Comparing General Anesthesia with Preemptive IV Atropine vs General Anesthesia with Single Injection Peribulbar Block with Levobupivacaine 0.5% or Lidocaine 2% for Prevention of Oculocardiac Reflex in Children Undergoing Strabismus Surgery: Randomized Control Study

Thesis

Submitted for Partial Fulfillment of Master Degree in Anesthesia, Intensive Care and Pain management

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2019

سورة البقرة الآية: ٣٢

Acknowledgment

First and foremost, I feel always indebted to **ALLAH**, *the Most Kind and Most Merciful.*

I'd like to express my respectful thanks and profound gratitude to **Prof. Dr. Galal Adel ElKady,** *Professor of Anesthesia, Intensive Care and Pain Management, Faculty of Medicine, Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.*

I am also delighted to express my deepest gratitude and thanks to **Dr. Milad Ragaie Zekry,** *Lecturer of Anesthesia, Intensive Care and Pain Management Faculty of Medicine, Ain Shams University, for his kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.*

I am deeply thankful to **Dr. Dalia Ahmed Ibrahim & Dr. Abeer Samir Salem,** *Lecturer of Anesthesia, Intensive Care and Pain Management Research Institute of Ophthalmology, for their great help, active participation and guidance.*

I would like to express my hearty thanks to all **my family** *for their support till this work was completed.*

Last but not least my sincere thanks and appreciation to all patients participated in this study.

Hani Ali Ezzat

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List of Abbreviations

Abb.	Full term

Ach .....*Acetyl Choline*
ADRS.....*Adverse Drug Reactions*
ASA.....*American Society of Anesthesiologists*
AV nodes.....*Atrioventricular Nodes*
cAMP .....*Cyclic Adenosine Monophosphate*
CNS .....*Central Nervous System*
CPR.....*Cardiopulmonary Resuscitation*
ECG .....*Electrocadogram*
ET .....*Endotracheal*
HS.....*Highly Significant*
IU.....*International Units*
IV .....*Intravenous*
LA .....*Local Anesthesia*
OCR .....*Oculocardiac Reflex*
PBB.....*Peribulbar Block*
PEA.....*Pulseless Electrical Activity*
Post op .....*Post Operative*
TCR.....*Trigemnocardiac Reflex*
PONV……..*Postoperative Nausea and Vomiting.*

INTRODUCTION

Strabismus is one of the common health problems among the children ***(Paul, 2006).***

In 1908, Aschner described a decrease in heart rate as a consequence of applying pressure directly to the eyeball. This phenomenon would eventually be termed "the oculocardiac reflex" and is defined clinically as a decrease in heart rate by 10% following pressure to the globe or traction of the ocular muscles. The reported incidence of the oculocardiac reflex varies from 14% to 90%, depending on the study, making it relatively common ***(Chung et al., 2008).***

The Oculocardiac reflex (OCR) consists of an afferent and efferent limb. The trigeminal nerve, otherwise known as the fifth cranial nerve, serves as the sensory afferent limb. The vagus nerve, also known as cranial nerve ten, comprises the efferent limb of the OCR. The pathway is initiated by activation of stretch receptors in the ocular and periorbital tissues. The short and long ciliary nerves conduct impulses that carry the sensory message to the ciliary ganglion. From there the impulses are transported by way of the ophthalmic division of the trigeminal nerve to the Gasserian ganglion, followed by the trigeminal nucleus, where the afferent limb will terminate in the central nervous system (CNS). The CNS will then process this sensory information, and internuclear communication will occur between the trigeminal sensory nucleus and the visceral

motor nucleus of the vagus nerve. This stimulates the efferent limb, causing impulses to exit the brainstem and transmit to the myocardium to synapse as the sinoatrial node and activate the vagal motor response. The resultant effects include negative chronotropy, leading to bradycardia. Triggered by traction on the extraocular muscles (especially medial rectus), direct pressure on the globe, ocular manipulation, ocular pain ***(Dunville LM et al., 2018).***

