

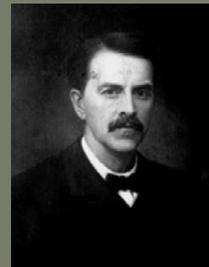
## Battlefield Analgesia

John V. Gandy, III MD

“What an infinite blessing”



May 1863



## Agenda

- Importance of Early Pain Control
- History
- Current State of Battlefield Analgesia
- The Future of Far Forward Pain Management
- Decision Brief
  - Addition of Ketamine to TCCC Guidelines

## Consequences of Untreated Pain

- Sensitization of pain pathways
- Chronic pain syndromes (CRPS, RSD, Fibromyalgia)
- Short and long term narcotic abuse
- Narcotic addiction
- Depression, suicide
- PTSD

## History

- ◉ Opium, wine, grog (rum)
- ◉ Morphine isolated from opium, 1803
- ◉ Hypodermic needle invented, 1850
- ◉ U.S. Civil War, Morphine widely used for pain control
- ◉ WW I, Morphine
- ◉ WW II, Morphine
- ◉ Korea, Vietnam, Beirut, Grenada, Panama, Desert Storm, Somalia...

## History-Morphine

- ◉ The “Gold Standard”
- ◉ Has reigned of the battlefield for more than 150 years
- ◉ Many in the anesthesia and pain management fields feel it is an outdated medicine

“Pain control in Baghdad, 2003,  
was the same as in the Civil  
War—a nurse with a syringe of  
morphine.”



## History

Until....

- A rogue band of medical heretics proposed a change
- 2001-2002- TCCC Fentanyl “lollipop” debate

## FDA Black Box Warning

- **IMPORTANT WARNING:**
- Buccal fentanyl should be used only to treat breakthrough cancer pain (sudden episodes of pain that occur despite round the clock treatment with pain medication) in cancer patients who are taking regularly scheduled doses of another narcotic (opiate) pain medication, and who are tolerant (used to the effects of the medication) to narcotic pain medications. This medication should not be used to treat pain other than chronic cancer pain, especially short-term pain such as pain from an injury or pain after a medical or dental procedure. Buccal fentanyl should only be prescribed by doctors who are experienced in treating pain in cancer patients. Buccal fentanyl may cause serious breathing problems or death if it is used by people who are not being treated with other narcotic medications or who are not tolerant to narcotic medications.
- Buccal fentanyl comes as two different products, a lozenge and a tablet. The medication in fentanyl lozenges is absorbed differently by the body than the medication in fentanyl buccal tablets, so one product cannot be substituted for the other. If you are switching from one product to the other, your doctor will prescribe a dose that is best for you.
- Buccal fentanyl may cause serious harm or death if taken accidentally by a child or by an adult who has not been prescribed the medication. Even partially used fentanyl buccal lozenges and tablets may contain enough medication to cause serious harm or death to children or other adults. Always keep fentanyl buccal lozenges and tablets in a locked storage space that is out of the reach of children. The manufacturer of the lozenges supplies child resistant locks and other items to help you store your medication safely. Ask your doctor how you can obtain these items. Dispose of partially used buccal lozenges or tablets according to the manufacturer's directions immediately after you remove them from your mouth.
- Tell your doctor if you are taking any of the following medications: certain antibiotics such as clarithromycin (Biaxin), erythromycin (Erythrocin), and troleandomycin (TAO) (not available in the US); certain antifungals such as fluconazole (Diflucan), itraconazole (Sporanox), and ketoconazole (Nizoral); aprepitant (Emedend); certain medications for human immunodeficiency virus (HIV) such as amprenavir (Agenerase), fosamprenavir (Lexiva), nelfinavir (Viracept), and ritonavir (Norvir, in Kaletra); nefazodone; or verapamil (Calan, Covera, Verelan). Taking these medications with fentanyl buccal lozenges or tablets may increase the risk that you will develop serious or life-threatening breathing problems. Your doctor may need to change the dosages of your medications and will monitor you carefully.
- Your doctor or pharmacist will give you the manufacturer's patient information sheet (Medication Guide) when you begin treatment with fentanyl and each time you refill your prescription. Read the information carefully and ask your doctor or pharmacist if you have any questions. You can also visit the Food and Drug Administration (FDA) website (<http://www.fda.gov/Drug>) or the manufacturer's website to obtain the Medication Guide.
- Talk to your doctor about the risks of using this medication.

## Current Status

- NSAID's/Tylenol
- Morphine IM
- Oral Narcotics
- Morphine IV
- Fentanyl Lozenge (Transmucosal)
- Fentanyl IV
- Dilaudid IV
- Ketamine IM/IV

## Future

- Multimodal pain management
- Early treatment of pain with different classes of medications
- Decreases doses and side effects of individual agents
- New medications (ketamine, fentanyl, hydromorphone)
- New routes of administration for ease of use (transbuccal, intranasal, transdermal)

## Fentanyl-EMS

- **Dosage and Administration**
- **Adult:**
- **IV/IO route:** 1-2 mcg/kg, SLOW IV/IO bolus.
- Dose may be repeated after 10 minutes and titrated to clinical effect to a maximum cumulative dose 200mcg
- Additional dosing requires BASE CONTACT
- **IN route:**
- 1-2 mcg/kg IN single dose.
- Repeat dosing only via IV route, and 10 minutes after initial IN dose up to a maximum cumulative dose of 200mcg
- Additional dosing requires BASE CONTACT
- Consider initial lower dose of 0.5-1 mcg/kg in elderly
- **Pediatric (1-12 years):**
- **IV/IO route:**
- 1 mcg/kg SLOW IV/IO bolus.
- Dose may be repeated after 10 minutes and titrated to clinical effect to a maximum cumulative dose of 3 mcg/kg
- **IN route:**
- 1 mcg/kg IN single dose.
- Repeat dosing only via IV route, and 10 minutes after initial IN dose up to a maximum cumulative dose of 3 mcg/kg
- **IN route requires BASE CONTACT and approval for any patient < 5 years old, or any patient < 12 years old with indication other than isolated orthopedic injury or burns**
- Approved by Denver Metro EMS Medical Directors July 1, 2011. Next review January 2012

