Dexmedetomidine: Clinical Application as an Adjunct for Intravenous Regional Anesthesia

Usha Ramadhyani, MD[a], Jason L. Park, MD[a], Dominic S. Carollo, MS, MD[a], Ruth S. Waterman, MD[b], Bobby D. Nossaman, MD[a,c,*]

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- Dexmedetomidine • α-2 agonist
- Intravenous regional anesthesia
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Alleviation of pain has become integral in preoperative medicine.[1] Pain pharmacotherapy is directed at peripheral nociceptors, primary and secondary spinal neurons, and pain-processing areas in the central nervous system. Accordingly, three primary pharmacologic strategies have evolved: drugs that activate opioid receptors, drugs that activate α-2 receptors, and drugs that can reduce de novo prostaglandin synthesis.[1]

Inhibition of presynaptic autoreceptors, such as α-2 adrenoceptors present in sympathetic nerve endings and noradrenergic neurons in the central nervous system, can modulate preoperative.[1] Administration of α-2 adrenoceptor agonists has been shown to have several beneficial actions during the perioperative period.[2–13] These agents decrease sympathetic tone, attenuate neuroendocrine responses to injury, reduce intraoperative anesthetic drug and perioperative opiate requirements, and induce dose-dependent sedation and analgesia.[2–13] This reported combination of

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[a] Department of Anesthesiology, Ochsner Medical Center, 1514 Jefferson Highway, New Orleans, LA 70121, USA
[b] Department of Anesthesiology, Tulane University Medical Center, 1430 Tulane Avenue, New Orleans, LA 70129, USA
[c] Department of Pharmacology, Tulane University Medical Center, 1430 Tulane Avenue, New Orleans, LA 70129, USA
* Corresponding author. Department of Anesthesiology, Ochsner Medical Center, 1514 Jefferson Highway, New Orleans, LA 70121.
E-mail address: bnossaman@ochsner.org

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the beneficial effects of α-2 adrenoceptor agonists might offer additional benefits, not only following systemic during the conduct of intravenous regional anesthesia.[14–20] Hemodynamic side effects of systemic α-2 adrenoceptor agonists consist of mild to moderate cardiovascular depression, with decreases in blood pressure and heart rate.[12,13,21–31] The development of new, more selective α-2 adrenoceptor agonists with an improved side effect profile may provide a novel therapy as an adjunct in the conduct of intravenous regional anesthesia.[16–20] This review examines what is currently known of the properties and applications of the novel α-2 adrenoceptor agonist, dexmedetomidine, when used as an adjunct in intravenous regional anesthesia.

DEXMEDETOMIDINE

In December 1999, dexmedetomidine was approved for clinical practice (**Fig. 1**A).[2,32] Dexmedetomidine is a highly selective α-2 adrenoceptor agonist that has been shown to have both sedative and analgesic effects in adults.[3,13,17,33–39] Dexmedetomidine has an α-2 to α-1 adrenoceptor ratio of approximately 1600:1, which is 7 to 8 times higher than reported for clonidine (see **Fig. 1**B).[40] This ratio favors the sedative/anxiolytic

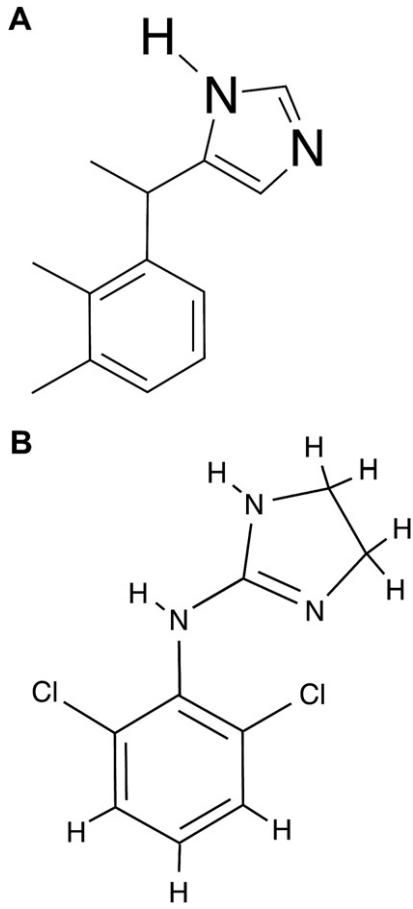

Fig. 1. Chemical structures of dexmedetomidine (*A*) and clonidine (*B*).