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Review Article

Anesthesia in Ophthalmology

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Abstract

Anesthesia for ophthalmic surgery is considered as a high-risk anesthesia, since there are many peculiarities that, if not taken into account, the visual prognosis of the patient could be altered, even causing loss of vision. Anesthetic requirements can vary significantly between different procedures. The anesthesiologist who develops in the field of ophthalmic surgery must adequately know the anatomy and physiology of the eyeball and orbit, the anesthetic implications on the physiology of the eye, the effects of surgery on the physiology of the patient as we see in the oculocardiac, oculogastric, oculorespiratory and oculodepressant reflexes, effects of ophthalmological pharmacology on human physiology: beta blockade, hypovolemia, hypokalemia; as well as the knowledge of the different surgical procedures; all the aforementioned will help to have a better ophthalmic prognosis.

Keywords: *Anesthesia; Ophthalmology; Ophthalmic Surgery; Oculocardiac*

Introduction

The anesthesia performed for ophthalmic surgery is intended for both pediatric-age patients and adults [1]. In relation to adults, cataract surgery, glaucoma and retinal detachment constitute the majority of operations. Ophthalmic surgery is mostly scheduled, rarely urgent, which makes possible preoperative consultation and exhaustive preparation of patients. Currently, this surgery is performed in most cases under locoregional anesthesia; the choice of technique and its correct practice require knowledge of ocular anatomy and physiology. Anesthesia must ensure ocular akinesia, analgesia, and normotonia. Of the parameters mentioned above, analgesia is the most important; the other two are highly dependent on surgical technique. Peribulbar anesthesia is used almost systematically for anterior segment interventions, which is also increasingly used for posterior segment interventions. The postoperative period does not usually present serious complications, the most frequent being nausea, vomiting and pain. Complications due to patient history are less and less frequent thanks to the almost systematic use of local anesthesia, since the intervention does not alter any of the body's vital functions. For cataracts and the simplest procedures, outpatient surgery is almost always used.

Development and Discussion

The preoperative study and preparation of the patients.

The preoperative study depends on the characteristics of the patient and the scheduled intervention because it depends on the type of anesthesia to which he will undergo. The usual standard is electrocardiogram (ECG), chest X-ray, blood count, coagulation tests, and biochemistry prior to anesthesiology consultation.

Important aspects to evaluate include:

- History and/or questionnaire with antecedents.
- Decrease anxiety.
- Premedication.

- Select patients with respiratory diseases, Parkinsonian tremor and senile tremors, Alzheimer's disease, claustrophobia and psychiatric diseases, among others with indication of general anesthesia due to their lack of collaboration.
- Pediatric patients with their specific anesthetic evaluations.
- Geriatric patients, where it is reported in the literature that 46% of those over 75 years of age have cataracts, suffer more frequently from congestive heart failure, high blood pressure, arrhythmias and arthrosis, which makes it difficult to place the patient on the operating table.
- Maintain the basic treatment until the day of the intervention: antiarrhythmic, antihypertensive, broncadilator, etc.

In controlled diabetic patients, anesthesia and outpatient surgery are not contraindicated:

- In patients with treatments that alter hemostasis, we have those treated with Ticlopidine, in these cases we will suspend the administration one week before the intervention, the Acetyl Salicylic Acid (AAS) suspend it five days before. If the cardiovascular indication does not allow the administration of antiplatelet agents to be interrupted, it can be substituted by Flurbiprofen and Sodium Heparin or low molecular weight Heparins after consultation with cardiology and hematology. In case of treatment with vitamin K antagonists, the administration should be interrupted for several days, replacing it with Heparin Sodium or Heparin with low molecular weight.
- Drugs in eye drops and their anesthetic implications: the systemic absorption of drugs for topical use in ophthalmology can occur either from the conjunctiva, or from the nasal mucosa following the nasolacrimal duct in which case it is faster and the possibility of greater systemic toxicity. It is recommended to compress the internal cantus of the eye for five minutes after each instillation to avoid this. Cases of lung edema have been described after ocular installation of 10% phenylephrine, mydriatic, which in turn is a vasoconstrictor due to α1 stimulation. The use of concentrations less than 2.5% is recommended and its use is contraindicated in patients with ischemic heart disease, heart failure or poorly controlled hypertensive patients.

