PERIOPERATIVNA DINAMIKA INTRAOKULARNOG PRITISKA TOKOM KONTINUIRANE ANALGOSEDACIJE ESKETAMINOM U KOMBINOVANOJ HIRURGIJI KATARAKTE I GLAUKOMA: PRIKAZ SLUČAJA

PRIKAZ SLUČAJA

CASE REPORT

PERIOPERATIVE DYNAMICS OF INTRAOCULAR PRESSURE DURING CONTINUOUS ESKETAMINE ANALGOSEDATION IN COMBINED CATARACT AND GLAUCOMA SURGERY: A CASE REPORT

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SAŽETAK

Uvod: Perioperativno zbrinjavanje pacijenata sa glaukomom zahteva preciznu ravnotežu između očuvanja sistemske hemodinamike i održavanja adekvatnog okularnog perfuzionog pritiska. Efekti esketamina na intraokularni pritisak (IOP) tokom hirurgije glaukoma još uvek nisu dovoljno ispitani.

Prikaz slučaja: Prikazan je slučaj pacijentkinje starosti 45 godina sa dijagnozom katarakte i hroničnog glaukoma, bez značajnih pridruženih komorbiditeta, kod koje je izvedena kombinovana operacija fakoemulzifikacije sa implantacijom intraokularnog sočiva i trabekulektomija. Hirurška intervencija sprovedena je u uslovima subtenonske anestezije, uz ciljanu kontinuiranu analgosedaciju esketaminom u subanestetičkoj dozi, brzinom infuzije od 0,25 mg/kg/h. Tokom perioperativnog perioda praćeni su hemodinamski parametri, zasićenost periferne krvi kiseonikom, intenzitet bola, nivo sedacije i intraokularni pritisak u više definisanih perioperativnih faza. Početna vrednost intraokularnog pritiska iznosila je 39 mmHg; nakon stabilizacije sedacije zabeleženo je smanjenje na 26 mmHg, dok je u ranom postoperativnom toku registrovan dalji pad na 11 mmHg. Tokom operacije nisu zabeležene hemodinamske oscilacije, respiratorna depresija niti potreba za dodatnom suportivnom analgezijom.

Zaključak: Ovaj prikaz slučaja ukazuje na izvodljivost primene kontinuirane analgosedacije esketaminom u subanestetičkim dozama tokom kombinovane hirurgije katarakte i glaukoma u uslovima subtenonske anestezije, uz stabilnu hemodinamiku, očuvano spontano disanje i dobru saradnju sa pacijentom, kao i povoljnu ranu perioperativnu dinamiku intraokularnog pritiska u opisanom slučaju. Neophodna su dalja prospektivna istraživanja radi potvrde ovih nalaza.

Ključne reči: intraokularni pritisak, esketamin, analgosedacija, glaukom, kombinovana hirurgija oka

ABSTRACT

Introduction: Perioperative management of patients with glaucoma requires a precise balance between maintaining systemic hemodynamic stability and preserving adequate ocular perfusion pressure. The effects of esketamine on intraocular pressure (IOP) during glaucoma surgery remain insufficiently investigated.

Case report: We report the case of a 45-year-old female patient diagnosed with cataract and chronic glaucoma, without significant associated comorbidities, who underwent combined phacoemulsification with intraocular lens implantation and trabeculectomy. The surgical procedure was performed under subtenon anestesia, combined with targeted continuous esketamine analgosedation at a subanesthetic dose, administered as a continuous infusion at a rate of 0.25 mg/kg/h. During the perioperative period, hemodynamic parameters, peripheral oxygen saturation, pain intensity, level of sedation, and intraocular pressure were monitored at multiple predefined perioperative time points. The baseline intraocular pressure was 39 mmHg; following stabilization of sedation, it decreased to 26 mmHg, with a further reduction to 11 mmHg observed in the early postoperative period. No hemodynamic instability, respiratory depression, or need for additional supportive analgesia was recorded during surgery.

Conclusion: This case report suggests that continuous subanesthetic esketamine analgosedation is a feasible option during combined cataract and glaucoma surgery performed under sub-Tenon's anesthesia, providing stable hemodynamics, preserved spontaneous respiration, good patient cooperation, and a favorable early perioperative intraocular pressure profile in the presented case. Further prospective studies are required to confirm these findings.

