GSC Biological and Pharmaceutical Sciences

eISSN: 2581-3250 CODEN (USA): GBPSC2

Cross Ref DOI: 10.30574/gscbps

Journal homepage: https://gsconlinepress.com/journals/gscbps/

(CASE REPORT)

Check for updates

Peribulbar nerve block using ropivacaine in patient with severe coronary arterial disease undergoing pars plana vitrectomy procedure: A case report

Victor Imanuel Sitaniapessy [1,*], Adinda Putra Pradhana [2] and IGP. Sukrana Sidemen [2]

[1] *Department of Anesthesiology and Intensive Care, Prof. Dr. dr. IGNG Ngoerah General Hospital/, Denpasar, Bali, Indonesia.*
[2] *Department of Anesthesiology and Intensive Care, Udayana University General Hospital, Denpasar, Bali, Indonesia.*

GSC Biological and Pharmaceutical Sciences, 2025, 32(03), 281-285

Publication history: Received on 27 July 2025; revised on 19 September 2025; accepted on 22 September 2025

Article DOI: https://doi.org/10.30574/gscbps.2025.32.3.0349

Abstract

Patients undergoing ophthalmic surgery may represent extremes of age. Many of them may have coexisting diseases (e.g., diabetes mellitus, coronary artery disease, essential hypertension, chronic lung disease, renal insufficiency/failure). The primary goal of any successful cardiac anesthetic is prevention of myocardial ischemia and prompt identification and treatment of new ischemic episodes.

Case : A 51 th-year-old male was diagnosed with complicated cataract and was planned to undergo VPP (Pars Plana Vitrectomy) and Phaco. The patient has uncontrolled diabetes mellitus since 10 years, had used OADs and insulin but was self-discontinued, currently using insulin glargin 8 units at night since the first right eye surgery. The patient also has a history of hypertension and severe coronary arterial disease (CAD) known since July 2024. The choice is Peribulbar nerve block with mild sedation if needed to guarantee pain free and not anxious during the surgery so as not to worsen his CAD problems. Post nerve block evaluate akinesia and analgesia of the eye achieved before surgery.

Discussion : Advantages of the peribulbar technique include less risk of penetration of the globe, optic nerve, and artery and less pain on injection. The peribulbar that has been done in this case showed that peripheral nerve block with ropivacaine can mimimalize cardiac event and avoid general anesthesia in patient with severe CAD.

Conclussion : This case demonstrates that the administration of ropivacaine in peribulbar nerve block is beneficial in ophthalmic surgical procedures with patients who have severe CAD

Keywords: Anesthesia; Peribulbar Nerve block; Ropivacaine; Vitrectomy; Coronary artery diseases

1. Introduction

Substantial proportion of patients undergoing ophthalmic surgery are often elderly with significant comorbidities, including diabetes mellitus, coronary artery disease, essential hypertension, chronic lung disease, and renal insufficiency or failure. This group is particularly vulnerable due to reduced functional reserve and the prevalence of multiple age-related diseases. Patient with significant cardiac comorbidities may restrict the use of some anaesthesia techniques and agents. They may have very narrow window of cardiac function, unable to be on a lying flat position, sensitive to oculocardiac reflex and the use of anti-platelet/anti thrombotic agent.

The use of a peribulbar nerve block with ropivacaine offers significant benefits for patients with cardiac diseases undergoing ophthalmic surgery. This technique avoids the systemic hemodynamic alterations associated with general anesthesia, thereby minimizing the risk of myocardial ischemia, arrhythmias, and other perioperative cardiac

* Corresponding author: Victor Imanuel Sitaniapessy

complications. Ropivacaine, a long-acting local anesthetic with a favorable safety profile, is particularly advantageous in this context due to its lower cardiotoxicity compared to bupivacaine. By providing effective analgesia and akinesia, ropivacaine ensures optimal surgical conditions while reducing the need for supplemental opioids or sedatives, which can exacerbate cardiac strain. Additionally, the reduced reliance on systemic anesthetic agents promotes faster postoperative recovery, facilitates early mobilization, and may shorten hospital stays. These benefits make the peribulbar block with ropivacaine a valuable anesthetic strategy for high-risk cardiac patients, combining efficacy, safety, and improved perioperative outcomes.

In the context of cardiac anesthesia, the primary objective is maintaining the hemodynamic stability and optimalization of oxygen supply and demand. This necessitates vigilant monitoring for ischemic episodes and prompt intervention. Effective management involves reducing myocardial oxygen demand (MVO2) by controlling key determinants such as heart rate, contractility, and wall tension, while simultaneously optimizing coronary blood flow through the maintenance of coronary perfusion pressure and prolongation of diastolic time.

