



Contents lists available at ScienceDirect

# American Journal of Ophthalmology Case Reports

journal homepage: <http://www.ajocasereports.com/>

## Case report

# Identifying rhegmatogenous detachments in bullous retinoschisis with optical coherence tomography studies



Josh O Wallsh, Ron P. Gallemore\*

Retina Macula Institute, 4201 Torrance Blvd Ste 220, Torrance, CA, 90503, United States

## ARTICLE INFO

### Article history:

Received 11 May 2016  
Received in revised form  
3 September 2016  
Accepted 8 September 2016  
Available online 10 September 2016

### Keywords:

Optical coherence tomography  
Bullous retinoschisis  
Rhegmatogenous retinal detachment

## ABSTRACT

**Purpose:** To demonstrate a novel technique for capturing optical coherence tomography images of peripheral retina and its application in identifying rhegmatogenous retinal detachments within bullous retinoschisis.

**Observations:** We report two patients presenting with bullous retinoschisis noted on clinical examination. After performing optical coherence tomography studies utilizing our image acquisition technique these lesions were found to be associated with rhegmatogenous retinal detachments. Both patients were subsequently treated without further complications.

**Conclusions and importance:** The image acquisition technique described herein allows visualization of peripheral retina utilizing optical coherence tomography studies to identify areas of rhegmatogenous retinal detachment within bullous retinoschisis that are otherwise difficult to discern.

© 2016 The Authors. 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/>).

## 1. Introduction

Retinoschisis can be associated with rhegmatogenous retinal detachment. This is a sight threatening complication and needs to be detected early and treated promptly. With early detection, prophylactic barrier laser retinopexy may be performed while with late treatment central vision loss may occur and more complicated procedures required to address the problem. Classically, the presence of an absolute scotoma or a noncompressible area of retinal elevation were used for differentiating retinoschisis from rhegmatogenous retinal detachment. These techniques are subjective. More recently, imaging techniques of the periphery such as optical coherence tomography (OCT) have been utilized to better identify the presence of a rhegmatogenous retinal detachment.<sup>1–3</sup> In order to attain these peripheral retinal images patients' were either directed to look in extreme gaze in the direction of the lesion<sup>1,2</sup> or a slit-lamp mounted OCT device was combined with a lens.<sup>3</sup> However, the former technique limits the examiner's ability to image lesions in the far periphery and the latter requires a slit-lamp mounted OCT and is not possible with Cirrus (Carl Zeiss Meditec, Dublin, CA) or Heidelberg Spectralis (Heidelberg Engineering, Heidelberg, Germany) OCT devices.

In patients with bullous retinoschisis associated with findings suspicious for rhegmatogenous detachment—such as irregularities of the contour of the retinoschisis cavity, flashes or floaters, and pigmented cells in the vitreous—we utilize OCT to visualize the posterior edge of the retinal elevation and identify areas of rhegmatogenous detachment. Techniques to optimize visualization of the periphery include tilting the patient's head along with the OCT camera to capture peripheral shots, allowing the patient to fully dilate following tropicamide and phenylephrine application, lubricating the cornea with artificial tears to optimize image quality, and capturing both horizontal and vertical cross-sections at the border. To attain images in the far periphery patients are prompted to look in extreme gaze in the direction of the lesion then turn their head in that direction. The OCT camera is then adjusted to allow for image acquisition (Fig. 1). Here we report the use of this novel technique for imaging the far periphery while utilizing the Cirrus high resolution OCT to identify areas of rhegmatogenous retinal detachment associated with bullous retinoschisis.

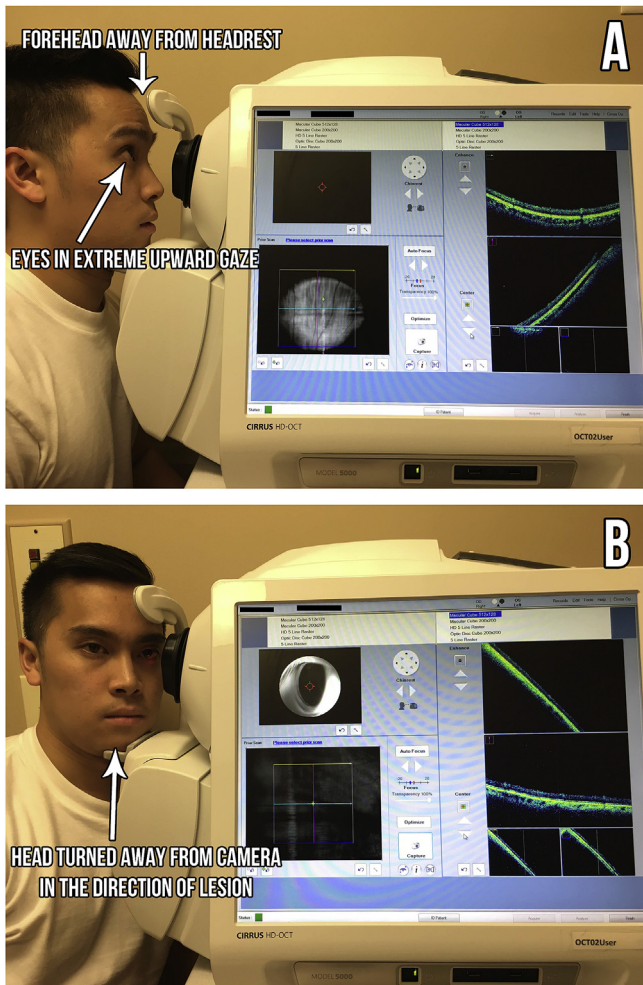
## 2. Findings

### 2.1. Case 1

Fifty-eight year old male with a history of rhegmatogenous retinal detachment in the right eye treated with barrier laser retinopexy presented with a new onset of flashes in the left eye. Visual

