

# Pulmonary oedema in ophthalmic surgeries under peribulbar anaesthesia: A retrospective analysis

## INTRODUCTION

Ophthalmic surgeries are considered low-risk, with an estimated incidence of major complications of approximately 0.006%, especially for surgeries performed under regional eye blocks.<sup>[1]</sup> The frequently documented complications are globe perforation, retrobulbar, and vitreous haemorrhage.<sup>[2,3]</sup> There are some reports on the development of pulmonary oedema (PE) in some patients;<sup>[4-7]</sup> however, the information on the frequency and settings of occurrence is not clearly understood. We report the clinical settings of cases that developed PE while undergoing ophthalmic surgeries under regional anaesthesia.

## METHODS

This retrospective, epidemiological observational study was done after obtaining approval from the institutional review board (vide approval number LEC-BHR-R-05-22-860, dated 03 May 2022), and the study conformed to all the Tenets of the Declaration of Helsinki, 2013. All patients who developed PE during the ophthalmic surgical procedure scheduled under regional anaesthesia from 2019 to 2021 were included in the study.

As per institutional protocols, an incident report was generated for all patients who developed any adverse event during surgery or in the immediate postoperative period. Appropriate authorities reviewed all the incidents through the incident report committees. The details of all these patients were collected by reviewing the incident reports, surgeons' notes and anaesthesiologists' documentation in the case sheets. The patients who developed PE after administration of general anaesthesia were excluded.

All the patients scheduled for ophthalmic surgeries under local anaesthesia were thoroughly examined by an in-house physician and provided surgical clearance. The patients who were >60 years old or associated with multiple co-morbid conditions were referred to the anaesthesiologist for a pre-anaesthetic

evaluation. Before administration of the peri-bulbar block, all standard monitors were attached to the patients, and baseline recordings were noted. During the procedure, the monitoring of the patients were continued. Any adverse events were managed by a team of in-house anaesthesiologists and a physician. The PE was managed as an acute emergency as per standard management. Patients who needed further critical care were transferred to the appropriate facility after stabilisation of the patient.

The study's primary objective was to find the incidence of PE in patients undergoing ophthalmic surgeries under local anaesthesia. The secondary objective was to identify the associated co-morbidities associated with such occurrence. The data collected from the database was entered into a Microsoft Excel sheet, and percentages were calculated accordingly.

## RESULTS

Of the 56,334 surgeries performed under regional anaesthesia, 27 (0.047%) patients developed PE. The mean (standard deviation) age of occurrence of PE was 55.8 (7.1) years, and 19 were male. Of these 27 patients, 19 were scheduled for retinal surgeries, six for cataract surgery, and the other two for wound re-suturing. The associated co-morbidities included hypertension (27 patients), diabetes mellitus (26 patients), coronary artery disease (15 patients), chronic renal failure with elevated creatinine levels (12 patients), and cerebrovascular accident (3 patients). The majority of the patients developed PE after the commencement of the surgical procedure. All of these patients complained of breathing discomfort during the surgical procedure, associated with tachypnoea, tachycardia, elevated blood pressure and a fall in the oxygen saturation values on pulse oximetry.

## DISCUSSION

The incidence of PE in this retrospective study of 56,334 patients over three years was low at 0.047%.

Davis *et al.*,<sup>[1]</sup> in their retrospective analysis of 16,224 patients who received peri-bulbar block, reported the incidence of major systemic complications 0.006%. We identified that most patients developing PE were those undergoing vitreoretinal procedures. Of those, the majority of the patients were undergoing diabetic vitrectomies. This association of having co-morbid conditions has also been pointed out in

previously published case reports.<sup>[4,5,8]</sup> In the previous case reports published,<sup>[9,10]</sup> one of the important reasons for the development of PE was the topical administration of phenyl epinephrine eye drops. Our dataset has no history of documented administration of these drops.

Kumar *et al.*,<sup>[4]</sup> described the development of PE in a patient with a history of mitral stenosis posted for cataract surgery. Taylor *et al.*,<sup>[5]</sup> reported a similar event in a patient with a history of congestive heart failure and atrial fibrillation posted for ophthalmic surgery. Chhabra *et al.*,<sup>[8]</sup> reported the development of PE in an optimised diabetic hypertensive patient with elevated serum creatinine levels posted for vitreoretinal surgery. The authors hypothesised that the PE threshold had been reduced due to associated co-morbid conditions.

