Pilocarpine aiding the management of early post-operative silicon oil migration into the anterior chamber after vitrectomy in an aphakic child: case report

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Case Report

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Abstract

Background:

Silicon oil has been used in retinal surgeries for decades. One of the observed complications after its use is a high intraocular pressure. Herein, the management of early high intraocular pressure secondary to silicon oil migration into the anterior chamber in an aphakic child post vitrectomy is described.

Case presentation:

An eight-year-old boy presented to the emergency department just five days post lensectomy; pars plana vitrectomy and silicon oil tamponade was done due to traumatic cataract in the left eye. He had a high intraocular pressure with massive silicon oil infiltration into the anterior chamber. He was managed conservatively with face-down position, mydriatics, and antiglaucoma drugs. Afterwards, the silicon oil retracted into the posterior pole, and the patient was given pilocarpine to constrict the pupil and prevent re-migration of silicon oil into the anterior chamber. His intraocular pressure remained controlled till it was safe to remove the silicon oil by the vitreoretinal surgeon.

Conclusion:

This case highlights the value of pilocarpine in the prevention of silicon oil remigration into the anterior chamber; thus creating time for safe silicon oil removal. By utilizing these conservative measures, invasive interventions can be deferred, minimizing risks and optimizing patient outcomes, particularly in the pediatric population.

Background

Since 1962, silicon oil tamponade has been successfully used in retinal surgeries for retinal detachment (1). Although it has changed the outcome of retinal detachments for the better, even after all these decades, it is not devoid of complications. One of the complications of silicon oil (SO) use is high intraocular pressure. The incidence of SO-induced high intraocular pressure varies and is dependent on several factors, including, but not limited to, the type of surgery—as it is more often observed with combined pars-plana vitrectomy and encircling scleral band; the type of SO used, especially low viscosity SO; pre-existing glaucoma; and duration of SO tamponade (2, 3). The timing of intraocular pressure rise after the use of SO can vary greatly; this rise might be temporary or permanent, leading to vision loss (4). As the management of this rise in intraocular pressure is challenging, we report our management of a case of an aphakic child with high intraocular pressure secondary to massive infiltration of silicon oil into the anterior chamber.

Case report

An eight-year-old boy presented to the emergency department with sudden onset ocular pain in the left eye (OS) with nausea and vomiting of one day duration. His past ocular history included Left eye primary globe repair in 2021, after which he had chronic serous choroidal detachment secondary to the previous penetrating trauma, hypotonus globe, and traumatic cataract. Eight months later, he underwent another surgery for lens aspiration with anterior vitrectomy for the traumatic cataract, pars plana vitrectomy with silicon oil “SO” 1300 centistokes injection and cyclitic membrane removal, and capsulotomy OS. Few days later, he presented to us with high intraocular pressure (IOP) OS of 50 mmHg: he had an injected conjunctiva, but intact sutures; mildly edematous cornea, and a very deep anterior chamber (AC) with inferior patent surgical iridectomy. We confirmed the presence of SO with gonioscopy by visualizing the SO meniscus at the angle; he was aphakic, and the retina was attached under the SO with a healthy hyperemic disc.

The patient was started on antiglaucoma topical combination of dorzolamide 2%, timolol maleate 0.5%, and latanoprost 0.005% and systemic oral Acetazolamide 250 mg; at this time, the IOP decreased to 24 mmHg, but one hour later, it increased to 40 mmHg, and the SO was still in the AC on examination. Afterwards, we admitted him under our care and administered mydriatics drops; then, we kept him on face-down position for three hours. Following that, we examined him: the gonioscopy exam showed an open angle with retracted SO into the posterior pole, and his IOP decreased to 20 mmHg. The following morning, the child became symptomatic again, and when we examined him, the SO had re-migrated into the AC; on gonioscopy, SO meniscus was seen again. His IOP was 40 mmHg; thus, we started the same management again—mydriatics, face down position, and topical and systemic antiglaucoma drugs. We kept him on face down position for three hours and when we re-examined him, the SO globule had retracted completely into the posterior pole. At that time, we administered pilocarpine to constrict the pupil to prevent SO re-migration into the anterior chamber. His IOP dramatically decreased to 13 mmHg after pilocarpine was commenced.