2. Case report

A 51-year-old male presented with a primary complaint of gradual vision loss in the left eye over the past two years. The patient denied additional symptoms such as eye redness, discharge, pain, or a history of ocular trauma. He was diagnosed with complicated cataract and was planned to undergo VPP (Pars Plana Vitrectomy) and Phaco. He has a 10-year history of uncontrolled diabetes mellitus, previously managed with oral antidiabetic drugs (OADs) and insulin, which were discontinued by the patient. Currently, he is on insulin glargine 8 units nightly, initiated following the first surgery on the right eye.

The patient has a documented history of hypertension and severe coronary artery disease diagnosed in July 2024. His current medications include amlodipine 5 mg once daily (PO), carvedilol 3.125 mg twice daily (PO), and ramipril 2.5 mg once daily (PO). Antiplatelet therapy with acetylsalicylic acid was discontinued one week prior to presentation. He reports exertional dyspnea, particularly when walking distances exceeding 1 kilometer.

The patient denies a history of fever, cough, cold, or shortness of breath in the preceding two weeks. He also denies any known drug allergies. Despite his comorbidities, the patient works as a private employee and remains capable of performing light physical activities without experiencing chest pain or shortness of breath. He reports being able to sleep comfortably with one pillow and has not experienced nocturnal dyspnea or orthopnea.

2.1. Preoperative Examination

Preoperative evaluation included a comprehensive assessment, with particular emphasis on the patient's cardiovascular status. Physical examination revealed a blood pressure of 140/80 mmHg, a regular heart rate of 75 beats per minute, and normal heart sounds (S1 and S2) without murmurs or gallop. Laboratory investigations were within normal limits. Electrocardiography (ECG) demonstrated sinus rhythm at a rate of 78 beats per minute, a normal axis, and T-wave inversion in leads aVL and V5-V6, suggestive of lateral ischemia.

Cardiology consultation included a full echocardiographic study, which revealed the following findings:

- **Cardiac chamber dimensions**: Dilatation of all chambers
- **Left ventricular hypertrophy**: Present
- **Left ventricular systolic function**: Severely decreased, with an ejection fraction of 25.72%
- **Left ventricular diastolic function**: Grade III diastolic dysfunction
- **Right ventricular systolic function**: Normal, with TAPSE of 29 mm
- **Left ventricular wall motion**: Regional wall motion abnormalities noted
- **Valvular findings**: Secondary mild mitral regurgitation

Based on these findings, the patient was classified as ASA Physical Status IV due to significant systemic disease posing a constant threat to life. Informed consent was obtained following detailed education on the anesthetic procedure, potential complications, and the possibility of nerve block failure. The anesthetic plan prioritized strategies to minimize perioperative pain and mitigate cardiac complications, particularly given the presence of severe coronary artery disease.

2.2. Anesthesia Management

The anesthesia plan was carefully tailored to minimize perioperative complications, with particular attention to the patient's cardiac functional status and the associated risks of severe coronary artery disease (CAD). Given the patient's compromised cardiac reserve, the chosen anesthesia technique was a peribulbar nerve block, which provides effective regional anesthesia while avoiding the hemodynamic perturbations associated with general anesthesia. Mild sedation was included as an optional adjunct to manage anxiety and ensure patient comfort, recognizing the importance of maintaining hemodynamic stability.

Effective pain management and anxiety control were prioritized, as both factors can exacerbate myocardial oxygen demand and potentially precipitate ischemic events in patients with CAD. Excessive sympathetic stimulation from pain or anxiety could lead to increased heart rate, blood pressure, and myocardial workload, further compromising an already impaired cardiovascular system. Thus, meticulous intraoperative monitoring is essential. We use intraarterial line, pulse oximetry and 5 leads-ECG.

2.3. Peribulbar Nerve Block

The procedure begins with two drops of 0.5% pantocaine for topical anesthesia. Intravenous administration of midazolam (1.5 mg) was used for mild sedation and as an anxiolytic agent, accompanied by fentanyl (25 µg) for additional analgesia. Intraocular pressure was assessed prior to initiating the block, and a sterile block set was prepared.

A local anesthetic injection consisting of 4 mL of 0.375% plain ropivacaine was administered into the left inferotemporal region of the eye, followed by an additional 4 mL injected into the medial canthus of the left eye and to facilitate the spread of the anesthetic and reduce intraocular pressure, a Honan balloon was applied with a pressure of 30 mmHg for 5–10 minutes. Patient was calm during the block and had no complaint of the procedure. Post-nerve block, the adequacy of akinesia and analgesia was carefully evaluated to ensure optimal conditions before surgery. Patient was ask to move his eyeball into several direction to see if the akinesia is achieved and the cornea was touch using tissue to evaluate the numbness.

