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Article in *Anesthesiology and Pain Medicine* · January 2021

DOI: 10.5812/aapm.112176

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# Postoperative Pain Management: Role of Dexmedetomidine as an Adjuvant

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Received 2020 December 15; Accepted 2020 December 20.

**Keywords:** Pain, Postoperative, Dexmedetomidine

Acute postoperative pain remains one of the major challenges of pain medicine. Although various methods and drugs have been proposed to manage perioperative pain, oral and intravenous opioid analgesics are still among the most common medications. However, their potential short- and long-term adverse effects can limit their application (1). Also, an increase in the dose of opioids during surgery may not always result in better postoperative pain management, and there are concerns about the faster onset and higher severity of acute postoperative pain, known as opioid-induced hyperalgesia (2).

To reduce the consumption of perioperative opioids, various drugs and methods have been studied to date, including non-opioids, adjuvants, and regional, peripheral, and neuraxial blocks. Nevertheless, the application of each of these methods and drugs requires specific knowledge, experience, equipment, arrangements, and care (3-7). Many clinical studies have been published on the application of multimodal analgesia in a variety of surgeries. In these studies, the addition of adjuvants to opioids in patient-controlled analgesia (PCA) or to local anesthetics in peripheral and neuraxial nerve blocks was common (8, 9).

Dexmedetomidine is a highly selective and potent central alpha-2 adrenergic receptor agonist. Administration of this adjuvant in miscellaneous methods has received considerable attention in recent years. Due to its analgesic and sedative effects, besides the lack of any respiratory-sparing effects, administration of this adjuvant has been effective in reducing the need for opioids in the perioperative period and may even result in cooperative sedation (10). Given the sympatholytic effects of dexmedetomidine (hypotension and bradycardia), in addition to over-sedation, especially when administered intravenously or at

high doses, caution must be taken in administering this drug, especially in elderly patients.

The neuraxial administration of dexmedetomidine has nociceptive effects on somatic and visceral pains (10). It also reduces postoperative pain and prolongs analgesia, although there is a risk of bradycardia. Various doses of dexmedetomidine, along with a number of analgesic drugs, have been used in many studies. However, the exact dose of dexmedetomidine, as an adjuvant drug administered along with other intravenous drugs in the perioperative period, has been controversial.

Regional blocks are one of the most interesting anesthetic techniques for many anesthesiologists. They are among common methods of surgical anesthesia, especially in surgeries of the upper and lower limbs and abdominal organs in many medical centers (11). They can also reduce the stress response of general anesthesia, accelerate the ambulation time, decrease the length of hospitalization, and consequently, reduce the risk of mortality and morbidity, especially in high-risk patients (12). One of the major concerns of medical teams in such cases is the short-term effects of local anesthetics. Therefore, to prolong the duration of pain relief, several methods have been proposed, such as continuous peripheral and epidural blocks and the addition of adjuvant drugs (13).

As mentioned earlier, dexmedetomidine has been used as an adjuvant to local anesthetics in many peripheral and neuraxial blocks. In major orthopedic surgeries of the lower extremities with a painful postoperative period, use of an adjuvant, such as dexmedetomidine, may have special applications, since appropriate pain management in these patients can lead to their faster return to everyday life, apart from pain relief (10).

Moreover, administration of adjuvants may be of

greater interest in geriatric populations, for whom sympathetic blockade may be associated with severe hypotension and bradycardia due to the administration of local anesthetics in spinal or epidural anesthesia. On the other hand, the same side effects can occur following the administration of dexmedetomidine; therefore, the doses of prescribed drugs (both local anesthetics and adjuvants) must be carefully adjusted.

In the neuraxial administration of dexmedetomidine during deliveries, besides surgical anesthesia and pain management, attention must be paid to the newborns' complications and the risk of passing the drug through breastfeeding. Therefore, the beneficial and adverse effects of analgesic methods and drugs must be carefully weighed with the physiological conditions of the mother and infant so as not to enhance the side effects, especially in newborns (9). The intravenous administration of dexmedetomidine via PCA, along with other non-opioid analgesic drugs, may help manage pain and improve patient satisfaction without requiring opioid prescriptions; however, the patient's hemodynamics needs to be evaluated due to its sympatholytic effects.