We discharged the patient on topical antiglaucoma, pilocarpine, and strict face down position for three days. One week later, on follow up, his IOP was controlled and there was no SO in the AC. The patient was scheduled for SO removal in a few months.

Discussion

Silicon oil–induced ocular hypertension has been reported relatively common after retinal surgery; it has different pathogenesis depending on the timing after surgery and the patient’s presentation. Early post-operative high intraocular pressure could be secondary to an inflammatory reaction, leading to trabeculitis and a rise in intraocular pressure. Another mechanism is pupillary block: this occurs when SO migrates into the AC and causes a physical obstruction of the pupil, preventing outflow of the aqueous through the angle. The migration of SO into the anterior chamber and the angle is also a proposed mechanism of early post-operative high intraocular pressure; this migration leads to an obstruction of aqueous outflow with subsequent increase in intraocular pressure. Intermediate- to late-onset post-operative high intraocular pressure includes SO emulsification, leading to an increase in the viscosity of

aqueous; thus, an increase in intraocular pressure, synechiael angle closure, and rubeosis iridis. Silicon oil-induced ocular hypertension is multifactorial, as we have shown, and other potential mechanisms exists (4–6).

The reports of the incidence of SO-induced ocular hypertension in literatures is conflicting, ranging from 2.2–50% (7)(4); however, a recent study by Khayoom et al. found the incidence to be approximately 61% in their patients (6).

The common practice in aphakic patients is to do a prophylactic peripheral iridectomy; inferiorly placed iridotomy to minimize the risk of developing pupillary block (8). Merriman et al. have argued that the best position for peripheral iridotomy in the setting of SO in the anterior chamber is to place the iridotomy at the edge of the SO globule at the most inferior and peripheral part (9). High intraocular pressure secondary to the use of silicon oil is usually managed medically with topical antiglaucoma and oral acetazolamide. Although the face-down position has been reported previously in literatures, it was ineffective on its own and could not be sustained by the patients (9, 10). Pilocarpine can be used in this setting to prevent re-migration of the SO and thus the patients would not need to continue the face-down position. Other options include surgical management such as silicon oil removal or glaucoma valve surgery.

In our patient, given that he is a child and he has had a recent retinal surgery, we decided to try conservative management initially. We started with topical plus systemic antiglaucoma drugs, gave him mydriatics, and instructed him to adopt a face-down position. Since the SO floats, it returned to the posterior pole. At that time, we used pilocarpine to constrict the pupil, thus preventing SO re-migration. The use of pilocarpine in reducing intraocular pressure is well known; its mechanism of action is by stimulating muscarinic receptors in the ciliary muscle, leading to its contraction. This pulls the scleral spur and opens the trabecular outflow (11). Our use of pilocarpine, in this case, was only to constrict the pupil; thus preventing SO remigration.

We propose the flowchart in Fig. 1 for the management of these patients.

Conclusion

As physicians treating the pediatric population, the benefits should always outweigh the risks in every intervention taken, and it is important to always start with conservative management, where applicable. The use of pilocarpine to prevent SO remigration should be considered to buy time for the patient until it is safe to remove the SO. Given its low risk, compared to the benefit, it is definitely worth keeping this conservative approach in mind when treating these patients.

Abbreviations

1. SO: silicon oil.
2. AC: anterior chamber.

3. OS: left eye.
4. IOP: Intraocular pressure.
5. PPV: Pars-plana vitrectomy.

Declarations

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Authors' contributions

All authors contributed significantly to this work. F.A planned and contributed to the write-up of the manuscript. N.A and F.Q contributed to reviewing and editing the final draft and N.A was the corresponding author. A.A contributed to collecting the patient data, reviewing the literature and the process of publication. All authors read and approved the final manuscript.

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Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of King Khaled specialist eye hospital and was implemented in accordance with the World Medical Association Declaration of Helsinki.
The patient mother was informed about the study and signed the written informed consent.

Consent for publication

Written informed consent for publication was obtained from the patient mother of this case report.

Competing interests

The authors declare no competing interests.

