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Swept source optical coherence tomography findings in a severe traumatic maculopathy following firework ocular injury

Giulio Vicini *, Cristina Nicolosi, Daniela Bacherini, Andrea Sodi

Eye Clinic, Neuromuscolar and Sense Organs Department, Careggi University Hospital, Largo Brambilla, 3, 50134, Florence, Italy

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1. Case report

A 17-year-old healthy male patient was referred to our clinic for an acute traumatic maculopathy following a firework blunt ocular trauma to his left eye (LE). He reported the accidental explosion of a small-sized cylinder firecracker right in front of his face, during the New Year's celebrations. Best-corrected visual acuity (BCVA) at presentation was 20/20 in right eye (RE) and 1/20 in LE. Slit-lamp examination of LE revealed periorbital ecchymosis, a lower eyelid laceration, which was sutured in the emergency room, and multiple corneal abrasions. Intraocular pressure was normal. Fundus examination of LE showed a diffuse post-traumatic retinal edema involving the posterior pole, with multiple retinal hemorrhages and inferior vitreous hemorrhage. RE was unremarkable.

The patient underwent fundus photography (Fig. 1) and swept-source optical coherence tomography (SS-OCT) at presentation, at 2 weeks and at 4 weeks follow-up. SS-OCT at presentation revealed extensive disruption of the retinal pigment epithelium (RPE)/ Bruch membrane (BM) complex and photoreceptor layer, outer retina thickening and hyporeflectivity in submacular area due to hemorrhage; circumvolution of outer plexiform layer, external limiting membrane and outer nuclear layer were visible in inter-papillomacular area (Fig. 2A). At 2 weeks follow-up SS-OCT showed retinal thinning, absence of ellipsoid zone due to atrophy at posterior pole, subretinal hyperreflective humps corresponding to fibrosis. Fluid in outer retina was visible (Fig. 2B). At 4 weeks follow-up SS-OCT showed slightly increased subretinal hyperreflective humps-like material in correspondence of RPE disruptions. An hyperreflective epiretinal membrane developed (Fig. 2C). LE BCVA at presentation was 1/20 and remained unchanged during the follow-up.

2. Discussion

Firework related ocular injuries primarily affect younger people and often result in permanent visual impairment due to posterior segment involvement.[1] Traumatic maculopathy following blunt ocular trauma can affect different retinal layers, depending on trauma severity. The major sites of retinal damage seem to be the photoreceptor outer segments (OS) and RPE layers and it has been confirmed by histopathologic analysis.[2]

OCT is a valuable non-invasive tool for the assessment of retinal status in traumatic maculopathy. The disruption of the inner segments (IS)/ OS layers was found to be the most common tomographic feature in blunt ocular trauma, although atrophy of the outer nuclear layer and disorganization of the inner retina were also present in some severe cases.[3] Mild traumatic lesions show a transient hyper-reflectivity of the outer retina and this is associated with good prognosis.[2] More severe traumas are associated to disruption of IS/OS junction, hyper-reflectivity of the overlying retina, pigment disturbance and retinal atrophy, implicating poor vision prognosis.[2] The evaluation of the retinal damage in blunt ocular trauma is clinically important because it may be associated with permanent visual loss.[2,3] The final BCVA correlates with the foveal thickness and the grade of outer retinal atrophy.[3] In our case, the severity of lesions detected by SS-OCT at presentation let us suppose an unfavorable prognostic evolution towards retinal atrophic modifications and irreversible visual impairment. SS-OCT provided useful information in the evaluation of a traumatic maculopathy both at presentation and during the follow-up.

* Corresponding author. Largo Brambilla, 3, 50134, Florence, Italy.
E-mail address: giulio.vicini@gmail.com (G. Vicini).

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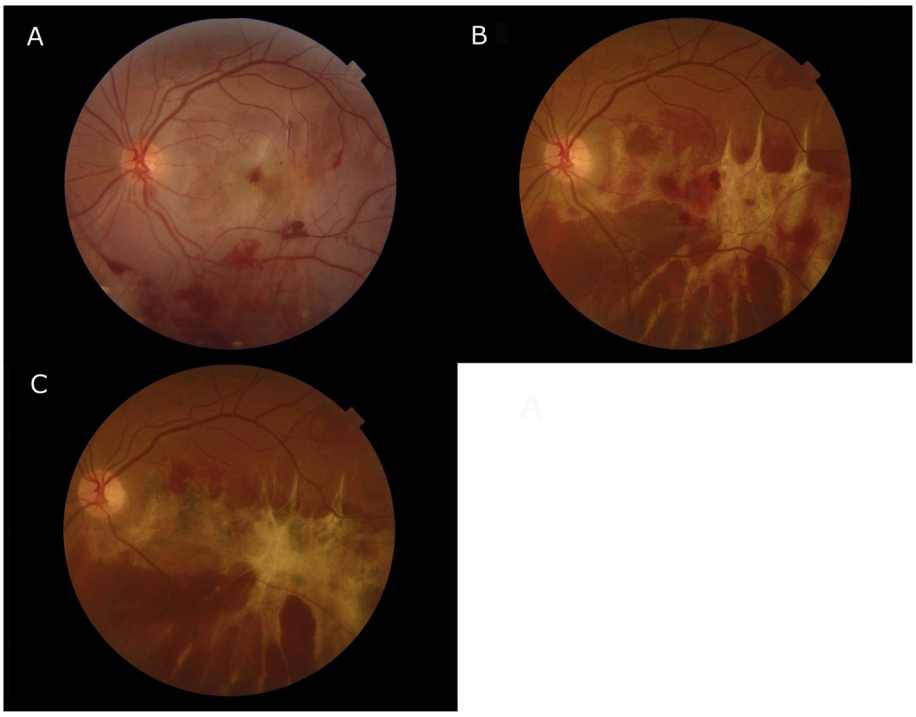