During the surgical procedure, anesthesia was maintained with oxygen delivered at 3 L/min via nasal cannula. No additional opioids or sedatives were administered to minimize potential respiratory and cardiovascular complications, aligning with the anesthetic strategy for a high-risk cardiac patient. Patient showed a great cooperation and was calm during the 80 minutes surgery.

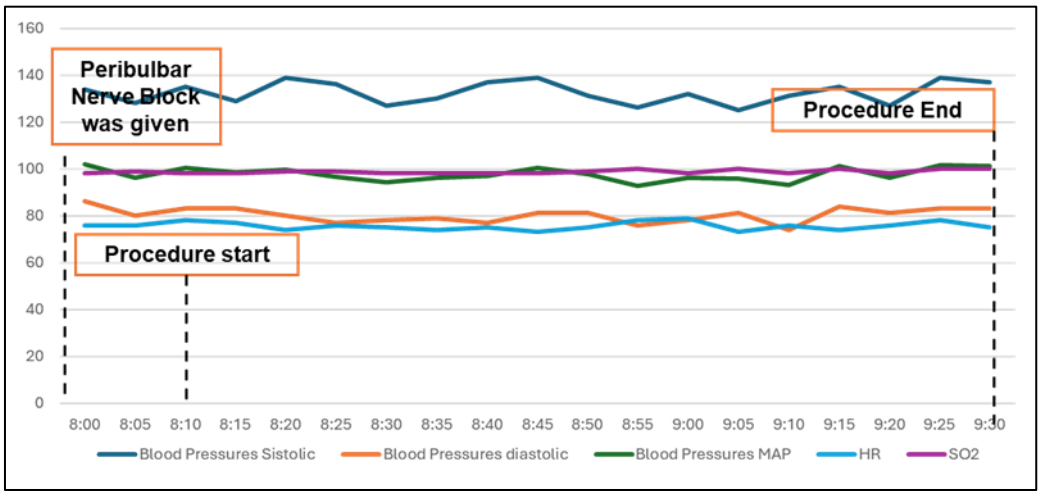

Figure 1 Intraoperative Hemodynamic monitoring show that patient are stable without any cardiac event

2.4. Postoperative Care

Following the completion of the surgical procedure, the patient was transferred to the post-anesthesia care unit (PACU) for close monitoring to ensure the absence of immediate postoperative complications. Particular attention was given to detecting any signs of cardiovascular instability, such as arrhythmias or ischemic symptoms, as well as local complications such as retrobulbar hemorrhage, excessive swelling, ptosis or inadequate return of ocular function.

Once the patient was deemed stable and free of acute complications, they were transferred back to the regular ward for further recovery. Analgesic management included oral paracetamol and ibuprofen, and during the follow up 12 and 24 hours after surgery show VAS score of 1/10. The patient was monitored overnight, with no adverse events noted, and discharged the following day with instructions for continued care and follow-up to monitor surgical outcomes and ensure recovery was progressing appropriately.

3. Discussion

The peribulbar anesthesia technique offers distinct advantages over retrobulbar block, particularly for high-risk patients. It minimizes the risks of globe penetration, optic nerve or artery injury, and injection-associated pain. However, its slower onset time and increased likelihood of ecchymosis are notable drawbacks. Both techniques, nonetheless, achieve comparable levels of ocular akinesia.

Local anesthetics exert their effects by blocking peripheral nerves, primarily through interference with the transmission of action potentials along nerve fibers. This blockade is mediated by the inhibition of voltage-gated sodium channels, a process that requires the local anesthetic to diffuse through surrounding tissue to reach the nerve membrane. Despite precise injection near the target nerve, only 1–2% of the administered local anesthetic penetrates the nerve to exert its effect. The degree of blockade is determined by the concentration and volume of the local anesthetic, as these factors govern the establishment of an effective concentration gradient.

Among the local anesthetics, the pipecoloxylidide group (e.g., mepivacaine, bupivacaine, ropivacaine, and levobupivacaine) consists of chiral compounds with molecules that possess an asymmetric carbon atom. Many such anesthetics are available as racemic mixtures containing equal proportions of left-handed (S) and right-handed (R) enantiomers. Pharmacological and toxicological profiles differ between enantiomers due to stereoselective binding to chiral receptors or enzymes. S-enantiomers, such as those in ropivacaine and levobupivacaine, demonstrate reduced neurotoxicity and cardiotoxicity compared to their racemic or R-enantiomer counterparts. This characteristic is particularly advantageous in high-risk patients, such as those with severe coronary artery disease (CAD).

