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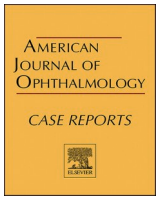

Phthisical eye and orbital ischemia after cosmetic platelet-rich plasma injection to the forehead

Samantha Madala, Yicheng K. Bao, Jun Hui Lee, Jeffrey Gluckstein, Jessica Chang, Sandy Zhang-Nunes *

USC Roski Eye Institute, Keck School of Medicine of the University of Southern California, Los Angeles, CA, USA

A R T I C L E I N F O

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A B S T R A C T

Purpose: To report a case of retrograde embolism of cosmetic injection of platelet-rich plasma (PRP) to the ophthalmic artery, resulting in orbital ischemia, blindness, and eventual phthisis bulbi.

Observations: A 37-year-old woman presented with two days of vision loss OS beginning seconds after undergoing cosmetic PRP filler injections to the face at an outside clinic. Immediately after injection to the left medial forehead, the patient reported bleeding, transient loss of consciousness, and complete vision loss OS. Two days later, vision remained no light perception OS and she exhibited manifestations of both anterior and posterior segment ischemia in the left eye. These findings were ultimately attributed to retrograde embolism to the ophthalmic artery via inadvertent injection of PRP into the supratrochlear or supraorbital arteries. She ultimately did not regain her vision in the left eye and the eye became enophthalmic and phthisical.

Conclusions: After conducting a literature review on August 18, 2023, utilizing PubMed and Google Scholar, and searching for the key words "platelet-rich plasma" and "vision loss" or "vision impairment," we did not find any prior reports of anterior segment ischemia or pan-orbital ischemia resulting in phthisis bulbi. In the setting of vision changes after cosmetic platelet-rich plasma filler injection. Additionally, there is no validated therapy for ophthalmic artery occlusion from any cosmetic filler embolism. Further research should prioritize developing therapeutic guidelines for managing such complications. Injectors should also be educated to emergently refer patients to hospitals with ophthalmology consults available and stroke protocols in place.

1. Introduction

Platelet-rich plasma (PRP) is an autologous blood-derived compound that has become a widely available cometic filler used to reduce wrinkles, acne scars, hair loss and more. PRP contains high concentrations of platelets and associated factors (such as vascular endothelial growth factor, platelet-derived growth factor, tissue growth factor-beta, and matrix metalloproteinases) that promote tissue remodeling and regeneration.[1] Compared to other filler formulations, PRP has been regarded as relatively safe given that it is derived from the patient's own plasma.[2] However, the thrombogenic potential of PRP poses a risk of catastrophic vascular occlusion.[3,4] Here, we report a case of retrograde embolism of cosmetic PRP filler to the ophthalmic artery, resulting in orbital ischemia, vision loss, and eventual phthisis bulbi.

2. Case report

A 37-year-old woman with no past medical or past ocular history presented with two days of vision loss OS, which began seconds after undergoing cosmetic PRP filler injections to the face at an outside clinic. Immediately after a PRP injection to the left medial forehead, the patient reported transient loss consciousness and complete loss of vision in the left eye. Shortly after, she experienced transient nausea, vomiting and difficulty speaking. One day later, she visited an outside emergency department where she underwent CT scan of the head with and without IV contrast, which did not reveal any acute cerebral ischemia or vascular occlusion. Visual acuity was 20/20 OD and no light perception OS. The left eye was hypotonus to palpation. The pupillary exam was significant for a relative afferent pupillary defect by reverse in the left eye. Slit lamp exam was notable for profuse conjunctival chemosis, conjunctival hyperemia, inferonasal subconjunctival hemorrhage, corneal edema with a

* Corresponding author. Department of Ophthalmology, Keck School of Medicine at the University of Southern California, 1450 San Pablo Street, 4th Floor, Suite 4700, Los Angeles, CA, 90033, USA.
E-mail address: sandy.zhang-nunes@med.usc.edu (S. Zhang-Nunes).