Anatomical and physiological considerations

Orbits

They are quadrangular pyramid shaped, their inner and outer walls form an acute angle of approximately 45º. The major axis of the orbit forms an angle of about 23º with the visual axis. The orbital volume is about 26 ml in women and 28 - 30 ml in men, although it may vary depending on the patient. The average volume of the eyeball is 6.5 ml. The distance from the lower orbital rim to the optic conduit is 42 - 54 mm.

The orbital roof in its anterolateral zone presents the lacrimal fossa, and in its axis in the anteromedial zone the trochlear fossa, in which the pulley of the greater oblique muscle is inserted. The supraorbital notch is located at the junction point between the inner third and the outer two-thirds of the upper border. The floor of the orbit is the area where the dental nerves and the maxillary nerve pass. The nasolacrimal duct, which is 12 mm long, starts in the anteromedial part of the orbital floor and runs vertically towards the nostril, where it empties into the lower meatus. The posterior part of the orbit has three holes that allow the passage of the nerves and vessels of the eye and its attached structures. The optic nerve enters the orbit through the optic hole. Ophthalmic veins and branches of the ophthalmic nerve pass through the sphenoid cleft. The superior maxillary nerve passes through the lower spheno-maxillary or orbital cleft. At the superior vertex of the orbit is the internal end of the sphenoid cleft, inserting the Zinn tendon.

Eyeball

It has an irregular spherical shape, its anterior part, the cornea, protrudes forming a sphere segment with a smaller radius than the rest of the eyeball. The equator is a circle perpendicular to the axis of the eye, located at the same distance from both poles. The antero-posterior diameter, or axial length, is the distance that exists from the anterior edge of the cornea to the internal surface of the retina and measures about 23 mm. This anatomical reference is necessary when performing periocular anesthesia. The wall of the eyeball is made up of three concentric membranes: sclera/cornea, uvea (choroid, iris, and ciliary body) and the retina, from the outside in. The contents of the eyeball include the lens, located behind the iris, the aqueous humor that occupies the space between the cornea and the lens, and the vitreous body that occupies from the posterior aspect of the lens to the retina.

Anterior segment: Cornea, lens, iridocorneal angle and ciliary body.

Posterior segment: Sclera, retina choroid and vitreous body.

The sclerocorneal limbus: It is the area where the sclera and the components of the iridocorneal angle meet at the periphery of the cornea. In the deepest part of this area are the trabecular system and the Schlemm duct, which is an ocular venous duct that surrounds the cornea.

The choroid (posterior uvea): It is a membrane formed mainly by blood vessels and occupies the posterior two thirds of the eyeball. Ahead the choroid continues with the ciliary body; Its anterior limit is formed by a circular line, called or serrata, located about 6 or 7 mm behind the cornea.

The iris: Forms a vertical and circular diaphragm in front of the lens, with a perforated central point, the pupil. In front it is separated from the cornea by the iridocorneal angle, and behind it is separated from the vitreous humor by the iridociliary angle (posterior chamber).

Pupillary motor skills are due to two smooth muscles. The iris sphincter surrounds the pupillary orifice like a circular crown. It is innervated by the parasympathetic system (M3 type muscarinic receptors). The pupil dilator is a flat muscle that extends in front of the pigment epithelium and is innervated by the sympathetic system (α adrenergic receptor). The ciliary body joins the lens through the zonula (or suspensory ligament of the lens) and through its base to the root of the iris. It includes smooth muscle fibers that form the ciliary muscle, in charge of accommodation. The ciliary body presents on its internal face the ciliary processes constituted by vascular tangles.

Orbital or tenon's fascia

It includes the Tenon capsule that lines the sclera of the eyeball, the muscle sheaths, which wrap around the muscles of the orbital cavity, and the anterior aponeurotic expansions that connect the Tenon's dome and muscle sheaths to the conjunctiva, eyelids, and orbital rim. In the anterior part, it fuses with the conjunctiva approximately at the corneal perimeter. Tenon's space separates it from the sclera. From behind it is inserted into the orbit around the optic conduit. The fasciae that divide the orbit are radial bands that extend between the globe, Tenon's capsule and the orbit, delimiting four quadrants, one for each rectus muscle, containing adipose tissue and influencing the diffusion of anesthetics used in anesthesia. periocular.