Keywords: intraocular pressure, esketamine, analgosedation, glaucoma, combined ocular surgery

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UVOD

Hirurgija glaukoma u savremenoj kliničkoj praksi najčešće se izvodi u uslovima lokalne anestezije uz ciljanu analgosedaciju, naročito kod pacijenata sa prisutnim sistemskim komorbiditetima i u starijoj populaciji. Osnovni anesteziološki cilj ovih procedura nije samo obezbeđivanje adekvatnog komfora pacijenta i nepokretljivosti operativnog polja, već prvenstveno očuvanje stabilne sistemske hemodinamike i adekvatnog okularnog perfuzionog pritiska, uz sprečavanje hemodinamskih oscilacija koje mogu dodatno ugroziti već kompromitovanu perfuziju optičkog živca [1,2].

Tradicionalno korišćeni sedativi u oftalmološkoj hirurgiji uključuju benzodiazepine, opioide, propofol i deksmedetomidin. Iako efikasni u postizanju anksiolize, analgezije i sedacije, njihova primena može biti praćena neželjenim efektima kao što su hipotenzija, respiratorna depresija, bradikardija, postoperativna mučnina i povraćanje, kao i poremećaji svesti u vidu agitacije i/ili delirijuma, posebno u starijoj populaciji. Hemodinamske oscilacije povezane sa primenom ovih agenasa mogu uticati na sistemski perfuzioni pritisak, sa potencijalno nepovoljnim posledicama po perfuziju optičkog živca.

Esketamin, S-enantiomer ketamina i potentni antagonist NMDA receptora, poslednjih godina zauzima sve značajnije mesto u savremenoj anesteziološkoj praksi zahvaljujući povoljnom hemodinamskom profilu, očuvanom spontanom disanju i izraženom analgetskom efektu, čak i u subanestetičkim dozama [3–5]. Njegove farmakokinetičke karakteristike, uključujući brz početak dejstva i relativno kratak poluživot, kao i farmakodinamske prednosti poput simpatikomimetskog efekta, očuvanja zaštitnih refleksa i minimalnog uticaja na respiratorni centar, čine ga pogodnim za primenu u kratkotrajnim hirurškim procedurama. U kontekstu razvoja jednodnevne hirurgije i „fast-track" anestezioloških protokola, postoji rastuća potreba za anesteticima koji obezbeđuju hemodinamsku i respiratornu stabilnost, brz postoperativni oporavak, minimalnu potrebu za dodatnom analgezijom, kao i nisku incidencu postoperativne mučnine, povraćanja i kognitivnih poremećaja.

Iako su dostupni podaci o primeni esketamina u oftalmološkim procedurama ograničeni i uglavnom se odnose na pedijatrijsku populaciju, pre svega u hirurgiji strabizma [6,7], klinička ispitivanja njegove primene u hirurgiji katarakte i glaukoma su retka i nedovoljno zastupljena u literaturi. Imajući u vidu navedeno, u ovom radu prikazujemo slučaj kombinovane hirurgije katarakte i glaukoma izvedene uz primenu subtenonske lokalne anestezije u kombinaciji sa kontinuiranom analgosedacijom esketaminom, sa detaljnim praće-

INTRODUCTION

Glaucoma surgery in contemporary clinical practice is most commonly performed under local anesthesia combined with targeted analgosedation, particularly in elderly patients and those with significant systemic comorbidities. The primary anesthesiological objective is not only to ensure patient comfort and maintain immobility of the operative field, but above all to preserve stable systemic hemodynamics and adequate ocular perfusion pressure, while minimizing hemodynamic fluctuations that could further compromise the already impaired perfusion of the optic nerve [1,2].

Sedative agents traditionally used in ophthalmic surgery include benzodiazepines, opioids, propofol, and dexmedetomidine. Although effective in providing anxiolysis, analgesia, and sedation, these agents may be associated with adverse effects such as hypotension, respiratory depression, bradycardia, postoperative nausea and vomiting, and disturbances of consciousness, including agitation and/or delirium, particularly in elderly patients. Hemodynamic fluctuations associated with the administration of these agents may influence systemic perfusion pressure, potentially leading to adverse effects on optic nerve perfusion.

