REPUBLIC OF AZERBAIJAN

On the rights of the manuscript

ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

PREVENTION OF COMPLICATIONS RELATED TO THE DEVELOPMENT OF OKULOVISSERAL REFLEKS DURING VITREORETINAL SURGERY

Specialty: 3231.01 – Anesthesiology and reanimatology

Field of science: Medicine

Applicant: **Farhan Tagi Hagverdiyev**

Baku – 2024

The work was performed in the "Anesthesiology, Reanimatology and Intensive Care" department of the National Ophthalmology Center named after academician Zarifa Aliyeva.

Scientific supervisors: Honoured Scientist, doctor of Medical Science, professor
Kamil Nizam Hajimuradov

Official opponents: doctor of Medical Science, professor
Isbandiyar Salimkhan Ismayilov

doctor of Medical Science,
Vagif Samad Rahimov

Candidate of medical sciences,
Parviz Mammad Mammadov

Dissertation council FD 1.12, of Supreme Attestation Commission under the President of the Republic of Azerbaijan operating at the Scientific Center of Surgery named after academician M.A.Topchubashov PLE.

Chairman of the Dissertation council:
doctor of medical sciences, professor
Rauf Magsud Aghayev

Scientific secretary of the Dissertation council:
doctor of medical sciences
Ilham Lazim Kazimov

Chairman of the scientific seminar:
doctor of medical sciences, professor
Fuad Jalil Hasanov

GENERAL CHARACTERİSTİCS OF SCİENTİFİC WORK

Relevance of the topic and the degree of its scientific elaboration. Vitreoretinal surgery is one of the longest and most traumatic operations in surgical ophthalmology[1]. Vitreoretinal operations are performed in the posterior segment of the eye. Currently, retinal detachment is one of the leading causes of disability and blindness. 70% of those suffering from this pathology are able-bodied people[2]. During the last 10-15 years, medical institutions have been equipped with qualitatively new equipment necessary for vitreoretinal operations, and there are ample opportunities to improve surgery in this area[3]. This, in turn, makes it necessary to apply adequate and safe anesthetic methods during vitreoretinal operation and in the immediate postoperative period without complications[4].

The anatomical and physiological characteristics of patients and the requirements of vitreoretinal surgery (prevention of eye reflexes, fixed position of the head, reduction of intraocular pressure, preventive measures against nausea and vomiting syndrome) require a different approach from the anesthesiologist in choosing the optimal method of anesthesia[5]. The purpose of surgical intervention in the posterior segment of the eye are: various complications of diabetic retinopathy (vitreous hemorrage, tractional retinal detachment), trauma to the posterior segment of the eyeball, lens dislocation, intraocular foreign bodies[6], complications of surgery in the anterior segment of the eye (endophthalmitis, vitreous dislocation of the

---

[1] Тахчиди Х.П, Сахнова С.Н., Мясникова В.В., Галенко-Ярошевский. П.А. Анестезия в офтальмологии. Москва. МИА. 2007. 552 с.

[2] Глинчук Н.Я. Тактика ведения больных с силиконовой тампонадой при тяжелых формах отслойки сетчатки / Дисс. кан. мед. наук. – М., – 2006, – 149 с.

[3] Mohamed S., Claes C., Tsang C.W. Review of small gauge vitrectomy: progress and innovations // J. Ophthalmol., – 2017; https: //doi.org/10.1155/2017/6285869.

[4] Коробова Л.С., Лазарев В.В. Анестезия при офтальмологических операциях у детей (обзор) // General Reanimatology, – 2018, 14, – с. 6.

[5] Белецкий А.В., Саенко С.А., Авдеев А.В. Использование пропофола как компонента анестезии в офтальмологической практике. Медицина неотложных состояний. №1 (64) 2015. с. 87-90.

[6] Klinikanı təqdim edirik. Akademik Z.Əliyeva adına Milli Oftalmologiya Mərkəzinin Şəkərli diabetin göz fəsadları və vitreoretinal cərrahiyyə şöbəsi. // Oftalmologiya. – 2011/1 (5), – s. 98-99.

intraocular lens)[7]. Eye injuries are more common among young people, and 17-41% of these injuries are the presence of foreign bodies inside the eye[8]. In the past, foreign bodies inside the eye were removed by a special external magnetic device, but now the use of vitrectomy under general and combined anesthesia is the main method[9].

An analysis of the literature on the problem shows that although research has been conducted on the prevention of oculocardial (OCR) and oculogastral (OGR) reflexes during strabismus correction surgery[10], a number of questions regarding the prevention of these reflexes during vitreoretinal surgery remain unclear. For example, how different anesthesia methods used in patients undergoing vitreoretinal surgery affect endocrine-metabolic sensitivity, in particular, plasma levels of epinephrine (metanephrine and normetanephrine), cortisol and glucose, which anesthesia method is more effective and prevents okulovisceral reflexes. The development of an anesthesia scheme has not been fully explored.

According to national and foreign authors, various combinations of accepted methods of general anesthesia using narcotic analgesics, neuroleptics and other neurotropic drugs (hypnotics, ataractics) can not completely prevent the response of the pituitary-adrenal system to surgical stress[11]. Therefore, some authors recommend using general anesthesia in various combinations with local anesthesia and regional blockades[12]. Local anesthetics prevent the

---

[7] Berrocal M.H., Acaba L.A., Acaba A. Surgery for diabetic eye complications // Current Diabetes Reports, – 2016, vol. 16, no. 10, – p. 99.

[8] Kərimov M.İ., Şamilova F.H. Gözdaxili yad cisimlərin xaric edilməsində 23 Gauge Pars Plana Vitrektomiyanın tətbiqi. // Oftalmologiya. – 2011/1 (5), – s. 23-28.

[9] Eckardt C. Transconjunctival sutureless 23-gauge vitrectomy. // Retina, – 2005 Feb-Mar. 25 (2), – p. 208-11.

[10] Bark R.H., Abdelaziz H.M. Subtenon bupivacaine injection for postoperative pain relief following pediatric strabismus surgery: a randomized controlled double blind trial. // Middle East J. Anaesthesiol. – 2015. Feb; 23 (1), – p. 91-99.

[11] Haciyev E.S. Aorta-koronar şuntlama əməliyyatları zamanı ümumi ağrısızlaşdırmanın komponenti kimi torakal epidural anesteziyanın tətbiqi. / Tibb elmləri namizədi alimlik dərəcəsi almaq üçün təqdim olunmuş dissertasiyanın avtoreferatı. – Bakı, 2008. – 19 s.

[12] Горобец Е.С. Концепция мультимодальной комбинированной анестезии и безопасность травмвтичных операций. // Регионарная анестезия и лечение острой боли, – 2009. Том III. №1, – с. 39-45.

pain impulse from passing through nociceptor axons to the central nervous system[13]. One of the main requirements of modern anesthesiology is multimodal protection of the patient from surgical trauma[14]. The use of multimodal anesthesia involves the application of nociceptive block at all levels of afferent sensory innervation - from local pain receptors, ganglia, pathways of the central nervous system to receptors of the central nervous system.[15].

Thus, since the use of multimodal anesthesia for the prevention of oculovisceral reflexes during vitreoretinal operations is a new and not fully studied field, we have dedicated the current research work to this topic.

Object and subject of research. 271 patients involved in the study, the object of the study are different vitreoretinal surgeries performed on patients and using different methods of general anesthesia were the subject of the study.

