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صدق الله العظيم

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Episcleral approach as a recent trend of regional anaesthesia for eye surgeries

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Mostafa Mahmoud
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Content

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List of abbreviations

ASA = American Society of Anaesthesiologists
DCR = Dacrocystorhinostomy.
DTFNBA = Topical fornix nerve block anaesthesia.
EOM = Extraocular muscles.
ESA = Episcleral anaesthesia.
IOL = Intraocular lens.
IOP = Intraocular pressure.
IV = Intravenous.
LA = Local anaesthetic.
LMA = Laryngeal mask airway.
MAC = Monitored anaesthesia care.
OCR = Oculocardiac reflex
OR = Operating room.
PABA = Para-aminobenzoic acid.
PBA = Peribulbar anaesthesia
RBA = Retrobulbar anaesthesia.
VTE = Venous thrombo-embolism.

Introduction

Ophthalmic surgery dates back to prehistoric times when early medicine-men, using little more than sharpened sticks, would “couch” cataracts from their patients’ eyes. By the early 19th century, sophisticated cataract surgical techniques were in place, but anaesthetic modalities were still limited to little more than heavy restraints . The introduction of general anaesthesia in the mid-18 hundreds allowed for painless eye surgery; however, the need for the anaesthetist to be near the airway, and hence, the eyes, as well as the side-effects of ether, limited its routine adoption. In 1884, Koller demonstrated that cocaine could be used as an effective topical anaesthetic to abate the pain associated with ophthalmic surgery. Shortly thereafter, Knapp delineated techniques of injecting cocaine within the orbit in order to achieve profound analgesia and akinesia of the globe. In 1971, peribulbar (PB) anaesthesia was introduced. In this block, local anaesthetic agent (LAA) is administered outside the cone of muscles and theoretically, avoiding some of the complications of retrobulbar anaesthesia. By the 20th century, a variety of needle-based conduction anaesthesia techniques were elucidated, particularly by Atkinson, who popularized the term retrobulbar anaesthesia. Needle-based injection anaesthesia remained the mainstay of ophthalmic anaesthesia for many decades,

until the recent resurgence of interest in cannula-based sub-Tenon's blocks and topical anaesthesia. **(Gayer and Kumar, 2008)**

Classification of the block is a name based on the likely anatomical placement of the needle. In retrobulbar block, local anaesthetic agent is injected into the part of the orbital cavity behind the globe and inside the cone of ocular muscles and is also called intraconal block. In peribulbar block, the placement of needle tip and local anaesthetic agent is outside the muscle cone and is also called extraconal block. A combination of peribulbar and retrobulbar blocks is described as combined retroperibulbar block. Sub-Tenon's anaesthesia refers to the injection of local anaesthetic agent beneath the tenon capsule, into a potential space called sub-Tenon's space. This block is also known as parabulbar block or pinpoint anaesthesia. Regional anaesthesia for the ophthalmological surgery can also be classified on the basis of whether the needle has been used for the performance of block or not. The blocks in which needles are used are retrobulbar and peribulbar anaesthesia. SubTenon's anaesthesia is accomplished by using needle or a blunt cannula. The block in which no needle is used is called topical anaesthesia (TA).Topical anaesthesia and retrobulbar (RB) block are in practice for more than a century. Over this period, RB block enjoyed popularity as sole orbital anaesthetic technique with high success rate. The disadvantages of this block are

higher complication rate including globe perforation, brain stem anaesthesia and death***. (Aqil, 2010)***

Widespread use of the phacoemulsification technique, however, has changed the anaesthesia requirements for this technique; total akinesia and lowered intraocular pressure are no longer necessary. Consequently, conventional retrobulbar anaesthesia is used less frequently today, particularly since it carries a greater risk for complications than do the emerging techniques. The newer techniques do not provide akinesia of the globe paralleling that of the retrobulbar block; however, they are useful for anterior segment surgery, especially cataract surgery. **(*Ripart et al.*, 2013)**

Although regional anaesthesia has many advantages over general anaesthesia for ophthalmic surgery, all these advantages can be annulled by improper selection and performance of the block. For safe performance of any local anaesthesia techniques, it is essential to have up to date knowledge on the adequate technique of any regional anaesthetic approach. ***(Aqil, 2010)***

Akinesia is most useful for intraocular surgery to prevent forceful eyelid closure. The facial nerve block is performed to block orbicularis oculi muscle during low volume classical retrobulbar block. This nerve may be blocked at several points after exiting from

the base of skull. This block is very painful and associated with skin bruising. Many complications such as hemifacial palsy, spread of local anaesthetic to the vagus nerve or glossopharyngeal nerve, neurogenic pulmonary edema and other rare complications have been reported. Modern needle block utilizing higher volume local anesthetic usually blocks the terminal branches of the facial nerve.***(Kumar, 2006)***

Aim of the work

The aim of this work is to review and summarize different approaches of regional anaesthesia for eye surgery with focusing on Episcleral approach and brief applied information about the basic anatomy and pharmacology of local anesthetic agents and adjuvant used in ophthalmic regional anaesthesia .

Anatomy of the orbit

Size, Shape and Purpose

The orbits are conical structures dividing the upper facial skeleton from the middle face and surround the organs of vision. Although the orbit is commonly described as pyramidal in shape, it is not an angular structure, and the walls are not regular. Rather, its walls, apex, and base are curvilinear and are perforated by foramina and fissures, and they have several irregularities where ligaments, muscles, and capsules attach. ***(Turvey & Golden, 2013)***

The apex is located proximally, whereas the base opens onto the facial skeleton. The apex and base of the orbit are composed of thick bone, whereas the walls are thinner. The height of the orbit is usually 35 mm, whereas the width is approximately 40 mm as measured at the rims. The child's orbit is rounder, but with age the width increases. The widest circumference of the orbit is inside the orbital rim at the lacrimal recess. From the medial orbital rim to apex, the orbit measures approximately 45 mm in length, whereas from the lateral orbital rim to the apex, the measurement is approximately 1 cm shorter. ***(Turvey & Golden, 2013)***