



Preservation of choriocapillaris perfusion on optical coherence tomography angiography in an eye treated with macular buckle

Younging Zhang^{a,b}, John Dickson^a, Jay M. Stewart^{a,b,*}

^a University of California, San Francisco, Department of Ophthalmology, San Francisco, CA, USA

^b Zuckerberg San Francisco General Hospital and Trauma Center, Department of Ophthalmology, San Francisco, CA, USA

ARTICLE INFO

Keywords:

Macular buckle
Myopic tractional maculopathy
Optical coherence tomography angiography

1. Case report

A 64-year-old female who had undergone successful pars plana vitrectomy (PPV), epiretinal and internal limiting membrane peel and gas for myopic foveoschisis and full thickness macular hole (FTMH) presented with recurrent FTMH with new total retinal detachment and no peripheral break (Fig. 1A and B) and visual acuity of hand motions. A decision was made to proceed with repeat PPV with gas and macular buckle placement. The macular buckle was fashioned utilizing materials readily available in an eye operating room (Fig. 2). A silicone scleral buckle (MIRA, type 287, MediMark® Europe, Sevenoaks, Kent, UK) was cut to a length of 3 cm. A tunnel was created within the scleral buckle along the long axis with a 19-gauge needle. A titanium orbital implant (MEDPOR TITAN®, orbital floor and wall MTB, Stryker, Kalamazoo, MI, USA) was trimmed to 3 cm and inserted into the tunnel. The assembled rigid macular buckle was then bent at the 1 cm mark to adopt an “L” shape. The macular buckle was inserted with the bent end aiming for the fovea and secured with horizontal mattress sutures. The position of the posterior indentation was adjusted and verified by appreciating an imbricating effect utilizing non-contrast widefield fundus imaging (ReSight, Zeiss, Dublin, CA, USA) (Fig. 3). On postoperative exam, the patient’s retina was attached with resolution of foveoschisis with vision improved to 20/400, but the macular hole remained open (Fig. 1C and D). Optical coherence tomography (OCT) of the macula demonstrated the indentation provided by the macular buckle (Fig. 1D). OCT angiogram (OCTA) (Cirrus, Carl Zeiss Meditec, Dublin, CA, USA) five months later showed normal choriocapillaris vasculature and normal retinal vasculature outside of the open macular hole (Fig. 4).

2. Discussion

The pathophysiology of macular hole retinal detachment (MHRD) from myopic traction maculopathy (MTM) is two-fold, vitreous causing tangential and anteroposterior traction and posterior staphyloma causing stretching of the retina. While PPV with membrane peel addresses the inner vitreous traction, macular buckle aims to change the concavity of the posterior part of the eye, further releasing the traction caused by posterior staphyloma. Recent studies from Europe and Asia have shown promising results with macular buckling in treatment of MTM. A randomized controlled trial compared PPV versus PPV with macular buckle in patients with primary MHRD, and found that macular buckle had a higher initial retinal attachment and macular hole closure rate.¹ Macular buckles described in the literature were not readily available at our hospital; therefore, we decided to assemble one using a type 287 scleral buckle and a titanium orbital implant, resembling that described by Parolini et al.² Concern has been raised on the effect upon ocular circulation, particularly in the posterior pole, due to the direct compression provided by the buckle. One study showed that circulation in short and long posterior ciliary arteries were not affected based on fluorescein angiography and indocyanine green angiography.³ In our patient, we used OCTA to evaluate the status of macular perfusion by each layer. To our knowledge, OCTA in macular buckle has not been previously reported. The choriocapillaris layer was observed to be intact. This finding was possibly confounded by the relatively modest imbrication associated with this self-assembled product compared to prior reports using commercially available products for macular buckling, as well as by the amount of time that had elapsed between surgery

* Corresponding author. University of California, San Francisco, Department of Ophthalmology, 490 Illinois Street, Floor 5, San Francisco, CA, 94143-4081, USA.
E-mail address: jay.stewart@ucsf.edu (J.M. Stewart).

