Smooth Moves:
Regional Anesthesia

Robert J. Vissers, MD FACEP FRCPC
Medical Director, Emergency Medicine
Legacy Emanuel Hospital
Adjunct Associate Professor, OHSU
Portland, OR
Objectives

- Explain the techniques for local and regional anesthesia in various parts of the body.
- Explain the techniques for intra-articular, hematoma, and Bier blocks.
- Discuss recent advances in regional anesthesia.
Regional Anesthesia

Case discussion of:

- Local infiltration
- Nerve blocks
- Intraarticular anesthesia
- Hematoma blocks
- Bier Blocks
Local Anesthetic History

- Cocaine was first isolated in Europe during the years 1859-1860
- Sigmund Freud first to propose the idea of using cocaine clinically
- Simultaneously, the advent of a precise syringe
Infected earring
Auricular block
Local infiltration

Less painful:

- Small needle
- Slow injection
- Inject on withdrawal
- Inject through wound edge, not skin
- Distraction
- Proximal first
Local infiltration

**Buffering**

- Epi = ↓ pH = ↑ pain
- Na Bicarb = ↑ pH = ↓ pain

1 mL of Na bicarb (1 mmol/mL)
10 mL of anesthetic
Local infiltration

- Wound with excessive bleeding:
  - lidocaine with epinephrine

- Apprehensive patient:
  - lidocaine with sodium bicarbonate

- Prolonged postprocedure pain:
  - bupivacaine
I’m allergic to that stuff…

- Allergic reactions rare – usually Esters (procaine, tetracaine) from metabolite PABA
- Amide may cross-react due to methylparaben
- Use single-use, or lido from resuscitation cart
I’m allergic to that stuff...

- 1% diphenhydramine (Benadryl) is as effective as 1% lidocaine
- Need to dilute! (usual 4% may cause necrosis)


Benadryl®
Know your limits

Patient requests
FB removal...
My toe hurts...
Nerve Block

Indicated when:

- Local infiltration impairs closure or compromises blood flow (e.g., fingertip)
- Multiple injections painful, amount excessive
- Most efficacious form of treatment
- Extensive limb surgery or manipulation
Digital Block
Flexor Tendon Sheath Digital Block

**Advantages:**
- Single injection
- Small amount
- Rapid onset
- High success rate
Flexor Tendon Sheath Digital Block

- Hand supinated
- Flexor tendon is located
- Needle inserted into the flexor tendon sheath at distal palmar crease
Flexor Tendon Sheath Digital Block

- Flexion-extension of finger causes wide swing of the needle
Flexor Tendon Sheath Digital Block

- Attach syringe, inject 2-4 ml of local anesthetic
- Resistance suggests needle tip is against the flexor tendon - careful withdrawal
Pediatric Metacarpal Block
Flexor Tendon Sheath Digital Block

- Chiu described in 1990
- Methylene blue in cadavers diffused to all 4 digital nerves
- 99% success in 420 patients
- Also called transthecal digital block


Sensory Inervation
Ulnar Nerve Block
Ulnar Nerve Block

- Under the tendon of the flexor carpi ulnaris
- Above the styloid process of the ulna
- Advance 5-10 mm
- Also inject above tendon to block hypothenar cutaneous
Ulnar Nerve Block
It’s fourth of July...
Median Nerve Block
Median Nerve Block

- Proximal volar crease of the wrist
- Between palmaris longus and flexor carpi radialis tendons
- Less than 1 cm deep, below flexor retinaculum
- About 5 cc
Median Nerve Block
Radial Nerve

- Extensor Pollicis Longus
- Radial Nerve
- First Metacarpal bone
- Extensor Pollicis Brevis
Radial Nerve Block
Ultrasound Nerve Localization


Ultrasound Nerve Localization


Ultrasound Nerve Localization


- 22 blocks on 11 patients after 1 hour of training
- All successful, no rescue needed
Crash...