The anterior limit of the orbit is constituted by the orbital septum, which is a fibrous lamina that joins the orbital rim with the peripheral edge of the palpebral tarsus.

Muscles and innervation:

Common eye motor (III cranial torque):

- Superior straight. Minor oblique.
- Elevator of the upper eyelid.
- Inner straight.
- Lower rectum.

Pathetic or Trachlear (IV):

- Greater oblique.
- (Penetrates into orbit outside of Zinn's ring).

External eye motor:

- External rectum.

Facial (VII) upper zygomatic branch:

- Frontal.
- Orbicularis superior eyelid.

Lower zygomatic branch:

- Orbicular of the lower eyelid.

The trigeminal nerve, ophthalmic branch, is the sensitive nerve of the eye and its attached structures. Before entering the orbit it is divided into three branches: nasal or nasociliary, lacrimal and frontal nerves.

The ciliary or ophthalmic ganglion: It is located at 1 cm. from the end of the orbit and 1.5 cm behind the posterior pole of the eyeball. Located between the optic nerve and the ophthalmic artery, on the inside, and the external rectus muscle on the outside. It is a peripheral ganglion of the parasympathetic system. Eight to ten branches come out of the front part, the short ciliary nerves, and three roots penetrate from the back: motor or parasympathetic, sensitive and sympathetic. The parasympathetic root comes from the III cranial nerve through the minor oblique nerve, its fibers are preganglionic and stop at the ciliary ganglion. The sensory root comes from the nasociliary nerve and transmits the sensitivity of the eyeball. The sympathetic root contains postganglionic fibers from the superior cervical ganglion that run through the plexus that surrounds the internal carotid and pass through the ciliary ganglion without stopping and reach the globe through the short ciliary nerves.

The facial nerve: The temporal nerve and the zygomatic nerve are terminal branches of the facial nerve and innervate the skin of the forehead, the eyebrow muscles, and the orbicularis oculi.

Parasympathetic system: Participates in accommodation, miosis and lacrimal secretion. Sympathetic stimulation produces mydriasis.

Vascularization

The arteries show individual variations, the veins have more constant paths. The arteries are located in the muscular cone near the orbital vertex and in the anterosuperior part of the orbit; the veins at the periphery and outside the muscular cone the veins do not accompany the arteries. In relation to locoregional anesthesia, it should be borne in mind that the vascularization is very intense in the posterior part of the orbit and not so much in the anterior and lateral parts; In these areas, the vessels follow an internal path.

The ophthalmic artery, a branch of the internal carotid artery, enters the orbit along with the optic nerve. The central artery of the retina is like that of the ophthalmic artery, it crosses the dural sleeve of the optic nerve at 1.25 cm. of the posterior pole of the eyeball. The superior ophthalmic vein presents a relatively constant path emerging from the internal part of the upper eyelid, it empties into the cavernous sinus as well as the central vein of the retina. The inferior ophthalmic vein leaves the orbit at the bottom of the sphenoid cleft. Intraocular Pressure (P.I.O) is the pressure exerted by the contents of the eyeball on its walls. Its normal value ranges from 16 ± 5 mmHg, figures higher than 25 mmHg being considered pathological; there are daytime fluctuations of 2 to 3 mmHg.

Intraocular Pressure (P.I.O)

IP depends on three factors:

- The volume and compliance of the liquid intraocular structures, the aqueous humor, the vitreous body and the choroidal blood volume.
- The compliance of the sclera.
- The extrinsic pressure exerted on the walls of the globe by the eye muscles and the orbicularis oculi.

In physiological conditions, its regulation depends fundamentally on the aqueous humor and its circulation. The aqueous humor is formed in the posterior chamber through the pupil to the anterior chamber, and by centrifugal flow reaches the iridocorneal angle, where it traverses the trabecular meshwork to penetrate the Schlemm duct, here the veins that drain into the Episcleral veins absorb aqueous humor.

Variations in intraocular pressure

Physiological factors: The vitreous body is an aqueous gel whose volume hardly varies in the short term. The fundamental factors are aqueous humor and choroidal blood volume. Blood pressure has little influence, since blood flow through the ophthalmic artery has a self-regulating mechanism. The increase Central venous pressure leads to congestion of the choroidal veins and a decrease in drainage through the episcleral veins, with the consequent increase in IOP. Hypercapnia dilates the choroidal veins and increases IOP. Hypoxemia increases IOP, but less than hypercapnia.

