Prolonging Peripheral Nerve Blocks for Ambulatory Surgery

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Overview

• Choice of the local anesthetic
• Use of additives to the local anesthetic
• Extended-release local anesthetics
• Use of peripheral nerve catheters in ambulatory patients

Long Lasting Local Anesthetics

• Etidocaine
• Tetracaine
• Bupivacaine
• Ropivacaine
• Levobupivacaine

Factors affecting the Duration of a Block: Local Anesthetic Volume

Factors effecting the Duration of a Block: Local Anesthetic Concentration

Additives: Epinephrine

Most widely used adjunct for local anesthetics in peripheral nerve blockade

Dose used: $1: 200,000$ to $1: 400,000$

Mechanism: Regional vasoconstriction
Additives: Clonidine

Established additive for neuraxial blocks

Mechanism:
Inhibition of the hyperpolarization-activated cation current
Not alpha 2 mediated

Dose range used in peripheral blocks:
30 – 300 mcg, mostly 150 mcg

Additives: Dexamethasone

Discussed Mechanism:
Vasoconstriction
Dexamethasone increases the activity of inhibitory potassium channels on nociceptive C-fibres (via glucocorticoid receptors), thus decreasing their activity
Other Additives: Opioids

μ opioids (Morphine, Fentanyl, Sufentanil)
  Efficacy: do not prolong PNB

Buprenorphine
  Efficacy: controversial

Tramadol
  Efficacy: largely negative findings, especially when combined with long-acting local anesthetics or when systemic controls have been included

Other Additives

Ketamine
  Efficacy: does not prolong PNB

Sodium Bicarbonate
  Efficacy: does not prolong PNB, but shortens onset

Midazolam
  Efficacy: some studies show prolongation, but data is limited. However: concerns for neurotoxicity

Magnesium
  Efficacy: very limited data, but at least two positive published studies

Coming soon: Extended Release Local Anesthetics

Sustained release, injectable bupivacaine using multivesicular liposomes (DepoFoam)

DepoFoam

Injectable system for sustained release drug delivery

Mostly used for wound infiltration
Peripheral Nerve Catheters

Advantages:

- Good analgesia for any desired duration
- Ability to adjust the flow rates to minimize motor blocks
- Ability to apply boluses to improve analgesia

Disadvantages:

- More complex and time consuming block procedure
- High failure rate
- Risk of migration
- Potentially increased risk for infection, nerve damage
- Requires health care provider on call to be available for patient