Purpose of research. The purpose of the work is to select the optimal anesthesia method as a result of the comparative analysis of various anesthesia methods during vitreoretinal operations and to develop ways of effective prevention of complications related to oculovisceral reflexes.

Objectives of research:

1. Comparative study of the frequency of complications associated with oculocardial and oculogastric reflexes during vitreoretinal operations using general endotracheal anesthesia (GEA).
2. Comparative study of the frequency of complications asso-

---

[13] Hüseynov H.F. Cərrahi aqressiyanın təsiri altında zülal-energetik mübadilədə baş verən katabolik pozğunluqların patogenezi və tənzimlənməsi prinsipləri. Tibb üzrə fəlsəfə doktoru alimlik dərəcəsi almaq üçün təqdim edilən dissertasiyanın avtoreferatı. Bakı 2012. s.164.

[14] Китиашвили И.З. Влияние различных методов анестезии на эндокринно-метаболическое звено хирургического стресс-ответа при гистерэктомии. / И.З.Китиашвили, А.С.Власов, Л.Л.Парфенов [и др.] // Регионарная анестезия и лечение острой боли, – 2010. Том IV. № 3, – с. 18-26.

[15] Ершов Е.Н. Сравнительная оценка общей и сочетанной анестезии при некоторых оперативных вмешательствах. / Е.Н.Ершов, Ю.С.Полушин, А.Д.Халиков [и др.] // Вестник анестезиологии и реаниматологии. – 2011. Т. 8, №4. – с. 37-44.

ciated with oculocardial and oculogastric reflexes during vitreoretinal operations using multimodal endotracheal-subtenon anesthesia (MESA) method.

3. Comparative study of the frequency of complications associated with oculocardiac and oculogastric reflexes during vitreoretinal operations using the multimodal endotracheal-subtenon-application anesthesia (MESAA) method.

4. Choosing the optimal anesthesia method based on the comparative study of the levels of epinephrine, cortisol, and glucose in the blood plasma using different anesthesia methods during vitreoretinal operations.

5. Choosing the optimal anesthesia method based on a comparative study of the occurrence frequencies of oculocardial and oculogastric reflexes during vitreoretinal operations performed using different anesthesia methods.

Methods of research.

1. Determination of epinephrine concentration in blood plasma;
2. Determination of cortisol concentration in blood plasma;
3. Determination of glucose in venous blood;
4. Study of the frequency, clinical manifestations and complications of the OCR;
5. Study of the frequency, clinical manifestations and complications of the OGR;
6. Statistical processing of the obtained results.

Main provisions to be defended:

–The use of general endotracheal anesthesia during vitreoretinal operations is observed with the development of oculocardial and oculogastric reflexes at a high rate.

–When performing vitreoretinal operations, the multimodal endotracheal-subtenon anesthesia method is observed with the development of oculocardial and oculogastric reflexes at a lower rate compared to general endotracheal anesthesia, and its use is appropriate.

When performing vitreoretinal operations, multimodal endotracheal-subtenon application of anesthesia is considered more effective than other methods – multimodal endotracheal-subtenon, and especially general endotracheal anesthesia, with a lower rate of

oculocardial and with a lower percentage the development of the oculogastric reflex, with high reliability, which proves that this method is more effective.

When performing vitreoretinal operations, the use of multimodal endotracheal-subtenon and multimodal endotracheal-subtenon-application anesthesia methods reduces the injection of repeated doses of narcotic analgesics during the intraoperative period compared to general endotracheal anesthesia.

Scientific novelty of research. Using the general endotracheal anesthesia (GEA) method, the occurrence frequencies of oculocardial and oculogastric reflexes in the perioperative period during vitreoretinal operations, their clinical manifestations, and the levels of epinephrines (normetanephrines and metanephrines), cortisol, and glucose in the blood plasma were studied in a complex way in dynamics.

Using the multimodal endotracheal-subtenon anesthesia (MESA) method the occurrence frequency of oculocardial and oculogastric reflexes clinical manifestations and levels of epinephrine, cortisol and glucose in the blood plasma were studied during vitreoretinal operations.

For the first time, using the multimodal endotracheal-subtenon-application anesthesia (MESAA) method, the occurrence frequencies of the oculovisceral reflexes in the perioperative period, clinical manifestations, and the levels of epinephrine, cortisol, and glucose in the blood plasma were studied dynamically during vitreoretinal operations. It is scientifically proven that this anesthesia method is more optimal anesthesia method compared to UEA and MESA (patent No. 2733165 Rus. Fed. 2019, certificate of rationalization of the proposal issued by the Azerbaijan State Advanced Training Institute for Doctors named after A.Aliyev No. 1, 2018).

The doses of narcotic analgesics used during the application of GEA, MESA and MESAA methods in vitreoretinal operations were comparatively studied.

Theoretical and practical significance of research.

A different approach to choosing the optimal anesthesia method during vitreoretinal operations is presented. During vitreoretinal operations, new methodical recommendations were given for intraoperative

and postoperative analgesia and prevention of oculovisceral reflexes.

Application of research results: The results of the dissertation were applied in the "Anesthesiology, Reanimatology and Intensive Care" department of the National Ophthalmology Center named after academician Z.Aliyeva.

Approbation and implementation. The main results of the research were presented at an international conference: Theses V All-Ukrainian scien. conf. stud. and young scientists in phys. with international participation (Kharkov, 2018) – "Фізіологія – медицині, фармації та педагогіці. Актуальні проблеми та сучаснідосягнения"; At the scientific conference dedicated to the 80th anniversary of the birth of the honored scientist, professor Abbas Ahmed Akhundbeyli (Baku, 2018); At the conference "Today and the Future of Ophthalmology" dedicated to the 10th anniversary of the National Ophthalmology Center named after academician Z.Aliyeva (Baku, 2019); It was reported at the scientific-practical conference dedicated to the birthday of A.Aliyev at the Azerbaijan State Advanced Training Institute for Doctors named after A.Aliyev (Baku, 2019).

The initial discussion of the dissertation was held at a joint meeting of the staff of the Department of "Eye diseases", "Anesthesiology and Reanimatology" of the Azerbaijan State Advanced Training Institute for Doctors named after Aziz Aliyev and the National Ophthalmology Center named after academician Zarifa Aliyeva (Protocol No. 9, 30.06.2021).

The approval of the dissertation was reported and discussed at the scientific seminar of the FD 1.12 Dissertation council operating under the Scientific Center of Surgery named after academician M.A.Topchubashov PLE (02.03.2024; protocol No. 2).

The results of the dissertation were published in 7 local scientific-practical journals (7 articles, 3 theses) and foreign journals (2 articles, 1 thesis) and presented at scientific conferences (local and foreign) which are on the relevant list of the Supreme Attestation Commission. In 2018, certificate of rationalization of the proposal issued by the Azerbaijan State Advanced Training Institute for Doctors named after A.Aliyev (No. 1), and in 2019, the patent of the

Russian Federation (No. 2733165) was issued.

Scientific results and practical recommendations of the dissertation are applied in the daily clinical activities of the department of "Anesthesiology-Reanimatology and Intensive Care" of the National Ophthalmology Center named after academician Zarifa Aliyeva of the Ministry of Health of the Republic of Azerbaijan.

The organization where the dissertation work is carried out. National Ophthalmology Center named after academician Z.Aliyeva.

Structure and volume of work. The dissertation is written on 142 pages of computer text, consisting of 5 chapters: literature review, material and examination methods, personal research results, conclusion, conclusions and practical recommendations.