Surgical and anesthetic factors: IOP should be avoided during open eyeball surgery, the frequency of which has decreased due to the generalization of phacoemulsion for cataract surgery. Following surgical or traumatic opening of the eyeball, intraocular pressure is balanced with atmospheric pressure. In this case, when the volume of the intraocular content increases, an extrusion of the ocular content may occur (prolapse of the iris and lens, exit of the vitreous body) through the surgical incision or the wound. The most serious form of this preoperative complication is subchoroidal hemorrhage, the anterior compression of which leads to the expulsion of the ocular contents through the scleral incision.

Surgical factors: Intraocular irrigation with an electrolytic solution increases IOP; the variation will depend on the height of the perfusion column. During phacoemulsion, the average IOP is 30 mmHg. During posterior segment surgery, manipulations of the eyeball induce

significant increases in IOP. In the postoperative period, the remnants of viscoelastic substances that remain in the anterior chamber due to trabecular blockage or the presence of expansive gases in the vitreous body are factors that can increase IOP.

Anesthetic factors: Anesthesia can influence IOP directly (anesthetic drugs) or indirectly (intubation, ventilation). In patients with normal or elevated IOP, all intravenous and inhalation anesthetics reduce IOP, with the exception of ketamine. The IOP falls on average between 20 and 30%, that is, from 3 to 6 mmHg. This reduction in IOP is due to a direct effect (decreased secretion or an increase in choroidal blood volume) due to an indirect effect through factors as varied as the tone of the extrinsic muscles, sympathetic tone and vascomotility, pressure central venous, anesthetic sleep and the influence of the central nervous system on IOP. With most anesthetics, indirect effects predominate. The pressure reduction mechanisms may vary slightly depending on the drugs used. Halothane reduces choroidal blood flow and propofol decreases the production of aqueous humor. The decrease in IOP also depends on the depth of anesthesia. Ketamine increases IOP. However, this increase is moderate and the pressure returns to normal before beginning surgery. Ketamine is only indicated for anesthesia in children who have to undergo an ophthalmic examination.

Opiates do not slightly modify or reduce IOP. Non-depolarizing muscle relaxants reduce IOP. Succinylcholine increases IOP (about 8 mmHg on average); This increase lasts between 5 and 10 minutes. Antagonization of curares does not modify IOP. Laryngoscopy and tracheal intubation increase IOP for several minutes. This increase is less when using a laryngeal mask. IOP increases in the Trendelenburg position and decreases in the prone position. Injection of the local anesthetic during a retrobulbar block increases the IOP, which can reach values greater than 40 mmHg. The pressure normalizes after several minutes due to the diffusion of the local anesthetic. Ocular compression favors this diffusion. In the postoperative period, transient increases in IOP (which can lead to 40 mmHg) are observed during coughing, nausea, and vomiting. These variations have no detrimental effect on the intact eye, as they are muffled by changes in the volume of the aqueous humor.

Oculocardiac reflex (ROC)

Nerve pathways: peripheral mechanical and intra-orbital stretching receptors, afferent fibers that through the short and long ciliary nerves, the ciliary ganglion, the ophthalmic branch of the trigeminal nerve and the Gasserian ganglion and ending in the trigeminal sensory nucleus. From here, the internuclear fibers of the crosslinked substance project over the motor nucleus of the vagus nerve and reach muscarinic receptors of peripheral organs such as the heart. ROC is more frequent during strabismus surgery and vitreoretinal surgery.

Factors favoring the ROC:

1. Stimulation of intraorbital structures:
    - Contact of the eye with a cold liquid.
    - Traction of extrinsic eye muscles.
    - Manipulation of the eyeball.
    - Dissection of intraorbital structures.
2. Ocular hypertonia:
    - Peroperative: Irrigation, intravitreal injection of gas.
    - Postoperative: Viscoelastic in the anterior chamber, intravitreal gases.

3. Intraorbital hypertonia:
    - Retrobulbar or peribulbar injection.
    - Intraorbital hematoma.
4. General factors:
    - Patient: Childhood, anxiety, hypercapnia, treatment with beta-blockers (general route, eye drops).
    - Anesthesia: Superficial anesthesia, bradycardiating drugs (opioids, vecuronium, propofol).

