Monitored anesthesia care for patients undergoing ophthalmic surgery

Essay submitted for partial fulfillment of master degree in Anesthesiology

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List of Abbreviations

AAG : Alpha (1)-Acid Glycoprotein

AAMS: Annals of the Academy of Medicine, Singapore

CNS : Central Nervous System

CO_2 : Carbon dioxide

COPD : Chronic Obstructive Pulmonary Disease

DCR : Dacrocystorhinostomy

DTFNBA : Deep Topical Fornix Nerve Block Anaesthesia

IM : Intramuscular

INR : International Normalized Ratio

IOP : Intraocular pressure

IV : Intravenous

MAC: Monitored Anesthesia Care

$NaHCO_3$: Sodium Bicarbonate

NSAIDs : Non-Steroidal Anti-Inflammatory Drugs

O_2 : Oxygen

OCR : Oculocardiac Reflex

RCA: Royal Collage of Anesthetists

Acknowledgment

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Introduction

Anesthetic management for eye surgical procedures is a multifaceted challenge regarding patient safety, elderly patients, akinesia, analgesia, minimizing bleeding, control of intraocular pressures, avoidance of oculocardiac reflex and postoperative surveillance. Patients undergoing ophthalmic surgery may suffer from various coexisting diseases (i.e., vascular diseases, arterial hypertension, coronary artery disease, metabolic syndrome, lung disease) these diseases are more likely in the elderly group. Therefore, either peribulbar or topical anesthesia is widely used for ophthalmic surgery, especially for cataract surgery. Complications of retrobulbar block are infrequent but include direct optic nerve trauma, retrobulbar hemorrhage and transient globe compression with increased intraocular pressure. The oculocardiac reflex may be stimulated during injection or by eye compression. Rarely, intravascular injection may cause seizures or myocardial depression, or local anesthetic may disseminate along the neural sheath affecting the central nervous system and cause temporary loss of consciousness without seizures. ***(Basta et al., 2011)***

Therefore, topical local anesthesia is favored in cataract surgery due to its effectiveness on the anterior chamber (i.e., cataract removal) as it responds well to topical agents for a duration of two hours operation time or less. Furthermore, the

quality of postoperative vital function, vigilance and cognitive dysfunction are less restricted, also topical anesthesia is cost-efficient. ***(Basta et al., 2011)***

Ophthalmic regional anesthesia provides excellent anesthesia for ophthalmic surgery with a high success rate. Only 40% of ophthalmic surgical procedures are performed under general anesthesia. When regional anesthesia is elected, the ophthalmologic surgeon usually administers the topical local blockade, while the anesthesiologist is present to monitor the patient's electrocardiogram, he routinely checks vital signs, and uses conscious sedation appropriately. But the level of the anesthesiologists' involvement in cataract surgery with conscious sedation is under discussion. ***(Fung et al., 2005)***

Phacoemulsification for cataract surgery appears to require more limited anesthesia than traditional extracapsular extraction, and is increasingly performed under topical anesthesia. The excessive use of intravenous sedatives significantly increases the risk of an adverse event specially when a combination of hypnotics, sedatives and opioids is used. The cardiovascular system is affected most commonly, manifested by arrhythmia and hypertension. ***(Katz et al., 2001)***

The criteria for the assessment of the observed variables are strictly defined. According to them anesthesiologist's intervention was required in around 20% of cases, mainly because of agitation or hypertension. Agitation was associated more with younger patients with neurological or psychiatric co-morbidity, while hypertension with older patients with relevant coexisting diseases. ***(Basta et al., 2011)***

Assessment of pain, patient's satisfaction or possible visual sensations occurring during ophthalmic surgery are important, since some patients report some degree of pain intraoperatively, others are drowsy postoperatively and others experience nausea and vomiting. ***(Monestam et al., 2001)***

Sedation might be preferred to reduce anxiety, discomfort and fear during ophthalmic regional anesthesia. The balance of the described side effects would vary with the use of different sedative and opioid agents. Evidence- based data suggest that preoperative comorbid disease is a determinant of postoperative complications. Patients under monitored anesthetic care are in an anesthetized condition and this should be tailored to comorbidities and the requirements of the surgical procedure (i.e., cataract surgery). There are three fundamental elements and purposes of conscious sedation: patient safety, control of patient anxiety, and pain control. ***(Ghisi et al., 2005)***

Monitoring during cataract surgery with conscious sedation is required and should be maintained according to patient's status. Furthermore, postoperative surveillance should be appropriate, including care for cognitive dysfunction in the elderly patients. Pain is poorly accepted in all patients and its optimal control speeds recovery and patients self-reliance and home discharge. ***(Basta et al., 2011)***

Aim of work

Most ophthalmic surgical procedures are now performed under a local anesthetic technique but the provision of anesthesia in terms of skills and resources varies worldwide.

