Case Report

Anterior 360° Synechiolysis in a Case of Late Iridocorneal Adhesions after 25-G Vitrectomy: Surgical and Physiopathogenetic Aspects

Raffaele Nuzzi   Francesca Monteu

Eye Clinic Section, University of Turin, Ophthalmic Hospital, Turin, Italy

Keywords

Vitrectomy · Iridocorneal synechiae · Synechiolysis

Abstract

We describe the case of an 86-year-old patient, pseudophakic in both eyes and with high myopia, who had previously had a 25-G vitrectomy with 20% C3F8 used as a tamponade due to a total retinal detachment with choroidal hemorrhages and macular hole. At the postoperative 4-month follow-up, we found 360° iridocorneal synechiae with elevated intraocular pressure due to angle closure in all sectors, with an adherent retina and in the absence of choroidal hemorrhage/detachment and of corneal edema or endothelial damage. The patient was, therefore, hospitalized to receive 360° anterior synechiolysis with a single opening to the corneal limbus, like in paracentesis, with topical anesthesia. We have tried to study the possible causes of this case history. However, it should be recognized that the development of iridocorneal synechiae and the rise of intraocular pressure can be a possible complication of air/C3F8 vitrectomy, which cannot be managed with medical therapy. It will be essential to monitor the situation and to hospitalize the patient for surgical synechiolysis to restore the normal anatomy and physiology and to correct the ocular hypertension. During the vitrectomy, we will have to introduce in advance an adequate amount of viscoelastic material in the anterior chamber and to perform a preventive surgical iridectomy, even if the iridocorneal angle is open in all sectors.

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We describe the case of an 86-year-old patient, pseudophakic in both eyes and with high myopia, who had previously had a 25-G vitrectomy with 20% C3F8 used as a tamponade due to a total retinal detachment with choroidal hemorrhages and macular hole.

At the early postoperative follow-ups, the intraocular pressure was within normal limits, the anterior segment was normal, the retina was attached in all sectors, the choroidal hemorrhage was in the process of reabsorption, and the macular hole appeared totally closed with air in progressive reabsorption. However, at the postoperative 4-month follow-up, we found 360° iridocorneal synechiae with elevated intraocular pressure due to angle closure in all sectors, with an adherent retina and in the absence of choroidal hemorrhage/detachment and of corneal edema or endothelial damage. The patient was, therefore, hospitalized to receive 360° anterior synechiolysis with a single opening to the corneal limbus, like in paracentesis, with topical anesthesia.

During the postoperative follow-ups, total iridocorneal angle reopening and persistence of the closure of the macular hole was found by gonioscopy. The intraocular pressure was within normal ranges, the retina was adherent, and there were no recurrences of hemorrhage/detachment of the choroid. It was decided not to prescribe mydriatic eye drops as a preventive measure and to monitor the patient more closely.

It must be noted that the patient did not report any changes in his medical history or in daily habits during the last 4 months and that he did not report any systemic diseases or existing systemic therapies.

Discussion

It should always be remembered that after a vitrectomy with air/C3F8 tamponade, an immediate increase in intraocular pressure can be caused by several mechanisms:

1. An overexpansion of the gas introduced in the eye, which may cause an increase in intraocular pressure due to the complete filling of the vitreous cavity if, in relation to the gas typology, the expandable gas concentration used was too high.

2. Travels to high altitudes, which can cause intraocular gas expansion according to Boyle's law [1].

3. Brosh et al. [2] reported several case reports of ocular hypertension which persisted despite getting back to the initial altitude and contrary to Boyle's law according to which the gas should return to the initial expansion by restoring the intraocular pressure. This process was explained by an increased production of aqueous humor due to a compensation mechanism to hypotony or by a gas bubble expansion due to particle diffusion inside the bubble while the pressure was higher.

Johnstone and Grant [3] have shown a collapse of the trabecular meshwork during low values of intraocular pressure, causing an increase in the volume of aqueous humor in the eye. However, upon ascent to a higher altitude, the gas bubble expands to the same size as it had at hospital discharge but with a larger volume of aqueous; therefore, the intraocular pressure rises. Furthermore, self-compensatory mechanisms, which include choroidal compression, sclera expansion, and increased aqueous outflow, need time to fully accommodate [4]. Thus, a rapid rate of ascent can overcome the compensatory mechanisms and can induce high intraocular pressure and pain.

Another factor that needs to be explained was the presence of massive choroidal hemorrhages as well as a choroidal detachment in our highly myopic patient at the time of vitrectomy. The voluminous hemorrhagic mass could have caused an anterior displacement of the iris due to retinal and choroidal detachment and, therefore, a secondary acute angle closure in relation to the anatomically and physiologically functional continuity of the uveal tract at a later time point, since the first checkups were normal.

In this particular case, we could not establish the major cause of the ocular hypertension and of the iridocorneal synechiae, since this situation was not related to the patient's clinical history and since it has not been documented in the literature and had an unusual timing.

The last point mentioned and the development of compensatory mechanisms of meshwork tissue remodeling in response to altitude changes can only give a partial answer in association with the anatomical features of a highly myopic eye, with massive hemorrhagic choroidal detachment, and with the similarity to the physiological angle closure due to a massive hemorrhagic choroidal detachment.

However, it should be recognized that the development of iridocorneal synechiae and the rise of intraocular pressure can be a possible complication of air/C3F8 vitrectomy, which cannot be managed with medical therapy. It will be essential to monitor the situation and to hospitalize the patient for surgical synechiolysis to restore the normal anatomy and physiology and to correct the ocular hypertension. During the vitrectomy, we will have to introduce in advance an adequate amount of viscoelastic material in the anterior chamber and to perform a preventive surgical iridectomy, even if the iridocorneal angle is open in all sectors.

Finally, it will be important to use an integrated strategy of general medicine, surgery, and postoperative care, as well as a case-by-case strategy, to avoid a late irreversible damage of the optic nerve head (with a deficit in visual acuity and visual field), of the cornea, and of the photoreceptors (already damaged by macular hole and retinal detachment).

Statement of Ethics

This study followed the tenets of the Declaration of Helsinki. Personal identifiers were removed because consent to publishing such information was not obtained.

Disclosure Statement

The authors have no conflicts of interest to disclose. This study was not funded.

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