



Case report

Sudden branch macular artery avulsion during internal limiting membrane peeling for idiopathic macular hole: A case report



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ABSTRACT

Introduction and importance: Macular Holes (MH) are variable thickness openings of the retina that develop in the fovea. This case presents a branch macular artery avulsion during internal limiting membrane (ILM) peeling for idiopathic macular hole management in an adult patient. The proper management of this complication along with the preventive measures is mentioned.

Case presentation: A 65-year-old woman developed a branch macular artery avulsion during ILM peeling for MH. After cataract extraction by phacoemulsification with intraocular lens implantation and pars plana vitrectomy, during ILM peeling, a multifocal bleeding along a macular artery was noted indicating its avulsion. The intraocular pressure was raised to control hemorrhage, blood remnants were passively aspirated and ILM peeling was kindly completed under adequate visualization.

Clinical discussion: Branch macular artery avulsion is a potential complication even for experienced surgeons. Proper management of this complication involves the increase of intraocular pressure for hemostasia. If hemostasia and proper visualization are achieved, the surgery could be completed, and if it is not the case, the ILM peeling could be completed in a second procedure. This complication might be avoided by initiating the ILM peeling away from the macular vessels.

Conclusion: Branch macular artery avulsion is an intraoperative complication that might be avoided by initiating the ILM peeling away from the macular vessels.

1. Introduction and importance

Macular Holes (MH) are variable thickness openings of the retina that develop in the fovea. There are different causes, but most of them are idiopathic [1]. MH are more commonly found in adult patients over 65 years and in women [2]. The pathogenesis of idiopathic MH involves vitreomacular traction, exerted by the vitreous cortex, which can be anteroposterior traction, tangential traction or a combination of both [3]. With the advent of macular optical coherence tomography (OCT), we have confirmed the MH pathogenesis. Also, we have described the

MH different stages. Further, we have confirmed our diagnoses, and planned its treatment.

Treatment for full-thickness MH includes Pars Plana Vitrectomy (PPV) with Internal Limiting Membrane (ILM) peeling and the application of long-lasting gas as tamponade [4]. PPV with ILM peeling usually has optimal anatomical and functional outcomes, nevertheless there is a low rate of complications even in the hands of experienced surgeons [5]. There exist intraoperative complications related to the ILM peeling, as focal retinal hemorrhages or iatrogenic eccentric full-thickness retinal breaks, among the most frequent, even though still

Abbreviations: FA, fluorescein angiography; ILM, internal limiting membrane; IOL, intraocular lens; IOP, intraocular pressure; MH, macular hole; OCT, optical coherence tomography; OD, Oculus Dexter; PPV, Pars Plana Vitrectomy.