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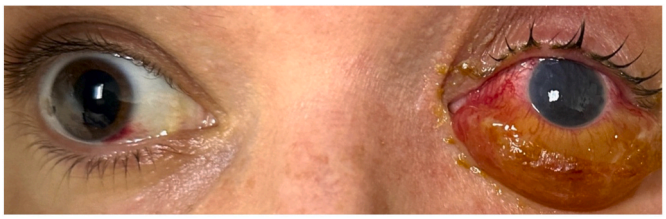

Fig. 1. Anterior segment photograph of both eyes two days after PRP injection to the left medial forehead. Right eye with inferonasal subconjunctival hemorrhage and left eye with conjunctival chemosis, conjunctival hyperemia, inferonasal subconjunctival hemorrhage, corneal edema with a diffuse haze and Descemet's folds, and a heme-filled anterior chamber.

diffuse haze and Descemet's folds, and a heme-filled anterior chamber in the left eye (Fig. 1). External exam revealed ptosis OS. Extraocular movement testing revealed limitations in supraduction, infraduction, abduction and adduction. Her left pupil was irregular and nonreactive.

A dilated funduscopic exam of the fellow eye revealed pigmentary changes within the choroid, nasal to the optic nerve. Fig. 2 is a color fundus photo and fundus autofluorescence photo of the right eye, demonstrating pigmented paravenous retinochoroidal atrophy nasally. Fig. 3 is indocyanine green angiography of the right eye, demonstrating marked choroidal hypoperfusion nasally.

Starting 6 months after the ischemic event, she developed severe orbital volume loss, enophthalmos, a persistently edematous cornea with multiple folds and striae, and phthisis bulbi. (Fig. 4). The plan is likely for evisceration or enucleation with replacement with an ocular implant and prosthesis and orbital revolumization procedures will be attempted, though it will be very challenging to even approach restoring her previous appearance.

3. Discussion

The acute onset of vision loss immediately after injection combined with findings of both anterior and posterior segment ischemia on exam suggest that she experienced retrograde embolism to the ophthalmic artery via inadvertent injection of filler into the supratrochlear or supraorbital arteries. In particular, the relative afferent pupillary defect by reverse, profuse conjunctival chemosis, and corneal edema with Descemet's folds were consistent with significant ischemic damage within the anterior chamber, limiting the functionality of the iris, cornea, and ciliary body. Her presentation was also suggestive of ischemia extending to the entire orbit given her impaired extraocular movements and ptosis, and eventual widespread degenerative changes and phthisis bulbi. Given these findings of diffuse, widespread ischemia and ultimate atrophy, it is possible that the original PRP embolus split off into even smaller micro-emboli that occluded more distal branches of the ophthalmic artery, resulting in ischemia throughout the orbit.

Later, she was found to have nonspecific pigmentary changes within

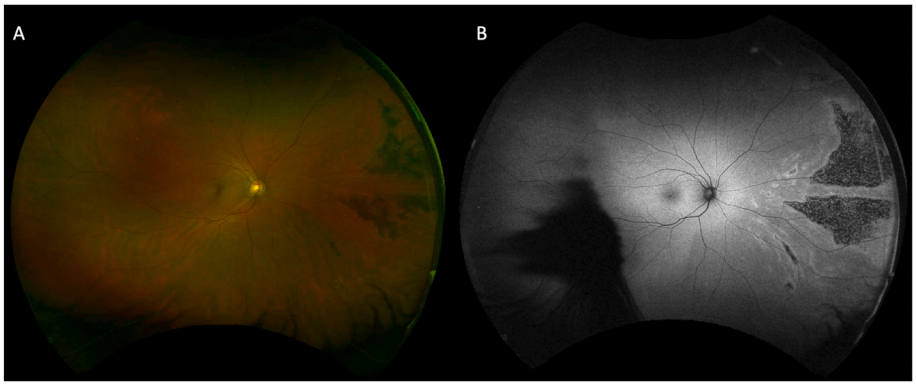

Fig. 2. (A) Color fundus photo of the right eye demonstrating retinal pigment epithelium degeneration along the retinal veins, nasal to the optic nerve. (B) Fundus autofluorescence photo of the right eye with evidence of hypoautofluorescence suggestive of retinal atrophy as well as bordering hyperautofluorescence indicative of retinal pigment epithelium dysfunction. There is an artifact temporally created by the patient's eyelashes. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