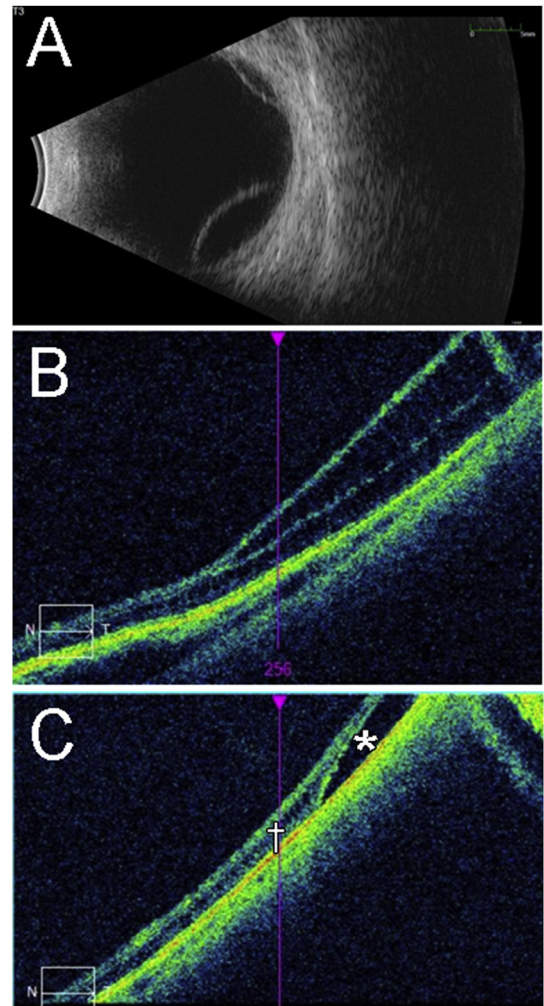
\* Corresponding author.

E-mail address: [rongallemoremd@gmail.com](mailto:rongallemoremd@gmail.com) (R.P. Gallemore).



**Fig. 1.** Demonstration of image acquisition technique with healthy individual. A) Superior retinal image attained by having healthy individual remove forehead from headrest, tilt head back and look in extreme upward gaze. Optical coherence tomography (OCT) demonstrates clear cross-sectional retinal image. B) Medial retinal image attained with healthy individual's head turned toward contralateral shoulder. OCT demonstrates clear cross-sectional retinal image.

acuity was 20/20 in both eyes and ophthalmoscopic examination with scleral depression and B-scan ultrasonography revealed new areas of bullous retinoschisis in the periphery of the left eye, but no apparent detachment (Fig. 2A). OCT studies were undertaken and demonstrated this retinoschisis, but did not reveal a detachment and no treatment was recommended (Fig. 2B). Given the recent onset of symptoms and suspicious areas on examination, the patient was scheduled to return 1 week later. At that time he reported a further increase in his flashes. Visual acuity remained 20/20 and ophthalmoscopic examination revealed further expansion of his bullous retinoschisis without a clearly visible detachment. Images of the far periphery with OCT were performed and demonstrated a clear rhegmatogenous retinal detachment within the area of bullous retinoschisis (Fig. 2C). Barrier laser retinopexy was applied surrounding this area of combined retinoschisis and rhegmatogenous retinal detachment. The patient has been followed for 15 months and required no further treatment while maintaining visual acuity of 20/20 in both eyes.



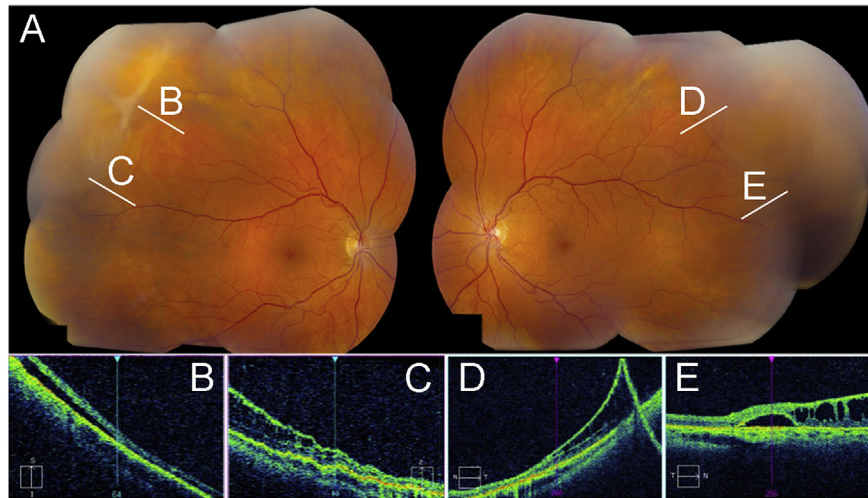
**Fig. 2.** A) B-scan with bullous retinoschisis. B) Optical coherence tomography (OCT) documents retinoschisis without signs of rhegmatogenous retinal detachment. C) Follow-up OCT 1-week later demonstrates a rhegmatogenous retinal detachment (\*) with areas of early retinoschisis change as well (†).

