The Effect Of Addition Of Atracurium To Local Anesthetic In Peribulbar Block In Patients Undergoing Cataract Surgery

Thesis

Submitted for Partial Fullfilment Of Master Degree In Anesthesiology

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Mohamed Ahmed Abdalla Abdelkader

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List of Abbreviations

Abbr.	Full term
CSF	Cerebrospinal fluid
DTFNBA	Deep topical fornix nerve block anesthesia
ECG	Electrocardiogram
IOL	Intraocular lens
LA	Local anesthetic
LAST	Local anesthetic systemic toxicity
MAO	Monoamine oxidase
NIABP	Non-invasive arterial blood pressure
NMDA	N-methyl-D-aspartate
OASS	Ocular Anesthetic Scoring System
PABA	P-amino-benzoic acid
SD	Standard deviation
SpO_2	oxygen saturation
SPSS	Statistical package for social sciences
STB	Sub-Tenon's block
X^2	Chi-square

INTRODUCTION

The provision of anesthesia for ophthalmic surgical procedures varies worldwide with an increasing tendency towards orbital regional local anesthesia**.** ***(Eke and Thompson, 2007)***

There are different approaches to the delivery of local anesthesia for cataract surgery. The two main approaches are retrobulbar and peribulbar blocks. Both can provide adequate analgesia, akinesia and control of intraocular pressure as well as postoperative analgesia. ***(Alhassan et al., 2008)***

The addition of neuromuscular blockers to local anesthetics does not affect analgesia, but because of their effect on neuromuscular junction, they induce akinesia in extraocular muscles and therefore optimizing the setting for ophthalmic surgeries. ***(Rizzo et al., 2005)***

Atracurium is a benzylisoquinolinium non-depolarizing neuromuscular blocker used to facilitate endotracheal intubation and to provide skeletal muscle relaxation during surgery or mechanical ventilation. Atracurium has intermediate onset and duration of action**.** ***(Peck and Hill , 2014).***

Like all muscle relaxants, atracurium has a quaternary group; however, a benzylisoquinoline structure is responsible for its unique method of degradation.The drug is a mixture of 10stereoisomers. Atracurium is so extensively metabolized that its pharmacokinetics are independent of renal and hepatic function, and less than 10% is excreted unchanged by renal and biliary routes. ***(John et al., 2013).***

Some clinical trials have shown that addition of a neuromuscular blocker to the local anesthetic solution improves the quality of anesthesia in different regional techniques. ***(Reah et al., 1998)***

AIM OF THE STUDY

To evaluate the effects of adding Atracurium (5mg) to local anesthetic mixture on akinesia of globe and eyelid regarding onset and duration in cataract surgery using peribulbar technique.

Primary objective:

Evaluation of adding Atracurium (5mg) to local anesthetic mixture on akinesia of eyelid and globe; regarding onset and duration in cataract surgery using peribulbar technique.

Secondary objective:

Evaluation of any specific complications related to Atracurium as an adjuvant to local anesthetics.

Chapter (1)
Anatomy of The Orbital Cavity

The bony orbit is a conical or four-sided pyramidal cavity which consists of a base,an apex and four walls ***(Snell and Lemp , 1997)***

The *base* represents the anterior open end. The *margin* is made up of three bones: the frontal, zygomatic and maxilla. The *apex* corresponds to the optic foramen. ***(Ahmed, 2011)***

1- Boundaries of the orbital cavity

Table (1**)**: boundaries of the orbit ***(Ahmed , 2011)***

Wall	Formed by
Roof	Mainly the orbital plate of the frontal bone & lesser wing of the sphenoid bone
floor	Orbital plate of maxilla, zygomatic & orbital process of the palatine bone
Medial wall	Ethymoid bone (lamina papyracea) , maxilla (frontal process), lacrimal bone and lateral aspect of body of sphenoid bone
Lateral wall	Greater wing of sphenoid and zygomatic bone

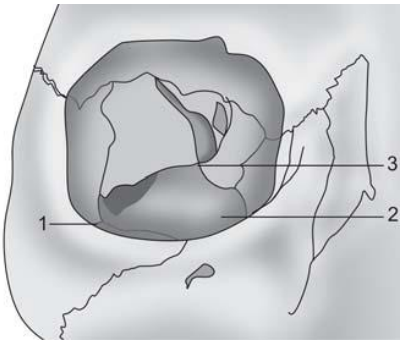

Figure (1): Orbital floor: 1. zygomatic bone; 2. maxilla; 3. Palatine ***(Ahmed , 2011)***