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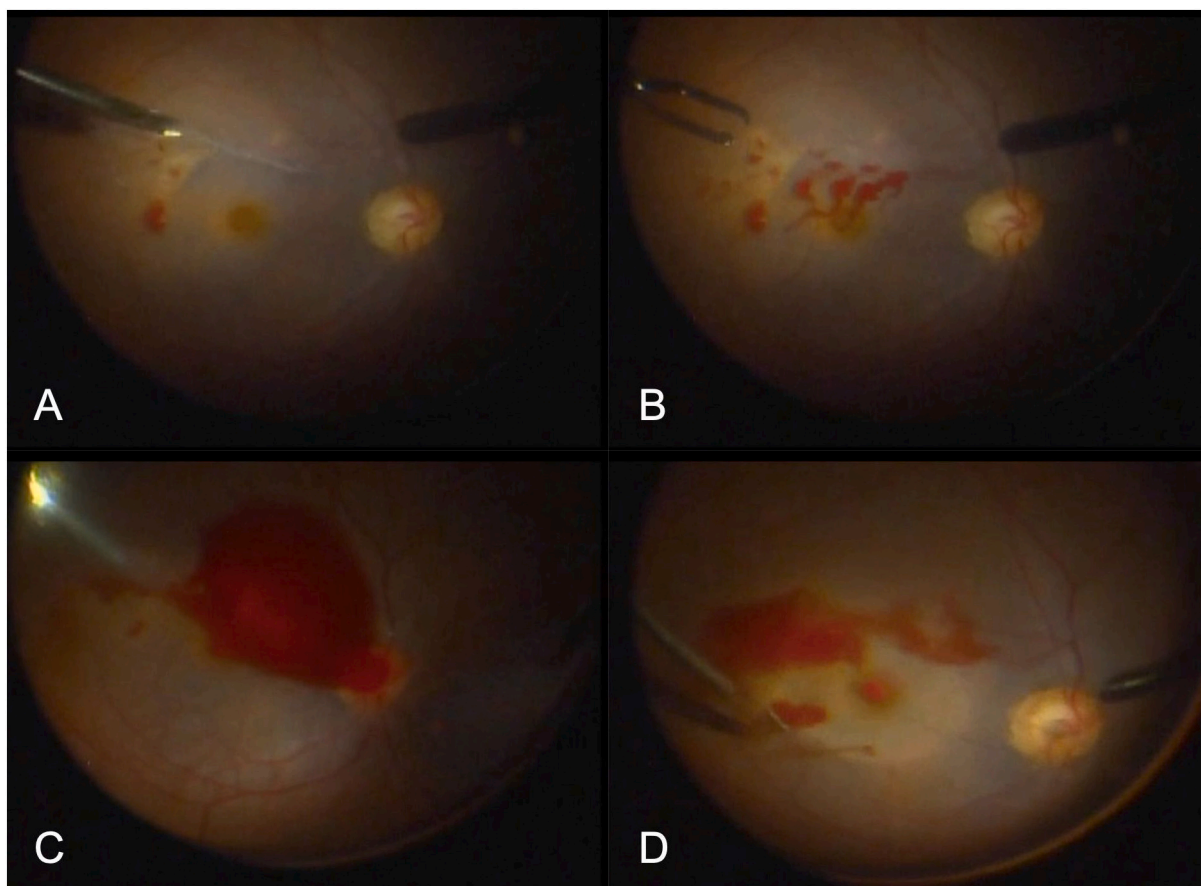


Fig. 1. Internal limiting membrane peeling for macular hole. A, shows the superotemporal branch macular artery being avulsed during flap creation. B, Multifocal bleeding throughout the vessel. C, Diffuse bleeding in the superior macula controlled by the raise of the intraocular pressure. D, ILM peeling is completed.

have a low incidence of 6.5 % and 2.5 %, respectively [6,7].

We describe a case of a patient who underwent ILM peeling for macular hole closure, who suffered an intraoperative branch macular

artery avulsion and the procedure that was followed to manage this complication. This case occurred in the Department of Ophthalmology from the University Hospital and Faculty of Medicine at the Autonomous