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Figures

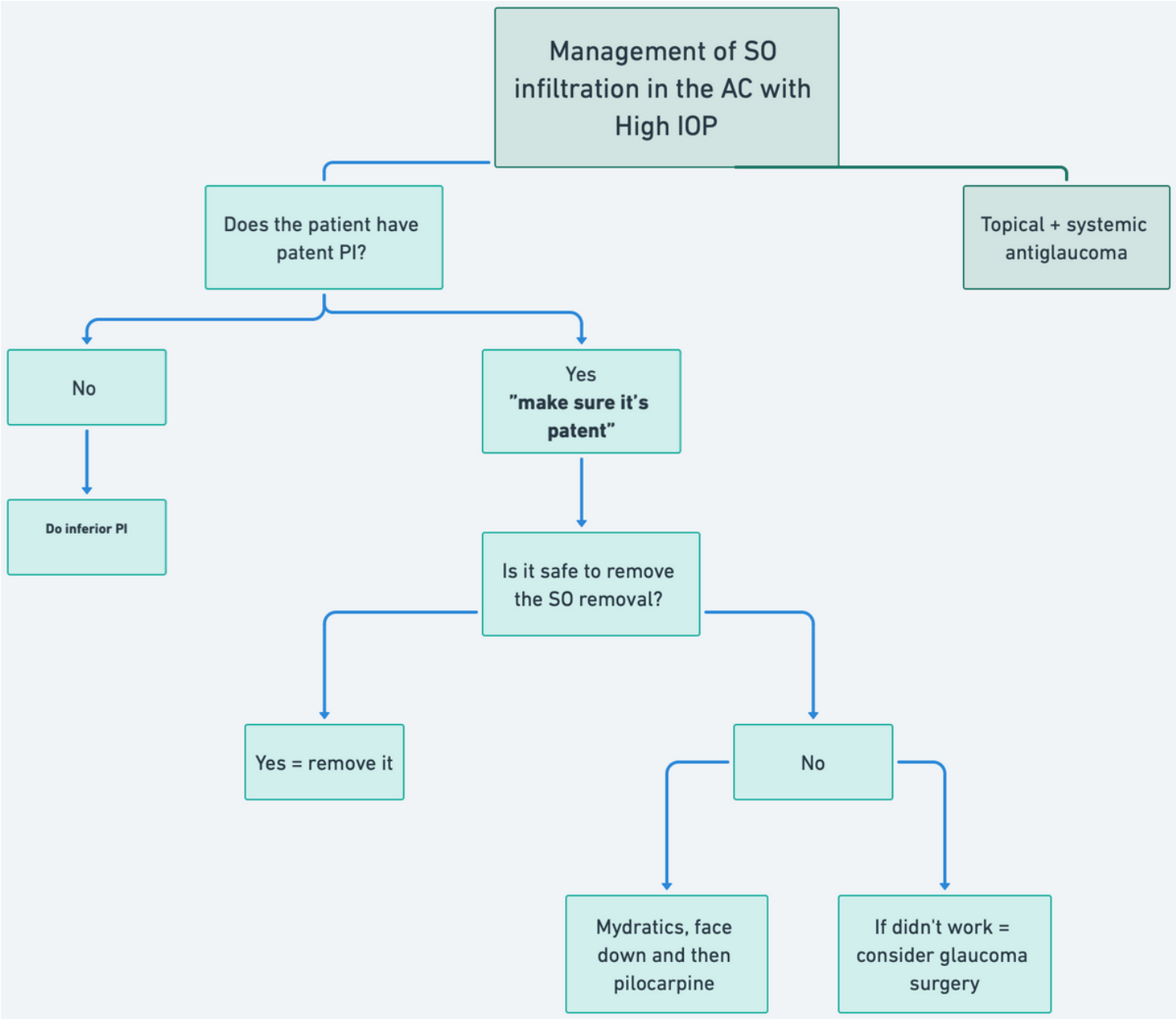

Figure 1

Although the conservative management might not work in all patients, we believe it is worth the try, especially in the pediatric population, to avoid the risk of more invasive procedures as well as the risks posed by general anesthesia.