MATERIAL AND METHODS OF RESEARCH

The study involved 271 patients who underwent vitreoretinal surgery in the "Anesthesiology, Reanimatology and Intensive Care" department of the National Ophthalmology Center named after academician Zarifa Aliyeva from 2014 to 2019. Among patients, 153 (56,5%) were male and 118 (43,5%) were female, and their mean age was 37,8 ± 0,6 (21-58).

The patients involved in the study were divided into 3 groups depending on the method of anesthesia: Group I – general endotracheal anesthesia (GEA) – 106 (39,11%) patients; Group II – multimodal endotracheal-subtenon anesthesia (MESA) – 89 (32,84%) patients; Group III – multimodal endotracheal-subtenon-application anesthesia (MESAA) – 76 (28,04%) patients.

Among the patients involved in the study, the following concomitant diseases were noted (table 1).

Among of the 19 patients who underwent surgery, 39 repeated vitreoretinal operations were performed in the operated eye or in the other eye using different methods of anesthesia. The reasons for these operations include: complications of the performed operation, concomitant diseases, various pathologies in the other eye. In total,

291 different vitreoretinal operations were performed on 271 patients using different methods of general anesthesia (table 2).

Table 1

Frequency of concomitant pathologies among patients

Concomitant diseases	Abs.	%
Diabetes (I and II type)	98	36,2
Diseases of the cardiovascular system	65	24,0
Infectious diseases	35	12,9
Chronic kidney diseases	22	8,1
Chronic obstructive pulmonary diseases	16	5,9
Allergy	18	6,6
Chronic disorders of blood circulation of the brain	14	5,2
Rheumatism	13	4,8
Diseases of the gastrointestinal system	8	3,0

Table 2

Types of vitreoretinal operations performed on patients

Types of vitreoretinal operations	Abs.
Pars plana vitrectomy	205
Pars plana vitrectomy+Scleral Buckling	27
Scleral Buckling	20
Phaco+İOL+İLM pilling+EL+qas tamponade	1
Revision+EL+Crio+qas tamponade	1
Pneumatic retinopecsy	1
Phaco+İOL+ foreign body removal	12
Retinoectomy+EL+silicon oil injection+Scleral Buckling removal	1
Silicon oil replacement+revision	1
Silicon oil (removal, injection, replacement)+EL+gas tamponade	14
CE+SOR+revision+air	1
Phaco+İOL+SOR+ERM+ILM pilling+retinotomia+EL+silicon oil injection	1
Phaco+ İOL+SOR (injection)	5
Retinal revision+retinotomy+EL+silicon oil injection	1
Total	291

Notice: Phaco – facoemulsifikation, EL – endolaser, ERM – epiretinal membran, İOL – intraocular lens, ILM pilling – internal limiting membrane pilling, CE – cataract extraction, SOR – silicon out removal.

In the perioperative period among the patients, were noted various complications and their condition stabilized after assistance was provided: hypotension – 23, hypertension – 22, cases where intubation is not obtained (Mallampati IV degree and other reasons) and, as a result, ventilation is continued with a laryngeal mask – 3, bronchospasm – 4, delayed respiratory depression – 2.

During admission to the clinic, all patients were examined according to the standard scheme. This includes: general blood analysis; biochemical analysis of blood; coagulogram; determination of blood group and rhesus factor, determination Wasserman's reaction and HİV, determination of markers of hepatitis viruses, electrocardiogram, chest x-ray, consultations of cardiologist, endocrinologist, anesthesiologist and other specialists.

Phenazepam tablets (per os) were prescribed in an appropriate dose before going to bed for the purpose of reducing stress and insomnia 1 day before the operation. 30 minutes before surgery intramuscular premedication consisting of antihistamine drugs (dimedrol 10 mg), benzodiazepines (midazolam 0,1 mg/kg), promedol at a dose of 1,5 mg/kg was prescribed, after which the patients were taken to the operating room. Premedication was performed in the same way in all groups.

Induction of general endotracheal anesthesia was performed in I group (GEA) patients: 2,5 mg/kg propofol, 2 mcg/kg fentanyl, piperkuronium bromid at a dose of 0,05 mg/kg or 0,5 mg/kg rokuronium bromid intravenously. Intubated with a suitable intubation tube, the patients were switched to "continuous mandatory ventilation" (CMV). The intraoperative period was continued with injection of propofol at a dose of 10 mg/ kg/h, fentanyl at a dose of 1,5 mcg/kg/h, piperkuronium bromid at a dose of 0,02 mg/kg or rokuronium bromid at a dose of 0,15 mg/kg. After the operation, extubation was performed against the background of recovery of muscle tone, pharyngeal-laryngeal reflex, clear consciousness, adequate spontaneous breathing.

In group II patients, induction of multimodal endotracheal-subtenon anesthesia (MESA) and intraoperative period were carried out in the same manner as in group I. In contrast to group I, in group

II, the surgeon performed a type of regional anesthesia – subtenon anesthesia – under endotracheal anesthesia before the operation. The technique of subtenon anesthesia is that, according to the surgeon's choice, the conjunctiva is cut 10-13 mm from the limbus and the tenon capsule below it in one of the lower quadrants. Using a curved spatula, the tenon fascia is bluntly separated from the sclera. A blunt curved cannula that matches the shape of the eyeball is brought closer to the posterior pole of the eyeball between the sclera and Tenon's capsules 4 ml of 0,75% ropivacaine solution is injected through a syringe attached to the cannula[16] (figure 1).

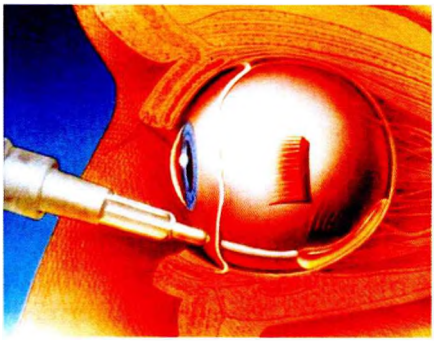

Figure 1. Subtenon anesthesia. Philip Guise. "Sub-Tenon's anesthesia: an update". Local and Regional Anesthesia 2012; 5; 35-46.

In group III patients, the induction and intraoperative period of multimodal endotracheal-subtenon-application anesthesia (MESAA) were carried out in the same manner as in group II. In addition to group III, patients underwent application anesthesia in contrast to group II. We applied this technique to muscle projection using Ropivacaine-gel. Ropivacaine-gel was obtained by mixing 0,75% ropivacaine and viscoelastic solution in equal proportions (1:1) (patent No. 2733165 Russian Federation 2019, certificate of rationalization No. 1, of the proposal issued by the Azerbaijan State Advanced Training Institute for Doctors named after Aziz Aliyev, 2018).

[16] А.М.Чухраев. Анестезия и периоперационное ведение в офтальмохирургии. 2018. с. 214.

Occurrence frequencies of OCR and OGR reflexes as a result of application of different anesthesia methods among patients in all three groups, clinical manifestation characteristics were analyzed.

Study of the frequency of oculocardiac reflex

According to the results of our study, 49 (46,2±4,84%) patients in group I (n=106) had different types of OCR. (table 3). Intraoperative OCR was reported in the form of various arrhythmias: transient sinus bradycardia, extrasystoles (more often atrial fibrillation, rarely ventricular), or acute sinus bradycardia. As a result of the analysis of OCR sinus arrhythmias in patients with acute sinus bradycardia revealed a 25-30% decrease in heart rate compared to preoperative values.