<https://doi.org/10.1016/j.ajoc.2022.101639>

Received 5 March 2022; Received in revised form 8 June 2022; Accepted 25 June 2022

Available online 28 June 2022

2451-9936/© 2022 Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

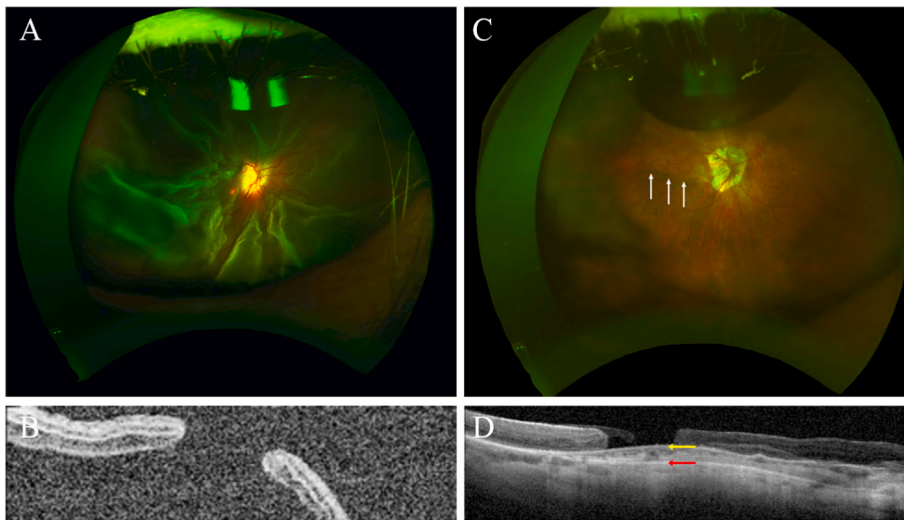


Fig. 1. Ultra-widefield photography and optical coherence tomography of pre- and post-operative evaluation. (A) Ultra-widefield photography demonstrating total retinal detachment secondary to full thickness macular hole. (B) Optical coherence tomography (OCT) demonstrating full thickness macular hole with macular detachment. (C) Ultra-widefield photograph demonstrating indentation of the macular buckle (white arrows), as well as attached retina and remaining gas bubble. (D) Overlaid preoperative OCT images from two occasions: prior to the development of retinal detachment (red arrow) and post-operatively (yellow arrow), demonstrating the posterior buckle effect, confirming a positive indentation provided by the buckle. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

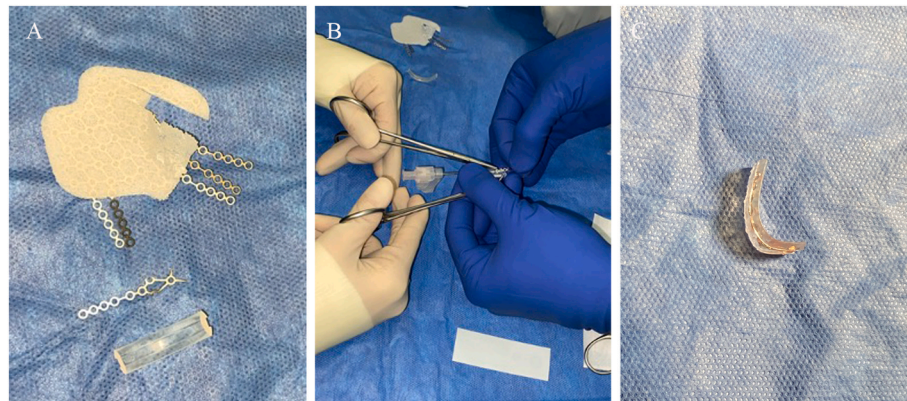


Fig. 2. Intraoperative assembly of macular buckle. (A) Titanium orbital implant and type 287 scleral buckle trimmed to 3 cm. (B) Insertion of the titanium orbital implant in a previously created tunnel within a type 287 scleral buckle. (C) “L” shaped macular buckle bent at 1 cm mark.

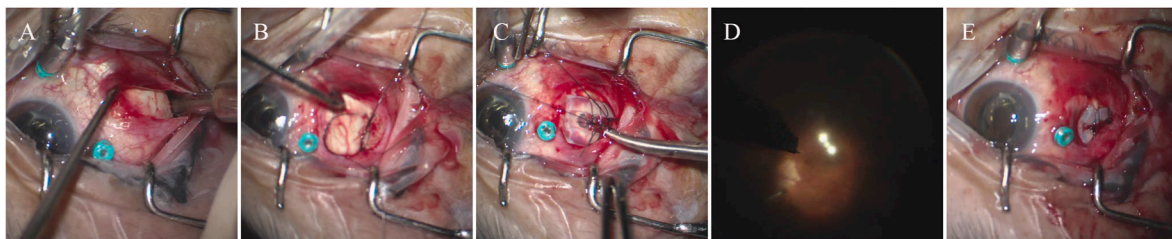


Fig. 3. Intraoperative insertion of macular buckle. (A) Limited peritomy was created in the superotemporal quadrant. (B) Horizontal mattress sutures were pre-placed using 5–0 nylon sutures. (C) The macular buckle was inserted with the bent portion facing posteriorly and secured with the pre-placed horizontal mattress sutures. (D) Location of the macular buckle underneath the fovea was confirmed with the ReSight viewing system (ReSight, Zeiss, Dublin, CA, USA). (E) Final position of the macular buckle.

and post-operative imaging.

