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SHORT COMMUNICATION

Immunohistochemical findings in epiretinal membrane after long-term silicone oil tamponade: Case report

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PURPOSE. *To report pre- and post-operative macular optical coherence tomography (OCT) and immunohistochemical findings in a case of long-lasting silicone oil tamponade followed by silicone oil removal and epimacular membrane peeling.*
METHODS. *A 69-year-old man with long-standing silicone oil tamponade and an epiretinal membrane at the posterior pole in his right eye (RE) underwent silicone oil/BSS exchange with epiretinal membrane peeling. Preoperatively, RE best-corrected visual acuity was 20/200 and macular OCT examination revealed a small increase in foveal thickness (250 µm) with the appearance of a linear hyper-reflective signal at the foveal vitreoretinal interface and a thicker (440 µm) hyperreflective finding causing posterior shadowing at the vitreoretinal interface inferiorly to the fovea. Histopathologic and immunohistochemical study of the specimen including the epiretinal membrane was performed.*
RESULTS. *Light microscopy revealed extensive rounded empty spaces interpreted as silicone oil bubbles in the preretinal membrane. Macrophages marker (CD68) positive staining cells were found surrounding the empty spaces within the preretinal membrane and several empty spaces were observed intracellularly within macrophage cytoplasm. Thirty days after surgery best-corrected visual acuity was 20/60 and OCT examination showed an evident decrease in foveal thickness (220 µm) with the disappearance of any hyper-reflective signal at the vitreoretinal interface referable to an epiretinal membrane.*
CONCLUSIONS.*The immunohistochemical study showed both silicone oil droplets and macrophagic cells embedded in the epiretinal membrane. Postoperative OCT demonstrated retinal recovery after silicone oil removal and epiretinal membrane peeling, thus justifying an unexpected visual acuity recovery despite the very long term tamponade. (Eur J Ophthalmol 2006; 16: 887-90)*

KEY WORDS. *Epiretinal membrane, OCT, Silicone oil*

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INTRODUCTION

The potential of silicone oil to promote a proliferative response within the eye has been described (1, 2).

Long-term silicone oil tamponade can cause a migration of silicone oil into the retina and other ocular tissues. Chung and Spaide reported the detection of intraretinal silicone oil vacuoles after the use of a silicone oil tamponade for macular hole surgery with internal limiting membrane peeling (3). These vacuoles were found to be intraretinal cystoid spaces by optical coherence tomography imaging.

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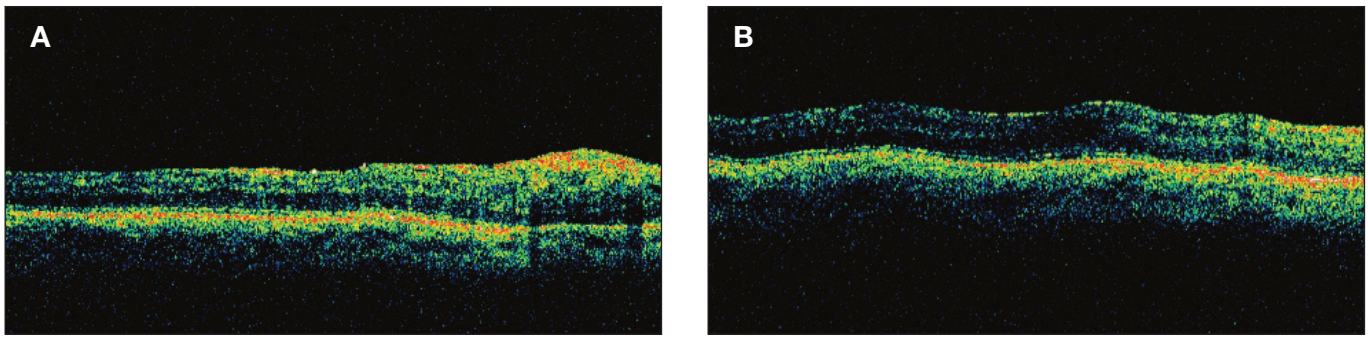

Fig. 1 - (A) *Preoperative optical coherence tomography (5-mm-long vertical section) shows a small increase in foveal thickness (250 µm) with the appearance of a linear hyper-reflective signal at the foveal vitreoretinal interface and a hyper-reflective thickening at the vitreoretinal interface (440 µm) causing posterior shadowing inferiorly to the fovea.* **(B)** *Thirty days after surgery optical coherence tomography shows a decrease in foveal (220 µm) and inferior-perifoveal (240 µm) thickness with the disappearance of any hyper-reflective signal at the foveal vitreoretinal interface.*