Esketamine, the S-enantiomer of ketamine and a potent NMDA receptor antagonist, has in recent years gained an increasingly prominent role in modern anesthesiology due to its favorable hemodynamic profile, preservation of spontaneous respiration, and pronounced analgesic effect, even at subanesthetic doses [3–5]. Its pharmacokinetic properties–such as rapid onset of action and a relatively short half-life, together with pharmacodynamic advantages including a sympathomimetic effect, preservation of protective reflexes, and minimal respiratory depression, make it particularly suitable for short surgical procedures. In the context of expanding day-case surgery and "fast-track" anesthesia protocols, there is an increasing demand for anesthetic agents that ensure hemodynamic and respiratory stability, enable rapid postoperative recovery, reduce the need for additional analgesia, and are associated with a low incidence of postoperative nausea, vomiting, and cognitive dysfunction.

Although available data on the use of esketamine in ophthalmic procedures are limited and largely pertain to the pediatric population, primarily in strabismus surgery [6,7], clinical studies evaluating its application in cataract and glaucoma surgery are scarce and underrepresented in the literature. In light of the above, we present a case of combined cataract and glaucoma surgery performed under sub-Tenon's local anesthesia with continuous esketamine analgosedation, accompanied by detailed monitoring of intraocular pressure

njem intraokularnog pritiska i hemodinamskih parametara tokom svih perioperativnih faza.

PRIKAZ SLUČAJA

Pacijentkinja starosti 45 godina, sa dijagnozom hroničnog glaukoma i katarakte, bez značajnih sistemskih komorbiditeta, planirana je za kombinovanu hiruršku proceduru koja je obuhvatila fakoemulzifikaciju sa implantacijom intraokularnog sočiva i trabekulektomiju. Tokom preoperativne anesteziološke procene nisu registrovane značajne pridružene bolesti; pacijentkinja je prema ASA klasifikaciji svrstana u grupu I–II. Psihološki profil bio je obeležen izraženom anksioznošću i strahom u vezi sa samom operacijom i njenim ishodom.

U preoperativnom periodu pacijentkinji je detaljno objašnjen tok planirane operativne procedure, uključujući i faze koje mogu biti praćene neprijatnim senzacijama ili bolom, sa ciljem smanjenja anksioznosti i uspostavljanja adekvatne saradnje tokom intervencije. Premedikacija anksioliticima nije primenjena. Jedan sat pre ulaska u operacionu salu pacijentkinja je primila jednu dozu acetazolamida per os.

Ciljano vođena kontinuirana analgosedacija esketaminom u subanestetičkoj dozi, brzinom infuzije od 0,25 mg/kg/h, započeta je 15 minuta pre početka operacije. Infuzija je titrirana do postizanja blage do umerene sedacije, uz očuvano spontano disanje i održavanje nivoa sedacije u rasponu Ramsay skale 2–3. Na početku operativnog zahvata primenjena je subtenonska lokalna anestezija. Ukupno je aplikovano 4 ml kombinacije lokalnih anestetika, koja je sadržala 2 ml 2% lidokaina i 2 ml 0,5% levobupivakaina.

Tokom perioperativnog perioda kontinuirano su praćeni sledeći parametri putem neinvazivnog monitoringa: srednji arterijski pritisak (MAP), srčana frekvenca (HR), zasićenost periferne krvi kiseonikom (SpO_2), kao i intenzitet bola procenjivan numeričkom skalom bola (NRS). Intraokularni pritisak meren je serijski u unapred definisanim vremenskim tačkama: bazalno, na početku operacije, tokom maksimalne hirurške stimulacije, na završetku operacije i u prvom postoperativnom satu (Tabela 1).

and hemodynamic parameters throughout all perioperative phases.

CASE REPORT

A 45-year-old female patient, diagnosed with chronic glaucoma and cataract and without significant systemic comorbidities, was scheduled for a combined surgical procedure comprising phacoemulsification with intraocular lens implantation and trabeculectomy. During the preoperative anesthesiological assessment, no significant comorbidities were identified, and the patient was classified as ASA I-II. Her psychological profile was notable for pronounced anxiety and fear related to the surgery and its potential outcome.