Table 3

Frequency of OCR during the use of various anesthesia methods

Groups	Total number of patients	Patients with OCR		P_I	P_{II}
		müt.	%		
I	106	49	46,2±4,84	–	–
II	89	28	31,5±4,92	<0,05	–
III	76	19	25,0±4,97	<0,01	>0,05

Note. P_I – with I group, P_{II} –is the accuracy of the difference compared to the II group

Transient bradycardia was not reported in group I. In group I the intraoperative period OCR was observed in various form of extrasystoles, acute sinus bradycardia from 49 patients in 30 (46,2%) patients to restore sinus rhythm at a dose of 0,01 mg/kg intravenous atropine, in addition to atropine in another 19 patients 0,5 mcg/kg doses of fentanyl were injected, resulting in the restoration of sinus rhythm (table 4).

In group II (n=89) in 28 patients – 31,5% OCR was observed. In group II, transient bradycardia was reported in 21 patients, in various extrasystoles and acute bradycardia in 7 patients. Of these 7 patients, 5 patients received intravenous atropine at a dose of 0,01 mg/kg for OCR, and 2 patients received fentanyl at a dose of 0,5 mcg/kg in addition to atropine (table 4). The incidence of OCR in

group II was 14,7% lower than in group I (p <0,05) (table 3).

Table 4

Drugs injected in connection with the development of OCR during the use of various methods of anesthesia

Groups	Injected drugs	
	Atropine 0,01 mg/kg	Atropine 0,01 mg/kg + Fentanyl 0,5 mcg/kg
I (n=106)	30	19
II (n=89)	5	2
III (n=76)	2	–

According to the studies conducted among patients of the III group (n=76), OCR was observed in 19 patients (25,0%). The incidence of OCR in this group was 21,2% less than group I (p<0,01) and 6,5% less than group II (p>0,05) (table 3). Transient bradycardia was reported in 17 patients in group III. Intravenous atropine was administered to 2 patients at a dose of 0,01 mg/kg to correct OCR. It should be noted that in this group there was no need for intravenous administration of narcotic analgesics (fentanyl, etc.) for the correction of OCR (table 4).

Study of the frequency of oculogastric reflex.

In the postoperative period, OGR was observed in 32 (30,2%) patients in group I. OGR was reported in the form of nausea and vomiting (single vomiting, repeated and indomitable vomiting) (table 5). In group I, 9 (8,5%) patients had nausea, 10 (9,4%) patients had nausea and single vomiting, 13 (12,3%) the patient had nausea and repeated and indomitable vomiting. Intravenous antiemetic drugs (Sol. Metoclopramid 10 mg, etc.) were administered to 10 (9,4%) patients with nausea and vomiting, and intramuscular non-steroids (Sol. Ketoprofen 100 mg, etc.) in addition to 13 (12,3%) patients with nausea and repeated and indomitable vomiting. As a result of injecting antiemetic, non-steroid drugs in appropriate doses, the clinical manifestations of OGR – nausea, single and repeated and indomitable vomiting (fig. 1) have passed.

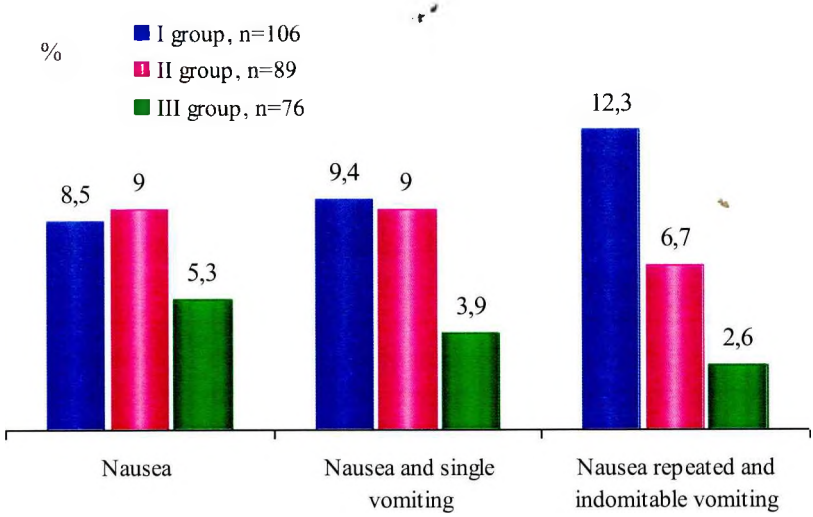

Figure 1. Manifestations of OGR depending on the method of anesthesia (%)

In the postoperative period in group II, OGR was 24,7% in 22 patients and was 5,5% lower than in group I ($p<0,05$) (table 5). In group II, nausea was observed in 8 (9,0%) patients, nausea and vomiting in 8 (9,0%) patients, nausea and repeated and indomitable vomiting in 6 (6,7%) patients (graph 1). There was no significant difference between the groups in terms of manifestations ($p>0,05$). Patients with nausea were given intravenous antiemetic drugs (Sol. Metoclopramid 10 mg, etc.), in addition to patients with nausea and persistent vomiting, intramuscular non-steroid drugs (Sol. Ketoprofen, etc.) were injected.

In the postoperative period, oculogastric reflex (OGR) was lower in group III – 11,8% (9 patients) (table 5). The incidence of OGR in group III was 18,4% less than in group I ($p<0,01$), and 12,9% less than in group II ($p<0,05$).

OGR has been reported in the form of nausea and vomiting (either once or repeated and indomitable). In this group, nausea 4 (5,3%), nausea and vomiting 3 (3,9%), nausea and repeated and indomitable vomiting 2 (2,6%) were noted in patients (fig. 1). According to the

forms of manifestation, there was no significant difference between the indicators of this group and other groups (p>0,05).

Table 5

Frequency of OGR in the use of various anesthesia methods

Groups	Patients with OGR		P_I	P_{II}
	N	%		
I (n=106)	32	30,2±4,46	–	–
II(n=89)	22	24,7±4,58	<0,05	–
III (n=76)	9	11,8±3,7	<0,01	<0,05

Note. P_I – with I group, P_{II} – is the accuracy of the difference compared to the group II.

In order to evaluate the stress-protective effectiveness of different methods of anesthesia, the level of epinephrines (metanephrines and normetanephrines), cortisol and glucose in blood plasma was determined on selected patients without concomitant diseases from each group. For this purpose, 21 (19,8%) patients from group I, 20 (22,5%) from group II, and 22 (28,9%) from group III were selected.

Endocrine-metabolic markers were determined in 3 stages of the study: stage I – one day before surgery; stage II – in the most traumatic part during the operation; stage III – 2 hours after surgery. In all three groups, the level of stress markers in the first stage was within the accepted norm.

Study of the dynamics of cortisol (norm 260,0-600,0 nq/ml).

In the II stage of the research in group I, this indicator increased from 179,7±9,2 ng/ml to 381,3±25,4 ng/ml. In the III stage, a slight decrease in the level of cortisol was noted – 282,5±17,4 ng/ml. In stage II of the study, compared to stage I, the level of cortisol increased by 201,6±21,3 ng/ml, (112,2%). In stage III, this indicator decreased by 25,9% (98,8±14,1 ng/ml) compared to stage II, and by 57,2% (102,8±12,2 ng/ml) compared to stage I.

