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Submission Files Included in this PDF

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Cover letter.docx [Cover Letter]

MOI_OCT_Strabismus.docx [Manuscript File]

IOM fundus y scan.jpg [Figure]

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Dear Editor, we submit an interesting image in which, for the first time, the inferior oblique muscle insertion is visualized using OCT technology (SS OCT triton).

Several articles have been previously published about the utility of OCT technology to visualize the insertion of rectus muscles, but to the best of our knowledge oblique muscles have not been visualized yet using OCT technology.

Currently this is only possible in patients with severe atrophy of the retinal pigment epithelium. We hope you find it suitable for being published in your journal.

Best regards.

Julio.

Title page:

Complete manuscript title: **Imaging the inferior oblique muscle insertion using swept source posterior segment optical coherence tomography: report of a case.**

Running title: **Imaging de inferior oblique muscle with OCT**

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Abstract:

We report the case of a 81–year-old woman who presented for a routine follow-up of her dry age related macular degeneration. Optical coherence tomography (OCT) using Triton OCT (Topcon, Tokyo) showed the presence of a round area behind the sclera , slightly inferior to the macula in her right eye. The morphology and position of this structure suggests this was a transversal cut of the inferior oblique muscle (IOM) close to its ocular insertion in her right eye. Several publications have reported the utility of OCT technology to visualize the anterior insertion of the rectus muscles. However, to the best of our knowledge this is the first publication to report the potential of posterior segment OCT to visualize the insertion oblique muscles in patients with severe chorioretinal atrophy.

Imaging the inferior oblique muscle insertion using swept source posterior segment optical coherence tomography.

A 81-year-old woman was seen for a follow up visit, because of advanced dry age related macular degeneration. She was diabetic without diabetic retinopathy and had been on treatment with a fixed combination of timolol and dorzolamide because she had border line intraocular pressures (IOP). Visual acuity was hand movement in her right eye (RE) and 0.3 in her left eye (LE). IOP was 18/14 mmHg, and fundus examination revealed severe geographic atrophy with pale optic discs in both eyes. Her cataracts had been operated one year before. Her refraction before cataract surgery was: +1.75 (-1x87º) in her RE and +1.25 (-0.5x105º) in her LE.

Optical coherence tomography (OCT) of the macular area using Triton OCT (Topcon, Tokyo), showed the presence of a round area behind the sclera (Figure 1B), slightly inferior to the macula in her right eye (Figure 1A). The morphology and position of this structure suggests this was a transversal cut of the inferior oblique muscle (IOM) close to its anterior insertion.

In 1991 Huang obtained the first scan of the anterior chamber of an ex vivo bovine eye, using optical coherence tomography (OCT). The first in vivo retinal images were obtained two years later[(1)]. Since then OCT technology has experienced an exponential development and today it is possible to visualize almost any ocular tissue. Recently, several groups have reported the possibility of locating with anterior segment OCT the anterior insertions of the rectus muscles. These groups have used OCT to measure the

distance between the muscle insertion and the limbus and have reported a good correlation with intraoperative caliper measurements.[2]

We have observed that in patients with significant retinal and choroidal atrophy swept source OCT can penetrate beyond the sclera and it is possible to visualize the orbital fat. In the patient we report herein, it was even possible to visualize the IOM. Anatomical studies on enucleated human eyes have proven that the fovea is located very close to IOM insertion. In one study, performed on 38 human eyes, the fovea was located mostly superior and slightly posterior to the posterior border of the IO insertion.[3] This anatomical proximity has raised concern about the macular implications of inferior oblique muscle surgery.[4, 5] Indeed one recent paper reported an increase in macular thickness following IOM recession surgery.[5]

Although several publications have reported the utility of OCT to visualize the rectus muscles, to the best of our knowledge this is the first publication to report the ability of posterior segment OCT to visualize the IOM in a patient with severe attenuation of the retinal pigment epithelium . Currently this is only possible in patients with severe retinal atrophy. In the future, new developments in OCT technology, may allow the visualization of the oblique muscles insertions in subjects without retinal atrophy and improve our understanding of strabismus.

None of the authors has conflict of interest.

Literature Search: MEDLINE was searched via PubMed December 10, 2019. Search field: title. Search algorithm: ((optical coherence tomography) OR (OCT)) AND ((extraocular muscles) OR strabismus OR (inferior oblique muscle) OR (superior oblique muscle))