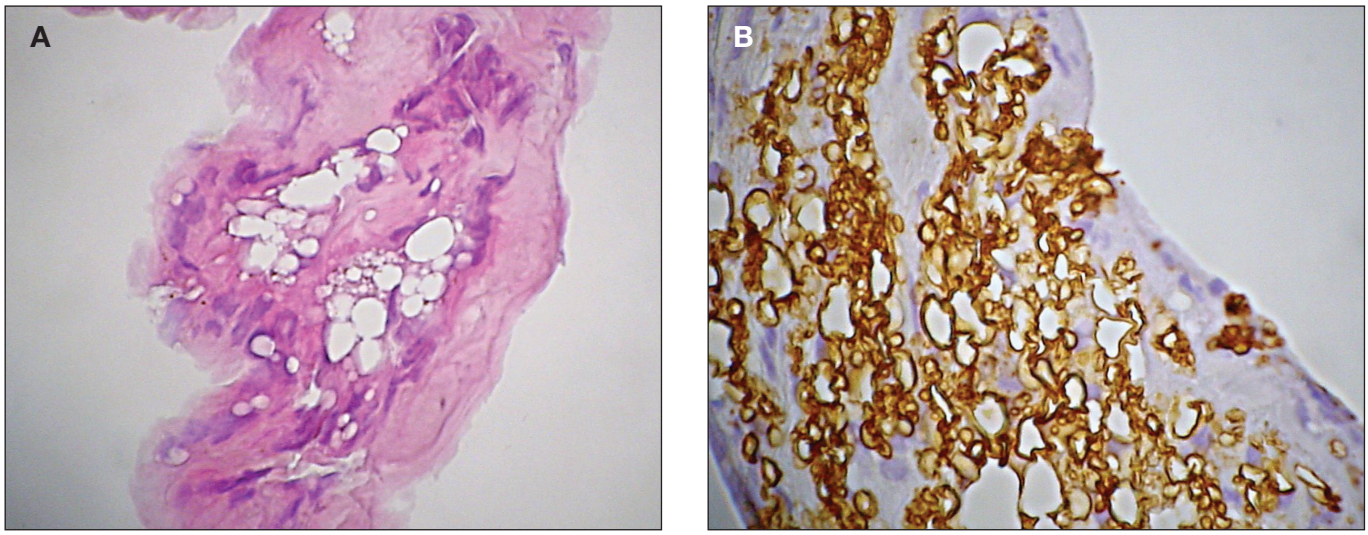

Fig. 2 - (A) *Hematoxylin-eosin staining of the specimen evidences rounded empty spaces (interpreted as silicone oil droplets) in the epiretinal membrane (power magnification x200).* **(B)** *Immunohistochemical staining shows the presence of macrophages marker (CD68) positive staining cells in the portion of epiretinal membrane surrounding the empty spaces (power magnification x200).*

We report a case of long-lasting silicone oil tamponade followed by silicone oil removal and epimacular membrane peeling. Pre- and postoperative macular optical coherence tomography (OCT) and immunohistochemical findings are reported.

Case report

A 69-year-old man was referred to the Ophthalmology Clinic of the University of Chieti-Pescara, Italy, for blurred vision in his right eye (RE). Anamnestic records revealed that 3 years earlier he had undergone pars plana vitrectomy and silicone oil (1000 centistoke) tamponade for pseudophakic rhegmatogenous retinal detachment with high-grade proliferative vitreoretinopathy (PVR).

His RE best-corrected visual acuity was 20/200. RE examination disclosed silicone oil in the vitreous chamber with slight emulsification, a flat retina, and an epiretinal membrane at the posterior pole. Intraocular pressure was 15 mmHg with 0.5% timolol twice daily. Macular OCT examination (Stratus OCT™, Carl Zeiss Meditec, Dublin, CA) showed a small increase in foveal thickness (250 µm) with the appearance of a linear hyper-reflective signal at the foveal vitreoretinal interface and a thicker (440 µm) hyper-

reflective finding causing posterior shadowing at the vitreoretinal interface inferiorly to the fovea (Fig. 1A), pictures compatible with the diagnosis of epiretinal membrane. The patient underwent silicone oil/BSS exchange with epiretinal membrane peeling. During the silicone oil removal surgery, pars plicata was observed with scleral depression and small bubbles of silicone oil were dislodged with gentle tapping. A fluid-gas exchange was repeated twice to remove all visible remnants of silicone oil.