In the II group, 172,1±11,4 ng/ml was recorded in the I stage of the research, in the II stage this indicator was 328,3±9,6 ng/ml, and in the III stage it was 260,9±10,3 ng/ml.

In the II stage of the study conducted in the II group, the level of cortisol increased by 156,2±10,8 ng/ml (90,76%) compared to the I stage. In stage III, cortisol level decreased by 20,53% (67,4±7,3ng/ml) compared to stage II, and was higher by 88,8±9,1ng/ml (51,60%) compared to stage I.

In the second stage of the study among group II patients, compared to stage I, the level of cortisol was 201,6±21,3 ng/ml (112,2%) in group I, 156,2±10,8 ng/ml (90,76%) in group II, increased by 21,4% less compared to group I, p>0,05).

In stage III of the study, compared to stage I, the level of cortisol was 102,8±12,2 ng/ml (7,24%) in group I, 88,8±9,1 ng/ml (1,60% in group II, compared to group I 5,64% less, p>0.05) increased.

In group III, the level of cortisol increased from 170,8±8,7 ng/ml to 298,7±8,5 ng/ml in stage II. In the III stage of the study, as in other groups, a slight decrease in the amount of cortisol was noted in this group – 240,0±6,7 (197-278) ng/ml.

In stage III of the study, the level of cortisol decreased by 19,65% (58,7±4,3 ng/ml) in group III compared to stage II (6,25% less than group I, 0,88% less than group II). There was no statistically significant difference between changes in groups (p>0,05).

Study of glucose dynamics (norm 4.4-6.0 mmol / l)

In the II stage of the study in the I group, this indicator increased from 5,12±0,11 mmol/l to 6,40±0,08 mmol/l, and in the III stage, a slight decrease was noted – 6,22±0,06 mmol/l.

In the II stage of the study, compared to the I stage, the level of glucose increased by 1,29±0,1 mmol/l (5,12%). In stage III, the level of glucose was 1,10±0,1 mmol/l (21,58%) higher than in stage I.

In group II, the amount of glucose was 5,20±0,10 mmol/l in the first stage of the study, 6,32±0,07 mmol/l in the second stage, and 6,19±0,07 mmol/l in the third stage.

In the II stage of the study, compared to the I stage, the amount of glucose in the I group was 1,29±0,1 mmol/l (25,12%), in the II group it was 1,12±0,1 mmol/l (21,44%, compared to the I group 3,7% less, p>0,05) increased.

In the III stage of the study, compared to the I stage, the amount of glucose in the I group was 1,1±0,1 mmol/l (21,58%), in

the II group 0,99±0,1 mmol/l (19,04%, compared to the I group 2,54% less, p>0,05) increased.

In group III, the level of glucose was 5,30±0,12 mmol/l in the I stage of the study. In the II stage, these indicators are up to 6,40±0,08 mmol/l in the I group, up to 6,32±0,07 mmol/l in the II group, from 5,30±0,12 mmol/l it increased to 6,26±0,04 mmol/l in the III group. In the III stage of the study, a slight decrease in the amount of glucose was noted in all three groups: in the I group – 6,22±0,06 mmol/l, in the II group – 6,19±0,07 mmol/l, in the III group – 6,11±0,04 mmol/l. There was no significant difference between the groups in terms of stages.

In the II stage of the study, compared to the I stage, the level of glucose was 25,1% in the I group, 21,44% in the II group, 18,18% in the III group (7,02% less compared to the I group – p<0,01; 3,26% less compared to the II group, – p<0,05) increased.

In the III stage of the study, compared to the I stage, the glucose level was 21,58% in the I group, 19,04% in the II group, 15,27% in the III group (6,32% less compared to the I group – p<0.005; 3,77% compared to the II group less – p<0,01) increased.

Study of metanephrine dynamics (norm N<120.0 ng/ml)

In the first stage of the research in the first group, the metanephrine level did not exceed the accepted norm – 78,2±6,1ng/ml. Although this indicator increased to 109,9±6,9 ng/ml in the II stage, a slight decrease was noted in the III stage – 92,9±6,5 ng/ml.

In stage II of the study, compared to stage I, the level of metanephrine increased by 40,46%. In stage II of the study, compared to stage I, the level of metanephrine increased by 40,46%. In stage III, the level of this indicator decreased by 15,48% compared to stage II, and was higher by 18,73% compared to stage I.

In group II, the level of metanephrine was 79,6±4,8 ng/ml in the first stage of the study, 105,0±6,0 ng/ml in the second stage, and 90,8±5,5 ng/ml in the third stage.

In stage II, the level of metanephrine increased to 109,9±6,9 ng/ml in group I and 105,0±6,0 ng/ml in group II. In the III stage of the study, the level of this stress marker decreased slightly in both groups: in group I – 92,9±6,5 ng/ml, in group II – 90,81±5,5 ng/ml.

In stage II of the study, compared to stage I, the level of metanephrine increased by 40,46% in group I and 31,87% in group II (8,5% less than group I, $p<0,05$).

In stage III of the study, the level of metanephrine compared to stage II decreased by 15,48% in group I and 13,50% in group II. The difference between stage II and stage I, and stage III and stage I in the changes in groups I and II was statistically significant ($p<0,05$).

In stage III of the study, compared to stage I, the level of metanephrine in group I was higher by 18,73% and in group II by 14,06% (4,67% less than group I, $p<0,05$).

In group III, the level of metanephrine in stage I of the study was 77,2±6,1 (42,9-115,2) ng/ml.

In the II stage of the study, this indicator increased to 109,86±6,9 ng/ml in group I, 104,99±6,0 ng/ml in group II, and 96,28±5,6 ng/ml in group III. In the III stage of the study, the level of metanephrine decreased slightly in all three groups: in group I – 92,88±6,5 ng/ml, in group II – 90,81±5,5 ng/ml, in group III – 83,79±5,2 ng/ml.

In the III stage of the study, the level of metanephrines was 18,73% in the I group, 14,06% in the II group, 8,52% in the III group compared to the I stage (10,21% less compared to the I group – $p<0,001$; 5,54% compared to the II group less – $p<0,005$) was higher.

Study of the dynamics of normetanephrine (norm N<200.0ng /ml).

In the I stage of the study, the normetanephrine level was 68,14±5,2 (30,6-111,1) ng/ml in the I group, 69,65±5,8 (30,3-111,5) ng/ml in the II group and in the III group it was 70.49±5.4 (39.1-106.8) ng/ml.

In the II stage of the study, compared to the I stage, the level of normetanephrine was 44,81% in the I group, 41,14% in the II group, 26,33% in the III group (18,48% less compared to the I group – $p<0,001$; 14,81% compared to the II group less – $p<0,005$) increased.

The results of the statistical analysis show that the level of normetanephrine was higher in the III stage of the study compared to the I stage: in group I – 23,04%, in group II – 21,56%, in group III –

10,51% (12,53% less than group I – p<0,001; 11,05% less than group II – p<0,001).

The study also compared changes in the quantitative indicators of stress markers between groups I, II and III.

As a result of the comparative study of the changes of the stress-marker cortisol by stages, in the II stage of the research in the I group, the level of cortisol increased by 201,6 ng/ml (112,2%) compared to the I stage. In the III stage, this indicator decreased by 25,9% compared to the II stage, and by 57,3% (102,8 ng/ml) compared to the I stage.

In the patients included in the II group, the level of cortisol in the II stage increased by 156,2 ng/ml (90,8%, 21,4% less compared to the group I, p>0,05) compared to the I stage. In stage III, the level of cortisol decreased by 20,53% compared to stage II, and was 88,8 ng/ml (51,60%) higher than stage I (table 6, fig. 2).

