

Low Dose Ketamine (LDK) AKA Sub-Dissociative Dose Ketamine

Background: Why is Low Dose Ketamine Used?

Pain control in the emergency department is an important part of patient care and a key reason patients seek our help. Current pharmacologic methods include opiates, non-steroidal anti-inflammatory drugs (NSAIDs), acetaminophen, and regional anesthesia. Opiates often produce inadequate pain control in both opiate tolerant and opiate naïve patients and have adverse effects such as over-sedation, respiratory depression, nausea, hypotension, tolerance, and dependence [1]. NSAID use can be complicated by nephrotoxicity, gastropathy, and cardiac toxicity and have been implicated in 11% of adverse drug reaction related hospital admissions [2]. Acetaminophen use can be complicated in patients with liver disease. Patients often seek our services when one or several of these modalities has been ineffective.

Ketamine has traditionally been used in the ED for procedural sedation and analgesia (PSA) as well as for rapid sequence intubation. Ketamine is a non-competitive N-methyl D-aspartic (NMDA) receptor antagonist with dissociative analgesia properties [3]. Multiple recent studies have shown that ketamine can be useful in controlling acute or chronic pain in the emergency department at doses far lower than traditional PSA doses [4] [5] [6]. These doses have not been found to have sedative effect, but have been shown to be useful as an adjunct to or in replacement of other pharmacologic agents.

This document seeks to educate emergency providers (RN, NP, PA, MD, DO) about appropriate use of LDK for pain control at Maine Medical Center.

Logistics of administration

1) What is the appropriate dose of LDK?

Low dose ketamine is 0.1 – 0.3 mg/kg IV bolus, though 0.1 – 0.2 mg/kg is generally preferred [6] [7]. It would be rare for a dose > 30 mg to be used. This dose range partially overlaps recreational dosing which is 0.2 – 0.5 mg/kg where patients may experience hallucinations, delusions or other psychotropic effects. This specifically contrasts typical PSA dosing which is 1-2 mg/kg.

When a single dose of opiates have been used prior to LDK no dose reduction of opiates is needed. However, a reduction of opiates by up to 50% may be considered. Caution should be taken to avoid opiate-induced hypo-ventilation when multiple doses of opiates have been given prior to administration of LDK.

2) What contraindications exist and what adverse reactions may occur?

Contraindications and precautions:

- Allergy and age < 3 months are the only absolute contraindication to LDK.
- Caution should be exercised in patients with schizophrenia or patients where increased blood pressure or intra-ocular pressure may be hazardous. (Lexicomp Drug Database Accessed January 2016)

Adverse reactions:

- Sedation will not be expected with LDK.
- Hemodynamics changes such as hypertension and tachycardia are commonly seen at PSA ketamine dosing. While these changes can occur at LDK dosing they are quite uncommon and

have been found to be small changes (e.g. SBP change by 9 mmHg). Given these small changes no clinical intervention should be necessary in most patients.

- Mild psychotropic effects such as dysphoria, hallucinations or delusions are the most common side effect (approximately 3.5%). This can generally be managed with gentle reassurance to the patient or reduction of stimuli (turning off the light). In extreme cases benzodiazepines such as lorazepam may be used. (Ahern, The First 500: Initial experience with widespread use of low dose ketamine for acute pain management in the ED. 2015)
- Hypoxia may occur rarely estimated at 1.5% (versus 5% for opiates). This can be managed with gentle stimulation of the patient. (Ahern, The First 500: Initial experience with widespread use of low dose ketamine for acute pain management in the ED. 2015)
- Emesis may also occur and is estimated at 1% (versus 7% for opiates) and can be controlled with typical anti-emetic agents. (Ahern, The First 500: Initial experience with widespread use of low dose ketamine for acute pain management in the ED. 2015)

3) Who can administer LDK?

Any RN working in the emergency department may administer LDK [7]. If ketamine is being drawn from a vial then a two-nurse verification "dual sign-off" is appropriate.

4) How should LDK be administered?

A slow IV push over 1-3 minutes is appropriate [8]. The preferred concentration is 10 mg/mL.

5) What monitoring is appropriate?

LDK should be respected similar to IV opiates. LDK can be given in any location in the MMC emergency department where IV opiates would be used. Monitoring should be consistent with that which would be used for IV opiates. Clinical judgement should be exercised for when more monitoring is appropriate.

6) Can LDK be re-dosed?

Yes, pain relief from LDK may last as little as 15 minutes or longer than two hours but more typically lasts about an hour [9]. Re-dosing is appropriate if the patient needs further pain control and is not having adverse reactions.

References

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