



Faculty of Medicine  
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# **Dexmedetomidine as an Additive to Local Anesthetic Mixture for Peribulbar Block in Vitreoretinal Surgeries**

*Thesis*

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا

إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

اللَّهُ  
صَلَّى  
الْعَظِيمُ

سورة البقرة

(٣٢)



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## **List of Abbreviations**

<i>Abbrev.</i>	<i>Full term</i>
<b>AMD</b>	: Age-related macular degeneration
<b>ASA</b>	: American Society of Anesthesia
<b>BRVO</b>	: branch retinal vein occlusion
<b>CBC</b>	: Complete blood count
<b>CME</b>	: Cystoid macular edema
<b>CN V</b>	: Choroidal neovascularization
<b>CN II</b>	: Optic nerve
<b>CN III</b>	: Oculomotor nerve
<b>CN IV</b>	: Trochlear nerve
<b>CN V</b>	: Trigeminal nerve
<b>CN VI</b>	: Abducens nerve
<b>CN VII</b>	: Facial nerve
<b>CPR</b>	: Cardiopulmonary Resuscitation
<b>CRVO</b>	: Central Retinal Vein Occlusion
<b>CSCR</b>	: Central serous chorioretinopathy
<b>ECG</b>	: Electrocardiogram
<b>EOM</b>	: Extraocular Eye Movement
<b>INR</b>	: International Normalized Ratio
<b>IOF</b>	: Inferior Orbital Fissure
<b>IOFB</b>	: Trauma and intraocular foreign bodies
<b>IOP</b>	: Intraocular Pressure

<b>IR</b>	: Inferior Rectus
<b>IV</b>	: Intravenous
<b>KFT</b>	: Kidney Function Tests
<b>LAS</b>	: Local Anesthetics
<b>LFT</b>	: Liver Function Tests
<b>LPS</b>	: Levator Muscle
<b>LR</b>	: Lateral Rectus
<b>MR</b>	: Medial Rectus
<b>NMDA</b>	: N-methyl-D-aspartate
<b>NSAIDs</b>	: Non-Steroidal Anti-Inflammatory Drugs
<b>O<sub>2</sub></b>	: Oxygen
<b>OCR</b>	: Oculocardiac Reflex
<b>PC</b>	: Prothrombin concentration
<b>PDR</b>	: proliferative diabetic retinopathy
<b>PT</b>	: Prothrombin Time
<b>PTT</b>	: Partial Thromboplastin Time
<b>PVR</b>	: Proliferative vitreoretinopathy
<b>RPE</b>	: Retinal Pigment Epithelium cells
<b>RSS</b>	: Ramsy Sedation Scale
<b>SOF</b>	: Superior Orbital Fissure
<b>SR</b>	: Superior Rectus
<b>VEGF</b>	: Antivascular endothelial growth factor
<b>VRS</b>	: Verbal Rating Score

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## ABSTRACT

**Background and rational:** With the requirement of safer local anesthetics, and the desire to early mobilization of the patient in early postoperative period. Regional block anesthesia has become more popular, causing muscle akinesia which is still the preferred choice of anesthesia for many vitreoretinal surgeons. Hence peribulbar anesthesia was advocated which is a safe technique to achieve both analgesia and akinesia. This technique has lesser complications and does not require a separate facial nerve block, unlike in retrobulbar anesthesia. Peribulbar anesthesia is routinely performed with a mixture of local anesthetics, most commonly bupivacaine and lidocaine.

**Methods and Materials:** The aim of this study was to compare the effect of adding different doses of dexmedetomidine to local anesthetic mixture for peribulbar block in vitreoretinal surgeries. The duration, efficacy of peribulbar block and pain relief in each group was assessed.

**Results:** Adding dexmedetomidine to a mixture of lidocaine and bupivacaine in peribulbar block shortens sensory and motor block onset, extends the analgesia period and the motor block duration. It also significantly decreases the IOP and enables better operation conditions.

**Conclusion:** This trial adds further confirmation for the previous studies that dexmedetomidine is a useful adjuvant to local anesthetics in peribulbar block with a least recommended dose of 25µg and better outcome with dose of 50µg.

**Key Words:**

Dexmedetomidine, safer local anesthetics, early mobilization, regional block anesthesia, peribulbar block.

## Introduction

**W**ith the requirement of safer local anesthetics, and the desire to early mobilization of the patient in early postoperative period. Regional block anesthesia has become more popular, causing muscle akinesia which is still the preferred choice of anesthesia for many vitreoretinal surgeons (**Ripart et al., 2001**).

Hence peribulbar anesthesia was advocated which is a safe technique to achieve both analgesia and akinesia. This technique has lesser complications and does not require a separate facial nerve block, unlike in retrobulbar anesthesia. Peribulbar anesthesia is routinely performed with a mixture of local anesthetics, most commonly bupivacaine and lidocaine (**Gottipati et al., 2015**).

But using local anesthetics alone for peribulbar anesthesia is accompanied with delayed onset of corneal anesthesia, globe akinesia, short duration of analgesia and frequent requirement of block supplementation. To achieve rapid onset of action and increase the duration of analgesia, many additives such as clonidine, sodium bicarbonate, hyaluronidase and adrenaline were added to local anesthetics with limited success (**Bahy Eldeen et al., 2015**).

Dexmedetomidine is a centrally acting highly selective  $\alpha_2$ -adrenoreceptor agonist that has  $\alpha_2$  to  $\alpha_1$  selectivity ratio of 1600:1, It is eight times greater than clonidine. Dexmedetomidine enhances both central and peripheral neural blockades when used as an additive to LAs. It provides better quality of anesthesia and prolonged postoperative analgesia (**Kemp et al., 2008**).

It is commonly used as sedative, preemptive analgesic and to maintain stable hemodynamics in many surgeries as an iv infusion as in laparoscopic surgeries (**Bhattacharjee et al., 2010**).

It has been also used as an additive to local anesthetics in peripheral nerve block eg.: brachial plexus block and spinal anesthesia, but none of the studies has shown the effect of dexmedetomidine on peribulbar block for vitreoretinal surgeries (**Gandhi et al., 2012**).

We therefore conducted a randomized, prospective clinical trial to evaluate the efficacy of dexmedetomidine on peribulbar anesthesia as an additive to LA mixture of 0.5% bupivacaine, 2% lidocaine with 120 IU of hyalourinidase either alone or with different doses of dexmedetomidine for vitreoretinal surgery.

## **Aim of the Work**

**T**he aim of the work is to determine the effect of dexmedetomidine as an additive to bupivacaine and lidocaine and hyaluronidase mixture in peribulbar block for vitreoretinal surgeries as regard the onset of corneal anesthesia, globe akinesia, sedation level and the effect on duration of analgesia.

## Chapter 1: **Anatomy of the Orbit**

**T**he Safe practice of orbital regional anesthesia, as with other regional technique requires adequate knowledge of the orbital anatomy as well as its nerve and blood supply (Jaichandran, 2013).

### **ANATOMIC FEATURES**

The eye is a special sense organ made up of three coats, as follows:

1. The outer connective tissue layer includes the cornea and sclera.
2. The middle layer includes the choroid, ciliary body, and iris.
3. The inner layer is the retina.

The globe is three spaces: the anterior chamber, posterior chamber, and vitreous chamber. The lens is located in posterior chamber (Jaichandran, 2013).