Choosing the anesthetic technique

General

Like all procedures performed in the operating room, it is necessary to respect the rules of asepsis. Mydriasis is required for most interventions; If at the moment the patient enters the operating room, pupillary dilation is insufficient, he should be given mydriatic eye drops again. The position of the patient and the anesthesia material will depend on the type of intervention. It is necessary to keep the head with the neck in a neutral position. In the case of local anesthesia, oxygen therapy is recommended, using a nasal tube, mask, or, more frequently, by supplying a free flow of oxygen.

Upon arrival of the patient in the operating room, a peripheral venous line should be canalized, monitor ECG, TANI, pulse oximetry and, if possible, with a capnography connection.

General anesthesia

Drugs have less influence on perioperative IP variations than ventilatory maneuvers such as orotracheal intubation (I.O.T.), cough, and the possibility of nausea and vomiting upon awakening.

Considerations:

In patients treated with diuretics and beta-blockers propofol can induce significant hypotension.

- Etomidate is an alternative in patients with heart failure.
- Succinylcholine produces an increase in IOP, lasts a few minutes, and usually does not exceed 5 - 15 mmHg. Non-depolarizing intermediate-acting muscle relaxants, vecuronium, atracurium, rocuronium and mivacurium are indicated.
- Maintenance of anesthesia: intravenous or inhalation.
- Airway control: I.O.T., the laryngeal mask can also be used, contraindicated in obese and COPD and in other patients with high insufflation pressures.

Locoregional anesthesia

It is performed using the retrobulbar or peribulbar technique. Retrobulbar block consists of injecting 3 - 4 ml. of anesthetic solution inside the muscular cone of the rectus. Peribulbar block 6 - 8 ml outside the cone. Since the distance between the inferior temporal orbital rim of the optic duct is between 42 and 54 mm, needles of more than 35 mm should not be used to avoid puncturing the optic nerve.

In the retrobulbar technique, a single injection is administered in the lower temporal zone. The needle is inserted through the lower eyelid, through the outer third of the upper edge of the lower orbital rim, it must be made perpendicular to the skin and once the eyeball is passed, it is directed upwards and inwards at an angle of 45º, approaching the optical axis behind the posterior pole of the eye, to a depth of 30 mm. Induces a conduction block in the ciliary ganglion, ophthalmic nerve, and cranial nerves II, III, and IV. Blockage of the IV cranial nerve is usually slightly delayed. After injection, mechanical compression should be performed for about ten minutes.

Two injections are performed in peribulbar anesthesia. The inferior puncture is performed in the temporal region, in the external third of the upper edge of the inferior orbital rim, in a neutral position keeping the direction to the equator of the eyeball, here it deviates upwards 20 or 30º and slightly inwards up to 25 - 30 mm. The patient will now look left and right making sure that the needle is not inside a muscle or in the sclera. 4 - 5 ml of slow anesthetic are injected avoiding pain due to increased intra-orbital pressure. The superior puncture is made in the nasal region superior to that of the supraorbital notch in the palpebral folds, forming an angle of 30º with the horizontal plane and advancing towards the frontal bone so as not to contact the sclera. Passing the equator of the balloon, advance perpendicular to the frontal plane at a depth of 25 - 30 mm. 4 - 5 ml are injected. of anesthetic. The volume and compliance of the orbit have interpersonal variations, so greater amounts of local anesthetic may be required.

Complications of retrobulbar and peribulbar anesthesia:

They can compromise the vision of the eye and in cases the life of the patient. They are more frequent during retrobulbar anesthesia:

- Central neurological complications.
- Penetration and perforation of the eyeball.
- Vascular complications:
    - Retrobulbar hemorrhage due to arterial or venous injury.
    - Occlusion of the central artery of the retina.
    - Occlusion of the central vein of the retina.
- Intravascular injection.
- Trauma to the optic nerve.
- Purtscher's retinopathy.
- Other complications: oculocardiac reflex, palpebral hematoma, conjunctival hematoma.

The subdural or subarachnoid space of the optic nerve can be punctured and the anesthetic can diffuse into the optic chiasm and the brainstem, causing the following signs and symptoms:

Neurological signs

- Alterations in consciousness, coma.
- Shaking chills.
- Seizures
- Anesthesia of the contralateral eye (nerves II, III, IV, VI) with amaurosis, mydriasis and ophthalmoplegia.
- Involvement of other cranial nerves, dysphagia (IX), hearing disorders (VIII), facial anesthesia (maxillary and mandibular nerves).