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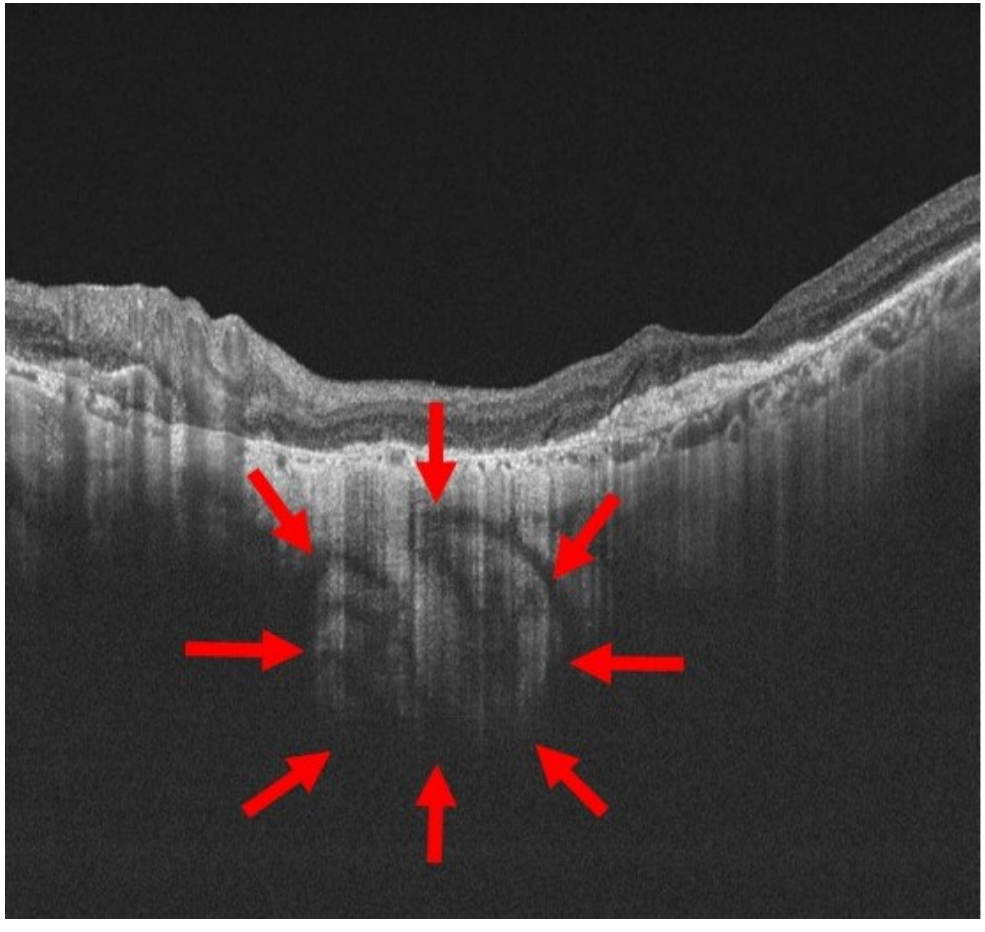
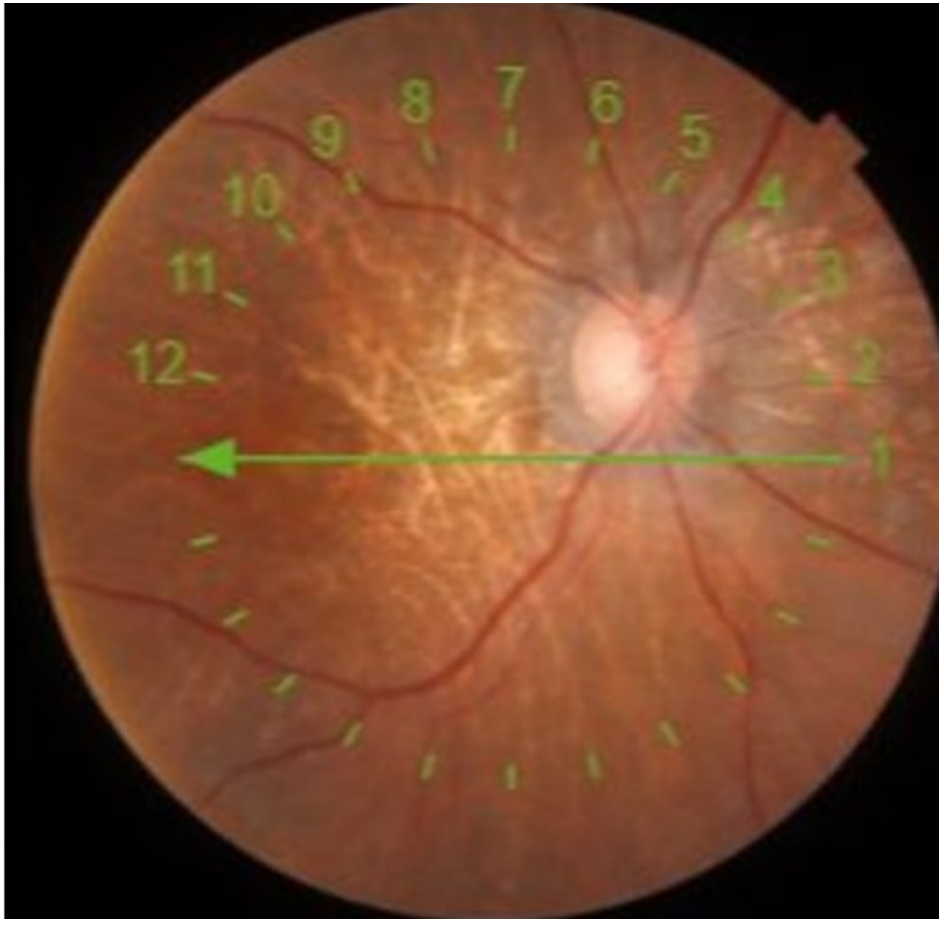
Figure 1A: Orientation of the 6 OCT scans. Figure 1B: Detail of the horizontal scan, showing the presence of a round area behind the sclera, slightly inferior to the macula in her right eye. The morphology and position of this structure (red arrows) suggests this was a transversal cut of the IOM close to its ocular insertion.

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