In group III, the level of cortisol in stage II of the study compared to stage I was 127,9 ng/ml (74,9%, that is 37,3% less than in group I – p<0,001; 15.9% less compared to the II group – p<0.005) increased.

Table 6

Comparison of changes in the level of cortisol (quantitative indicators) (ng/ml) between the stages of the study between patients of groups I, II and III

Groups	I-II stage	I-III stage
I	201,6±21,3 (76,8-371)	102,8±12,2 (39,0-231)
II	156,2±10,8 (77,0-261)	88,8±9,1(33,0-179)
III	127,9±7,4 (64,0-193)	69,2±6,6 (18,0-119)
P_{Ig-IIg}	p>0,05	p>0,05
$P_{Ig-IIIg}$	p<0,001	p<0,001
$P_{IIg-IIIg}$	p<0,005	p<0,001

Notice: P_{Ig-IIg} – statistical significance between I and II groups, $P_{Ig-IIIg}$ – I and III groups, $P_{IIg-IIIg}$ – II and III groups.

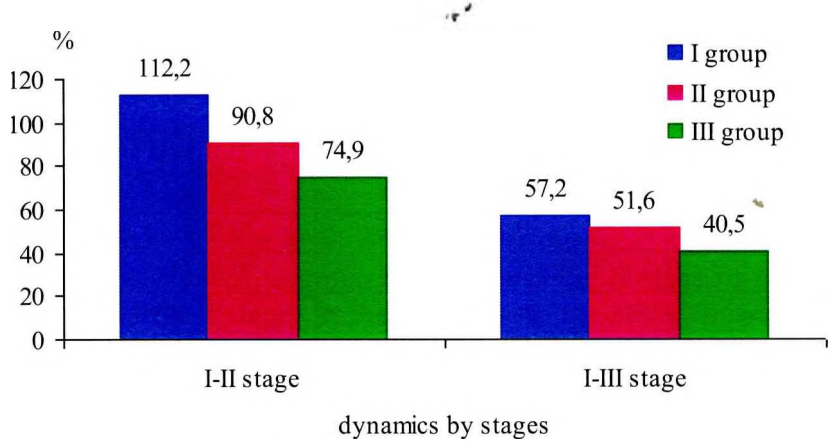

Figure 2. Dynamics of cortisol by stages (in %)

The level of cortisol was higher in the III stage of the study compared to the I stage: in the I group – 57,24%, in the II group – 51,6%, in the III group – 40,5% (16,74% less than in the I group – $p<0,001$; 11,1% less compared to the II group – $p<0,001$).

As a result of the comparative study of the changes of the stress-marker glucose by stages, the level of glucose in the I group of the II stage increased by 25,12% compared to the I stage. In stage III, the level of glucose decreased by 2,83% compared to stage II, and was higher by 21,58% compared to stage I.

In group II, the amount of glucose increased by 21,44% (3,7% less compared to group I, $p>0,05$) in the II stage of the study compared to the I stage. In stage III of the study, the amount of glucose decreased by 1,98% in group II compared to stage II ($p>0,05$), and increased by 19,04% compared to stage I (2,54% less than group I, $p>0,05$). (table 7, fig. 3).

In group III, the level of glucose in stage II of the study compared to stage I was 18,18% (7,02% less than in group I – $p<0,01$; 3,26% less compared to the II group – $p<0,05$) increased. In the III stage of the study, the level of glucose decreased by 2,47% in the III group compared to the II stage. There was no statistically significant difference between changes in groups ($p>0,05$).

Table 7

Comparison of changes in the amount of glucose (quantitative indicators) (mmol/l) between the stages of the study between patients of groups I, II and III

Groups	I-II stage	I-III stage
I	1,29±0,1 (0,3-2,2)	1,10±0,1 (0,2-2,1)
II	1,12±0,1 (0,2-2,0)	0,99±0,1 (0,1-1,9)
III	0,96±0,1 (0,1-1,8)	0,81±0,1 (0,0-1,6)
P_{Ig-IIg}	p>0,05	p>0,05
$P_{Ig-IIIg}$	p<0,01	p<0,005
$P_{IIg-IIIg}$	p<0,05	p<0,01

Notice: P_{Ig-IIg} – I and II group, $P_{Ig-IIIg}$ – I and III group, $P_{IIg-IIIg}$ – statistical significance between group II and III.

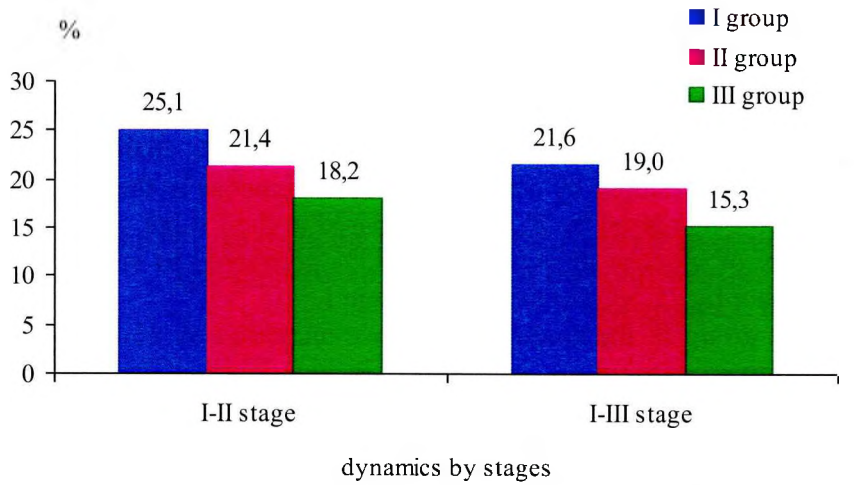

Figure 3. Dynamics of glucose by stages (in %)

In the III stage of the study, compared to the I stage, the level of glucose was 21,58% in the I group, 19,04% in the II group, 15,27% in the III group (6,32% less compared to the I group – p<0,005; 3,77% compared to the II group less – p<0,01) increased.

As a result of the comparative study of the changes of the stress-marker metanephrine by stages, the level of metanephrine increased by 40,46% in the II stage of the research in the I group compared to the I stage. In stage III, the level of this indicator decreased by 15,48% compared to stage II, and was higher by 18,73% compared to stage I.

In group II, the level of metanephrine increased by 31,87% (8,5% less compared to group I, $p<0,05$) in the II stage of the study compared to the I stage. In the III stage of the study, this indicator decreased by 13,50% in the II group compared to the II stage; It was 14,06% higher than the first stage (4,67% less than the first stage, $p<0,05$).

In group III, the level of metanephrine decreased by 24,71% (15,64% less compared to group I – $p<0,001$; 7,17% less than group II – $p<0,05$) in the II stage of the study compared to the I stage. In the III stage of the study, compared to the I stage, the level of metanephrines in the I group – 18,73%, in the II group – 14,06%, in the III group – 8,52% (10,21% less compared to the I group – $p<0,001$; compared to the II group 5,54% less – $p<0,005$) was higher (table 8, fig. 4).

