

10-2018

Multimodal analgesia technique in a chronic opioid dependent patient

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Recommended Citation

D'Souza S. Multimodal analgesia technique in a chronic opioid dependent patient. American Society of Anesthesiologists (ASA) Conference, October 13-17, 2018, San Francisco, CA.

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Introduction

Perioperative pain management in chronic pain patients can present a challenge, especially if they are treated with long term opioids. This case describes the use of multimodal analgesia perioperatively in an opioid-dependent chronic pain patient.

Case Description

A 57-year-old male with a history of chronic pain and long term daily opioid use presented for a sternal hardware removal, open reduction and internal fixation and cadaveric bone graft for a nonunion of prior sternotomy. A multimodal approach was used for perioperative pain management with a combination of medications to address multiple different pain receptors and pathways. Patient received high dose fentanyl, dexmedetomidine, ketamine, intravenous acetaminophen, and continuous intercostal nerve blockade with local anesthetics via surgically placed On-Q pump. The perioperative course was uneventful and patient was comfortable in the postoperative period.

Multimodal Mechanism of Pain¹

- Peripheral pain receptors: Sensitive to capsaicin, moderate thermal stimuli, acid pH, adenosine, and other related phosphates
- Ion channels: Voltage-gated sodium channels, voltage-gated calcium channels
- Inflammatory Mediators: Substance P, bradykinin, cytokines, prostaglandins
- Peripheral sensitization
- Central sensitization

Multimodal Approach to Pain Management in an opioid-dependent chronic pain patient

| Medication/Technique | Description |
|--|--|
| <i>Regional Anesthesia</i> | <i>Neuraxial block or peripheral nerve block</i> |
| <i>Acetaminophen</i> | <i>Inhibits the synthesis of prostaglandins</i> |
| <i>Non-steroidal anti-inflammatory drugs</i> | <i>Non-selective: Inhibits cyclooxygenase 1 and cyclooxygenase 2 (Ex: Ketorolac)</i> <i>Selective: Inhibits cyclooxygenase 2 only (Ex: Celecoxib)</i> |
| <i>Opiates</i> | <i>Acts on mu receptors which are primarily located in substantial gelatinosa of the spinal cord and periaqueductal gray matter in the brain</i> |
| <i>Gabapentin and Pregabalin</i> | <i>GABA B (1a,2) receptor subtype-selective agonist, and activates postsynaptic K channels and inhibits postsynaptic calcium channels</i> |
| <i>Intravenous Lidocaine (2)</i> | <i>Sodium channel blocker</i> <i>Inhibition of priming of polymorphonuclear granulocytes</i> <i>Inhibition of intracellular G protein signaling molecules.</i> |
| <i>Alpha 2 agonists (Dexmedetomidine, clonidine)</i> | <i>Presynaptic alpha 2 receptor agonist and decreases the release of norepinephrine. Alpha receptors are rich at locus coeruleus, pons.</i> |
| <i>Ketamine</i> | <i>Non-competitive antagonist of NMDA receptor calcium channel and a weak opiate receptor agonist.</i> |
| <i>Magnesium</i> | <i>Inhibits calcium influx into the cell and antagonist of NMDA receptors.</i> |

Discussion

Chronic pain is a complex disease that can lead to dysregulation of one or more of the pain receptors within the pain pathway.^{3,4} These changes can cause increased spontaneous activity as well as hyperresponsiveness to noxious and non-noxious stimuli.³ Pain management in these patients can be a challenge and may lead to inadequate pain control. Multimodal analgesia can be useful in managing patient pain by addressing multiple receptors involved in the pain pathway.⁴

In addition, the use of pre-emptive analgesia by administering medication prior to incision to cause an imitation of the activation of the nociceptive pathways and central sensitization can be useful in managing pain in opioid-dependent chronic pain patients. However, at this time, clinical data does not show a benefit of preemptive analgesia compared to post-incisional administration of analgesic medications.⁵

Conclusion

The patient's perioperative pain was effectively managed with opiates, dexmedetomidine, ketamine, intravenous acetaminophen and continuous intercostal block. The use of multimodal analgesia is a way to provide pain management in a chronic pain patient.

References

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