Respiratory signs:

- Irregular breathing.
- Hypoventilation.
- Apnea.
- Acute Pulmonary Edema.

Cardiovascular signs:

- Tachycardia.
- Bradycardia.
- Heart rhythm disturbances.
- Arterial hypertension.
- Arterial hypotension
- Heart attack.

Eyeball piercing:

- Its diagnosis is early based on excessive pain or resistance to injection, it can also be diagnosed in the postoperative period.

There are factors that increase the risk of perforation:

- Increased axial length of the eyeball (intense myopia).
- Staphyloma.
- Previous surgery (cerclage).
- Left eye if the anesthesiologist is left-handed.

- Transconjunctival puncture.
- Multiple punctures.
- Superonasal puncture.
- Needle of more than 30 mm in length.

Retrobulbar hemorrhage, an injury to an orbital vessel is due. They occur more frequently with the retrobulbar technique. Be aware of this complication in diabetic patients, under treatment with anticoagulants, antiplatelet agents and a vascular history. It produces live pain, exophthalmia, eyelid edema, subconjunctival hemorrhage, and sometimes amaurosis. It can cause compression of the optic nerve, thrombosis of the artery or central vein of the retina, and permanent loss of vision in the affected eye.

With regard to injuries to the extrinsic muscles of the eye, they have been related to a toxic effect of local anesthetics on their muscle fibers.

Other techniques

The subconjunctival, subtenonial, topical anesthesia, and intracameral anesthesia. The first two allow surgery of the anterior chamber.

Topical anesthesia allows phacoemulsion cataract surgery and some minor interventions on the conjunctiva and cornea. Topical anesthesia can be enhanced with intracamera. Once the corneal incision is made, a small volume of anesthetic can be injected through it.

Choice of local anesthetics

Local anesthetics such as amide, Lidocaine, Mepivacaine, and Bupivacaine are frequently used. Lidocaine 2% and Bupivacaine 0.5% are usually mixed in equal parts, causing rapid induction and motor block due to Lidocaine and sensory block and prolongation of effect due to Bupivacaine. This mixture guarantees 90 minutes of surgical analgesia, and a postoperative analgesia for 3 or 4 hours. In addition, the establishment and quality of the block can be improved by using local anesthetic solutions with 1/200,000 adrenaline, alkalinization of the anesthetics (the pH should not exceed 7, so that the anesthetic does not precipitate), and with hyaluronidase and clonidine.

Follow-up in the postoperative period

During an ophthalmology intervention, complications due to the patient's history are rare, and are generally not seen in the recovery room. Locoregional anesthesia rarely produces cardiovascular morbidity.

Postoperative nausea and vomiting are 15 - 30% after the interventions during which the eyeball is manipulated, as in the surgery for retinal detachment and strabismus; less after cataract surgery.

After general anesthesia, the patient should be extubated in the operating room or recovery room. The effect of curares can be antagonized if required; anticholinesterase drugs do not modify intraocular pressure. Oxygen therapy (preferably using a nasal tube or mask to avoid rubbing with the eye bandage) is generally short-lived and based on SpO_2. Ophthalmic surgery does not alter respiratory function; Regardless of the anesthetic technique, postoperative hypoxemia is rare. Cardiovascular (hypertensive crisis, myocardial ischemia, left ventricular failure, stroke), respiratory (asthmatic), and neurological (postoperative agitation) complications are usually late, and usually manifest after the patient leaves the recovery room. Intravenous anesthesia with propofol and periocular anesthesia reduce the frequency of postoperative nausea and vomiting. Treatment can be carried out with metoclopramide, droperidol (antidopaminergic effect) and ondansetron (anti-5HT3).

Postoperative analgesia is achieved with non-steroidal anti-inflammatory drugs (NSAIDs) intravenously for the first dose and then go on to the oral route. Monitoring and/or treating postoperative ocular hypertonia also collaborates in analgesic treatment [2-20].

Conclusion

With the advent of new technology applied to ophthalmology, new surgical procedures and the increasingly used topical anesthesia, anesthesiologists have adapted our techniques to modern times, since we are largely responsible for the visual prognosis of our patients.