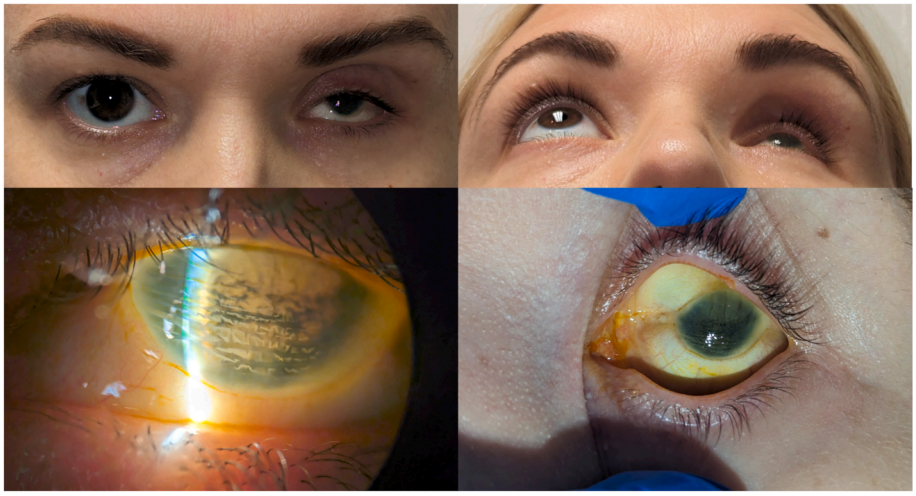

Fig. 3. Phthisical eye and severe orbital volume loss 8 months after ischemic event from PRP injection to the forehead.

the retina in the right eye, demonstrating multiple areas of choroidal infarction. Given the extent of orbital ischemia in the left eye and her initial loss of consciousness immediately after the injection, it is possible that the filler embolus could have traversed even further intracerebrally and caused embolic infarction in the fellow eye, resulting in eventual retinochoroidal degeneration.

After conducting a literature review on August 18, 2023, utilizing PubMed and Google Scholar, and searching for the key words "platelet-rich plasma" and "vision loss" or "vision impairment," we did not find any prior reports of anterior segment ischemia or phthisis bulbi in the setting of vision changes after cosmetic platelet-rich plasma filler injection. This literature review revealed eight cases of reported vision loss secondary to PRP embolization—each of these patients displayed evidence of posterior segment ischemia on initial evaluation such as a relative afferent pupillary defect, fluorescein angiography with evidence of reduced or absent retinal perfusion, and funduscopic exam with findings of optic disc gliosis, attenuation of retinal vessels, and patchy retinal whitening with pre-retinal hemorrhages.[5] Though retinal imaging was not possible in this case given the poor view to the posterior segment on initial presentation, a funduscopic exam would have likely displayed similar findings. All but one of the reported cases of PRP embolization to date, along with the present case, exhibited immediate, total loss of light perception in the affected eye. However, none of these reported cases demonstrated concurrent anterior segment ischemia and ocular shrinkage and atrophy secondary to PRP embolization as in the present case. Additionally, it is unclear whether other fillers such as hyaluronic acid may have been mixed with these injections.

The ischemic mechanism of all filler emboli suggests that emergent evaluation is necessary, just as stroke protocol evaluation for tPA is recommended for central retinal artery occlusion (CRAO).[6] Presently, there is no first-line treatment for filler-associated CRAO though proposed therapeutic techniques include ocular massage, sublingual isosorbide dinitrate, mechanisms to lower intraocular pressure (including intravenous acetazolamide, intravenous mannitol, oral glycerol, and anterior chamber paracentesis) to dislodge the embolus into more peripheral retinal vessels to increase perfusion centrally, and lastly, thrombolytics such as streptokinase. These treatments may not be as effective in the setting of PRP embolism either. Compared to endogenous strokes, cosmetic fillers may have additional thrombotic and vasospastic potential.[7] One translational study even suggests that PRP clots may resist natural or tPA-assisted recanalization more than natural clots,[8] perhaps explaining the severity of ischemia in the few cases that have been reported.

Previously, the Aesthetic Interventional Induced Visual Loss (AIIVL) Consensus Group published suggested guidelines on treating ophthalmic artery occlusion specifically secondary to hyaluronic acid filler embolism.[9] However, the mainstay of management of hyaluronic acid filler embolism centers on using a reversal agent, hyaluronidase, but there are no validated treatments to dissolve PRP emboli as of now.

4. Conclusions

Currently, there is no randomized data supporting a particular therapy for ophthalmic artery occlusion from any cosmetic filler embolism. Research into therapies for these multifactorial clots should focus on stroke-like protocols using tPA in addition to specific reversal agents such as anti-platelet medications for PRP injection or hyaluronidase for hyaluronic acid.[10] It is also crucial to educate injectors and patients about the need for emergent referral to hospital emergency departments with ophthalmology consultation available and stroke protocols in place if there is concern for ischemic complications.

Consent

The patient consented to the publication of the case in writing and orally.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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