Anesthesia for Rural and Remote Locations

John Cullen MD
Valdez, Alaska
Valdez, Alaska

- A community of 4200 people
- 4 hour transport time from Anchorage
- Large industrial base
- 4 season adventure sports
- Relatively young population with a high pregnancy rate
Problem

- Rural and remote hospitals care for major trauma, pregnancies, surgical cases
- Transportation can be limited by time, distance, and weather.
- Air transportation can be hazardous.
Problem

Lack of volume for anesthesiologists or nurse anesthetists.

Decreasing numbers of both CRNAs and Anesthesiologists in rural areas.
Medical helicopter missing with 4 aboard

Patient, three others were traveling to Anchorage, Alaska, hospital
Solutions

- Hire an anesthesiologist or nurse anesthetist
Solutions

- Local anesthesia
- Procedural sedation
- Field blocks
- Regional anesthesia
- Rapid sequence intubation

2001 AAFP position paper entitled *Rural Practice: Family Medicine Graduate Medical Education Training For Rural Practice*
Local anesthesia

- Lichentstein Hernia Center  UCLA
- 12,000 inguinal hernias repaired under local anesthetic

Local anesthesia

- 50/50 Mixture of .5% Bupivacaine and 1% Lidocaine without epi
- Up to 45 ml per Hernia
  1. Subdermal injection 5 ml
  2. Intradermal skin injection 3 ml
  3. Deep subcutaneous injection 10 ml
  4. Sub Fascial plane 10 ml
  5. Hernia neck 3 ml
Disadvantages

- Lidocaine toxicity 3 - 5 mg /kg
- CNS toxicity first
- Cardiovascular toxicity next
- Using midazolam may hide CNS toxicity
Procedural sedation
Equipment

- Suction
- Emergency cart with appropriate medications
- Defibrillator
Equipment

- Oxygen Bag - mask system for positive pressure ventilation
- Laryngoscope with appropriately sized blades
- Appropriately sized endotracheal tubes
Monitoring

- Cardiac monitor
- End tidal CO2
- Watch the patient.
Environment

- Setting
- Lighting
- Conversation
- Midazolam 2 mg increments
- Fentanyl 25 mcg increments
- Go slow
- 6 mg of Midazolam to achieve amnesia
- Titrate to effect
- Best to dilute 10:1
Children
Intranasal midazolam

- Administer using a 1 mL needleless syringe into the nares over 15 seconds;
- use the 5 mg/mL injection form
- 1/2 of the dose may be administered to each nare;
- 0.2 mg/kg; may repeat in 5-15 minutes; range: 0.2-0.3 mg/kg/dose

Intranasal midazolam

- Or Relax, take it easy, take your time, wait, give a little, give a little more.
Ketamine

- Oral: 6-10 mg/kg for 1 dose (mixed in cola or other beverage) given 30 minutes before the procedure
- I.M.: 3-7 mg/kg
- I.V.: Range: 0.5-2 mg/kg, use smaller doses (0.5-1 mg/kg) for sedation for minor procedures;
Blocks

- Local
- Bier block
Local blocks
Bier Block
Bier Block

- Tourniquet upper arm or leg
- 2 cuff technique.
- Lidocaine 2% without epinephrine
- 10 ml injected IV
Bier Block

Advantages

- Good pain relief
- Bloodless field.
Bier Block

Disadvantages

- Pain from tourniquet
- Lidocaine toxicity
- Expensive equipment
- Better in younger patients
**Lumbar sympathetic block**

- 0.5 percent bupivacaine
- Anterolateral to the L2 or L3 vertebral body on the right and left sides
Intrathecal anesthesia

- Injection of opioids only as a spinal
- Advantages
  - Quick
  - Safe
  - Effective
  - Uses same technique as lumbar puncture
  - Fewer staff needed to administer
Intrathecal anesthesia

- Disadvantages
  - Short window
  - Pruritis
  - Spinal headache
  - Respiratory depression
Intrathecal anesthesia

Respiratory depression

- 1915 women given .15 mg Morphine for cesarean section
- 6 patients exhibited bradypnea within 24 h after the injection of morphine
- 4 had mild respiratory depression and were treated with oxygen or encouragement (.26%)
- 1 had oxygen saturation below 90% and apnea spells lasting 30 seconds and was treated with naloxone (.052%)
- 1 had obstructive apnea

*J Anesth.* 2008;22(2):112-6. 2008 May 25. *Delayed respiratory depression associated with 0.15 mg intrathecal morphine for cesarean section: a review of 1915 cases*
Intrathecal anesthesia

- Same technique as Lumbar puncture for diagnostic purposes
- Injection of .5 ml Fentanyl and .5 ml Duramorph
- 25 gauge pencil tip needle

Spinal anesthesia

- Lidocaine 10% (Hyperbaric) mix 50/50 with D10 to make 5%
- 1.2 - 1.5 ml
- Bupivicaine .75% preservative free
- 1 - 1.4 ml
- sitting position
- L3-L4 T7-C8
- Need at least T6
Spinal anesthesia

- Hydrate first
- (2) 18 gauge IVs

- Use less medication if obese.
- Injecting faster causes higher level
- Coughing causes higher level as well
Spinal anesthesia

- Watch for high level
- Hypotension
- Difficulty breathing
Rapid sequence induction
Preoxygenation

- Nitrogen Washout effect
- creating oxygen reservoir
T - 5 minutes

- Lidocaine cough suppressant
  1.5 to 3 mg/kg IV T -2 to 5 minutes
- Atropine in kids
T - 3 minutes

- Defasciculating agent - Vecuronium (0.01 mg/kg)
- Fentanyl
- Midazolam 0.2 to 0.3 mg/kg
- Neuromuscular blocking agent
  - Succinylcholine .6 mg/kg using ideal body weight
  - Rocuronium .6 mg/kg using ideal body weight
Intubation
Post intubation management

- end-tidal CO2 determination
- Examination
- CXR
- Secure tube
General anesthesia

Canadian Family Medicine Anesthesia
Editorial comments

- Canada recognizes Family Medicine Anesthesiologists. Why can’t there be US FMAs.

- As rural family physician retire, we will lose knowledge. We need a repository of our hard won lessons.

  AAFP Rural Online Community
Editorial comments

- The time to practice these techniques is not during an emergency.