Table 8

Comparison of changes in the level of metanephrine (quantitative indicators) (ng/ml) between the stages of the study among patients of groups I, II and III

Groups	I-II stage	I-III stage
I	31,7±2,1 (22,0-59,0)	14,6±1,4 (4,2-29,1)
II	25,4±1,8 (13,9-41,0)	11,2±1,3 (3,1-22,4)
III	19,1±0,9 (10,1-27,2)	6,6±0,5 (3,6-13,0)
P_{Ig-IIg}	$p<0,05$	$p<0,05$
$P_{Ig-IIIg}$	$p<0,001$	$p<0,001$
$P_{IIg-IIIg}$	$p<0,05$	$p<0,005$

Notice: P_{Ig-IIg} – I and II group, $P_{Ig-IIIg}$ – I and III group, $P_{IIg-IIIg}$ – statistical significance between group II and III.

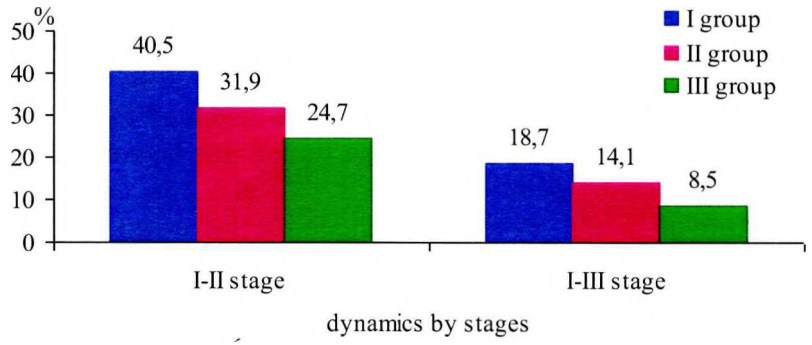

Figure 4. Dynamics of metanephrine by stages (in %)

As a result of the comparative study of the changes of stress-marker normetanephrine by stages, the level of normetanephrine increased by 44,81% in the II stage of the study in the I group compared to the I stage. In stage III, this indicator decreased by 15,03% compared to stage II, and was higher by 23,04% compared to stage I (table 9, fig. 5).

In group II, the level of normetanephrine was higher by 41,14% (3,67% less than in group I, $p>0,05$) in stage II of the study compared to stage I. In stage III, the level of normetanephrine decreased by 13,8% compared to stage II, and was higher by 21,56% compared to stage I (1,48% less than group I – $p>0,05$).

Table 9

Comparison of changes in the level of normetanephrine (quantitative indicators) (ng/ml) between groups I, II and III patients during the stages of the study

Groups	I-II stage	I-III stage
I	30,5±1,8 (19,0-47,4)	15,7±0,8 (9,0-24,0)
II	28,7±2,1 (12,0-45,0)	15,0±1,4 (6,0-30,2)
III	18,6±1,2 (9,9-29,7)	7,4±0,7 (1,7-17,2)
P_{Ig-IIg}	p>0,05	p>0,05
$P_{Ig-IIIg}$	p<0,001	p<0,001
$P_{IIg-IIIg}$	p<0,005	p<0,001

Notice: P_{Ig-IIg} – I and II group, $P_{Ig-IIIg}$ – I and III group, $P_{IIg-IIIg}$ – statistical significance between group II and III.

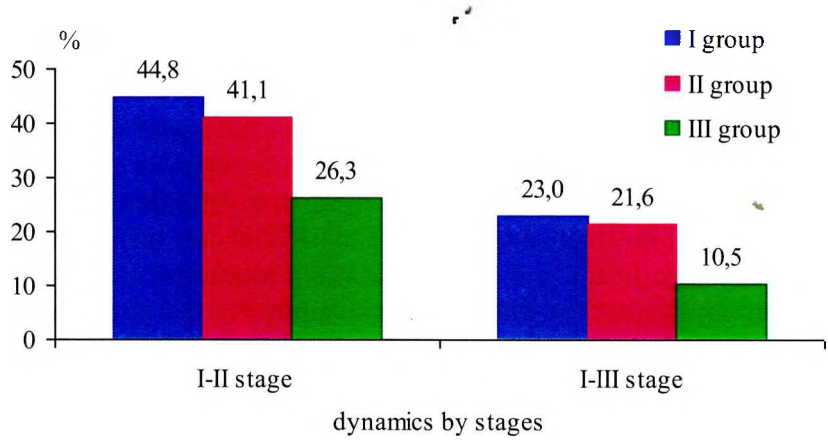

Figure 5. Dynamics of normetanephrine by stages (in %)

In group III, the level of normetanephrine increased by 26,33% (18,48% less compared to group I – $p<0,001$; 14,81% less than group II – $p<0,005$) compared to stage I. In stage III, it decreased by 12,52% compared to stage II

In the III stage of the study, compared to the I stage, the level of normetanephrine in the I group was 23,04%, in the II group – 21,56%, in the III group – 10,51% (12,53% less compared to the I group – $p<0,001$; compared to the II group, 11,05% less – $p<0,001$) was high (table 9, fig. 5).

Thus, when comparing changes in the levels of stress markers in patients who underwent multimodal endotracheal-subtenon-application anesthesia (group III), it was found that the differences were statistically less ($p<0,001$) compared to groups I and II.

During the study, the statistical analysis of the doses of narcotic analgesics (fentanyl) injected intraoperatively in all three groups showed that the doses of narcotic analgesics used in group I were significantly higher than those in groups II and III ($p<0.05$)

Thus, as a result of the study of the frequency of occurrence of OCR and OGR among group I, II, III patients, it was found that the development of various complications related to OCR and OGR reflexes in group III (MESAA), compared to group II (MESA) and especially group I (GEA) provides more effective prevention. As a

result of the analysis of the indicators of stress-markers by stages in all three groups, it was found that there was no statistically significant difference between the levels of stress-markers in the groups. This is a confirmation of the effectiveness of each of the studied anesthesia methods. However, when comparing the changes in the levels of stress markers by stages, the differences noted in group III are less than in groups I and II, and the differences are statistically significant, indicating that the multimodal endotracheal-subtenon-application anesthesia method applied in this group is more effective than the others.

RESULTS

1. Using the general endotracheal anesthesia method during vitreoretinal operations the occurrence frequency of OCR 46,2% and of OGR was 30,2%.

2. The use of the multimodal endotracheal-subtenon anesthesia method during vitreoretinal operations compared to the group in which general endotracheal anesthesia was applied resulted in an OCR of 31,5% ($p<0,05$), and an occurrence frequency of OGR of 24,7% ($p<0,05$) was.

3. Using the multimodal endotracheal-subtenon-application anesthesia method, the incidence of OCR was 21,2% ($p<0,01$) compared to the group where general endotracheal anesthesia was applied, and 6,5% compared to the multimodal endotracheal-subtenon anesthesia ($p>0,05$) was less.

Using the multimodal endotracheal-subtenon-application anesthesia method, the incidence of OGR was 18,4% ($p<0,01$) compared to the general endotracheal anesthesia group, and 12,9% ($p<0,05$) compared to the multimodal endotracheal-subtenon anesthesia was less. Based on the findings, multimodal-subtenon-application anesthesia provides prevention of the incidence of occurrence of complications related to OCR and especially OGR compared to other methods.

4. Statistical analysis of stress-markers indicators by stages by applying different methods of anesthesia showed that there was no

statistical (p>0,05) significant difference between the levels of stress-markers in the groups. This confirms that each of the studied anesthesia methods is adequate.

However, when comparing the changes in the levels of stress-markers by stages, the differences noted during the use of the multimodal endotracheal-subtenon-application anesthesia method are statistically significantly (p<0,05), indicating that this anesthesia method is more efficient than the others.

