Procedural Sedation and Analgesia in the ED

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Overview
- Terminology
- Goals
- Indications
- Precedation Assessment
- Consent Issues
- Equipment and Personnel
- Agents
- Recovery

Terminology
- The Continuum of Sedation

Goals
- Safe and effective control of pain, anxiety and motion to optimize conditions for procedure to be performed
- Provide appropriate decreased awareness and memory loss for the patient to tolerate the procedure

Indications
- Minor trauma
  - Pediatric lacer repair
  - Fracture reduction
- Instrumentation
  - Abscess I&D
- Diagnostic imaging
  - Pediatric head CT

Presedation Assessment
- History
- Physical
- NPO status
  - 2 hours clear liquids
  - 8 hours solids and non-clear liquids
Consent Issues
- Risks
- Benefits
- Limitations
- Potential Side Effects
- Alternatives
- Verbal or written consent obtained

Be Prepared!
- Personnel
  - Two experienced providers
  - Most adverse events occur in first 1-5 minutes
- Monitors
  - Continuous pulse oximetry
  - Capnography
  - ECG monitoring

Be Prepared!
- Airway equipment
- Oxygen
- Suction
- Vitals
- IV access

Monitoring
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Agents

Benzodiazepines
- Midazolam (Versed)
  - Shortest acting benzo
  - Sedation/amnesia/anxiolysis
  - No analgesic properties
  - Adverse effects
    - Hypoventilation
    - Hypotension
    - Paradoxical hyperactivity
Opiates

- Fentanyl
  - Short-acting opioid
  - Excellent analgesic
  - No anxiolytic or amnestic properties
  - Fentanyl has no histamine release
    - Less nausea/vomiting
    - Less hypotension

Fentanyl

- Common adverse effects
  - Respiratory depression
  - Pruritis
  - Rarely rigid chest syndrome
  - Reverse with naloxone

Barbiturates

- Methohexital (Brevital)
  - Ultra-short acting barbiturate
  - Sedation/amnesia/anxiolysis
  - No analgesic properties
  - Can give iv, pr

Methohexital

- Disadvantages
  - Respiratory depression
  - Hypotension
  - Relatively contraindicated for patients with seizures
  - No reversal agent

Propofol

- Ultra-short acting sedative hypnotic
- No significant analgesia
- Extremely rapid onset and recovery
- Inherent anti-emetic & euphoric effect

Propofol

- Disadvantages
  - Hypotension
  - Respiratory depression
  - Pain at injection site
  - Avoid in patients with egg/soy allergies
**Etomidate**
- Ultra-short acting sedative hypnotic agent
- Sedation, anxiolysis and amnesia
- No analgesia
- Extremely rapid onset and recovery
- Unique because does not cause hypotension

**Etomidate disadvantages**
- Myoclonus
- Nausea/vomiting
- Transient adrenal suppression
- Pain at injection site
- Emergence delirium

**Etomidate vs. Propofol**
- Both are extremely short-acting
- Etomidate advantages
  - Maintains hemodynamics
- Propofol advantages
  - Inherent anti-emetic effect
  - No myoclonus

**Ketamine is unique**
- Dissociative anesthetic
- Preserves cardiopulmonary stability
- No dose-response continuum
- Emergence phenomenon

**Ketamine**
- Excellent safety profile
- Adverse effects
  - Increased salivation
  - Vomiting
  - Respiratory depression/laryngospasm
    - Rare
    - Self-limited
    - Associated with rapid iv push

**Ketamine Pharmacology**
- Catecholamine surge
  - Increases HR/BP
  - Bronchodilation
  - Increases CPP/IOP
Ketamine Contraindications

- **Absolute**
  - Age <3 months
  - Psychosis

- **Relative**
  - Age <12 months
  - Procedures on posterior pharynx
  - Hx of tracheal surgery or stenosis
  - Pulmonary disease
  - Cardiovascular dz
  - High risk for elevated ICP/IOP

Ketamine Summary

- Extremely safe, especially im
- Useful in children
- Be aware of pharmacology and contraindications

Reversal Agents

- Naloxone
  - Short-acting opioid antagonist
- Flumazenil
  - Benzodiazepine antagonist
  - Contraindications
  - Precipitates seizures on patients who are alcohol or benzodiazepine dependent

Recovery

- Discharge guidelines
  - Vital signs stable
  - Alert
  - Age-appropriate baseline mental status
  - Talk and sit unaided

Critical Points

- Become familiar with a few key agents
- Dedicated airway provider
- Be especially vigilant
  - Immediately after drugs given
  - When noxious stimulus is removed
- Be prepared!
Case 1

- 4 yo F presents after fall from monkey bars with forehead contusion and angulated R forearm fracture. You are asked to provide sedation for reduction. Which agent do you choose?

**What do you want?**
- Short acting
- Skeletal muscle relaxation

**Which agent?**
1. Fentanyl/Versed
2. Ketamine
3. Propofol
4. Etomidate
5. Methohexital

Case 2

- 2 yo M with complex facial laceration. Needs sedation for repair. Which agent should you use?

**Which agent?**
1. Fentanyl/Versed
2. Ketamine
3. Propofol
4. Etomidate
5. Methohexital
Thank you!