In addition to its use in the management of acute postoperative pain, dexmedetomidine has also been studied in chronic pain management procedures. In transforaminal epidural steroid injections for the treatment of lumbar radiculopathy, the addition of dexmedetomidine as an adjuvant improves chronic and neuropathic pain and prolongs the effects of these procedures (14). Although various studies have been published in this area, the exact safe dose of dexmedetomidine as an adjuvant in perioperative pain management needs further investigations. The ambiguity about the safe dose of dexmedetomidine is due to the fact that the patients' responses are multifactorial in nature, and factors, such as the type of the main analgesic, pain management method, age range, underlying disease, and type of surgical procedure, can have significant effects on determining the optimal dose.

## Footnotes

**Authors' Contribution:** Study conception: FI and BZ; drafting of the manuscript: FI and BZ; and revision of the manuscript: FI and PDN.

**Conflict of Interests:** The authors declare no conflict of interest.

## References

- Malik KM, Imani F, Beckerly R, Chovatiya R. Risk of opioid use disorder from exposure to opioids in the perioperative period: A systematic review. *Anesth Pain Med.* 2020;10(1). e101339. doi: [10.5812/aapm.101339](https://doi.org/10.5812/aapm.101339). [PubMed: [32337175](https://pubmed.ncbi.nlm.nih.gov/32337175/)]. [PubMed Central: [PMC7158240](https://pubmed.ncbi.nlm.nih.gov/PMC7158240/)].
- Rupniewska-Ladyko A, Malec-Milewska M. A high dose of fentanyl may accelerate the onset of acute postoperative pain. *Anesth Pain Med.* 2019;9(5). e94498. doi: [10.5812/aapm.94498](https://doi.org/10.5812/aapm.94498). [PubMed: [31903331](https://pubmed.ncbi.nlm.nih.gov/31903331/)]. [PubMed Central: [PMC6935250](https://pubmed.ncbi.nlm.nih.gov/PMC6935250/)].
- Imani F, Varrassi G. Ketamine as adjuvant for acute pain management. *Anesth Pain Med.* 2019;9(6). e100178. doi: [10.5812/aapm.100178](https://doi.org/10.5812/aapm.100178). [PubMed: [32280623](https://pubmed.ncbi.nlm.nih.gov/32280623/)]. [PubMed Central: [PMC7119219](https://pubmed.ncbi.nlm.nih.gov/PMC7119219/)].
- Suksompong S, von Bormann S, von Bormann B. Regional catheters for postoperative pain control: Review and observational data. *Anesth Pain Med.* 2020;10(1). e99745. doi: [10.5812/aapm.99745](https://doi.org/10.5812/aapm.99745). [PubMed: [32337170](https://pubmed.ncbi.nlm.nih.gov/32337170/)]. [PubMed Central: [PMC7158241](https://pubmed.ncbi.nlm.nih.gov/PMC7158241/)].
- Poursalehan S, Nesioonpour S, Akhondzadeh R, Mokmeli S. The effect of low-level laser on postoperative pain after elective cesarean section. *Anesth Pain Med.* 2018;8(6). e84195. doi: [10.5812/aapm.84195](https://doi.org/10.5812/aapm.84195). [PubMed: [30719420](https://pubmed.ncbi.nlm.nih.gov/30719420/)]. [PubMed Central: [PMC6347730](https://pubmed.ncbi.nlm.nih.gov/PMC6347730/)].
- Karbasy SH, Sekhavati A, Sabertanha A, Shakhsemampour B. Nitroglycerin plus morphine on Iv patient controlled analgesia for abdominal surgery: The effect on postoperative pain. *Anesth Pain Med.* 2020;10(3). e99582. doi: [10.5812/aapm.99582](https://doi.org/10.5812/aapm.99582). [PubMed: [32944554](https://pubmed.ncbi.nlm.nih.gov/32944554/)]. [PubMed Central: [PMC7472788](https://pubmed.ncbi.nlm.nih.gov/PMC7472788/)].