3. Conclusion

Macular buckle may increase the success rate in management of complications secondary to MTM. In a resource-limited setting, basic ophthalmic surgical supplies can be used to assemble the macular buckle. In our patient, OCTA demonstrated preserved choriocapillaris perfusion.

Patient consent

Written consent to publish this case has not been obtained. This report does not contain any personal identifying information.

Funding

The authors would like to acknowledge financial support from Research to Prevent Blindness and All May See Foundation.

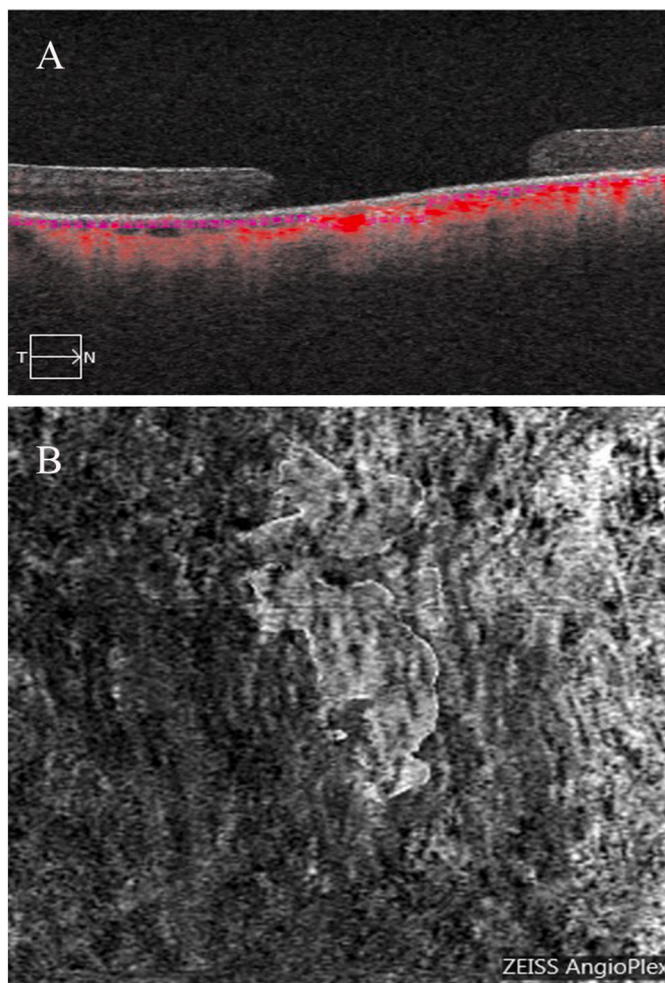


Fig. 4. Optical coherence tomography angiography (OCTA) upon post-operative evaluation. (A) OCTA B-scan demonstrating normal flow in choriocapillaris layer. (B) *En-face* image of the choriocapillaris layer demonstrating normal vascular constitution and density.

Authorship

All authors attest that they meet the current ICMJE criteria for

Authorship.

Declaration of competing interest

All authors have no disclosures to report.

Acknowledgements

None.

References

1. Ma J, Li H, Ding X, Tanumiharjo S, Lu L. Effectiveness of combined macular buckle under direct vision and vitrectomy with ILM peeling in refractory macular hole retinal detachment with extreme high axial myopia: a 24-month comparative study. *Br J Ophthalmol.* 2017;101(10):1386–1394. <https://doi.org/10.1136/bjophthalmol-2016-310123>, 10.
2. Parolini B, Frisina R, Pinackatt S, Mete M. A new L-shaped design of macular buckle to support a posterior staphyloma in high myopia. *Retina.* 2013 Jul-Aug 2013;33(7):1466-1470. doi:10.1097/IAE.0b013e31828e69ea.
3. Theodossiadis GP, Chatziralli IP, Theodossiadis PG. Macular buckling in optic disc pit maculopathy in association with the origin of macular elevation: 13-year mean postoperative results. *Eur J Ophthalmol.* 2015 May-Jun 2015;25(3):241-248. doi: 10.5301/ejo.5000553.