Fig. 1. Fundus photography (FF450 Retinograph, Carl Zeiss Meditec, Jena, Germany) at presentation (A) shows extensive retinal edema involving posterior pole, with macular and vitreous hemorrhages. Fundus photography at 2 weeks follow-up (B) shows fibrotic sequelae interesting posterior pole and subretinal hemorrhages. Fundus photography at 4 weeks follow-up (C) shows increased subretinal fibrosis and reduction of retinal hemorrhages.

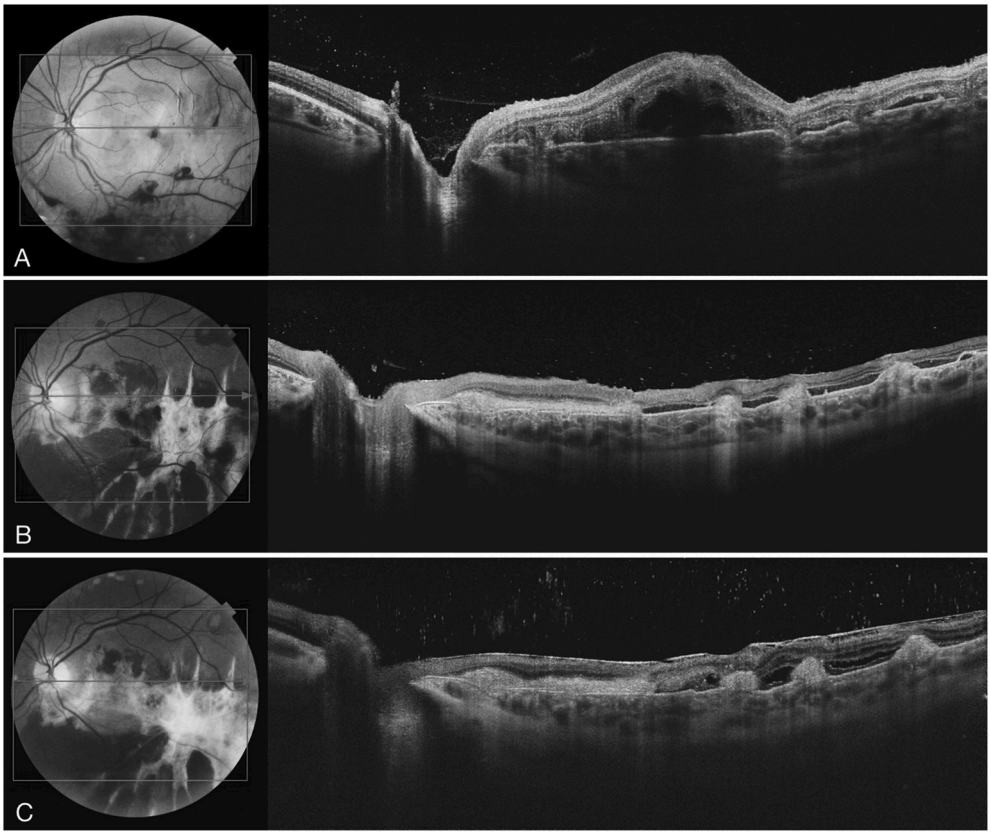

Fig. 2. SS-OCT 12.0 × 9.0 mm 3D Wide (H) scan (DRI SS-OCT Triton, Topcon Corporation, Tokyo, Japan) at presentation (A) shows extensive disruption of the RPE/BM complex and photoreceptor layer, outer retina thickening (CFT 336 μm) and hyporeflectivity in submacular area due to hemorrhage. SS-OCT at 2 weeks follow-up (B) shows retinal thinning, absence of ellipsoid zone due to atrophy at posterior pole and subretinal hyperreflective humps corresponding to fibrosis. SS-OCT at 4 weeks follow-up (C) shows slightly increased subretinal hyperreflective material in correspondence of RPE disruptions and the development of an epiretinal membrane.

3. Patient consent

The article does not contain personally identifiable patient information.

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

Declaration of competing interest

None of the authors have any financial disclosures.

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