Histopathologic and immunohistochemical study of the specimen including the epiretinal membrane was performed. Hematoxylin-eosin (HE) staining was performed on 14% formalin-fixed (Bioptika, Milan, Italy), paraffin wax-embedded tissue sections of 5-mm thickness. Light microscopy of the HE-stained section revealed extensive rounded empty spaces interpreted as silicone oil bubbles in the preretinal membrane (Fig. 2A). For immunohistochemical staining the sections were subjected to labeling with antibody against CD68 marker which stained macrophages cells, in order to evaluate macrophagic cell infiltration within the epiretinal membrane. Four-micron sections cut from the same tissue blocks were stained with a conventional avidin-biotin peroxidase technique, using an automated immunostainer (Autostainer, Dako, Glostrup, Denmark) and commercially available monoclonal antibody (CD68, Dako, Glostrup, Denmark) according to the manufacturer's instructions.

Macrophages marker (CD68) positive staining cells were found surrounding the empty spaces within the preretinal membrane and moreover, several empty spaces were observed intracellularly within macrophage cytoplasm (Fig. 2B).

Thirty days after surgery best-corrected visual acuity was 20/60. OCT examination showed an evident decrease in foveal thickness (220 μm) with the disappearance of any hyper-reflective signal at the vitreoretinal interface referable to an epiretinal membrane (Fig. 1B).

DISCUSSION

Previous reports have documented recurrent epiretinal proliferation behind silicone oil. Lewis et al (1) found that 19 of 31 eyes (61%) developed perisilicone proliferation, causing redetachment in 15 out of 19 eyes. Microscopic examination of five preretinal membranes showed droplets of silicone oil and necrotic cells on the silicone side and glial or retinal pigment epithelial cells, or both, on the retinal side, often in layers separated by extracellular matrix.

Using immunohistochemistry and electron microscopy, Eckardt et al (4) found macrophages in the retina of eyes that had been filled with silicone oil for longer than 6 months. Light microscopy revealed vacuoles presumably lying in the cytoplasm of macrophages. Using energy dispersive X-ray analysis, vacuoles could be identified as storage sites of the silicone oil.

In their histopathologic and ultrastructural study of oil-associated complications in silicone oil-filled human eyes, Zhong et al (5) demonstrated some macrophages marker (CD68) positive staining cells in the tissues filled with silicone bubbles, such as preretinal or subretinal membrane and optic nerve.

Heidenkummer et al (6) in seven PVR and four diabetic membranes found specific interstitial and intracellular vacuoles which were considered to be silicone oil droplets. The phagocytosing cells were macrophages, partially embedded within vitreous residues. The residual parts of the membranes are typical vitreoretinal membranes. The receptors for collagen and vitronectin were positive within these membranes. The silicone oil-specific macrophage reaction might be supported by emulsified silicone oil droplets, which might get phagocytosed at a certain size. The secondary inflammatory reactions can further enhance silicone oil emulsification, promoting a vicious circle.

In our case report preoperative OCT examination did not reveal any preretinal or intraretinal empty space attributable to the silicone oil droplets. Probably the size of the silicone oil droplets embedded in the epiretinal membrane was smaller than the optical resolution power of Stratus OCT (nearly 8 micrometers). The histopathologic study indirectly evidenced the silicone oil as empty spaces, while the immunohistochemical study showed the presence of macrophagic cells surrounding the empty spaces. The macrophagic infiltration featured by the immunohistochemical study, together with the extracellular matrix components typical of the epiretinal membrane, may justify the OCT appearance of a hyper-reflective signal at the vitreoretinal interface.

Clinically, despite the very long term silicone oil tamponade, there was an unexpected recovery of the visual function (from 20/200 to 20/60). We assume that the epiretinal membrane itself causing macular traction reduced visual acuity before surgery.

In conclusion, in our case report silicone oil droplets

were not evidenced by preoperative OCT examination due to their minimal size. The immunohistochemical study showed both silicone oil droplets and macrophagic cells embedded in the epiretinal membrane. Postoperative OCT demonstrated retinal recovery after silicone oil removal and epiretinal membrane peeling, thus justifying an unexpected visual acuity recovery despite the very long term tamponade.

The authors have no proprietary interest in any product mentioned in the manuscript.

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