Rocuronium Versus Atracurium as Adjuvants to Local Anesthetic in Peribulbar Induced Akinesia

Thesis

Submitted for the Partial Fulfilment for MD Degree in Anesthesia

By

Alya Aly Moselhy Hassan

M.B., B.Ch. MSc. (Ain Shams University)

Supervised By

Prof.Dr.Ahmad Abdelkader Shesh

Professor of Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Prof. Dr. Mohammad Ismail Elseidy

Professor of Anesthesia and Intensive care
Faculty of Medicine - Ain Shams University

Dr. Ramy Mounir Wahba

Lecturer in Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Dr. Mohammed Mohammed Abdelfattah

Lecturer in Anesthesia and Intensive Care
Faculty of Medicine - Ain Shams University

Faculty of Medicine
Ain Shams University
2017

First thanks to **ALLAH** *to whom I relate any success in achieving any work in my life.*

I wish to express my deepest thanks, gratitude and appreciation to **Prof. Dr. Ahmad Abdelkader Sayed Shesh,** *Professor of Anesthesia and Intensive Care Faculty of Medicine - Ain Shams University for his meticulous supervision, kind guidance, valuable instructions and generous help.*

Special thanks are due to **Prof. Dr. Mohammad Ismail Elseidy,** *Professor of Anesthesia and Intensive Care Faculty of Medicine - Ain Shams University for his sincere efforts, fruitful encouragement.*

I am deeply thankful to **Dr. Ramy Mounir Wahba,** *Lecturer in Anesthesia and Intensive Care Faculty of Medicine - Ain Shams University for his great help, outstanding support, active participation and guidance.*

I am also delighted to express my deepest gratitude and thanks to **Dr. Mohammed Mohammed Abdelfattah,** *Lecturer in Anesthesia and Intensive Care Faculty of Medicine - Ain Shams University for his kind care, constant help and great assistance throughout this work.*

List of Contents

List of Tables

List of Figures

List of Abbreviations

Abb.	Full term
ASA	American society of anesthesiologists
CNS	Central nervous system
CYP1A2	Cytochrome P450 1A2
CYP3A4	Cytochrome P450 3A4
Fig.	Figure
ICU	Intensive care unit
IOP	Intra-ocular pressure
IV	Intravenous
LA	Local anesthetic
OCR	Oculo-cardiac reflex
SD	Standard deviation
SPO_2	Arterial oxygen saturation

Abstract

Many adjuvant agents were added to local anesthetic in peribulbar block including low dose of atracurium, rocuronium, and hyaluronidase.

The score of akinesia was evaluated in the 1st, 3rd, 5th, 10th minutes after administration of the medications. 10 minute after drug administration, 13 (86%) reached the total akinesia with rocuronium, 11(73%) with atracurium and 10 (66%) with the control (P>0.05). Addition of low-dose atracourium and rocuronium to the anesthetic drug is recommended in order to enhance the quality of akinesia especially when hyaluronidase is not added.

Key words: Intensive care unit - Local anesthetic - Intravenous- Oculo-cardiac reflex- Standard deviation - Arterial oxygen saturation

INTRODUCTION

Local anesthesia has been progressed greatly in recent years. Surgeons have been using the local anesthesia for ophthalmological procedures since 1884. [1] Nowadays, regional anesthesia with the help of retrobulbar or peribulbar blocks or topical anesthesia is being used in cataract surgeries. [2] The key role of anesthesia is akinesia-establishment that helps the surgeon during the operations. The retrobulbar technique is more effective and rapid than the peribulbar methods in establishing the akinesia. However it potentially carries hazardous side toxicities such as brainstem numbness, posterior ocular bleeding, and optic nerve damage [3,4]. Moreover, Hyaluronidase has useful effects in establishing akinesia[2].

These types of anesthesia may prove to be useful even without the synchronic application of sedative substances, whereas, the pain felt by the patients during operation are more severe following the exploitation of topical analgesics. Thus, comparing to other techniques, the peribulbar and retrobulbar anesthesia have successfully proved themselves in clinical trials.In cataract surgeries, different types of anesthetic techniques are being used considering the convenience and comfort for both the surgeon and the patient. However; taking into account the usage of sedation during the injection in different types of anesthesia, the peribulbar and retrobulbar anesthesia have been considered as appropriate for the cataract