- Rahimzadeh P, Faiz SHR, Imani F, Soltani A, Derakhshan P. The effect of nitroglycerine infusion on postoperative pain in lower limb surgery: A clinical double-blind study. *Anesth Pain Med.* 2019;9(4). e93848. doi: [10.5812/aapm.93848](https://doi.org/10.5812/aapm.93848). [PubMed: [31754611](https://pubmed.ncbi.nlm.nih.gov/31754611/)]. [PubMed Central: [PMC6825369](https://pubmed.ncbi.nlm.nih.gov/PMC6825369/)].
- Rahimzadeh P, Faiz SHR, Imani F, Derakhshan P, Amniati S. Comparative addition of dexmedetomidine and fentanyl to intrathecal bupivacaine in orthopedic procedure in lower limbs. *BMC Anesthesiol.* 2018;18(1):62. doi: [10.1186/s12871-018-0531-7](https://doi.org/10.1186/s12871-018-0531-7). [PubMed: [29875020](https://pubmed.ncbi.nlm.nih.gov/29875020/)]. [PubMed Central: [PMC5991430](https://pubmed.ncbi.nlm.nih.gov/PMC5991430/)].
- Imani F, Rahimzadeh P, Faiz HR, Nowruzina S, Shakeri A, Ghahremani M. Comparison of the post-caesarean analgesic effect of adding dexmedetomidine to paracetamol and ketorolac: A randomized clinical trial. *Anesth Pain Med.* 2018;8(5). e85311. doi: [10.5812/aapm.85311](https://doi.org/10.5812/aapm.85311). [PubMed: [30538943](https://pubmed.ncbi.nlm.nih.gov/30538943/)]. [PubMed Central: [PMC6252045](https://pubmed.ncbi.nlm.nih.gov/PMC6252045/)].
- Gousheh M, Akhondzadeh R, Rashidi M, Olapour A, Moftakhar F. Comparison of dexmedetomidine and morphine as adjuvants to bupivacaine for epidural anesthesia in leg fracture surgery: A randomized clinical trial. *Anesth Pain Med.* 2019;9(4). e91480. doi: [10.5812/aapm.91480](https://doi.org/10.5812/aapm.91480). [PubMed: [31803587](https://pubmed.ncbi.nlm.nih.gov/31803587/)]. [PubMed Central: [PMC6829178](https://pubmed.ncbi.nlm.nih.gov/PMC6829178/)].
- Akhondzadeh R, Rashidi M, Gousheh M, Olapour A, Baniahmad A. The effect of adding dexmedetomidine as an adjuvant to lidocaine in forearm fracture surgeries by supraclavicular block procedure under ultrasound-guided. *Anesth Pain Med.* 2018;8(4). e74355. doi: [10.5812/aapm.74355](https://doi.org/10.5812/aapm.74355). [PubMed: [30250821](https://pubmed.ncbi.nlm.nih.gov/30250821/)]. [PubMed Central: [PMC6139532](https://pubmed.ncbi.nlm.nih.gov/PMC6139532/)].
- Omar Mostafa M, Makram Botros J, Sayed Khaleel AM. Effect of dexmedetomidine versus nalbuphine as an adjuvant on paravertebral block to manage postoperative pain after mastectomies. *Anesth Pain Med.* 2018;8(2). e13308. doi: [10.5812/aapm.13308](https://doi.org/10.5812/aapm.13308). [PubMed: [30027066](https://pubmed.ncbi.nlm.nih.gov/30027066/)]. [PubMed Central: [PMC6045777](https://pubmed.ncbi.nlm.nih.gov/PMC6045777/)].
- Agamohammadi D, Montazer M, Hoseini M, Haghdoost M, Farzin H. A comparison of continuous thoracic epidural analgesia with bupivacaine versus bupivacaine and dexmedetomidine for pain control in patients with multiple rib fractures. *Anesth Pain Med.* 2018;8(2). e60805. doi: [10.5812/aapm.60805](https://doi.org/10.5812/aapm.60805). [PubMed: [30009148](https://pubmed.ncbi.nlm.nih.gov/30009148/)]. [PubMed Central: [PMC6035480](https://pubmed.ncbi.nlm.nih.gov/PMC6035480/)].
- Imani F, Rahimzadeh P, Khademi SH, Narimani Zamanabadi M, Sadegi K, Abolfazli-Karizi A. Comparison of transforaminal triamcinolone and dexmedetomidine in radicular low-back pain: A randomized double-blind clinical trial. *Anesth Pain Med.* 2019;9(5). e96117. doi: [10.5812/aapm.96117](https://doi.org/10.5812/aapm.96117). [PubMed: [31903335](https://pubmed.ncbi.nlm.nih.gov/31903335/)]. [PubMed Central: [PMC6935293](https://pubmed.ncbi.nlm.nih.gov/PMC6935293/)].