It can also be triggered by retrobulbar block (pressure associated with local infiltration), ocular trauma, or manipulation of tissue in orbital apex after enulcleation ***(Chung et al., 2008).***

The incidence of the oculocardiac reflex decreases with age and tends to be more pronounced in young, healthy patients, which is clinically significant for pediatric as it is observed with greatest incidence in young healthy neonates and infants undergoing strabismus surgery ***(Yi and Jee, 2008).***

Peribulbar block: a 26 gauge needle (25mm) / 27 gauge 1/2 inch (12mm**)** is inserted as far laterally as possible in the inferotemporal quadrant. Once the needle is under the globe, it is directed along the orbital floor, passing the globe equator to a depth controlled by observing the needle/hub junction reaching the plane of the iris. After negative aspiration for blood, with the globe in primary gaze, 4 to 5 cc of local anaesthetic agent is injected ***(Jeetinder Kaur et al., 2018).***

By this procedure, all extraocular muscles including superior oblique can be paralyzed. The local anaesthetic solution diffuses through the orbital septum and orbicularis muscle can also be paralyzed. A separate eyelid block might not be required with this technique.

Single injection, peribulbar block using a short needle and a small volume is a safe and effective technique when combined with general anesthesia in pediatric ophthalmic surgery ***(Manal and Sherif, 2018).***

Patients of strabismus surgery are high risk for the oculocardiac reflex (OCR). Exaggerated OCR may be life threatening. Maintenance of the adequate depth of anesthesia and use of anti-cholinergics is the mainstay to reduce this risk. The routine prophylaxis could not eliminate the risk of OCR ***(Subhedar et al., 2015).***

The incidence of the OCR during strabismus varies with the premedication and use of an anesthetic agent. There are studies which conclude that general anesthesia is with a higher incidence of OCR as compared with regional anesthesia ***(Grover et al., 1998).***

It is also correlated that manipulation of extraocular muscles may aggravate post-operative nausea and vomiting (PONV) ***(Lai et al., 2009; Karanovic et al., 2006).***

Levobupivacaine is a long acting, amide-type local anaesthetic that is the isomer of the racemate bupivacaine. In general, in vitro, in vivo and human volunteer studies of nerve block indicate that levobupivacaine is as potent as bupivacaine and produces similar sensory and motor block. A trend towards a longer sensory block with levobupivacaine was seen in some studies, and may be related to the greater vasoconstrictive activity of levobupivacaine ***(Foster et al., 2000).***

Levobupivacaine is indicated for peripheral nerve block, peribulbar administration and local infiltration for surgical anesthesia in adults ***(Foster et al., 2000).***

Lidocaine is Intermediate-acting local anesthetic (amide type), the efficacy profile of lidocaine as a local anesthetic is characterized by a rapid onset of action and intermediate duration of efficacy. Therefore, lidocaine is suitable for infiltration, block, and surface anesthesia ***(Balakrishnan et al., 2015).***

Hyaluronidase is an enzyme which degrades hyaluronan and has diverse clinical applications resulting from its ability to facilitate the dispersion and/or absorption of an array of medications and fluids. It provides rapid penetrance of anesthetic agents, particularly to locations difficult to access. In ophthalmology, hyaluronidase is used most often as an adjunct to local anesthesia for retrobulbar, peribulbar, or sub-Tenon's blocks. The use of hyaluronidase in ophthalmology began as early as 1949, when Atkinson added it to retrobulbar and lid blocks ***(Silverstein et al., 2012).***

Face, Legs, Activity, Cry and Consolability (FLACC) scale contains five categories, each of which is scored from 0 to 2 to provide a total score ranging from 0 to 10 and has been found to have good interrater reliability and validity for evaluating pain after surgery, trauma, malignancy, and other disease processes in infants and children up to 7 years of age ***(Merkel SI et al., 1997).***