5. When performing vitreoretinal operations, the average dose of fentanyl consumed using multimodal endotracheal-subtenon application anesthesia was 164,0 mcg, and these indicators were 169,7 mcg (p>0,05) in multimodal endotracheal-subtenon anesthesia, as well as the total compared to the numbers obtained in the single application of endotracheal anesthesia (214,6 mcg), statistically significantly (p<0,05), it was lower. Thus, as a result, multimodal endotracheal-subtenon-application anesthesia is confirmed to be more effective for the prevention of side effects of narcotic analgesics.

PRACTICAL RECOMMENDATIONS

1. During vitreoretinal operations, the composition of propofol-based multimodal endotracheal + subtenon with 0,75% ropivacaine + 0,75% ropivacaine-gel application anesthesia method prevents the occurrence of OCR in the intra- and OGR in the postoperative periods, stable passage of these periods, complications (bleeding, repeated rupture etc.) prevention is recommended from the point of view of patient comfort. There is also a decrease in the doses of narcotic analgesics during the intraoperative period.

2. Stable intra- and postoperative periods and prevention of possible complications play an important role when various and repeated vitreoretinal operations are performed in the only functioning eye. So, when performing these operations, the composition is multimodal endotracheal (propofol-based) + subtenon (with 0,75% ropivacaine) of anesthesia, and especially multimodal endotracheal (propofol-based) + subtenon (with 0,75% ropivacaine)

+ application (with 0,75% ropivacaine-gel) the use of anesthesia is more appropriate as it leads to a decrease in the frequency of occurrence of OCR in the intraoperative period and OGR in the postoperative period and the stable passage of these periods.

3. It is recommended to use multimodal endotracheal-subtenon-application anesthesia method in order to prevent complications related to OCR during vitreoretinal operations in patients with various arrhythmias, cardiac ischemia and other concurrent diseases of the cardiovascular system.

4. The possibility of nausea and vomiting increases in the postoperative period in patients with gastrointestinal disease, along with a violation of cerebral blood circulation. Thus, in order to prevent the OGR in these patients, the composition of multimodal endotracheal (propofol-based) + subtenon (with 0,75% ropivacaine) anesthesia and especially multimodal endotracheal (propofol-based) + subtenon (with 0,75% ropivacaine) + application (0,75 % ropivacaine gel) anesthesia is recommended.

List of published scientific papers on the topic of the thesis

1. Гаджимурадов, К.Н., Хагвердиев, Ф.Т. Обеспечение безопасности пацциентов при витреоретинальных операциях // – Украина: Вісник проблем біології і медицини, – 2015. Випуск 3, Том 2 (123), – с. 17-22.
2. Гаджимурадов, К.Н., Асадов, Р.М., Хагвердиев, Ф.Т. Применение интегративного показателя для оценки выраженности эндокринного-метаболического ответа на хирургический стресс // – Bakı: Sağlamlıq, – 2017. №3, с. 178-181.
3. Хагвердиев Ф.Т. Сравнительная оценка эффективности различных методов анестезии в профилактике осложнений при проведении витреоретинальных операций // – Украина: Актуальні проблеми сучасної медицини, – 2018. Випуск 2 (62), Том 18.- с. 127-130.
4. Hacımuradov K.N., Qasımov E.M., Haqverdiyev F.T. Vitreoretinal əməliyyatlar zamanı okuloqastral refleksin yaranmasının profilak-

tikasında müxtəlif anesteziya üsullarının effektivliyinin müqayisəli öyrənilməsi // – Bakı: Oftalmologiya, – 2018. №3 (28), – s. 8-11.
5. Haqverdiyev F.T. Vitreoretinal əməliyyatlar zamanı yaranan ağırlaşmaların profilaktikasında müxtəlif anesteziya üsullarının effektivliyinin müqayisəsi // – Bakı: Azərbaycan Tibb Jurnalı. – 2018. №2, – s. 16-18.
6. Hacımuradov K.N., Qasımov E.M., Haqverdiyev F.T. Vitreoretinal əməliyyatlar zamanı yaranan okulokardial refleksin profilaktikasında müxtəlif anesteziya üsullarının rolu // – Bakı: Azərbaycan Təbabətin Nailiyyətləri, – 2018. №3, – s. 76-78.
7. Haqverdiyev F.T. Vitreoretinal əməliyyatlar zamanı və əməliyyatdan sonraki ən yaxın dövrdə yaranan fəsadların profilaktikasında anesteziyanın rolu // – Bakı: Azərbaycan Oftalmologiya Jurnalı, – 2020. №3, cild 34, – s. 68-75.
8. Haqverdiyev F.T. Vitreoretinal əməliyyatlar zamanı müxtəlif anesteziya metodlarının orqanizmin endokrin-metabolik reaksiyasına olan təsirinin öyrənilməsi // – Bakı: Azərbaycan Oftalmologiya Jurnalı, 2021. №2, cild 37, – s. 21-31.
9. Хагвердиев, Ф.Т. Сравнительная оценка эффективности различных методов анестезии в профилактике осложнений при проведении витреоретинальных операций. Proqram. Фізіологія – медицині, фармації та педагогіці. Актуальні проблеми та сучаснідосягнения // Тезисы V Всеукр. науч. конф. студ. и молодых ученых по физиологии с международным участием, – Харьков: – 2018, – с. 86-87.
10. Гаджимурадов К.Н., Касимов Э.М., Хагвердиев Ф.Т. Сравнитиельная оценка эффективности различных методов анестезии в профилактике рефлекса Ашнера при проведении витреоретинальных операций // Əməkdar elm xadimi, professor Abbas Əhməd oğlu Axundbəylinin anadan olmasının 80 illik yubileyinə həsr olunmuş elmi konfransın materialları – Bakı: – 2018. – s. 213-216.
11. Hacımuradov K.N., Qasımov E.M., Haqverdiyev F.T,. Использование различных методов анестезии и их роль в профилактике тригеминокардиального рефлекса при операциях на заднем отрезке глаза // Akademik Zərifə Əliyeva adına Milli

Oftalmologiya Mərkəzinin 10 illiyinə həsr olunan "Oftalmologiyanın bu günü və gələcəyi" adlı konfrans – Bakı: – 24 may – 2019, – s.19-20.
12. Гаджимурадов К.Н., Касимов Э.М., Хагвердиев Ф.Т. Рефлекс Ашнера и поиск путей профилактики осложнений, связанных с возникновением этого рефлекса при офтальмологических операциях // Əziz Məmmədkərim oğlu Əliyevin doğum gününə həsr olunmuş elmi-praktiki konfransın Məcmuəsi. – Bakı: – 2019, – s. 241-246.

The defense will be held on 23 09 2024 at 1400 at the meeting of the Dissertation counsil FD 1.12 of Supreme Attestation Commission under the President of the Republic of Azerbaijan operating at the Scientific Center of Surgery named acad. M.A.Topchubashov PLE.

Address: AZ 1122 Baku, Sharifzada str.196, conference hall.

Dissertation is accessible at the science department of the Scientific Center of Surgery named after acad. M.A. Topchubashov PLE.

Electronic version of the abstract is available on the official website of the Scientific Center of Surgery named after acad. M.A.Topchubashov PLE (www.ecm.az).

Abstract was sent to the required addresses on 15 July 2024.

Signed for print: 20.06.2024

Paper format: 60x84$^{1/16}$

Volume: 37122

Number of hard copies: 20