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Case report

Scleral rupture during intraoperative silicone oil injection in pars plana vitrectomy

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ABSTRACT

Purpose: To report a single case history of scleral rupture (SR) during silicone oil injection in a pars plana vitrectomy.
Observations: A 60-year-old woman with a history of pathological myopia presented with acute vision loss in her right eye. A retinal detachment, with multiple tears, was diagnosed, and she underwent vitreoretinal surgery. During silicone oil injection, a SR, with extra ocular oil leakage, was advised. Due to the small extent of the lacerated area, the SR was left to spontaneously resolve and, after three surgeries, the retina remained attached, with no internal tamponade, and the patient had not presented symptoms or signs of intracranial migration or toxicity.

Conclusions and importance: During silicone oil injection, it is most important to maintain a controlled eyeball pressure, especially in patients with scleral weakness, and to carefully check the drainage of air, due to the risk of SR. When oil leakage is detected in the orbital cavity, an accurate assessment may be required due to the likelihood of progression inside the intracranial structures.

1. Introduction

During pars plana vitrectomy (PPV), scleral rupture (SR) is an uncommon, but very serious complication. The main predisposing factors are reoperation after a failed scleral buckling procedure (SBP) and preexisting scleral disease. Pathological myopia (PM), characterized as a thinned sclera, choroid, and retina may be identified as a further risk factor.

Intraocular silicone oil tamponade has been used for decades in treating complex vitreoretinal diseases. Some complications have been reported, which have appeared during the postoperative period, including emulsification, secondary glaucoma, cataract formation, band keratopathy, repopulation of membranes beneath the oil interface, optic atrophy, and extraocular migration through sclerotomy wounds, glaucoma drainage devices, and the optic disc. To the best of our knowledge, this case is the first report of a blowout during silicone oil injection in a PPV.

2. Case report

A 60-year-old woman presented in June 2016 to the Retina and Vitreous Department of the Hospital Universitario Austral with acute vision loss in her right eye (OD). She had no history of ocular trauma, ocular surgery, or elevated intraocular pressure (IOP) in either eye. There was no remarkable systemic condition, except for chronic obstructive pulmonary disease (COPD). The OD measured −11.4 D and presented amblyopia. The best-corrected visual acuity (BCVA) was light perception in the OD and 20/30 in the left eye, with a −0.50 D sphere.

Examination revealed a total retinal detachment (RD) in the OD, with multiple tears in the superior quadrants and signs of moderate proliferative vitreoretinopathy (PVR). A standard 23G PPV was performed using an OERTLI OS4 (Oertli, Switzerland), according to the routine technique for RD repair.

In brief, a complete vitrectomy was performed and the hyaloid was peeled back. The retina was reattached with perfluorocarbon liquid (FCI Ophthalmics, perfluorocarbon liquid, 5 ml vial), and the tears were treated with an endolaser. After fluid–air exchange, 1000 cSt of silicone oil (FCI Ophthalmics, purified silicone oil, 10 ml) was injected into the air-filled eye via an infusion cannula at a predetermined 5-bar of maximum pressure. Three ports were valved. A 30G cannula inserted via sclerotomy was used for draining the air. During the injection procedure, silicone oil was observed underneath the conjunctiva. An SR was identified beneath the superior temporal arcade over a chorioretal atrophy area. The procedure was halted and the endolaser was applied around the dehiscent area. The sclerotomies were sutured with vicryl 7/0.

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After surgery, topical prednisolone acetate and moxifloxacin were indicated, in addition to intramuscular dexamethasone. Orbital magnetic resonance imaging (MRI) revealed a hypointense signal inside the right eyeball and in the periorbital tissue and the intraconal and extracranial orbital fat indicative of silicone oil (Fig. 1). There was no alteration in the cerebral MRI. Three weeks later, an ophthalmologic assessment showed inferior RD with temporal tears and signs of PVR.