The scale has also been recommended for continued use in clinical trials in young children, until additional validation data are available .For assessment of the pain score of zero indicates that the patient is relaxed , score of 1-3 means mild discomfort , score 4-6 means moderate pain while score 7-10 means that there is severe intolerable pain . ***(Crellin D et al., 2007).***

Category	Scoring		
	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quietly, normal position moves easily	Squirming, shifting back and forth, tense	Arched, rigid, or jerking
Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractible	Difficult to console or comfort

Figure (1): Diagram of FLACC pain scale (El-Sharkawi et al , 2012).

The pain VAS is a continuous scale comprised of a horizontal (HVAS) or vertical (VVAS) line, usually 10 centimeters (100 mm) in length, anchored by 2 verbal descriptors, one for each symptom extreme . ***(ensen MP et al., 1986).***

The pain VAS is self-completed by the respondent. The respondent is asked to place a line perpendicular to the VAS line at the point that represents their pain intensity. ***(Hawker et al., 2011).***

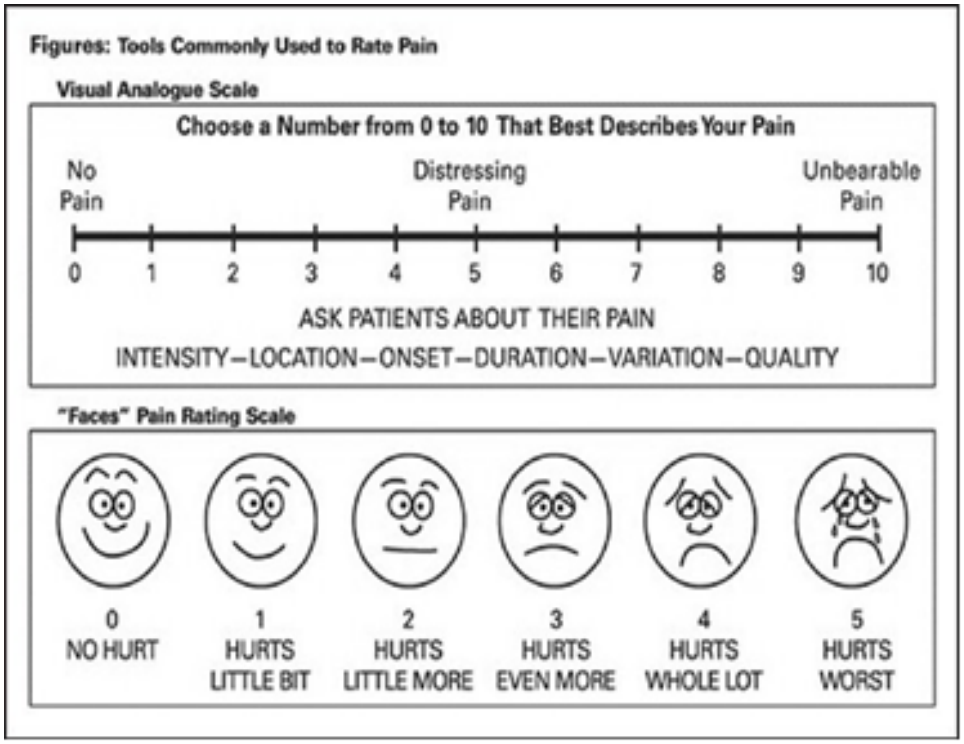

Figure (2): Diagram of VAS pain scale (Ghaderi et al , 2013)

AIM OF THE WORK

The main goal of this Thesis is to evaluate and assess the efficacy of Levobupivacaine 0.5% and Lidocaine 2% if injected in peribulbar block in preventing the incidence of Oculocardiac reflex in Pediatrics patients undergoing strabismus surgery.

The secondary goal is to evaluate the effect of peribulbar block if combined with general anesthesia on post-operative pain and analgesia.