surgeries, particularly in surgeries where establishing akinesia is of vital importance for the surgeon [2]. Peribulbar anesthesia is widely applied in cataract surgeries, however, the onset of akinesia is way behind and slower in comparison to that for the retrobulbar technique [5]. Despite the fact that the method of peribulbar block brings forth less severe toxicities comparing to the retrobulbar technique [3][4], nonetheless, surgeons may still apply it less frequently due to the slower onset of the effect and it's inadequate movement block [5]. According to some studies, the effect of using atracurium and its derivatives as adjuvant to the peribulbar block in developing ameliorated conditions in absence of any adverse effects, and in accelerating the onset of akinesia have been implicated [5][6]. Moreover; since an inadequate motor block interferes negatively while the surgeon is operating, and undesired eye movements under microscope may cause complications that in certain occasions prove irremediable, and considering the possibility of widely using of peribulbar blockages in cataract surgeries through establishing akinesia, a low dose of atracurium, rocuronium, and hyaluronidase in combination with a local anesthetic solution was used in this study for the purpose of accelerating total immobility of the eyes, ocular muscle paresis, and for a more satisfaction of the surgeon during his surgery. The above-mentioned plan has been put into practice for the purpose of comparing the effect of using atracurium, rocuronium, and hyaluronidase as adjuvant agents to the local anesthetic substance on peribulbar-induced akinesia in cataract surgeries.

Aim of The Study

The aim of this study is to compare the effect of using atracourium, rocuronium and hyaluronidase as adjuvant agents to the local anesthetic substance on peribulbar induced akinesia regarding the degree of akinesia.

Chapter One

ANATOMY OF THE ORBIT

As with all anesthetic techniques, thorough knowledge of the anatomy is essential. Anatomy of the orbit and its nerve supply is necessary for the safe practice of ophthalmic regional anesthesia. [7]

Anatomy of the bony orbit:

The orbits are conical or four-sided pyramidal cavities, which open into the midline of the face and point back into the head.

Each consists of a base, an apex and four walls. [8] The base, which opens in the face, has four borders. The following bones take part in their formation:

1. Superior margin: frontal bone
2. Inferior margin: maxilla and zygomatic bones
3. Medial margin: frontal bone, lacrimal bone and maxilla
4. Lateral margin: zygomatic and frontal bones. [9]

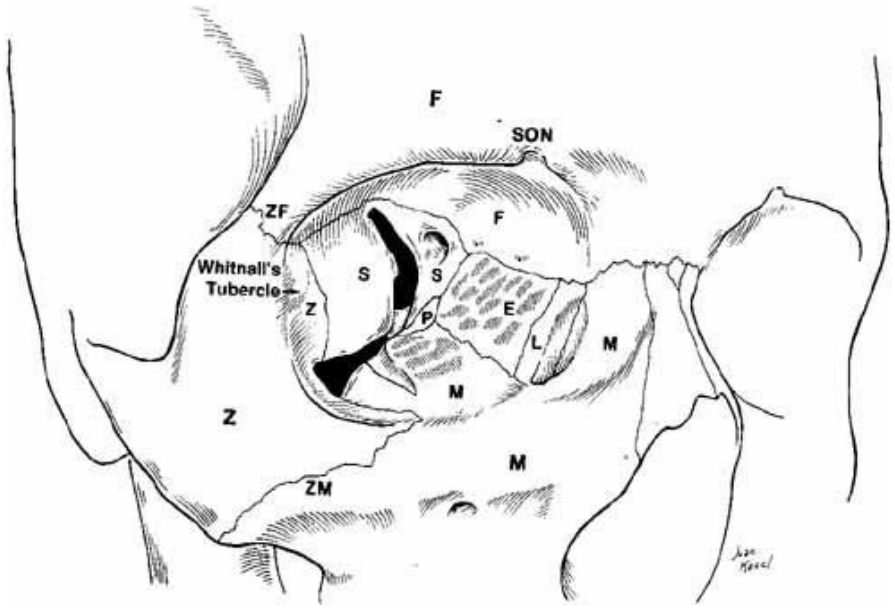

Fig. (1): Sphenoid (S) frontal bone (F) zygomatic bone (Z) maxilla (M), palatine bone (P) ethmoid bone (E) lacrimal bone (L) supraorbital notch (SON). [10]

The apex lies near the medial end of superior orbital fissure and contains the optic canal, which communicates with middle cranial fossa. The optic foramen, which contains the optic nerve and the large ophthalmic artery, is at the apex. [11]

The roof (superior wall) is formed by the orbital plate of the frontal bone and the lesser wing of sphenoid. The orbital surface of the frontal bone presents medially by the trochlear fovea and laterally by the lacrimal fossa**.** [11]

The floor (inferior wall) is formed by the orbital surface of maxilla, the orbital surface of zygomatic bone and the orbital process of palatine bone. Medially near the orbital margin is

located the groove for nasolacrimal duct. Near the middle of the floor, located infraorbital groove, which leads to the infraorbital foramen. The floor is separated from the lateral wall by inferior orbital fissure, which connects the orbit to pterygopalatine and infratemporal fossa. (11)

The medial wall is formed by the frontal process of maxilla, lacrimal bone, orbital plate of ethmoid and a small part of the body of the sphenoid. (11)