In the preoperative period, the planned surgical procedure was explained to the patient in detail, including stages that might involve discomfort or pain, with the goal of alleviating anxiety and promoting effective cooperation during the intervention. No premedication with anxiolytics was administered. One hour before entering the operating room, the patient received a single oral dose of acetazolamide.

Targeted continuous analgosedation with esketamine at a subanesthetic dose of 0.25 mg/kg/h was initiated 15 minutes prior to the start of surgery. The infusion was titrated to achieve mild-to-moderate sedation, with spontaneous breathing preserved and sedation maintained at a Ramsay scale level of 2-3. At the start of the operation, sub-Tenon's local anesthesia was administered. A total of 4 ml of a local anesthetic mixture was used, comprising 2 ml of 2% lidocaine and 2 ml of 0.5% levobupivacaine.

Throughout the perioperative period, the following parameters were continuously monitored non-invasively: mean arterial pressure (MAP), heart rate (HR), peripheral oxygen saturation (SpO_2), and pain intensity using the Numerical Rating Scale (NRS). Intraocular pressure was measured sequentially at predefined time points: baseline, at the start of surgery, during periods of maximal surgical stimulation, at the conclusion of the procedure, and during the first postoperative hour (Table 1).

Tabela 1. Perioperativni parametri

Table 1. Perioperative parameters

Vreme / *Time*	*MAP (mmHg)*	*HR*	*SpO2 (%)*	*IOP (mmHg)*	Bol (NRS) / *Pain (NRS)*
T_0	105/70	60	99	39	-
T_1	115/75	65	99	26	0
T_2	120/75	75	100	≤40 (intraoperativne varijacije / *intraoperative variations*)	3
T_3	110/70	70	100	20	0
T_4 – 30 min postop.	105/65	60	99	15	0
T_5 – 1 hour postop.	105/60	60	99	11	0

Inicijalni intraokularni pritisak, pre započinjanja kontinuirane analgosedacije, iznosio je 39 mmHg. Nakon stabilizacije esketaminske sedacije, neposredno po započinjanju operacije, zabeležen je pad IOP-a na 26 mmHg. Tokom intraoperativnog perioda registrovane su očekivane varijacije intraokularnog pritiska u skladu sa fazama hirurške intervencije, sa maksimalno zabeleženim vrednostima do 40 mmHg. Na završetku operacije intraokularni pritisak iznosio je 20 mmHg. U ranom postoperativnom toku zabeleženo je dalje sniženje intraokularnog pritiska, sa vrednostima od 15 mmHg nakon 30 minuta i 11 mmHg nakon jednog sata.

Tokom celokupnog perioperativnog perioda nije zabeležena respiratorna depresija, hemodinamska nestabilnost niti potreba za dodatnom analgezijom. Intenzitet bola tokom najizraženije intraoperativne faze procenjen je na 3, dok je na završetku operacije iznosio 0. Hirurški uslovi ocenjeni su maksimalnom ocenom 5/5. U prva 24 sata postoperativno nisu registrovani postoperativna mučnina ili povraćanje; pacijentkinja nije zahtevala analgeziju niti je postojala potreba za ponovnom primenom acetazolamida.

DISKUSIJA

Ovaj prikaz slučaja pokazuje da je ciljano sprovedena analgosedacija esketaminom u subanestetičkoj dozi omogućila stabilan perioperativni tok kod pacijentkinje sa inicijalno značajno povišenim intraokularnim pritiskom. Tokom celokupnog operativnog zahvata zabeleženi su hemodinamska stabilnost, očuvano spontano disanje i adekvatan analgetsko-sedativni efekat, bez potrebe za dodatnom analgezijom ili ventilatornom potporom.

