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Spontaneous Globe Rupture as Complication of Pneumatic Retinopexy: Case Report

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***Summary**:*
Pneumatic retinopexy is a retinal reattachment procedure involving trans conjunctival injection of gas into the vitreous cavity. The patients are commonly advised against air travel during the first weeks following the surgery due to intraocular pressure variation. We report the case of a patient presenting with a spontaneous globe rupture occurring during a flight 3 weeks after his retinal detachment surgery. In the era of growing air traffic, more studies are needed to establish criteria for air travel safety after vitreo retinal surgery. This case highlights the importance of thoroughly informing the patient about any procedure adverse outcomes.

Keywords: *gas tomponnade, pressure, intraocular pressure, altitude.*

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I. Introduction:

Pneumatic retinopexy is a retinal reattachment procedure involving transconjunctival injection of gas into the vitreous cavity, combined with cryotherapy or laser retinopexy followed by postoperative positioning.

The surgery is generally safe. However it remains an intraocular procedure and therefore potentially carries with it the danger of infection, hemorrhage, and damage to intraocular structures. Most complications can be avoided with careful preoperative examination, close attention to surgical details, and appropriate postoperative management. The patients are commonly advised against air travel during the first weeks following the surgery.

We report the case of a spontaneous globe rupture complicating a pneumatic retinopexy during a flight

II. Patients And Methods:

An 85 year-old male patient, with a history of hypertension and ischemic cardiopathy presented with a left eye bleeding occurring several hours prior to his admission in the ophthalmology department. The patient reported an avid pain in the left eye during the flight followed by a gush of warm fluid and blood. He had a retinal detachment surgery with gas injection 3 weeks prior to the flight in a foreign structure. Medical records couldn't be provided. The patient was reportedly advised against air travel but proceeded to it nonetheless. The patient had no history of elevated IOPs.

On examination, the visual acuity was 6/10 in the right eye and no light perception in the left. On the right, all findings were normal and the intraocular pressure was evaluated at 15 mmHg. On the left, there was marked periorbital edema, generalized injection of the conjunctiva, uveal tissue protruding through the cornea with no visualization of other structures(figure1)

The orbital computed tomography scan showed the protrusion of intraocular content from the globe with a vitreous hemorrhage and no sign of malignancy(figure2). The patient underwent an evisceration with insertion of an orbital implant in the left eye. The histology report showed inflammatory infiltrates involving the retinal and uveal layers with hemorrhagic necrosis.

Figure 1: Left globe rupture

Figure 2 : CT Scan showing left globe rupture

III. Discussion:

A search for information on the websites of the world's largest airlines, , suggests a considerable range of opinion as to when it might be safe to fly after intraocular gas injection Information provided for passengers by some of these airline websites suggest a passenger could be cleared to travel after as little as 6 days after injection of gas. Others recommend waiting for as long as 6 weeks(1).

The most common gas tamponades used are air, SF6 and perfluoropropane (C3F8) .In some centers, perfluoroethane (C2F6) is used. SF6 expands approximately two times over 1–2 days, 100% C2F6 expands approximately three times over 1–2 days, and 100% C3F8 expands approximately four times over 3–4 days(2).

Small volumes of undiluted gas are typically used for pneumatic retinopexy. Commonly used concentrations are 20% for SF6, 16% for C2 F6, and 14% for C3F8. Following a complete gas–fluid exchange, gas tamponade agents resorb spontaneously from the vitreous cavity, over a period of 5–7 days for air, 2 weeks for 20% SF6, 4–5 weeks for 16% C2F6, and 8 weeks for 14% C3F8.

Altitude-associated changes in the volume of intraocular gas bubbles can be explained by Boyle's law (P1V1 = P2V2). Decreases in absolute IOP (atmospheric pressure +IOP) are observed as altitude increases, due to the falling surrounding atmospheric pressure. As the atmospheric pressure decreases, an intraocular gas bubble will undergo expansion following Boyle's law: P1V1=P2V2, where P indicates the pressure of the system and V indicates the volume of the gas. This elevation in intraocular pressure is moderated by factors such as choroid compression, scleral expansion, and increased aqueous outflow, but these mechanisms are limited in their ability to accommodate expansion of the intraocular gas bubble(3). Once the globe's maximum

capacity is reached, the intraocular pressure increases, which may result in acute glaucoma and even central retinal artery occlusion(4) In our case, the globe rupture was related to intraocular pressure increase due to gas expansion. No similar case has been reported before.