A second 23G PPV was performed. Before the trocars were inserted, a balanced salt solution (500 ml) was delivered with an infusion cannula at 2-bar pressure. The surgeon continuously digitally checked the IOP during the procedure. Two weeks later, a new MRI showed decreased orbital oil (Fig. 2) and continuously digitally checked the IOP during the procedure. Two weeks later, a new MRI showed decreased orbital oil (Fig. 2) and normal cerebral images.

A temporal RD and cataract were diagnosed during ophthalmic evaluation. A third 23G PPV, combined with phacoemulsification, was required. The tamponade used was 14% perfluoropropane ophthalmic gas, multidose cylinder, Arcadophta). No intraocular lens was placed.

Several years after the third surgery in the OD, the retina remained attached with no internal tamponade. There was fibrotic tissue over the temporal side of the retinectomy, but the optic disc showed no significant changes compared to the initial assessment. The IOP was 12 mmHg and the BCVA was a hand motion in the OD (Fig. 3).

3. Discussion

We reported a single case history of a patient with PM and SR during a PPV, with silicone oil migration into the orbital cavity. Silicone oil is an inert material known to be associated with complications, such as emulsification, secondary glaucoma, cataract formation, corneal edema, oil keratopathy, inflammatory reaction with repopulation of membranes beneath the oil interface, optic atrophy, and oil migration.

SR has been more frequently reported during the placement of sutures in strabismus or an SBP, during periocular anesthesia, episcleral dissection, or extremely tight extraocular muscle disinsertion. Immediate management includes anatomical recovery by suturing or by the placement of a scleral patch graft or silicone explant over the lacerated area. PM, defined as the eye having choroidal atrophy equal to, or more severe than, diffuse atrophy, tends to present thinner sclera, and infusion pressure at values that are usually safe in emmetropic patients can be dangerous in myopes.

During the first intervention, the maximum oil injection pressure was set (5 bar) and a 30G cannula was inserted through sclerotomy because valved trocars would have prevented air drainage. The permeability of the cannula was prechecked, as usual; it was assumed that this could have become momentarily occluded by the eye wall or oil because silicone oil is too viscous to pass through such a small-bore cannula, and the pressure could have risen to a maximum for enough time to rupture a weak scleral wall. To avoid this complication, the venting cannula should be at least 25G.

When we noticed that there was a small SR and that the retina was still attached around the break, an endolaser was applied around it, leaving the SR to spontaneously resolve. This can be controversial, but the lesion was small and it was assumed that it was valved because the eyeball maintained an acceptable pressure. In addition, the anesthesiologist advised the surgeon not to extend the procedure time because valved trocars would have prevented air drainage. The permeability of the cannula was prechecked, as usual; it was assumed that this could have become momentarily occluded by the eye wall or oil because silicone oil is too viscous to pass through such a small-bore cannula, and the pressure could have risen to a maximum for enough time to rupture a weak scleral wall. To avoid this complication, the venting cannula should be at least 25G.

During the postoperative follow-up, silicone oil was detected in the orbital cavity, with no progression beyond that. The presence of extracranial silicone oil is a rare complication. Migration through scleral wounds or glaucoma drainage devices into the subconjunctival and orbital space, and through the optic nerve into the brain, has been reported. In addition to glaucoma, this can cause a direct toxic effect on the optic nerve in humans and rabbits, and its intracranial presence has been related to symptoms including seizures, headaches, dizziness, and nausea. Silicone oil in the orbital cavity requires assessment by orbital and cerebral MRI, in consultation with a neurologist, because of the possibility of intracranial migration and toxicity. For the time being, the patient has not presented symptoms or signs of toxicity or mass effect.

4. Conclusions

During silicone oil injection, it is extremely important to maintain...
controlled eyeball pressure, especially in patients with scleral weakness. The pressure values for injection should be set to minimum or medium. The venting cannula should be at least 25G – a bore wide enough to allow excess oil to be vented through the cannula. Scleral repair can be skipped when a small rupture is suspected. Because the side-effects of silicone oil inside the orbital cavity and in contact with intracranial structures have not been well defined or elucidated, an accurate assessment may be required. In this case, there are no sequels to report.

Patient consent

Not applicable. This report does not contain any personal information that could lead to the identification of the patient.

Conflicts of interest

None.

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