due to protocols regarding the administration of controlled substances in the prehospital setting, enrolled patients were not blinded. The investigators excluded patients unable to use the visual pain scale, history of chronic pain, history of AMI, and those there were unconscious.

A total of 27 patients were enrolled (11 Morphine and 16 Morphine/Ketamine). Pain severity was determined using a visual analog scale (1-10) every five mins and all vital signs as well as level of consciousness and nausea and vomiting were recorded as potential complications.

The Johansson group found that there was a statistically significant ($P < 0.05$) decrease in the reported pain scale in those patients that received adjunctive Ketamine compared to those that were treated with Morphine alone. They report that although there was an increased incidence of nausea and vomiting in the M/K group (4 vs 1) that there were no other adverse drug effects in either group (including LOC and respiratory status).

Jennings Paper

This was a prospective, randomized, controlled, open label prehospital study conducted in Australia involving adult with a GCS 15 reporting acute traumatic pain of at least 5 on a 1-10 visual analog scale in the prehospital setting comparing the use of Morphine against Morphine and Ketamine. Medications were administered by paramedics in the prehospital setting. Patients were excluded if they had a known allergy to Ketamine, were pregnant, current ischemic chest pain or pulmonary edema, severe hypertension or had sustained a head injury.

Pain scale values were obtained every ten minutes and potential complications such as profound hypotension, unconsciousness, respiratory depression requiring ventilatory support were recorded.

A total of 136 patients were enrolled and overall the investigators found that there was a statistically significant greater decrease in mean pain scale for those patients in the Morphine/Ketamine group compared to those that received only Morphine with those patients in the M/K group additionally reporting a much more rapid decrease in pain intensity.

The authors note that there was a greater incidence of adverse side effects within the group that received Ketamine (27 vs 9 patients) including 'disorientation' and 'emergence phenomenon' but that none of the SE were significant enough to result in withdrawal from the study. There were no significant differences in vital signs recorded between the two treatment arms.

Comments:

Both authors have argued that Ketamine is an agent that is well suited to the prehospital environment as it effectively provides analgesia while providing the additional benefits of anxiolysis and amnesia - properties that may be beneficial in the traumatically injured population.

While these studies involve different health care practitioners (paramedics vs nurses) both involve the administration of low dose Ketamine as an adjunctive analgesic in the prehospital environment to patients with traumatic injuries.

Both studies have demonstrated that not only does the addition of low dose Ketamine as an adjunct to narcotic based prehospital analgesia provide better prehospital analgesia (as per patient reported pain scales) but that it likely does so in a shorter time frame while providing the additional benefits described above.

Investigators in both studies acknowledge the potential for a sympathemetic effect with the use of Ketamine - increasing HR and systolic BP. While the authors speculate that

this may not be a detrimental effect given the potential for hypotension in the trauma patient population, given more recently accepted concepts involving permissive hypotension, this component of Ketamines side effect profile may require further investigation.