There are very few reports in the literature of altitude-associated IOP changes with intraocular gas volumes superior to 20%. In 1994, Kokame and Ing published a case detailing the IOP changes in a patient with a gas bubble volume of 65% ascending to 3,000 feet(5). As with Foulsham et al, a patient with 50% fill bubble who underwent a short trip ascending to 2600 feet did not experience pain or decreased vision(6) Both cases also describe instantaneous changes in IOP with changes in altitude. The IOP increase per 1,000 feet of ascent was similar in both studies (10.8 mmHg). In our case; nor the volume of intraocular gas, nor the flight characteristics could be determined.

Although the risks of air travel with intraocular gas have been well documented, there have been some suggestions in the literature that under certain conditions (low-altitude flight or small gas bubbles) flight with intraocular gas may be safe. Kokame and Ingal reported the case of a 78 years old patient who underwent a vitreous surgery with injection of 16% C3F8 for recurrent psudophaquic retinal detachment taking a short time flight responding to specific measures. During the flight, the intravitreal cavity bubble size, the intraocular pressure as well as the flight characteristics were assessed. No incident was reported (6)

Air flights at low altitudes up to 2000 feet seems to be well tolerated even with large vitreous cavity gas fills. The flight characteristics to be considered are: duration of the flight, the maximum cruising altitude, maximum pressurized cabin altitude and type of the engine. Other ocular factors are also to be considered including: size of the vitreous cavity gas, history of advanced glaucomatous optic nerve damage and baseline intraocular pressure(5)

The importance of a patient's ophthalmic history is emphasized by a case reported by Muzychuk et al, who describe a 64-yearold patient with glaucoma and a 10% fill C3F8 intraocular gas bubble after pneumatic retinopexy taking an international flight(7). The patient described pain and complete loss of vision in the postoperative eye after take-off, which persisted until after landing. On review 2 weeks later, the patient's cup-to-disc ratio was observed to have increased from 0.3 to 0.5, and his optical coherence tomographic scan revealed a loss of nerve fiber layer thickness from an average of 97.0 mm before the flight to 85.6 mm afterward

IV. Conclusion:

The standard recommendation is that patients should not fly until intraocular gas has been fully absorbed. However in the era of growing air traffic, more studies are needed to establish criteria for air travel safety after vitreo retinal surgery. This case highlights the importance of thoroughly informing the patient of any procedure adverse outcomes.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

Contribution of the authors:

All the authors participated in the care of the patient and the writing of the manuscript. All authors have read and approved the final version of the manuscript.

References:

[1]. Houston S, Graf J, Sharkey J. Commercial Air Travel After Intraocular Gas Injection. Aviat Space Environ Med. 2012 Aug 1;83(8):809–10.

[2]. Vaziri K, Schwartz SG, Kishor KS, Flynn HW. Tamponade in the surgical management of retinal detachment. Clin Ophthalmol Auckl NZ. 2016 Mar 16;10:471–6.

[3]. Lincoff H, Weinberger D, Reppucci V, Lincoff A. Air travel with intraocular gas. I. The mechanisms for compensation. Arch Ophthalmol Chic Ill 1960. 1989 Jun;107(6):902–6.

[4]. Dieckert JP, O'Connor PS, Schacklett DE, Tredici TJ, Lambert HM, Fanton JW, et al. Air Travel and IntraocuIar Gas. Ophthalmology. 1986 May;93(5):642–5.

[5]. Kokame GT, Ing MR. Intraocular gas and low-altitude air flight. Retina Phila Pa. 1994;14(4):356–8.

[6]. Foulsham W, Chen XN, Vavvas DG. ALTITUDE-ASSOCIATED INTRAOCULAR PRESSURE CHANGES IN A GAS-FILLED EYE. Retin Cases Brief Rep [Internet]. 2019 Jan 11 [cited 2021 Jun 19];Publish Ahead of Print. Available from: https://journals.lww.com/01271216-900000000-98727

[7]. Muzychuk AK. Commercial Air Travel With a Small Intravitreous Gas Bubble. Arch Ophthalmol. 2011 Jun 1;129(6):805.

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