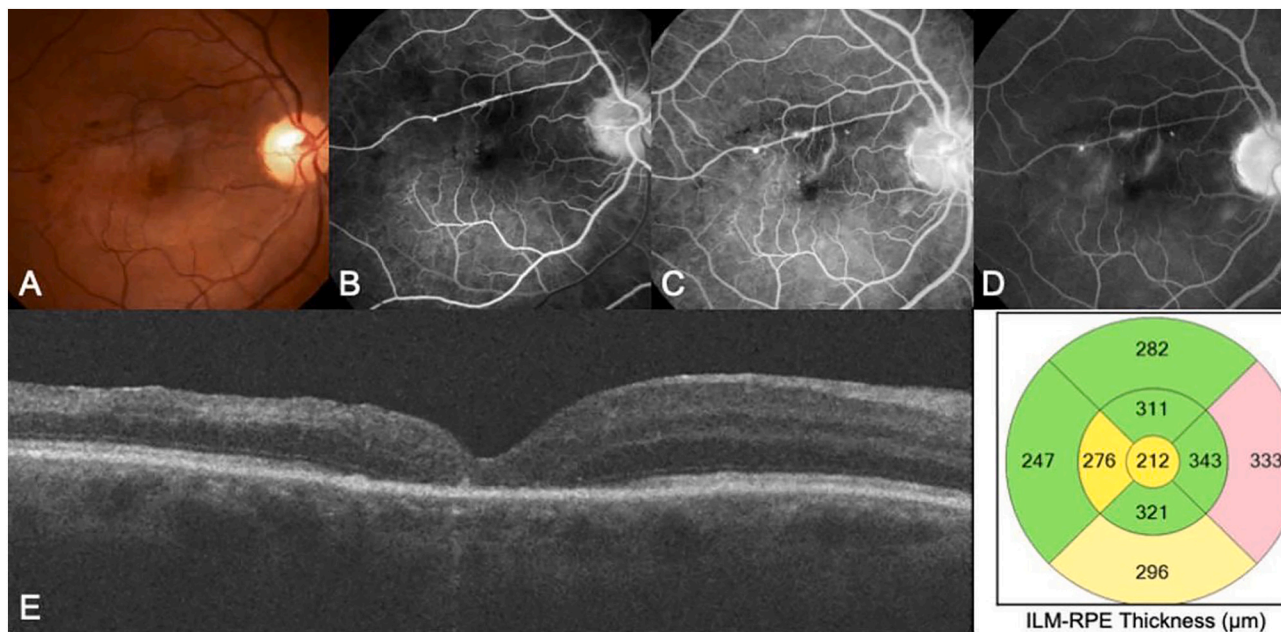


Fig. 2. 3-weeks after macular closure surgery. A, shows a closed macular hole and a thinned superior macular branch. B-D, fluorescein angiography in B a delay in the superior branch macular artery filling is noted. C and D show leakage in the vessel path. E, OCT image shows a closed macular hole.

University of Nuevo Leon (UANL), Monterrey, Mexico. This is a rare complication and it is the second case reported in the literature of an intraoperative artery avulsion during ILM peeling. This is an interesting case because we discuss the preventive measures and the correct management for this complication.

2. Method

This case report has been reported in line with the SCARE 2020 guidelines [8].

3. Case presentation

A 65-year-old woman, with no known personal or familiar medical history, presented with a MH in the right eye (OD) with 3 months of evolution. Her visual acuity was 20/400 in the affected eye. Optical coherence tomography (OCT) showed a full thickness macular hole 480 μ m diameter. Cataract extraction by phacoemulsification with intraocular lens (IOL) implantation, and PPV with ILM peeling were scheduled.

After phacoemulsification and IOL implantation, a 23-gauge pars plana vitrectomy (EVA™, Dutch Ophthalmic Research Center, DORC) was completely performed by a retina surgeon (JHGC), with more than 30 years of retina surgery experience. Brilliant blue was injected to allow staining the ILM. ILM forceps were used, and on a first attempt to remove the ILM in the superotemporal macula, suddenly and unexpectedly, the superior branch of the macular artery was pulled causing its avulsion, generating multifocal bleeding throughout the vessel (Fig. 1A, B).

First, the intraocular pressure (IOP) was raised for some seconds to contain the bleeding (Fig. 1C). The bleeding was controlled and the remnants of blood were passively aspirated with silicon aspiration cannula. Optimal visualization was achieved and the ILM peeling was completed (Fig. 1D) (see Video 1, Supplemental Digital Content 1, link). Next, fluid-air exchange was performed, and the air was then exchanged with 20 % SF₆ gas as tamponade. Finally, the patient was instructed lecture head position for 5 days, and topical prednisolone acetate 1 % 6 times a day tapered every 5 days and moxifloxacin hydrochloride 0.5 % 4 times a day for 7 days.

