

Background

- Poorly managed perioperative pain can lead to decreased patient satisfaction, delayed recovery, prolonged hospitalization, chronic pain syndromes, and further complications.
- Multimodal analgesia involves the integration of opioid and non-opioid pharmacologic mechanisms of pain relief acting on different sites via various routes of administration.
- The additive and synergistic effects of multimodal analgesia can reduce the dose of each drug, and thereby their side effects.
- Emerging trends are shifting towards minimizing and alleviating opioid use due to adverse effects including ventilatory depression, excessive sedation, post-operative nausea and vomiting (PONV), constipation, and itching.
- Dexmedetomidine is a highly potent and selective alpha-2 adrenergic agonist with analgesic, anxiolytic, sedative, and sympatholytic properties without significant respiratory depression.
- Continuous perioperative dexmedetomidine infusions improve pain control, decrease opioid requirements by 66 percent, reduce side effects associated with opioids, and enhance patient satisfaction.

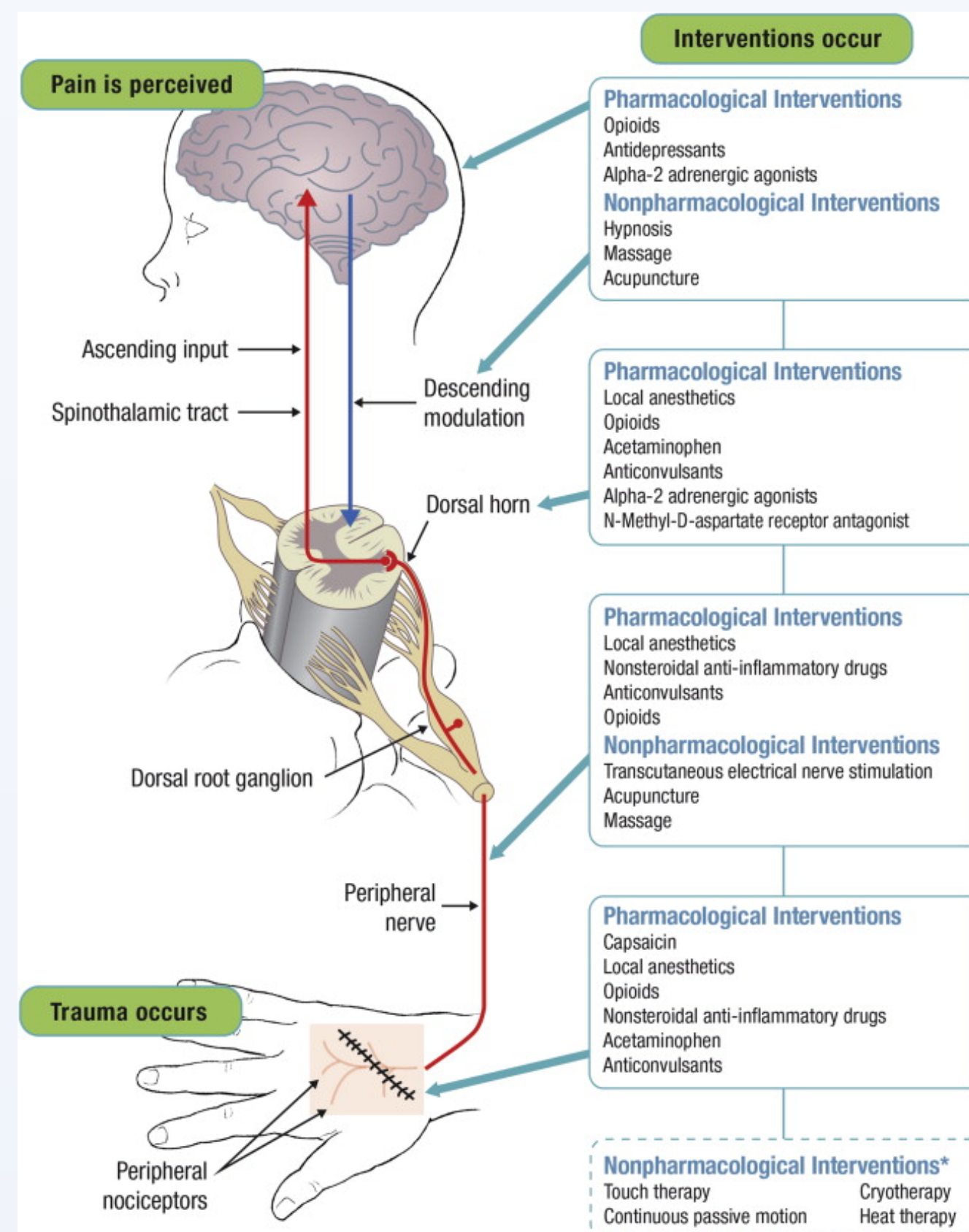


Figure 1: Manworren RC. Multimodal pain management and the future of a personalized medicine approach to pain. *AORN J.* 2015;101(3):307-318. doi:10.1016/j.aorn.2014.12.009

Clinical Question

Does dexmedetomidine in conjunction with other analgesic agents improve perioperative analgesia and reduce opioid requirements in patients undergoing painful surgery requiring airway protection at extubation?

Case Report

- 17-year-old, 57 kg female with a deviated nasal septum and dentofacial anomaly presented for a LeFort I bilateral sagittal split osteotomy, genioplasty, and rhinoplasty.
- Patient denied any significant medical, surgical, or social history.
- Baseline vitals signs: blood pressure (BP) 108/69 mm Hg, heart rate (HR) 81/min, respiratory rate 14/min, SpO2 99%
- Preoperative medications: intravenous (IV) midazolam 2 mg
