



# ARTICLE OF THE MONTH

## Intraoperative and Postoperative Administration of Dexmedetomidine Reduces Anesthetic and Postoperative Analgesic Requirements in Patients Undergoing Cervical Spine Surgeries

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Welcome to the December 2017 installment of the SNACC Article of the Month! In continuation with recent features, this month's article addresses the role of dexmedetomidine in the context of cervical spine surgery. As evidence mounts regarding this agent's efficacy, it may particularly help achieve goals specific to the care of patients in this context.

This month's expert commentator, Edina Kim of the University of Illinois, provides insight on this matter. Dr. Kim serves as assistant professor in the neuroanesthesia division of the department of anesthesiology. She provides anesthetic care for complex spine and brain surgery and serves as director for medical student education.

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~ Adrian Pichurko MD, Oana Maties MD and Nina Schloerker MD

### Commentary

Edina Kim, MD, MSc

It is critical to maintain respiratory function after cervical spine surgery. Wound hematoma or tissue edema can cause airway obstruction and reintubation can be difficult after cervical fusion. Anesthetic and analgesic regimens should thus be designed to preserve respiratory function, often with a balance of agents. Respiratory depression caused by opioids risks reintubation; NSAIDs may not provide adequate analgesia and may be implicated in surgical nonunion of bone.<sup>1</sup> The agent dexmedetomidine may be beneficial to supplement anesthesia as well as analgesia.

Dexmedetomidine is a highly selective  $\alpha_2$  agonist that has been shown to reduce the requirements of several anesthetic agents including propofol, volatile agents, and rocuronium intraoperatively, as well as provide analgesia. It decreases serum catecholamine concentration by suppressing their release due to noxious stimulation. It has been shown to reduce anesthetic requirements in spine surgery.<sup>2</sup> Its benefits also include

analgesic properties without added respiratory depression in adults, which may be a valuable option when NSAIDs are contraindicated. This study by Gandhi *et al* evaluated patients undergoing elective cervical spine surgeries to investigate the effects of dexmedetomidine on intraoperative anesthetic and postoperative analgesic requirements, as well as hemodynamic changes when used perioperatively.

Gandhi *et al* conducted a prospective, randomized, observer-blinded, placebo-controlled trial from October, 2010 to September, 2011. The authors designed their study to determine the effect of dexmedetomidine as an adjuvant to reduce intraoperative anesthetic and postoperative analgesic requirements. Sixty adult patients (ASA I or II), aged 18-60 years, scheduled for elective anterior or posterior cervical spine surgeries involving 1 to 2 vertebrae, were selected for this study. The patients were randomized to either group D (dexmedetomidine group) or group C (control group). Both groups received standardized anesthetics including a 0.1 mg/kg IV dose of morphine after induction. The treatment group received a loading dose of 1 µg/kg over 10 minutes of intravenous dexmedetomidine followed by infusion of 0.5 µg/kg/hr intraoperatively. The infusion was continued postoperatively at 0.2 µg/kg/hr for 24 hours after the surgery. Group C received a volume-matched bolus and infusion of 0.9% normal saline. Intraoperative anesthetic requirement, time to recovery, and discharge were assessed. Hemodynamic parameters, pain scores, and sedation scores were recorded for 48 hours after surgery.

The results of this study show that the group receiving dexmedetomidine required significantly lower doses of anesthetic to maintain the bispectral index within target range compared to the control group ( $P < 0.001$ ). Specifically, total requirement of propofol in group D was 21.9% less than the requirement in group C. The total requirement of vecuronium also decreased by 30%. Postoperatively, the pain scores were significantly reduced in group D compared with group C for the first 24 hours.

Patients who underwent perioperative dexmedetomidine infusion displayed more stable hemodynamic parameters and similar sedation scores compared to controls. Rescue vasoactive drugs were available to treat hemodynamic derangements while on the 0.2 µg/kg/hr postoperative infusion, but were ultimately not administered. Post-operative sedation scores were comparable between groups, as well. These results allay concerns that dexmedetomidine's side effects prohibit its use in clinically effective doses.

This study presented several limitations. Both anterior and posterior cervical surgeries were included; posterior approach involves more muscle dissection compared to the anterior approach and is thus more painful. Also, intraoperative care providers could not be truly blinded to the group assignment as telltale hemodynamic changes could be observed with dexmedetomidine.

In summary, this study investigated dexmedetomidine as an anesthetic-sparing agent and adjunctive postoperative analgesic in the setting of cervical spine surgery. It provided stable hemodynamic parameters in the face of noxious surgical stimuli, decrease in anesthetic requirements and facilitated early recovery. This information is valuable particularly for cervical spine surgery, in which maintaining respiratory status and controlling pain are important and sometimes conflicting priorities. Similar benefits have been reported in patients undergoing craniotomy.<sup>3</sup> The result of this study supports the safe and effective use of perioperative dexmedetomidine in neurosurgical patients in offsetting anesthetic requirements and improving pain control.

## References:

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3. Rajan S, Hutcherson MT, Sessler DI, *et al.* The Effects of Dexmedetomidine and Remifentanyl on Hemodynamic Stability and Analgesic Requirement After Craniotomy: A Randomized Controlled Trial. *J Neurosurgical Anesthesiol*. 2016 Oct;28(4):282-90.