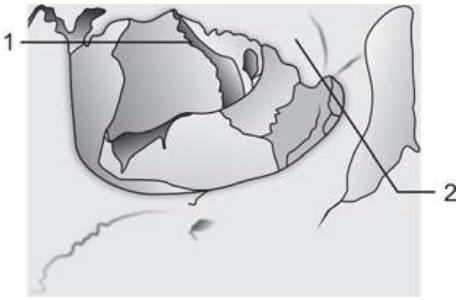

Figure (2): Orbital Roof: 1. orbital plate of the frontal bone; 2. lesser wing of the sphenoid bone ***(Ahmed , 2011)***

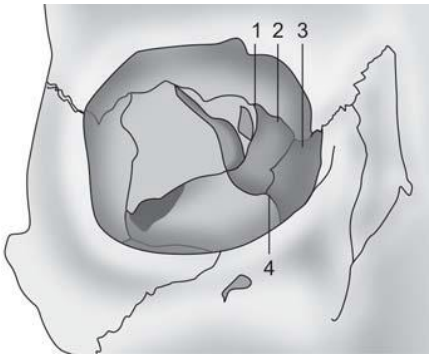

Figure (3): Medial orbital wall: 1. lesser wing of the sphenoid; 2.zygomatic bone 3.foramen for zygomaticofacial nerve; 4. grearer & lesser sphenoid wings ***(Ahmed , 2011)***

Figure (4): Lateral orbital wall: 1. orbital plate of frontal bone; 2. Ethymoid; 3.lacrimal bone; 4. Maxillabone ***(Ahmed , 2011)***

2-Relations of the orbit

Table (2**)**: Orbit relations ***(Ahmed , 2011)***

Margin	Relation
Superiorly	frontal and supraorbital air sinuses
Medially	Ethnocide air cells, nasal cavity and sphenoid sinus
Inferiorly	maxillary antrum and palatine air cells
Laterally	Middle cranial, temporal and pterygopalatine fossae

3- Anatomical position and dimensions

The lateral walls are nearly perpendicular to each other (i.e. angle between them is nearby 90 degrees).The medial walls of both orbits are parallel to each other and in the sagittal section. The arc from medial to lateral wall in each orbit is approximately 45° ***(Smerdon , 2000)***

Average Orbital Dimensions:- ***(Ahmed , 2011)***

- Each orbital margin: 40 mm
- Base of the orbit: 40 mm wide and 35 mm high
- Width of orbital opening: 40 mm
- Intraorbital distance: 25 mm
- Orbital volume: 30 ml

4- Openings Of The Orbital Cavity

It means the connections of the orbital cavity to the surroundings.

I: The orbital margin:

- Formed mainly by the base of the orbital cavity.

Table (3**)**: Orbital margins ***(Johnson and Forrest , 1996)***

Margin	Formed by
Superior	frontal bone
Inferior	maxilla and zygomatic bones
Medial	frontal, lacrimal and maxilla bones
Lateral	zygomatic and frontal bones

The supraorbital notch or foramen is felt within the supraorbital rim. The supraorbital rim discontinued laterally at the lacrimal fossa which contains the lacrimal gland. ***(Johnson and Forrest , 1996)***

II: The optic foramen: *(Ahmed , 2011)*

The optic foramen is an oval opening at the apex of the orbit. It transmits:

- Optic nerve
- Ophthalmic artery

III: The superior orbital fissure

IV: The inferior orbital fissure

V: The anterior and posterior ethymoidal foramina

VI: The infraorbital foramen

(Johnson and Forrest 1996)

Contents Of The Orbital Cavity

The orbit contains: the eyeball, extraocular muscles, Conjunctiva , orbital fat and fascial sheath and part of the lacrimal apparatus.***(Smerdon, 2000)***

1- The Eyeball

Shape:

The eyeball is not properly a sphere in shape rather than a fused two-piece unit; the anterior small part and the posterior large part. ***(Johnson and Forrest , 1996)***

Dimensions:

Table (4**)**: Adult eyeball dimensions ***(Khurana , 2007)***

Item	Measurement
Antero-posterior diameter	24 mm
Horizontal diameter	23.5 mm
Vertical diameter	23 mm
Circumference	75 mm
Volume	6.5 ml

Ultrasonography and eye dimensions

Axial length measurement of the eyeball (Biometry) is the most common application of ultrasonography in ophthalmology. ***(Ahmed , 2011)***

The ultrasonic axial length is the distance from the external corneal surface to the retinal surface of the eye. It ranges 23-25 mm in length. Myopic eyes are eyes with axial length more than 26 mm and thinner sclera that may lead to irregular bulges called staphyloma (especially at the inferotemporal compartment), being highly susceptible to needle trauma and perforation so they should be treated cautiously during regional anesthesia. Nowadays, the axial