Dexmedetomidine for Procedural Sedation in Patients with Dementia

Matthew Walker, BSN

Dept. of Nurse Anesthesia, Moffett & Sanders School of Nursing, Samford University

Structured Abstract

Background

A 90-year-old female with dementia required an open reduction with internal versus external fixation of the tibia, fibula, and talus bones. Due to the patient's extensive comorbidities, general anesthesia was to be avoided if possible, and a spinal anesthetic was contraindicated as the patient was on chronic dual antiplatelet therapy. The placement of a regional nerve block was to be attempted to allow the use of monitored anesthetic care during the surgical procedure. Due to the patient's age and dementia, the administration of midazolam for procedural sedation was avoided. Instead, the patient received fentanyl 100 mcg intravenously, which provided minimal sedative effects, requiring the assistance of 2 staff members to minimize patient movement. During the nerve block placement, the patient's movement resulted in inadvertent intravenous access, which was identified by aspiration and rectified before further local anesthetic administration. After successful regional nerve block placement, the patient underwent the surgical intervention with a propofol infusion for sedation with no additional narcotics required during recovery.

Clinical Question

For geriatric patients with diagnosed dementia, can dexmedetomidine be safely used for procedural sedation during regional nerve block administration?

Evidence Based Discussion

The recommendation against administering benzodiazepines, such as midazolam, for geriatric patients or those with dementia revolves around the benzodiazepines agonism of the gamma-aminobutyric acid (GABA) receptor. Since dexmedetomidine is approved by the Federal Drug Administration for procedural sedation and agonizes the alpha2-adrenergic receptor with no interactions at the GABA receptor, it is a candidate for use in this patient population. Dexmedetomidine, like GABA agonists, can provide sedation and anxiolysis, but unlike GABA agonists, causes minimal respiratory depression. Dexmedetomidine also provides analgesia and has a synergistic effect with opioids, allowing for a reduced dose of opioids in patients who are more sensitive to opioid-induced respiratory depression.

A growing body of research includes evidence that dexmedetomidine has neuroprotective qualities, particularly in patients with Alzheimer's disease, but its impact on the incidence of postoperative cognitive dysfunction remains unclear. In addition, one limitation of dexmedetomidine is the requirement to administer the loading dose over 10 minutes to avoid adverse effects such as bradycardia and hypertension. While there is a difference of only a few minutes between initial administration and optimal sedation depth between benzodiazepines and dexmedetomidine, this time constraint requires preplanning by the provider to avoid adverse

effects. Nevertheless, based on current evidence, dexmedetomidine is an appropriate medication choice in place of midazolam when providing procedural sedation.

Translation to Practice

Dexmedetomidine would be an appropriate medication choice for this patient population as it could provide enough sedation to facilitate the placement of a peripheral nerve block while not increasing the risk for postoperative cognitive dysfunction. However, dexmedetomidine presents a unique challenge as a loading dose is needed to achieve an adequate depth of sedation, but that loading dose must be given over 10 minutes to reduce the occurrence of adverse effects such as bradycardia and hypertension. Therefore, the successful implementation of dexmedetomidine preoperatively for procedural sedation could be more challenging, and a protocol would be beneficial to guide the healthcare team. That protocol would identify specific patient criteria where the use of dexmedetomidine would be more appropriate than a benzodiazepine such as patients older than 65 years, patients diagnosed with dementia or other cognitive dysfunction, as well as the new tasks required such as the use of an infusion pump and additional time to administer medications.

This protocol would serve as a framework to integrate multiple disciplines into the practice change. For instance, identifying in the framework how the provider would administer dexmedetomidine would allow the pharmacy to stock the most appropriate preparation where they are most readily available, as opposed to the provider needing to obtain a medication vial from the operating room medication cabinet and then dilute it down to a safe concentration. Also, identifying how the provider will administer dexmedetomidine would allow the block team to retrieve the prepared infusion and set it up on the infusion pump in a timely manner. These coordinated efforts help increase efficiency in dexmedetomidine's use for procedural sedation, which is a primary barrier to its widespread adoption for this application. Further research on the use of dexmedetomidine should be focused on comparing sedation efficacy and safety in the geriatric population. Also, specific comparisons between dexmedetomidine and common sedative medications, such as benzodiazepines and propofol, for use in procedural sedation and their respective recovery periods and adverse effects would be insightful in more widespread adoption of dexmedetomidine for procedural sedation, especially during the placement of regional nerve blocks preoperatively.

Keywords: dexmedetomidine, dementia, postoperative cognitive dysfunction, procedural sedation

Team Leader: Lisa Herbinger, DNP, CRNA

Team Member: Mary Beth Greenway, DNP, CRNA

Learner Objectives

1. Compare and contrast the pharmacodynamics of dexmedetomidine and midazolam.
2. Describe the anesthesia implications related to the use of dexmedetomidine for preoperative procedural sedation.
3. Discuss the advantages and disadvantages for the use of dexmedetomidine for procedural sedation in patients with dementia or other cognitive dysfunction.

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