## 2.2. Case 2

Sixty-one year old male referred with concern for retinal detachments in both eyes. Visual acuity was 20/20 in both eyes. Ophthalmoscopic examination with scleral depression and fundus photography revealed expansive areas of bullous retinoschisis without definitive evidence of retinal detachment (Fig. 3A). Multiple OCT studies were performed in each eye confirming the presence of bullous retinoschisis (Fig. 3C,D), but also revealing rhegmatogenous retinal detachments (Fig. 3B,E). He subsequently returned for barrier laser retinopexy surrounding these two areas of combined bullous retinoschisis and rhegmatogenous retinal detachment. The patient has required no further treatment, his visual acuity remains 20/20 in both eyes, and both of his retinal detachments remain well-treated 15 months after treatment.

## 3. Discussion

We report the use of Cirrus OCT to identify areas of rhegmatogenous retinal detachment in patients with bullous retinoschisis. Our technique allows for the acquisition of lesions in the far periphery, which was previously a limitation of such imaging of



**Fig. 3.** A) Composite fundus image of the right and left eye for one patient demonstrating areas of retinoschisis with possible concomitant retinal detachments. B) Right eye cross-sectional optical coherence tomography (OCT) demonstrating rhegmatogenous retinal detachment. C) Right eye cross-sectional OCT demonstrating retinoschisis. D) Left eye OCT demonstrating retinoschisis. E) Left eye OCT demonstrating rhegmatogenous retinal detachment. For each cross-sectional OCT image, the location is demonstrated on the composite fundus image.

peripheral retina. However, our technique is limited by the technician's skill with the OCT device and patient cooperation with head and eye placement directions. Technicians in our practice are routinely capable of imaging lesions at the equator and, in select cooperative patients with the right anatomy, we have even been able to image anterior to the equator midway between the equator and the ora serrata. With this technique, it is not uncommon to find a small pocket of rhegmatogenous detachment prompting treatment when observation would otherwise be undertaken. If only clinically observed, then a more complicated detachment may result down the road requiring more complex surgical maneuvers for repair. Rachitskaya et al. discussed OCT morphology in retinoschisis and combined retinoschisis and rhegmatogenous retinal detachments,<sup>4</sup> which can help guide treatment decisions following image acquisition.

We suggest monitoring the posterior edge of all bullous retinoschisis that can be captured on optical coherence tomography on a periodic basis, perhaps every 6 months or more frequently if symptoms arise. Combined with ultrasonography and visual field studies (Goldmann) progression of retinoschisis and development of rhegmatogenous components may facilitate early treatment and better outcomes. Further exploration of this technique is warranted with a clinical trial to better elucidate its best utilization in clinic and the extent of peripheral retina that can be reproducibly imaged. Future application of ultra-widefield steering-based spectral-domain OCT may further extend the applications for this technique, as well.<sup>5</sup>

#### 4. Patient consent

Consent to publish the case report was not obtained. This report does not contain any personal information that could lead to the identification of the patients.

#### Funding

No funding or grant support.

#### Conflicts of interest

The following authors have no financial disclosures: JOW, RPG.

#### Authorship

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

#### Acknowledgements

Don Pham.

#### References

1. Stehouwer M, Tan SH, van Leeuwen TG, Verbraak FD. Senile retinoschisis versus retinal detachment, the additional value of peripheral retinal OCT scans (SL SCAN-1, Topcon). *Acta Ophthalmol.* 2014 May;92:221–227.
2. Yeoh J, Rahman W, Chen FK, da Cruz L. Use of spectral-domain optical coherence tomography to differentiate acquired retinoschisis from retinal detachment in difficult cases. *Retina.* 2012 Sep;32:1574–1580.
3. Ip M, Garza-Karren C, Duker JS, et al. Differentiation of degenerative retinoschisis from retinal detachment using optical coherence tomography. *Ophthalmology.* 1999 Mar;106:600–605.
4. Rachitskaya AV, Yuan A, Singh RP, et al. Optical coherence tomography of outer retinal holes in senile retinoschisis and schisis-detachment. *Br J Ophthalmol.* Published Online First: [24 Jun 2016] doi:10.1136/bjophthalmol-2016-308551.
5. Choudhry N, Golding J, Manry MW, Rao RC. Ultra-widefield steering-based spectral-domain optical coherence tomography imaging of the retinal periphery. *Ophthalmology.* 2016 Jun;123:1368–1374.