The lateral wall is formed by the orbital process of zygomatic and the orbital plate of greater wing of sphenoid. The bones meet at the zygomaticosphenoid suture. The lateral wall is the thickest wall of the orbit. (11)

The volume of the adult orbit is 30 ml^3; whereas that of an average sized globe is 6.5 ml^3. The typical dimensions at the rim are 35 mm vertically and 40 mm horizontally. The depth of the orbit from the inferior orbital rim to the optic foramen ranges from 42 to 54 mm. (12)

The orbital septum:

A thin sheet of connective tissue called the orbital septum encircles the orbit as an extension of the periosteum of the roof and the floor of the orbit. It also attaches to the anterior surface of the levator muscle. Posterior to the orbital septum is the orbital fat. In both the upper and lower eyelids, the orbital septum attaches to the aponeurosis. The orbital septum thus

provides a barrier to anterior or posterior extravasation of blood or the spread of inflammation.[13]

Extra-ocular muscles:

Each orbit contains 6 extra-ocular muscles that function together to move the eye: 4 recti muscles (superior, inferior, lateral, medial) and 2 oblique muscles (superior, inferior) **(Figs. 2 and 3)**. The levator palpebrae muscle elevates the upper lid Traditionally, the four recti muscles, along with connective tissue septa, were believed to create a defined compartment known as the orbital cone. This so-called cone extends from the rectus muscle origins around the optic foramen at the apex of the orbit to the attachment of the muscles to the globe anteriorly.[14] The actions of each extra-ocular muscle on the eye globe are as follows: **(Fig. 4).**

- Medial rectus: Converging
- Lateral rectus: Diverging
- Superior rectus: Elevation
- Inferior rectus: Depression
- Inferior oblique: Extorsion, elevation and abduction
- Superior oblique: Intorsion, depression, abduction

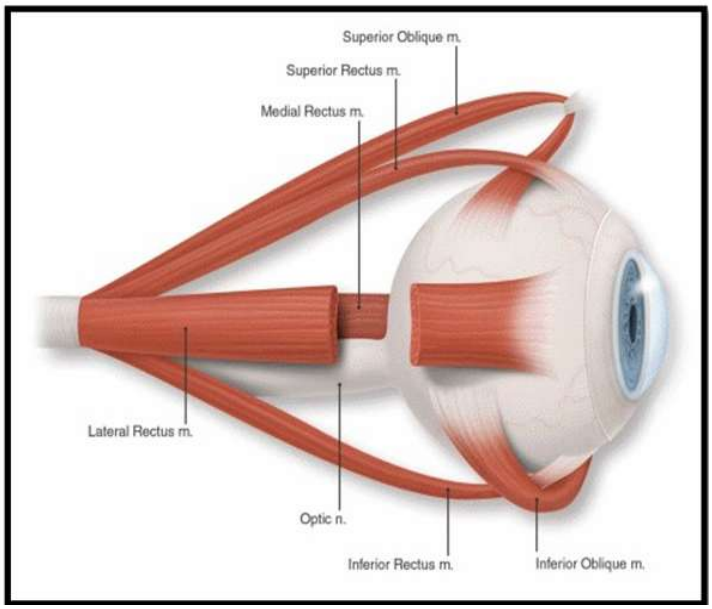

Fig. (2): The extra-ocular muscles (side view).[9]

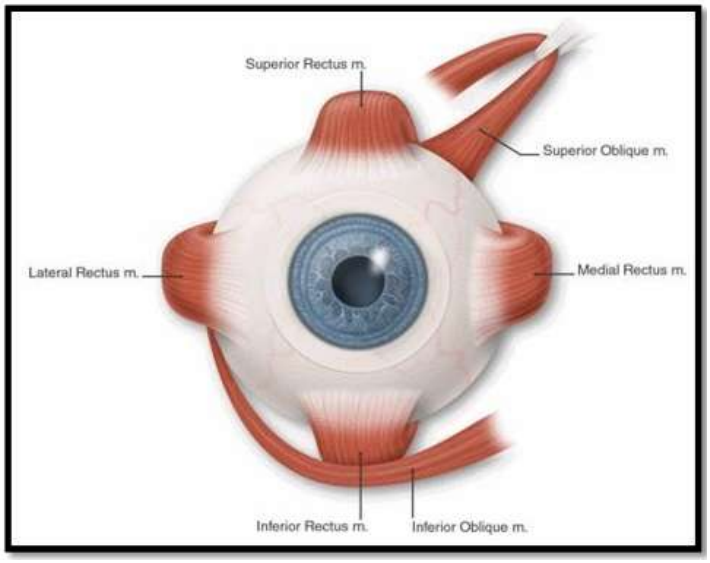

Fig. (3): The extra-ocular muscles (front view). [9]