In this essay, we review the current practice and recent development of the different ophthalmic regional anesthetic techniques under monitored anesthesia care and its techniques**.**

Anatomy of the eye globe

As with all anesthetic techniques, thorough knowledge of the anatomy is essential. Anatomy of the orbit and its nerve supply is necessary to the safe practice of ophthalmic regional anesthesia. ***(Beard and Quicker, 1988)***

This chapter will discuss the anatomy of the bony orbit, the extra-ocular muscles, motor and sensory nerve supply, blood supply, orbital fat, Conjunctiva, Tenon's capsule and applied anatomy.

1- Anatomy of the Bony Orbit

The eyes lie within two bony orbits, located on either side of the root of the nose. Each orbit is pear-shaped, with the optic nerve representing the stem. Seven bones conjoin to form the orbital structure **(Fig. 1)**; frontal, zygomatic, maxillary, ethmoidal, sphenoid, lacrimal and palatine bone. ***(Beard and Quickert, 1988)***

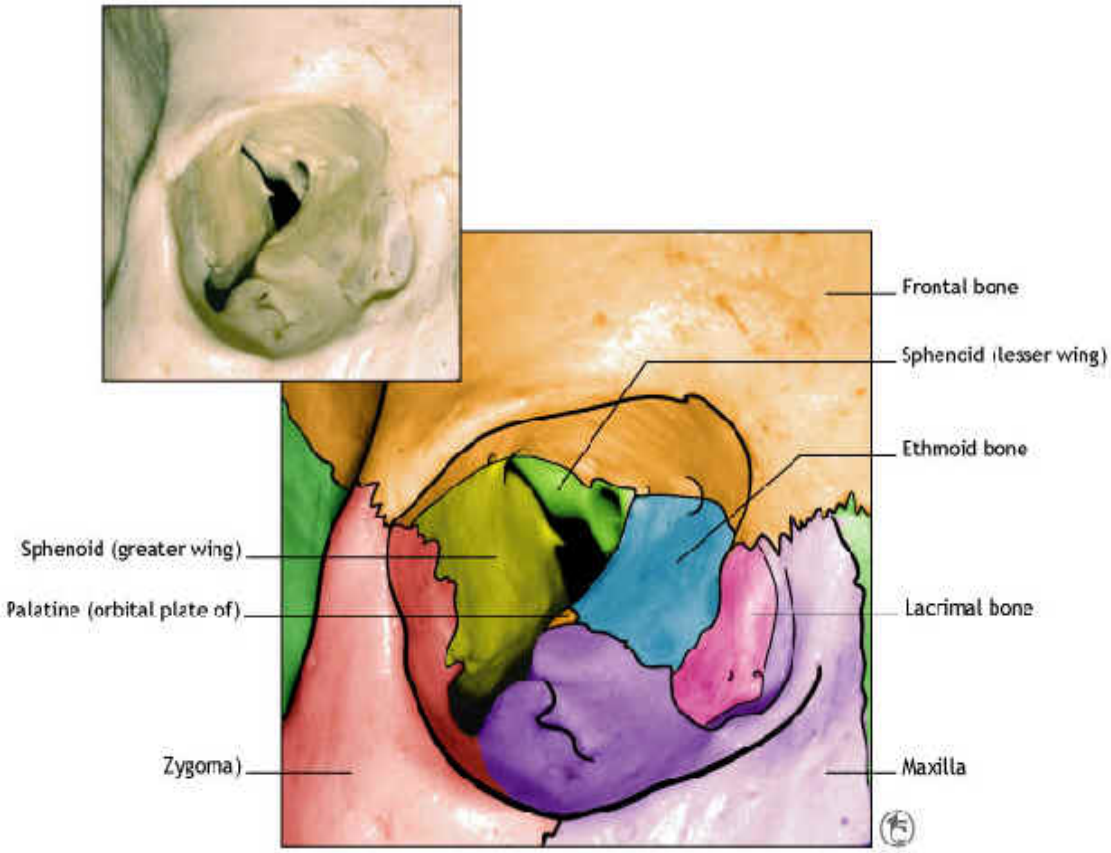

Fig. 1 –The bony orbit is formed by seven bones conjoined together.

(Beard and Quickert, 1988)

The seven bones which form the pear shape, which the orbit is characterized by, are structured as follows:

The apex lies near the medial end of superior orbital fissure and contains the optic canal which communicates with middle cranial fossa. ***(Tasman, 2007)***

The roof (superior wall) is formed by the orbital plate of the frontal bone and the lesser wing of sphenoid. The orbital surface presents medially by trochlear fovea and laterally by lacrimal fossa. ***(Tasman, 2007)***

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. ***(Tasman, 2007)***

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. ***(Tasman, 2007)***

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. The optic foramen, which contains the optic nerve and the large ophthalmic artery, is at the nasal side of the apex. ***(Tasman, 2007)***