The peribulbar technique involves the administration of a larger volume (6–12 mL) of local anesthetic into the extraconal space, allowing extensive spread within the orbital adipose tissue and into the intraconal space to effectively block the relevant nerves. Additionally, the anterior spread of the anesthetic into the eyelids provides a block of the orbicularis muscle, eliminating the need for separate eyelid nerve blocks. The classic approach employs two injections: one in the inferotemporal region and the other in the medial canthus, with precise placement facilitated by aspiration to avoid intravascular injection.

In this case, ropivacaine was selected due to its potent analgesic properties and lower risk of cardiotoxicity compared to alternatives like bupivacaine. A combination of ropivacaine 0.75% (2 mL) and lidocaine 2% (2 mL) was administered using a 25-gauge needle into the inferotemporal and medial canthus regions of the left eye, ensuring no intravascular injection through aspiration.

The safety and efficacy of ropivacaine in high-risk patients are supported by clinical evidence. Choi et al. reported the successful use of ropivacaine for peripheral nerve block in a patient with Brugada syndrome undergoing lower-limb surgery, highlighting its safety in arrhythmia-prone patients. Similarly, Martinez et al. described the effective use of ropivacaine via intercostal catheter infusion in a patient with severe multivessel CAD undergoing liver transplantation, demonstrating excellent analgesia and facilitating early recovery. Senapathi et al. further validated the use of ropivacaine 0.75% combined with lidocaine 2% for peribulbar block during vitrectomy, achieving sufficient analgesia and akinesia.

In this case, the peribulbar block with ropivacaine provided effective analgesia and ocular akinesia while minimizing the risk of cardiac events associated with general anesthesia in a patient with severe CAD. This approach underscores the value of regional anesthesia in optimizing outcomes for high-risk patients, offering both safety and efficacy in the perioperative setting.

4. Conclusion

This case highlights the efficacy of ropivacaine in peribulbar nerve block as a valuable anesthetic technique for ophthalmic surgical procedures in patients with severe coronary artery disease (CAD). The use of ropivacaine not only minimizes the requirement for opioids and systemic anesthetic agents, thereby reducing associated side effects, but also

facilitates improved postoperative recovery and mobilization. These benefits contribute to a shorter hospital length of stay, which is particularly advantageous for high-risk cardiac patients.

Compliance with ethical standards

Acknowledgments

The authors would like to acknowledge that there are no contributions or support to declare for this case report.

Disclosure of conflict of interest

The authors declare that there is no potential conflict of interest related to this case report.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Lin Y, Q. W. (2024). Local Anesthetics (B. F. Cullen, M. C. Stock, R. Ortega, S. R. Sharar, N. F. Holt, W. C. Christopher, & N. Nathan, Eds.; 9th ed.). Wolters Kluwer.

[2] Flood, P., & Shafer, S. (2015). Basic Principles of Pharmacology - Stoelting Pharmocolgy & Physiology in Anesthetic Practice (P. Flood, P. R. James, & S. Shafer, Eds.; 5th ed.). Wolters Kluwer.

[3] Butterworth, John., Mackey, David., & Wasnick, John. (2022). Morgan and Mikhail's Clinical Anesthesiology, 7th Edition John Butterworth, David Mackey, John Wasnick. McGraw Hill Medical.

[4] Prineas S. Local and Regional Anesthesia for Ophthalmic Surgery . https://www.nysora.com/techniques/head-and-neck-blocks/local-regional-anesthesia-ophthalmic-surgery

[5] Choi, E. K., Park, S. J., Baek, J. Y., & Seo, M. (2023). Peripheral nerve block with ropivacaine in Brugada syndrome patient: Anesthetic consideration. Saudi Journal of Anaesthesia, 17(1), 91–93. https://doi.org/10.4103/sja.sja_573_22

[6] Martinez S, Davierwalla P, neethling E, Mccluskey S, Karla S, et all. (2024). Hybrid Coronary Artery Revascularization Before Liver Transplantation: A Case Report. Journal of Cardiothoracic and Vascular Anesthesia. Elsevier, 38 (9), 2105-2108. https://www.sciencedirect.com/science/article/pii/S1053077023006122

[7] Senapathi, TGA; Widnyana, IMG; Ryalino C; Wibawa IBG. Ropivacaine 0.75% for Peribulbar Block in Vitrectomy. Bali Journal of Anesthesiology 5(1):p 38-39, Jan–Mar 2021. | DOI: 10.4103/BJOA.BJOA_146_20