Dexmedetomidine: One Approach for Multimodal Opioid –Sparing Analgesia

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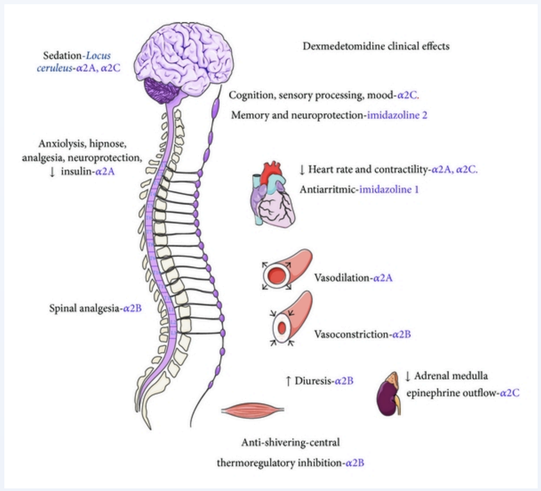
Background

Multimodal analgesia is widely advocated throughout the literature as a comprehensive approach for controlling postoperative pain.[1-2] Respiratory depression, excessive sedation, hyperalgesia, and postoperative nausea and vomiting (PONV) are few of the many adverse effects associated with opioid-centered analgesia; therefore, this warrants a call to action amongst anesthesia providers for shifting away from opioid centric and moving toward multimodal or balanced analgesia.[1] The pharmacologic properties of dexmedetomidine make it an appealing option for minimizing postoperative pain, reducing opioid consumption, and optimizing patient recovery and baseline functionality.[3]

Clinical Question

What role does dexmedetomidine play as an anesthetic adjunct, and is dexmedetomidine a safe and effective option for reducing postoperative pain?



Sites of Action of Dexmedetomidine

https://www.researchgate.net/publication/c/figures?lo=1

Case Report

- A 17-year-old male with a body mass index of 37.6kg/m^2 presented for a Le Fort I with bilateral sagittal split osteotomy.
- Past medical history included a generalized anxiety disorder, malocclusion, and PONV.
- Preoperative medications included a transdermal scopolamine patch 1.3mg for PONV, midazolam 3mg IV for anxiolysis, and oxymetazoline 0.05% nasal spray to bilateral nares.
- Maintenance of general anesthesia was accomplished with IV infusions of dexmedetomidine at 0.5mcg/kg/hr and propofol at 25mcg/kg/min, sevoflurane at 1.8% expired concentration, fentanyl totaling 50mcg and an esmolol total of 20mg IV. Ketorolac 30mg, dexamethasone 4mg, and ondansetron 4mg were administered 30 minutes prior to extubation.
- Emergence was accomplished by discontinuing propofol and dexmedetomidine infusions 15 minutes prior to surgical finish time and sugammadex 200mg IV was administered for reversal.
- The time from surgical completion to recovery of protective reflexes took approximately 25 minutes.
- Following extubation, the patient remained sedate yet arousable to repeated verbal command and was transported to the postoperative care unit (PACU) where he demonstrated stable vital signs.
- The patient was revisited and assessed 30 minutes after transfer to the PACU and appeared to be resting comfortably with eyes closed with had demonstrated no requirements for additional analgesia postoperatively.

Level of Evidence

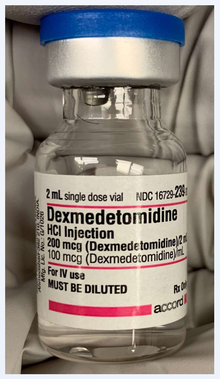
Graff et al. *The Official Journal of the Anesthesia Patient Safety Foundation,* 2018- Level V
Crespo et al. *Rev Esp Anestesio Reanim,* 2017- Level V
Afonso et al. *Rev Bras Anestesiol,* 2012- Level V
Tonner et al. *Best Pract Res Clin Anaesthesiol,* 2017-Level V
Liaquat et al. *Pak Armed Forces Med Jo,* 2019- Level II
Tsausi et al. *Eur J Clin Pharmacol,* 2018- Level I
Miao et al. *J Clin Anesth,* 2020- Level I
Li et al. *BMC Opthalmol,* 2020- Level II
Bladszun et al. *Anesthesiology,* 2012- Level I
Krishna et al. *IAIM,* 2017- Level II

Evidence Based Discussion

- Inadequate postoperative pain control has been linked to prolonged hospital stays, lower patient satisfaction scores, reduced patient functionality, and the potential for developing chronic pain syndromes.[1]
- Opioid centered anesthetic techniques are associated with respiratory depression, cognitive dysfunction, constipation, PONV, and hyperalgesia.[1,4]
- Dexmedetomidine is an alpha-2-agonist that exerts its action by direct stimulation of adrenoreceptors in the central nervous system and spinal cord leading to an inhibition of nociceptive neuronal firing; thus, causing blockade to a painful stimulus.[1]
- Dexmedetomidine's pharmacologic properties offer analgesic and anesthetic sparing effects.[4]
- Dexmedetomidine has been shown to decrease anesthesia requirements, decrease postoperative pain, reduce opioid requirements, and provide a reduction in the occurrence of PONV. [2,5-7]
- The use of dexmedetomidine for multimodal analgesia benefited the patient specifically in the following aspects: a) optimizing pain control and patient comfort while avoiding excessive sedation and respiratory depression, b) minimizing the risks of narcotic induced PONV, and c) reducing total intraoperative opioid administration.

Additional Considerations

- The use of dexmedetomidine in the case report described, along with the use of other pharmacologic agents may have contributed to a slightly prolonged and clinically significant delay in patient emergence; however, this was a minor aspect counteracted by the advantages it posed.
- Additional considerations for optimizing emergence include discontinuation of dexmedetomidine and propofol infusions at least 30 minutes prior to emergence and/or lowering the rates of these continuous infusions.



https://rk.md/2018/dexmedetomidine/

Translation to Practice

- Based on what has been synthesized from review of the literature, dexmedetomidine may afford opioid sparing and anesthetic sparing effects while also providing suitable analgesia.
- The use of dexmedetomidine as an adjunct to anesthesia has been demonstrated throughout the literature to be a safe and efficacious option for decreasing postoperative pain without compromising respiratory function.[3-4,6-7,10]
- Bradycardia appears to be the most commonly notable side effect associated with administration of alpha-2-agonists including dexmedetomidine however, the occurrence of such is variable throughout the literature.[9]
- Further research is warranted for which patient populations dexmedetomidine's analgesic properties will offer the most benefit
- Future implications for research include which surgical categories dexmedetomidine will offer the most benefit, what dosing provides optimal analgesia without contributing to toxicity nor delay in emergence or recovery, in addition to which patients and surgical categories dexmedetomidine should be avoided.
- Currently, no standard of care nor patient criteria exist for the perioperative use of dexmedetomidine, and traditional practice should always constitute weighing the risks and benefits on a case-by-case basis.
- Strategies to incorporate and generalize specific criteria for the use of dexmedetomidine include a facility specific patient questionnaire and checklist that can identify which surgical candidates dexmedetomidine will offer the most benefit.

References

Scan this QR code for a complete reference list.

Questions?

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