- Induction: fentanyl 100 mcg, lidocaine 40 mg, propofol 160 mg, ketamine 25 mg, rocuronium 40 mg IV
- Nasal intubation by a 6.5 mm nasal RAE ETT.
- Maintenance: dexamethasone 6 mg IV, desflurane end-tidal concentration 5.2%, propofol 25 mcg/kg/min IV infusion, dexmedetomidine 0.7 mcg/kg/hour IV infusion
- Induced hypotension with a goal point of systolic BP 90 mmHg per surgeon request was maintained with titration of dexmedetomidine infusion.
- Closing and emergence: ketorolac 30 mg, ondansetron 4 mg, glycopyrrolate 0.4 mg, and neostigmine 3 mg IV
- Propofol infusion and desflurane delivery were discontinued prior to extubation in a deep plane of anesthesia. After extubation, dexmedetomidine infusion was discontinued.
- One hour after arrival to post-anesthesia care unit (PACU), the patient denied any pain or PONV.

Level of Evidence

- Bellon et al. *Pain Ther*, 2016 – Melnyk & Fineout-Overholt Level I
- Singh et al. *Surg Obes Relat Dis*, 2017 – Level I
- Grape et al. *Anaesthesia*, 2019 – Level I
- Jain et al. *Indian J Palliat Care*, 2012 – Level II
- Wang et al. *J Cardiothorac Vasc Anesth*, 2016 – Level II
- Galvin et al. *Cochrane Database Syst Review*, 2019 – Level I
- Ge et al. *Sci Rep*, 2016 – Level II
- Deepak et al. *IOSR JDMS*, 2020 – Level IV
- Cheung et al. *Anaesthesia*, 2014 – Level II
- Méndez et al. *Rev Colomb Anestesiol*, 2013 – Level VI

Evidence Based Discussion

- Dexmedetomidine is a useful adjuvant analgesic due to its multifaceted mechanism of action independent of opioid receptors. It exerts its analgesic effect by binding to alpha-2 receptors at the spinal and supraspinal levels through inhibition of norepinephrine release, thereby impeding pain signals to the brain.
- Pain management during general anesthesia is often titrated to the patient's BP and HR. Since dexmedetomidine commonly causes hypotension and bradycardia, these effects may alter the signs of pain used to determine the need for opioid administration.