Benzodiazepini, iako se često koriste kao anksiolitici u oftalmološkoj hirurgiji, povezani su sa rizikom od respiratorne depresije, produžene sedacije, postoperativne konfuzije i paradoksalne agitacije, naročito kod starijih pacijenata. Njihova sposobnost da obezbede stabilan okularni perfuzioni pritisak je ograničena, posebno u kombinaciji sa drugim sedativima [1,2]. Opioidi su efikasni u postizanju analgezije, ali nose rizik od centralne respiratorne depresije, hiperkapnije i potencijalnog refleksnog porasta intrakranijalnog i intraokularnog pritiska (Tabela 2). Njihova primena je, takođe, povezana sa povećanom učestalošću postoperativne mučnine i povraćanja, što može dodatno doprineti porastu intraokularnog pritiska [1]. Propofol predstavlja standardni anestetik u svakodnevnoj anesteziološkoj praksi, ali njegova izražena negativna inotropna i vazodilatatorna svojstva mogu dovesti do arterijske hipotenzije i posledičnog smanjenja okularnog perfuzionog pritiska, što kod pacijenata sa glaukomom može imati nepovoljne posledice po perfuziju optičkog živca [2]. Deksmedetomidin obezbeđuje kvalitetnu sedaciju

The initial intraocular pressure, measured before the initiation of continuous analgosedation, was 39 mmHg. Following stabilization of esketamine sedation and immediately after the start of surgery, IOP decreased to 26 mmHg. During the intraoperative period, intraocular pressure fluctuated as expected in relation to the stages of the surgical procedure, with maximum values reaching up to 40 mmHg. At the conclusion of the surgery, intraocular pressure measured 20 mmHg. In the early postoperative period, IOP continued to decrease, reaching 15 mmHg at 30 minutes and 11 mmHg at one hour.

Throughout the perioperative period, no respiratory depression, hemodynamic instability, or need for additional analgesia was observed. Pain intensity peaked at 3 during the most stimulating phase of the surgery and decreased to 0 by the end of the procedure. The surgical conditions were rated at the maximum score of 5/5. During the first 24 hours postoperatively, no nausea or vomiting occurred, the patient required no additional analgesia, and there was no need for re-administration of acetazolamide.

DISCUSSION

This case report demonstrates that targeted subanesthetic esketamine analgesia facilitated a stable perioperative course in a patient presenting with markedly elevated intraocular pressure. Throughout the entire procedure, hemodynamic stability and spontaneous breathing were maintained, with effective analgesia and sedation, without the need for supplemental analgesics or ventilatory support.

Although benzodiazepines are commonly used as anxiolytics in ophthalmic surgery, they carry a risk of respiratory depression, prolonged sedation, postoperative confusion, and paradoxical agitation, especially in elderly patients. Their capacity to maintain stable ocular perfusion pressure is limited, particularly when administered in combination with other sedative agents [1,2]. Opioids provide effective analgesia but are associated with the risk of central respiratory depression, hypercapnia, and a potential reflex elevation in intracranial and intraocular pressure (Table 2). Their use is also associated with a higher incidence of postoperative nausea and vomiting, which may further contribute to elevations in intraocular pressure [1]. Propofol is a widely used anesthetic in routine clinical practice; however, its pronounced negative inotropic and vasodilatory effects may result in arterial hypotension and a consequent reduction in ocular perfusion pressure, which in patients with glaucoma can adversely affect optic nerve perfusion [2]. Dexmedetomidine provides effective sedation while preserving respiratory function; however, its pronounced sympatholytic properties frequently lead to bradycardia and hypotension [7].

Tabela 2. Sedativi u očnoj hirurgiji – prednosti i ograničenja kod pacijenata sa glaukomom

Table 2. Sedatives in ophthalmic surgery – advantages and limitations in patients with glaucoma

Lek / ***Drug***	**Prednosti /** ***Advantages***	**Mane /** ***Limitations***	**Uticaj na IOP /** ***Effect on IOP***	**Respiratorni efekat /** ***Respiratory effect***
Benzodiazepini / *Benzodiazepines*	Anksioliza / *Anxiolysis*	Produžena sedacija, agitacija, konfuzija / *Prolonged sedation, agitation, confusion*	↓	Depresija (dozno – zavisna) / *Depression (dose-dependent)*
Opioidi / *Opioids*	Snažna analgezija / *Potent analgesia*	Perioperativna i postoperativna mučnina i povraćanje / *Perioperative and postoperative nausea and vomiting*	↑	Depresija (dozno -zavisna) / *Depression (dose-dependent)*
Propofol / *Propofol*	Brza i efikasna sedacija / *Rapid and effective sedation*	Hipotenzija / *Hypotension*	↓	Depresija (dozno – zavisna) / *Depression (dose-dependent)*
Dexmedetomidin / *Dexmedetomidine*	Sedacija uz spontano disanje / *Sedation with preserved spontaneous breathing*	Bradikardija, hipotenzija / *Bradycardia, hypotension*	↓	Minimalni – očuvano spontano disanje / *Minimal – preserved spontaneous breathing*
Esketamin / *Esketamine*	Analgezija, sedacija uz spontano disanje, hemodinamska stabilnost / *Analgesia and sedation with preserved spontaneous breathing; hemodynamic stability*	Ograničeni podaci u hirurgiji glaukoma / *Limited data in glaucoma surgery*	Neutralan ili povoljan efekat? / *Neutral or potentially favorable effect*	Minimalni – očuvano spontano disanje / *Minimal – preserved spontaneous breathing*

