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Dexmedetomidine as an Additive to Local Anesthetic Mixture for Peribulbar Block in Vitreoretinal Surgeries

Thesis

Submitted for Partial Fulfillment of the M.D Degree
in Anesthesiology

By

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2019

بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا

إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

سورة البقرة
(٣٢)

Acknowledgements

First and foremost, thanks to ***Allah****, the most beneficent and merciful.*

I wish to express my deepest appreciation and sincere gratitude to ***Prof. Dr. Hala Gomaa Salama Awad,*** *Prof. of Anesthesiology, Intensive Care Medicine and Pain Management, Ain Shams University, for her everlasting guidance and support. It was a great honor to me to work under her supervision.*

I wish to express my sincere thanks and deepest gratitude to ***Prof. Dr. Ashraf Mahmoud Hazem Mohamed,*** *Prof. of Anesthesiology, Intensive Care Medicine and Pain Management, Ain Shams University for prompt guidance, generous support, encouragement and revision throughout the work.*

Also, I would like to express my sincere thanks and deep gratitude to ***Prof. Dr. Aktham Adel Ehsan Shokry,*** *Assistant Professor of anesthesiology, Intensive Care Medicine and pain management, Ain Shams University, for his keen and valuable guidance.*

Special appreciation to ***Dr. Marwa Mostafa Mohamed Ali,*** *Lecturer of Anesthesiology, intensive care medicine and pain management, Ain Shams University, for her close guidance and kind advice throughout this work, which was pivotal in its completion.*

Last but not least, I would like to present a lot of thanks to my family, and colleagues, who without their help and support, this work could not come to birth.

Sarah Ahmed Salem Ahmed

Contents

List of Abbreviations

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

IR : Inferior Rectus

IV : Intravenous

KFT : Kidney Function Tests

LAS : Local Anesthetics

LFT : Liver Function Tests

LPS : Levator Muscle

LR : Lateral Rectus

MR : Medial Rectus

NMDA : N-methyl-D-aspartate

NSAIDs : Non-Steroidal Anti-Inflammatory Drugs

O_2 : Oxygen

OCR : Oculocardiac Reflex

PC : Prothrombin concentration

PDR : proliferative diabetic retinopathy

PT : Prothrombin Time

PTT : Partial Thromboplastin Time

PVR : Proliferative vitreoretinopathy

RPE : Retinal Pigment Epithelium cells

RSS : Ramsy Sedation Scale

SOF : Superior Orbital Fissure

SR : Superior Rectus

VEGF : Antivascular endothelial growth factor

VRS : 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

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 **(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 α2-adrenoreceptor agonist that has α2 to α1 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

The 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

The 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).**