

Commentary: Role of alpha-2 agonists in regional ophthalmic anaesthesia

Regional anaesthesia is the most common mode of anaesthesia used in ophthalmic surgical procedures. Among regional blocks, peribulbar anaesthesia is the safest and most commonly employed. However, in procedures with prolonged operating time, such as vitreoretinal surgeries, repeated need for block supplementation and patient anxiety, are a challenge. Adjuvants to peribulbar anaesthetics, namely, hyaluronidase and adrenaline along with preoperative anxiolytics/sedatives have been tried to overcome these challenges.^[1] Alpha-2 agonists are drugs which bind selectively to alpha-2 adrenergic receptors in the central, peripheral and autonomic nervous system as well as in vital organs and blood vessels. They produce dose-dependent analgesia, anxiolysis and sedation without causing respiratory depression by acting on the G protein-coupled alpha-2 receptors.^[2]

Two main alpha-2 agonists that are commercially available include clonidine and dexmedetomidine. Although neither of them is completely selective for alpha-2 receptors, dexmedetomidine is 8-10 times more selective towards these receptors compared to clonidine. Dexmedetomidine has a higher avidity and affinity for alpha-2 receptors, shorter elimination half-life and higher clinical efficacy with a lesser side-effect profile compared to clonidine.^[3] The study by Gujral *et al.* adds credence to the anxiolytic effect of dexmedetomidine which is coupled with hemodynamic safety in patients receiving peribulbar block for vitreoretinal surgery.^[4]

Clonidine was the first alpha-2 agonist to be used as an adjuvant by Mjahed *et al.* who found that its addition to peribulbar block decreased intraocular pressure, enhanced anaesthesia, akinesia and intraoperative sedation.^[5] However, use of clonidine was associated with hemodynamic side-effects such as bradycardia, arterial and orthostatic hypotension, rebound hypertension and syncope. The long half-life of clonidine meant that the hemodynamic instability was not only seen intra-operatively but also for up to 8 hours in the post-operative period.^[6] Dexmedetomidine, a newer alpha-2 agonist, has shown potential with a better safety profile due to its higher selectivity and shorter half-life. Two recent studies have evaluated its efficacy and side-effect profile when used as an adjunct to peribulbar block during vitreoretinal surgery.^[7,8] Ahmed *et al.*^[7] used 20 µg of dexmedetomidine along with lidocaine, bupivacaine and hyaluronidase. They found faster onset of anaesthesia, akinesia, increased duration of anaesthesia and increased patient sedation in comparison to a control group using normal saline. EL-Shmaa *et al.*^[8] compared two doses of dexmedetomidine, 15 and 30 µg, as adjuvants to routine peribulbar anaesthetic agents. They also found similar results in terms of onset and duration of anaesthesia in the dexmedetomidine groups compared with the control group. The two doses did not differ significantly in terms of their efficacy or side-effect profile. The current study in contrast did not find any difference in the time of onset of anaesthesia between the study and the control groups; however, the patient and surgeon comfort were

significantly better with dexmedetomidine. This study is also unique in keeping the systemic stability as its primary outcome measure.^[4] No significant systemic side-effects have been reported with either of the studies while using this drug in vitreoretinal surgeries.

There is increasing evidence that supports the use of dexmedetomidine as an adjunct to regional blocks for ophthalmic anaesthesia. This drug seems to be especially useful in cases with prolonged operating times such as complex vitreoretinal surgeries and for apprehensive patients. However, use of dexmedetomidine in patients with heart block, heart failure, renal/hepatic insufficiency, uncontrolled diabetes, obesity and/or chronic obstructive pulmonary disease is contraindicated. Meticulous pre-operative evaluation by the anaesthesia team is thus essential before subjecting a patient to peribulbar block with dexmedetomidine as an additive. Establishment of standard pre-anaesthetic evaluation and intra-operative monitoring protocols are needed before this drug gains popularity as an adjunct for regional anaesthesia in ophthalmic surgery. Hence, further studies on the requirement of systemic monitoring during surgery and long-term safety profile of these agents are warranted.

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Access this article online	
Quick Response Code:	Website: www.ijo.in
	DOI: 10.4103/ijo.IJO_635_19

Cite this article as: Singh SR, Saini V, Singh A, Dogra M. Commentary: Role of alpha-2 agonists in regional ophthalmic anaesthesia. *Indian J Ophthalmol* 2019;67:641-2.