Bibliography

1. Klein KS., *et al.* "Anesthetic and airway management during laser treatment for retinopathy of prematurity: a survey of US ophthalmologists and neonatologists". *Journal of AAPOS* 17.2 (2013): 221-222.

2. Shirono Y., *et al.* "Intraoperative intraocular pressure changes during robot-assisted radical prostatectomy: associations with perioperative and clinicopathological factors". *BMC Urology* 20.1 (2020): 26.

3. Han J., *et al.* "Anesthesia for Intravitreal Injection: A Systematic Review". *Clinical Ophthalmology* 14 (2020): 543-550.

4. Jain A., *et al.* "Oculocardiac reflex in an anophthalmic eye". *Indian Journal of Anaesthesia* 64.2 (2020): 163-165.

5. Lerch D., *et al.* "Outcomes and Adverse Events of Sub-Tenon's Anesthesia with the Use of a Flexible Cannula in 35,850 Refractive Lens Exchange / Cataract Procedures". *Clinical Ophthalmology* 14 (2020): 307-315.

6. Ono T., *et al.* "Effect of Metabolic Syndrome on Blood Pressure Changes During Cataract Surgery". *The Asia-Pacific Journal of Ophthalmology* 9.1 (2020): 14-19.

7. Javaid FZ and Cochrane T. "Retrobulbar haemorrhage following routine sub-Tenon's anaesthetic in a non-anticoagulated patient". *BMJ Case Reports* 13.1 (2020): e231258.

8. Chua AW., *et al.* "Review of anaesthetic management for cataract surgery in transplant recipients". *Anaesthesia and Intensive Care* 48.1 (2020): 25-35.

9. Fabian ID., *et al.* "Number, frequency and time interval of examinations under anesthesia in bilateral retinoblastoma". *Graefe's Archive for Clinical and Experimental Ophthalmology* 258.4 (2020): 879-886.

10. Malik R., *et al.* "Contemporary management of refractory pediatric glaucoma". *Current Opinion in Ophthalmology* 31.2 (2020): 123-131.

11. Hirooka K., *et al.* "Retinal Nerve Fiber Layer Thickness Progression after Robotic-Assisted Laparoscopic Radical Prostatectomy in Glaucoma Patients". *Journal of Ophthalmologya* (2019): 6576140.

12. Pham C and Setabutr P. "Loss of Pacer Spikes as electrocardiographic (EKG) Artifact Due to Microdebrider Use During Endoscopic Dacryocystorhinostomy". *Ophthalmic Plastic and Reconstructive Surgery* 36.2 (2020): e50-e51.

13. Ye H., *et al.* "Ocular findings and strabismus surgery outcomes in Chinese children with Angelman syndrome: Three case reports". *Medicine* 98.51 (2019): e18077.

14. Lemaître S and González-Candial M. "Evaluation of anxiety and pain in eyelid surgery patients: a pilot study". *The Canadian Journal of Ophthalmology* 54.6 (2019): 723-726.

15. Arnold RW and Bond AN. "Does Topical Proparacaine Improve Postoperative Comfort After Strabismus Surgery?" *Clinical Ophthalmology* 13 (2019): 2279-2283.

16. Donnenfeld ED and Shojaei RD. "Effect Of Intracameral Phenylephrine And Ketorolac 1.0% / 0.3% On Intraoperative Pain And Opioid Use During Cataract Surgery". *Clinical Ophthalmology* 13 (2019): 2143-2150.

17. Andonegui J., *et al.* "Randomized controlled trial on vitreoretinal surgery with and without oral anticoagulants: surgical complications, visual results and perioperative thromboembolic events". *Trials* 20.1 (2019): 677.

18. Li T., *et al.* "Patient-reported outcomes measures and patient preferences for minimally invasive glaucoma surgical devices". *Eye* 34.1 (2020): 205-210.

19. Rickmann A., *et al.* "Analysis of different types of anesthesia in descemet membrane endothelial keratoplasty". *International Ophthalmology* 40.3 (2020): 541-545.

20. Miwa Y., *et al.* "Effect of midazolam, medetomidine, and butorphanol tartrate combination anesthetic on electroretinograms of mice". *Molecular Vision* 25 (2019): 645-653.

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