Local Anesthetic Use in Emergency Medicine

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In this lecture:
- Mechanism of action, absorption, toxicity
- Loco-regional techniques
- Drug options
- Duration of action
- Lidocaine benefits and consequences

When to use locals
- Local anesthetics block nerve conduction via voltage-gated sodium channels within the neuron
- Frequency dependent blockade

Mechanism of action
Mechanism of action - Pain

Absorbed by mucous membranes, pleura or peritoneum

Skin

Side effect – vasodilation. Enhance absorption

Vasoconstriction?

Absorption into bloodstream = end of action
Toxicity

- Dosage based on lean body weight
- Overdosage - incorrect dose or IV admin
- Toxicity additive
- Local tissue irritation and histological changes
- Neurotoxicity
- CNS tox occurs before cardio tox
- Lidocaine vs bupivacaine

LipidRescue
Realization of local anesthetic toxicity

Toxicity cont’d

- CNS toxicity signs:
  - Sedation, disorientation, ataxia
  - Tremors, convulsions, resp. depression
- CV toxicity:
  - 4x CNS tox doses
  - Long-acting anesthetics (bupivacaine)
- Toxic dosages in dogs:
  - Lidocaine - 20mg/kg IV, Bupivacaine - 4.3 mg/kg IV
- Toxic dosages in cats:
  - Lidocaine - 12mg/kg IV, Bupivacaine - 3.8mg/kg IV

Local Anesthetic Techniques

- How do we use them?
  - Sole anesthetics
  - Anesthetic adjuncts
  - Diagnostics
  - Block pre-emptively
- Local infiltration - Peripheral nerve blocks
- Topical
  - Corneal, laryngeal
  - EMLA cream, Lidoderm patch
Local and Peripheral

- Subcutaneous
- Ring Blocks
- Dental Blocks
- Ocular - retrobulbar

Ring Blocks

- Dorsal
- Ventral
- Dorsal
- Palmar

Dental Blocks

- Infrasymphyseal
- Mesiobuccal
- Anterior alveolar
Retrobulbar Block

- Indications
  - Enucleation
  - Easy to use
  - Curve a 1.5in, 22ga needle
  - Deposit small amount behind eye
  - Blockade of vagal response

Retrobulbar Block

Intact skin poorly absorbed
- Exception EMLA cream, Lidoderm patch
- Eutectic mixture of local anesthetics
- Cornea and mucous membranes

Topical Anesthetics
Topical Anesthetics

- Lidoderm patch
- 700mg lidocaine released over ~12 hours
- Analgesia but not sensory block
- Absorption in 30 minutes
- Measurable plasma levels

Regional Anesthesia

- Epidurals
- Brachial Plexus Block
- Femoral/Sciatic Nerve Block
- Intercostal Nerve Blocks
- Intrapleural
- IV Regional Anesthesia (Bier Block)

Epidurals

- Uses/Indications
  - Caudal and hindlimb procedures
  - Forelimb procedures?
  - Painful abdominal procedures
  - Painful post-operative patients
  - Cesarean section!
Epidurals
- Easy procedure once proficient
- CHIMES acronym
  - Coagulation
  - Hypovolemia/Hemorrhage
  - Infection/Inflammation
  - Neuro disorder/Neoplasia
  - Anatomical Abnormality
  - Sepsis

Sacrococcygeal Block
- Coccygeal epidural with local anesthetic for catheterization and pain management in the treatment of feline urethral obstruction

Sacrococcygeal Block
**Intercostal Nerve Blocks**

**Uses/Indications**
- Analgesia/Anesthesia to portion of thoracic wall
- Blockade of 2 intercostal spaces cranial and caudal to defect/chest tube/incision
- Deposit local CAUDAL to rib
- 1.5in, 22ga needle for dog

[Image of Intercostal Nerve Blocks]

[Image of Diagram showing Intercostal Nerve Blocks]

[Link to eMedicine Medscape]

[Link to CVMBS Colorado State University]
IV Regional Anesthesia

- Uses/Indications
  - Anesthesia of distal extremities
  - Conjunction with sedation/anesthesia
  - Tourniquet on limb
  - Infuse local into vessel that is cannulated distal to tourniquet
  - Effects dissipate after tourniquet removal
  - No post-operative analgesia

Bier Block

Bier Block!
Drugs and their effects:

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<th>Onset</th>
<th>Duration</th>
<th>Potency</th>
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Drug Options

- What to use and when?
  - Depends on your goals
  - Severity of pain
  - Invasiveness of procedure
  - Return to function
  - Degree of panic allowable post-op ...
  - Pick your patient!
  - Species differences

Opioids enhance duration

Addition of morphine or buprenorphine

24 to 32 hours!

Old research in dogs for epidurals

Morphine + bupivacaine

The addition of opioids to local anaesthetics in brachial plexus block: the comparative effects of morphine, buprenorphine and sufentanil

J. E. Baxin, C. Massoni, R. Bretti, V. Ferraro, D. Gouiller and R. Schneidler

Hôpital d’Anesthésie et de Réanimation, Hôpital Universitaire G. Mangin, 4605 Cluses-France CEDEX
When do YOU use lidocaine?

Versatile medication – long list of uses and indications

Ischemic reperfusion injury

Free radical scavenger
- Reactive oxygen species (ROS)
- Decrease proinflammatory cytokines
- Decrease pain which decreases cytokines
- Anti-inflammatory effect
- Decreases neutrophil migration/activation
- Improves blood flow
Lidocaine

Original Study

Evaluation of lidocaine treatment on frequency of cardiac arrhythmias, acute kidney injury, and hospitalization time in dogs with gastric dilatation volvulus

Yaron Buchin, DVM; Segev-Saj, DVM; Ber-Helevy Shira, DVM; Efrat Kelmner, DVM, MS; DACVECC; Tali Dinstein Sagal, DVM; DECVS; Arosh Inman, DVM, DECVIM-CA and Sgev Giladi, DVM, DECVIM-CA

In a nutshell

- If there’s a nerve, you can block it
- Pre-emptive is better than post
- Always calculate toxic dose
- No IV to cats
- Lidocaine possible decrease mortality in IRI??

Questions??

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