Clinical Rationale & Critique

- A multimodal analgesic plan consisting of perioperative dexmedetomidine infusion alongside boluses of fentanyl, ketamine, and ketorolac, as well as local infiltration using lidocaine with epinephrine was chosen due to the high incidence of pain from orthognathic procedures.
- Prevention of PONV and respiratory depression, both side effects of opioids, was critical due to interdental wiring and limited airway access in case of an emergency.
- The patient was extubated in a deep plane of anesthesia to prevent coughing and agitation. However, a continuous infusion of dexmedetomidine during an awake extubation would have prevented emergence delirium and lowered the risk of respiratory compromise with return of the patient's protective airway reflexes.

Conclusion & Recommendations

- An intraoperative dexmedetomidine IV infusion of 0.2 to 0.7 mcg/kg/h can be used as an adjuvant analgesic safely and effectively in painful procedures that require airway protection at extubation.
- This strategy, in lieu of higher or more frequent doses of opioids, reduces adverse effects and preserves protective airway reflexes and tone without sacrificing perioperative analgesia.
- When compared to remifentanyl by Grape and associates, patients who received intraoperative dexmedetomidine infusions had lower pain scores up to 24 hours after surgery, longer durations before rescue analgesics were required, less postoperative opioid requirements, and fewer side effects.
- Intraoperative dexmedetomidine use has been associated with better chronic pain control and improved quality of life three months after surgery.

Translation to Practice

- Due to the opioid epidemic and its related negative implications, evidence that demonstrates improved patient outcomes will increase engagement of stakeholders.
- Initiating interprofessional collaboration between anesthesia practitioners, surgeons, pharmacists, and PACU nurses is an essential aspect of research translation to practice.
- The interprofessional team will develop a protocol outlining appropriate candidates that will benefit from intraoperative dexmedetomidine administration, as well as timing and dosage ranges.
- Educational sessions will be conducted to aid in successful integration of the protocol into practice.
- Additional research is needed regarding timing of administration in the perioperative period, dosage ranges, and the use of boluses versus infusions. Further research to promote involvement of stakeholders is also warranted.