## Future



## Ketamine –Decision Brief

- Ketamine Hydrochloride, 1962
- Derivative of Phencyclidine
- NMDA receptor antagonist
- At lower doses, potent analgesic and mild sedation
- At higher doses, dissociative anesthesia and moderate to deep sedation
- Gained popularity in the U.S. in the 1990s

## Ketamine

- ◉ Unique among anesthetics because pharyngeal-laryngeal reflexes are maintained
- ◉ Cardiac function is stimulated rather than depressed
- ◉ Works reliably by numerous routes
- ◉ Oral, rectal, intranasal, IM, IV, IO

## Ketamine

- ◉ Raecemic mixture of S-(+) Ketamine and R(-) Ketamine isomers
- ◉ S-Ketamine is thought to be the more potent analgesic and anesthetic
- ◉ R-Ketamine is thought to be responsible for more of the side effects and psychomimetic effects
- ◉ S-Ketamine available in Europe
- ◉ Raecemic Ketamine in U.S.

## Ketamine-Uses

- ◉ Single agent surgical anesthesia in austere settings and developing countries
- ◉ Anesthesia induction
- ◉ Procedural sedation
- ◉ Peri-operative pain management
- ◉ Cancer breakthrough pain
- ◉ Migraine headaches

## Ketamine-Uses

- ◉ Chronic pain syndromes
- ◉ Chronic severe depression
- ◉ Narcotic withdrawal
- ◉ Intubation sedation in severe asthmatics
- ◉ Sedation for prolonged extrications

## Ketamine-Uses

- ◉ Battlefield analgesia and sedation
- ◉ The Military Advanced Regional Anesthesia and Analgesia handbook
- ◉ USSOCOM Tactical Trauma Protocols
- ◉ Ranger Medic Handbook
- ◉ Pararescue Procedures Handbook

## Ketamine-Safety

- ◉ Very favorable safety profile
- ◉ Few, if any, deaths attributed to Ketamine as a single agent

## Safety-FDA Insert

- ***"Ketamine has a wide margin of safety; several instances of unintentional administration of overdoses of ketamine (up to ten times that usually required) have been followed by prolonged but complete recovery."***

## Ketamine-Contraindications

- Head injuries at risk for increased intracranial pressure
  - Can cause increased ICP
- Glaucoma and globe injuries
  - Can cause increased intraocular pressure
- Hypersensitivity to Ketamine

## Ketamine-Side Effects

- Elevated heart rate
- Elevated blood pressure
- Hypersalivation
- Nausea
- Muscular clonus
- Nystagmus

## Ketamine-Side Effects

- “Bad dreams”
- Hallucinations
- Emergence Phenomena
  - Dose related
  - 12% of patients
  - Decreased symptoms with benzodiazepines, barbiturates and narcotics

## Ketamine-Side Effects

- ◉ Respiratory depression and apnea can occur if Ketamine is administered too rapidly IV
- ◉ Treatment is assisted ventilation

## Ketamine-Dosages

- ◉ Vary widely by user and clinical situation
- ◉ Surgical anesthesia
  - 1 mg/kg to 4.5mg/kg IV
  - 6.5 mg/kg to 13 mg/kg IM
- ◉ Surgical induction and procedural sedation
  - 1 mg/kg to 2 mg/kg IV
  - 4 mg/kg to 5 mg/kg IM

## Ketamine-Dosages

- Analgesia
  - 0.1 mg/kg to 0.5 mg/kg IV
  - 0.4 mg/kg to 1mg/kg IM

## Ketamine-Proposed Protocol

### Tactical Field Care

12. Provide analgesia as necessary.

a. Able to fight:

*These medications should be carried by the combatant and selfadministered*

*as soon as possible after the wound is sustained.*

- Mobic, 15 mg PO once a day
- Tylenol, 650-mg bilayer caplet, 2 PO every 8 hours

b. Unable to fight:

*Note: Have naloxone readily available whenever administering opiates.*

- Does not otherwise require IV/IO access
- Oral transmucosal fentanyl citrate (OTFC), 800 ug transbuccally
- Recommend taping lozenge-on-a-stick to casualty's finger as an added safety measure
- Reassess in 15 minutes
- Add second lozenge, in other cheek, as necessary to control severe pain.
- Monitor for respiratory depression.

## Ketamine-Proposed Protocol

- IV or IO access obtained:
  - Morphine sulfate, 5 mg IV/IO
  - Reassess in 10 minutes.
  - Repeat dose every 10 minutes as necessary to control severe pain.
  - Monitor for respiratory depression
- Promethazine, 25 mg IV/IM/IO every 6 hours as needed for nausea or for synergistic analgesic effect

## Ketamine-Proposed Protocol

For patients with persistent severe pain after treatment with narcotics or patients in whom narcotics are contraindicated:

- Does not otherwise require IV/IO access
    - Ketamine 100mg IM
    - Repeat dose every 30 minutes to 1 hour as necessary to control severe pain
  - IV or IO access obtained
    - Ketamine 20 mg slow IV/IO push over 1 minute
      - Reassess in 5-10 minutes.
      - Repeat dose every 5-10 minutes as necessary to control severe pain up to 5 doses (100mg total dose) or until the patient develops nystagmus
      - Continue to monitor for respiratory depression and agitation
- (Ketamine should not be given to patients with head injuries or eye injuries)

## Discussion