On postoperative day 21, the patient was happy and satisfied with her vision. Her VA was 20/40, the retina looked attached with no hemorrhage, the macular hole was closed, and a retinal oedema in the upper macular region was observed following the vascular path of the superior branch macular artery, which was thin and rectified (Fig. 2A). Fluorescein angiography (FA) showed a delay in the superior branch macular artery filling. In the early arteriovenous phase, hypofluorescence of the superior macular area was observed due to a filling defect from retinal vasculature non-perfusion and due to a blocking of the choroidal fluorescence from retinal oedema (Fig. 2B). In late arteriovenous phase, hyperfluorescence was noted in the superior macular arterial branch path, which in recirculation phase enlarges, indicating leakage (Fig. 2C and D). OCT showed the macular hole closed, with loss of the outer foveal layers and thinning of the inner layers in the temporal area (Fig. 2E).

4. Clinical discussion

Intraoperative complications related to PPV and ILM peeling exist, and their management must be known in case they occur. There are intraoperative complications related to PPV, as retinal tear formation, vitreous hemorrhage, subretinal hemorrhage, and choroidal or supra-choroidal hemorrhage [9]. On the other hand, there are intraoperative complications directly related to ILM peeling such as: focal retinal hemorrhages, RPE and choriocapillaris focal lesions, and iatrogenic eccentric full-thickness retinal breaks, among the most frequent [7,8].

Yoshiaki Shimada described a case of an unintentional amputation of the inferior temporal retinal arcade during macular peeling for

epiretinal membrane removal in a 73-year-old female with severe staphyloma. During surgery, excessive triamcinolone was used, which obscured retina details. After the event, it was decided to perform a fluid-air exchange. Postoperative visual acuity improved after vitreous hemorrhage resolution, however, the superior nasal visual field was lost [10].

In the present case, the ILM peeling was initiated in the superotemporal macula, near the superior arterial macular branch, and unfortunately, both the ILM and the macular vessel were pulled apart from the retina, producing multifocal bleeding and avulsion of the vessel. It is recommended to initiate the ILM peeling to 1000 μ m above or below the foveola, avoiding the temporal retina, which it is the thinnest, and the nasal retina which carries the papillomacular nerve-fiber bundle [11].

According to our case report, during ILM peeling, we recommend to start the flap formation away from vessels to avoid this complication. Further, if a macular or a retinal vessel is damaged during ILM peeling, a prompt identification is needed, keep the calm and be patient. The IOP could be temporarily raised approximately 60 mmHg to achieve hemostasis. If hemostasis is not achieved, it is preferable to perform a fluid-air exchange followed by an air-tamponade exchange and, in a second procedure, complete the ILM peel. We recommend not to use photocoagulation or endodiathermy in the affected vessel for bleeding control due to the possible ischemia that may result.

Finally, the final clinical expectation of closing the macular hole and having good final vision was met in our patient. Visual acuity gain of at least 1.5 Snellen lines at 3 and 6 months was achieved as well as the closure of the macular hole in the first intervention given the high success rate of PPV [4].

5. Conclusion

Branch macular artery avulsion is a potential complication during ILM peeling even in experienced surgeons. The goal is to prevent complications, and in case they happen, we must identify them early and know how to manage them properly.

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Ethical approval

All procedures performed were in accordance with the ethical standards of the institutional committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Declaration of competing interest

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Author contribution

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Treviño-Herrera AB: Conceptualization, Data curation, Formal Analysis, Writing original draft, writing – review & editing, investigation.

Gonzalez-Cantu JE: Writing original draft, writing – review & editing, investigation. Sudhalkar A: Investigation, validation, review and editing.

Hernandez-Da Mota SE: Investigation, validation, review and editing.

Mohamed-Hamsho J: Project administration, resources, investigation, methodology, supervision, validation, review and editing.

Research registration

N/a.

Guarantor

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