uz očuvanu respiratornu funkciju, ali je zbog izraženog simpatikolitičkog efekta često povezan sa bradikardijom i hipotenzijom [7].

Za razliku od navedenih lekova, esketamin ispoljava simpatikomimetski efekat i obezbeđuje analgeziju, anksiolizu i blagu do umerenu sedaciju u subanestetičkim dozama, uz očuvano spontano disanje i stabilne fiziološke fluktuacije srednjeg arterijskog pritiska i srčane frekvence (Tabela 2) [3–5]. Iako se ketamin u ranijim studijama povezivao sa porastom intraokularnog pritiska, dostupni podaci ukazuju da njegov S-enantiomer, esketamin, u subanestetičkim dozama nema klinički značajan negativan efekat na intraokularni pritisak [8–10]. Podaci o primeni esketamina u ovom kontekstu i dalje su ograničeni; međutim, dostupne studije, pretežno u pedijatrijskoj hirurgiji strabizma, ne ukazuju na nepovoljan uticaj na očnu hemodinamiku [6,7].

U prikazanom slučaju, uprkos inicijalno izrazito povišenom intraokularnom pritisku, nakon stabilizacije esketaminske sedacije došlo je do njegovog sniženja, dok je u postoperativnom periodu zabeležena dodatna progresivna redukcija IOP-a, bez potrebe za dodatnom primenom acetazolamida. Ovi nalazi ukazuju da primena esketamina nije dovela do pogoršanja očne hipertenzije, već je omogućila stabilan i kontrolisan perioperativni tok u opisanom slučaju.

Fazno praćenje intraokularnog pritiska i sistemskih hemodinamskih parametara u prikazanom slučaju

In contrast to the aforementioned drugs, esketamine exerts a sympathomimetic effect and, at subanesthetic doses, provides analgesia, anxiolysis, and mild-to-moderate sedation while preserving spontaneous respiration and maintaining stable mean arterial pressure and heart rate within physiological ranges (Table 2) [3–5]. Although earlier studies have linked ketamine to increases in intraocular pressure, current evidence suggests that its S-enantiomer, esketamine, when administered in subanesthetic doses, does not exert a clinically significant adverse effect on intraocular pressure [8–10]. Data regarding the use of esketamine in this context remain limited; however, existing studies, primarily in pediatric strabismus surgery, do not suggest any detrimental effects on ocular hemodynamics [6,7].

In the presented case, despite markedly elevated baseline intraocular pressure, a reduction was observed following stabilization of esketamine sedation. In the postoperative period, IOP continued to decline progressively, without the need for additional acetazolamide administration. These findings suggest that esketamine administration did not exacerbate ocular hypertension but instead facilitated a stable and well-controlled perioperative course in the described case.

Phase monitoring of intraocular pressure and systemic hemodynamic parameters in the presented case was planned to allow separate analysis of the effects of analgosedation, surgical stress, and their mutual interaction.

bilo je planski osmišljeno sa ciljem razdvojene analize efekata analgosedacije, hirurškog stresa i njihove međusobne interakcije.