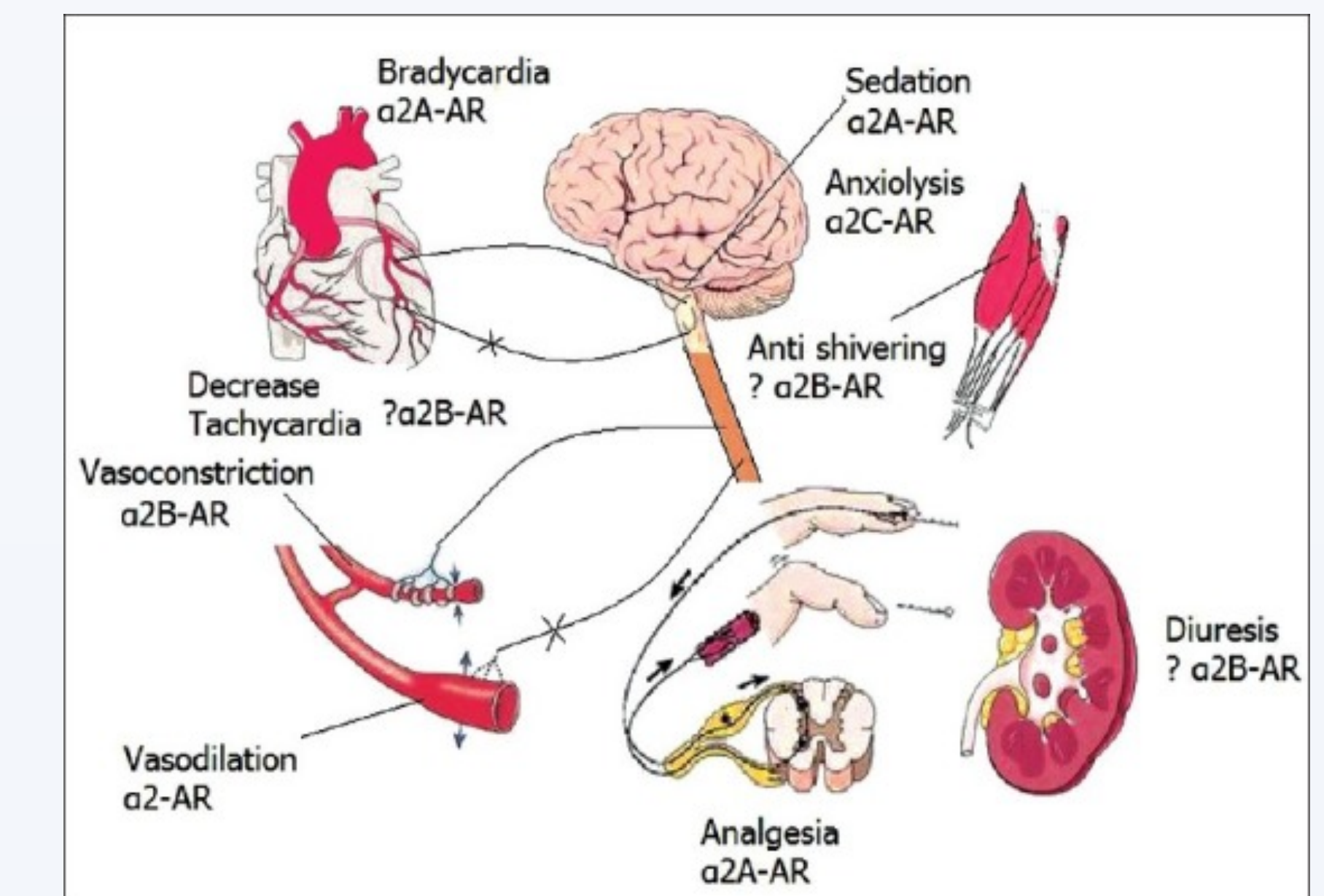
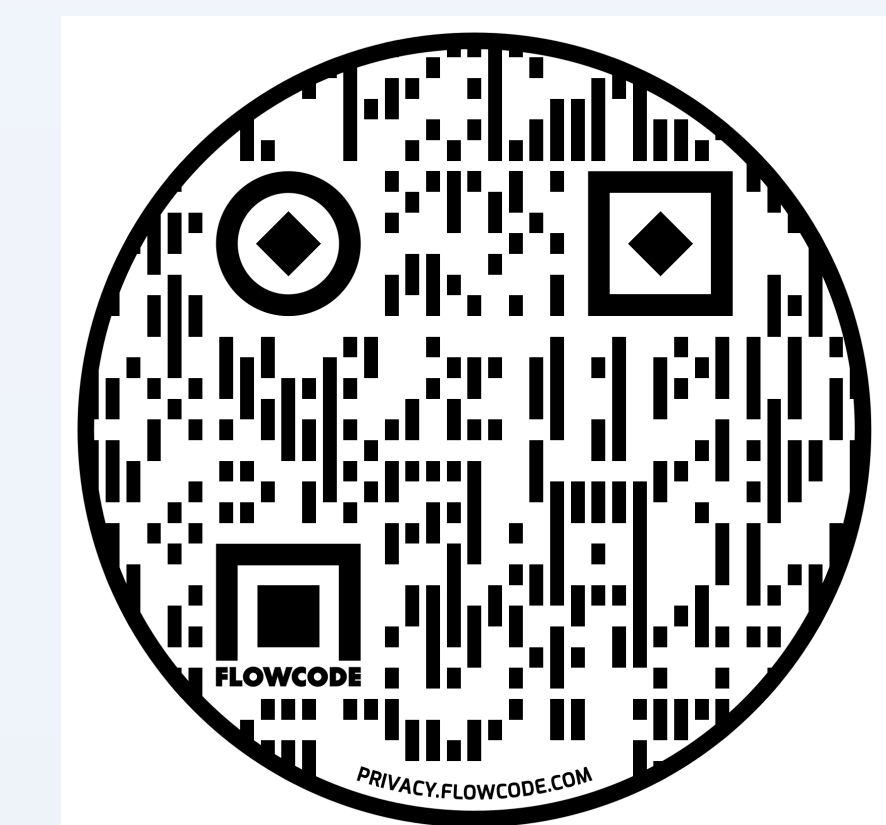


Figure 2: Kaur M, Singh PM. Current role of dexmedetomidine in clinical anesthesia and intensive care. *Anesth Essays Res.* 2011; 5(2):128-133. doi:10.4103/0259-1162.94750.

References

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Questions?

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