The exact reason for the development of PE is unknown. However, it can be hypothesised that the underlying mechanism could be the slow diffusion of local anaesthetics from the orbital cavity into the ventral region of the medulla, leading to varied sympathetic responses. Systemic co-morbid conditions such as diabetes, hypertension, coronary artery disease, and chronic kidney disease could lower the threshold due to sub-optimal ventricular function, leading to PE. The prolonged supine position in vitreoretinal surgery could add to the poor cardiac output.

## CONCLUSION

From our retrospective analysis, we infer that the association of long-term systemic co-morbid conditions such as hypertension, diabetes, chronic kidney disease, and coronary artery disease increases the chances of developing PE in vitreoretinal surgeries as they are prone to varied sympathetic response and suboptimal ventricular function.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

**Ramakrishna Chaitanya Kasanavesi,  
Vivek Pravin Dave<sup>1</sup>, Subhadra Jalali<sup>1</sup>,  
Rajanarsing Rao**

Department of Anesthesia, LV Prasad Eye Institute, KAR Campus,  
<sup>1</sup>Smt. Kanuri Santhamma Center for Vitreoretinal Diseases, Anant  
Bajaj Retina Institute, LV Prasad Eye Institute, Hyderabad,  
Telangana, India

### Address for correspondence:

Dr. Ramakrishna Chaitanya Kasanavesi,  
Plot No 45/2 and 3, Flat 202 Bramarambha Residency Manikonda,  
Hyderabad, Telangana, India.  
E-mail: chaitanyakr83@gmail.com

**Submitted:** 01-Jul-2023

**Revised:** 09-Sep-2023

**Accepted:** 11-Sep-2023

**Published:** 07-Nov-2023

## REFERENCES

1. Davis DB 2<sup>nd</sup>, Mandel MR. Efficacy and complication rate of 16,224 consecutive peribulbar blocks. A prospective multicenter study. *J Cataract Refract Surg* 1994;20:327-37.
2. Rubin A. Complications of local anaesthesia for ophthalmic surgery. *Br J Anaesth* 1995;75:93-6.
3. Hamilton RC. A discourse on the complications of retrobulbar and peribulbar blockade. *Can J Ophthalmol* 2000;35:363-72.
4. Kumar CM, Lawler PG. Pulmonary oedema after peribulbar block. *Br J Anaesth* 1999;82:777-9.
5. Taylor I, Watters M. Pulmonary oedema after ophthalmic regional anaesthesia in an unfasted patient undergoing elective surgery. *Anesthesia* 2001;56:441-6.
6. Kwinten FA, De Moor GP, Lamers RJ. Acute PE and trigeminal nerve blockade after retrobulbar block. *Anesth Analg* 1996;83:1322-4.
7. Elk JR, Wood J, Holladay JT. PE following retrobulbar block. *J Cataract Refract Surg* 1988;14:216-7.
8. Chhabra A, Singh PM, Kumar M. Pulmonary oedema in a patient undergoing vitreoretinal surgery under peribulbar block. *Indian J Anaesth* 2012;56:387-90.
9. Solosko D, Smith RB. Hypertension following 10 per cent phenylephrine ophthalmic. *Anesthesiology* 1972;36:187-9.
10. Abdelhalim AA, Mostafa M, Abdulmomen A, Othman EA. Severe hypertension and PE associated with systemic absorption of topical phenylephrine in a child during retinal surgery. *Saudi J Anaesth* 2012;6:285-8.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
Quick response code	Website: <a href="https://journals.lww.com/ijaweb">https://journals.lww.com/ijaweb</a>
	DOI: 10.4103/ija.ija_623_23

**How to cite this article:** Kasanavesi RC, Dave VP, Jalali S, Rao R. Pulmonary oedema in ophthalmic surgeries under peribulbar anaesthesia: A retrospective analysis. *Indian J Anaesth* 2023;67:1009-10.