1. T0 predstavlja referentnu vrednost pre ulaska u operacionu salu, u uslovima pune budnosti i izražene anksioznosti, jedan sat nakon primene acetazolamida u okviru preoperativne pripreme, čime se odražava realni početni rizik za okularni perfuzioni pritisak.
2. T1 označava period nakon stabilizacije kontinuirane analgosedacije esketaminom i omogućava procenu izolovanog farmakodinamskog efekta esketamina, u odsustvu hirurške stimulacije.
3. T2 predstavlja fazu maksimalnog kombinovanog opterećenja, koja uključuje lokalni tkivni stres, sistemski stresni odgovor i kontinuirano farmakološko dejstvo sedacije, pri čemu se može očekivati najveća oscilacija intraokularnog pritiska.
4. T3, faza na završetku operacije, od posebnog je značaja jer odražava kumulativni efekat primenjene sedacije, lokalne anestezije i završenog hirurškog stresa.
5. T4 predstavlja ranu postoperativnu fazu u prvom satu nakon operacije i omogućava uvid u rani oporavak očne hemodinamike. U tom kontekstu, zabeležena normalizacija intraokularnog pritiska ima poseban klinički značaj, jer ukazuje na povoljan balans između hirurškog efekta i sistemskog hemodinamskog odgovora.

ZAKLJUČAK

Na osnovu prikazanog slučaja može se zaključiti da je ciljano sprovedena kontinuirana analgosedacija esketaminom u subanestetičkim dozama obezbedila stabilne hemodinamske parametre, očuvano spontano disanje i povoljnu perioperativnu dinamiku intraokularnog pritiska tokom kombinovane hirurgije katarakte i glaukoma. Time su stvoreni uslovi za očuvanje adekvatnog okularnog perfuzionog pritiska, koji predstavlja ključnu determinantu perfuzije retinalnih ganglijskih ćelija i optičkog živca. Fazno praćenje intraokularnog pritiska omogućilo je detaljno sagledavanje međusobnog odnosa farmakološkog dejstva esketamina, hirurškog stresa i očne hemodinamike. Ovi nalazi ukazuju na to da esketamin može predstavljati vredan element savremenog, individualno prilagođenog pristupa analgosedaciji u hirurgiji glaukoma, naročito kod anksioznih pacijenata, ali zahtevaju potvrdu kroz buduća prospektivna, kontrolisana klinička ispitivanja.

SAGLASNOST PACIJENTA

Pisana informisana saglasnost pacijentkinje dobijena je za publikovanje prikaza slučaja.

Sukob interesa: Nije prijavljen.

1. T0 represents the reference value measured before entering the operating room, while the patient was fully alert and experiencing pronounced anxiety, one hour after oral administration of acetazolamide as part of preoperative preparation, reflecting the true baseline risk for ocular perfusion pressure.
2. T1 corresponds to the period following stabilization of continuous esketamine analgosedation, allowing assessment of the isolated pharmacodynamic effects of esketamine in the absence of surgical stimulation.
3. T2 represents the phase of maximal combined stress, encompassing local tissue trauma, systemic stress response, and the ongoing pharmacological effects of sedation, during which the greatest fluctuations in intraocular pressure are anticipated.
4. T3, corresponding to the end of the operation, is particularly important as it reflects the cumulative effects of sedation, local anesthesia, and the completed surgical stress.
5. T4 represents the early postoperative phase, within the first hour after surgery, providing insight into the initial recovery of ocular hemodynamics. In this context, the observed normalization of intraocular pressure is clinically significant, indicating a favorable balance between the surgical intervention and the systemic hemodynamic response.

CONCLUSION

Based on the presented case, it can be concluded that targeted continuous analgosedation with subanesthetic doses of esketamine maintained stable hemodynamics, preserved spontaneous respiration, and supported favorable perioperative intraocular pressure dynamics during combined cataract and glaucoma surgery. This ensured conditions favorable for maintaining adequate ocular perfusion pressure, a critical factor for the perfusion of retinal ganglion cells and the optic nerve. Phase monitoring of intraocular pressure allowed for a detailed assessment of the interplay between the pharmacological effects of esketamine, surgical stress, and ocular hemodynamics. These findings suggest that esketamine may be a valuable component of a modern, individualized analgosedation strategy in glaucoma surgery, particularly for anxious patients; however, this potential needs to be confirmed in future prospective, controlled clinical trials.

PATIENT CONSENT

Written informed consent was obtained from the patient for the publication of this case report.

Conflict of interest: None declared.

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