- Morbidly obese
- Backboard, collar
- Head injury
- Left leg adducted, internally rotated
Posterior hip dislocation
Femoral nerve block/ 3-in-1

- 3-in-1 femoral nerve block
- Femoral nerve, obturator nerve, lateral cutaneous nerve
- Commonly used post hip surgery, proximal femur fractures
- Innervates the anterior thigh, the periosteum of the femur, hip joint capsule and the knee joint

Femoral nerve block

- 50 patients with fractured neck of femur
- Randomized to morphine IV (24) vs. 3-in-1 block 20cc 0.5% bupivacaine (26)
- Performed by ED staff after training
- Pain improved twice as fast
- Required half the morphine
- No adverse events

Femoral nerve block

- Drug safety study of 2mg/kg bupivacaine in 3-in-1 femoral blocks in patients >80 years*
- No toxic levels in 6 hour arterial sampling
- Average analgesia and anesthesia, 26.6 hours
- Study of 61 ED patients with femur fractures – safe, reliable, fast, easy – used wt based dosing**

Femoral nerve block
Femoral nerve block
Femoral nerve block

- Recommend 0.25% bupivicaine, 0.5cc/kg, max of 20cc to 30cc
- To achieve 3-in-1:
  - Use higher end of volume (30cc)
  - Apply pressure distally for 5 minutes to encourage proximal diffusion
- Wait 15 minutes for full effect
Sound familiar...?

- 85 year old, found down in nursing home
- Demented, yelling
- Significant cardiac history
- Dehydrated
What about prosthetics?
Knee dislocation
Bilateral lower leg fractures

- Pedestrian hit by car
- Intoxicated
- Bilateral tib-fib
- Patient keeps trying to get up
Whole Body Nerve Block
Infraorbital block

Infraorbital block

- Identify
- Palpate
- Position
- Retract
- Direct
- Advanced
- Aspirate
Ma Ung Urrs...
Lingual/Alveolar block

Lingual/Alveolar block

- Direct infiltration of the tongue is painful and ineffective
- Lingual nerve innervates anterior two-thirds of the tongue, floor of the mouth and gums
- Can be blocked with alveolar block
- Or, lingual nerve can be anesthetized by injecting 2 to 3 mLs into the lateral floor of the mouth adjacent to the premolar teeth.
Lingual/Alveolar block

Intraorally identify the vertical ridge of the anterior border of the ramus of the mandible by palpation.

Insert needle medial to ridge, 1 cm above the third molar tooth and advanced along the medial side of the ramus to 2 cm, where the bone must be felt with the needle.

Withdraw slightly and inject 1–2 cc.
Procedural sedation?
Intraarticular anesthesia

- Consider as primary or supplementary anesthesia
- Useful for reductions
- Reduces the needs for sedatives
42 year old male trips, popped his shoulder again
Out of towner, wants to drive home, requests no sedation
Intraarticular shoulder anesthesia

- 20 cc of 1% plain lidocaine is injected using an 18 gauge needle
- 2 cm below the lateral edge of the acromion
- Directed towards the glenoid fossa
- Fifteen minutes to maximize the analgesic effect

Intraarticular shoulder anesthesia

- 30 patients, anterior shoulder dislocation
- Randomized to intraarticular lido VS morphine and versed
- No difference in pain and success
- Shorter stay (78 vs. 186 min, p<0.004)
- Reduced cost by 62%

Intraarticular shoulder anesthesia

- 49 patients, anterior shoulder dislocation
- Randomized to intraarticular lido (29) VS morphine and diazepam (20)
- No difference in pain and success
- Lido-only less successful if >5.5 hours
- Patients preferred analgesia

Where’s the sulcus sign?
Intraarticular shoulder anesthesia

- Consider if no sedation (or less) desired
- Sooner the better
- May be faster
- Consider doing before x-ray
Hematoma block

- For isolated closed fracture reduction
- Local anesthesia
- Hematoma is aspirated
- Lidocaine 1% is infiltrated (3 to 10 mL) into the fracture cavity and around the periosteum
- Effective within 5 to 10 min - several hours duration
Hematoma block

About 30 degrees

L
DF
R
Hematoma vs. Biers Block

- 142 patients with colles’ randomised to hematoma block (70) or bier’s block (72)*
- Bier’s block less painful
- Less pain and better result with less manipulations under bier’s block
- Same length of stay times

Intravenous regional anesthesia

- Intravenous administration of local anesthetic distal to an inflated pneumatic tourniquet
- Useful for:
  - fracture reductions
  - large laceration repairs
  - foreign body removal
- Duration of regional anesthesia 30 to 60 min
Intravenous regional anesthesia

Bier’s block equipment
- Flexible extension tubing
- Esmarch bandage
- Double cuff tourniquet
- Pressure source
Intravenous regional anesthesia

- Proximal cuff is inflated to 50 to 100 mmHg above systolic pressure
- Lidocaine (0.6 mL/kg of 0.5 percent solution) without epinephrine is used IV distal to cuff
- Do not deflate for 30 minutes