

Feasibility of Peripheral OCT Imaging using a Novel Integrated SLO Ultra-Widefield Imaging Swept-Source OCT device



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Financial Disclosure – Netan Choudhry: Bayer (S,C,R); Novartis (S,C); Allergan (S,C); Optos (S,C,R); Carl Zeiss Meditec (C); Simrat Sodhi, John Golding and Carmelina Trimboli (N)



PURPOSE

To describe the feasibility of peripheral OCT imaging in retinal diseases using a novel full-field device.

METHODS

A total of 96 patients (134 eyes) were consecutively referred and imaged on the Optos Silverstone swept-source OCT (SS-OCT) (Optos PLC; Dunfermline, UK). After review, 5 patients were removed due to incomplete imaging, leaving 91 patients (125 eyes). At baseline, color and green autofluorescence (AF) optomap images, and ultra-widefield (UWF) 6 mm line and 6 mm volume OCT scans were obtained for all patients. Based on possible pathology identified, additional scans were acquired. Typically, a UWF 6 mm HD volume and 23 mm extended line OCT scans were also captured, at the photographer's discretion. Each patient's images were assessed on several specific areas of interest by a single physician, which included confirmation of diagnosis, pathology location and ability to capture peripheral pathology. If a patient had multiple pathologies, each pathology was analysed separately. Pathology location was classified as posterior pole, mid periphery or far periphery based on the classifications and guidelines for wide field imaging from the International Wide Field Imaging Study Group¹.

RESULTS

A total of 91 patients (125 eyes) assessed in this study. The average age of the subjects was 54 years (range 21-92 years). Fifty-three of the 91 patients were female and 38 were male. Eighty-six out of 125 eyes (69%) had peripheral only pathologies. Frequent peripheral pathologies included: retinal tears (11 eyes), retinal holes (10 eyes), retinoschisis (10 eyes), retinal detachment (RD) (10 eyes), of which 5 eyes were assessed post-pneumatic retinopexy (PnR), retinal tuft (7 eyes), central serous retinopathy (CSR) (5 eyes), lattice degeneration (4 eyes), and choroidal nevus (4 eyes). Three of the eyes (2.4%) had pathologies that were not accessible by the full-field SS-OCT device. These included a retinal tear, retinal hole and a status post PnR. In 57 of the cases (45.6%), the pathology was located in the mid-periphery or far periphery only (**Table 1**). These pathologies would not have been captured by standard OCT devices with a 50 degree field of view.

Table 1: A summary of the pathology location of peripheral medical and surgical cases

Pathology Location	Number of Cases
Mid-Periphery Only	29
Far-Periphery Only	28
Posterior Pole & Mid-Periphery	4
Mid-Periphery & Far-Periphery	5
Posterior Pole, Mid-Periphery & Far Periphery	2

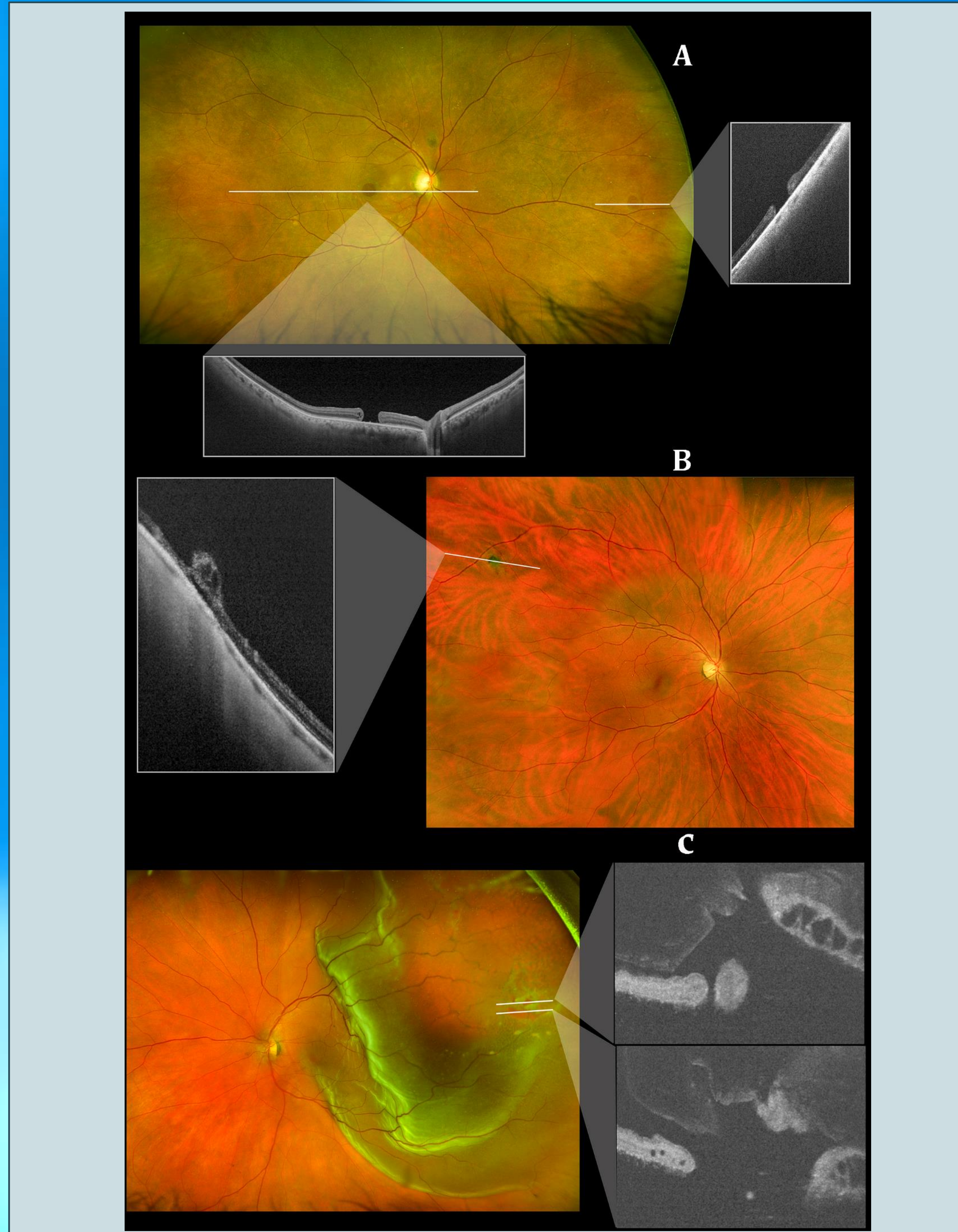


Figure 2: Ultra-widefield (UWF) color scanning laser ophthalmoscope (SLO) images and corresponding insets depicting cross sectional swept source OCT scans of: **A)** A macular hole and atrophic retinal hole in the far periphery **B)** cystic retinal tuft in far periphery and **C)** retinal detachment extending from posterior pole to far periphery with retinal tear in mid-periphery

RESULTS



Figure 3: Ultra-widefield color scanning laser ophthalmoscope image and magnified inset of retinoschisis in far periphery

CONCLUSION

- Three instances would particularly benefit from a full-field SS-OCT device:
- I. Surgical cases, where OCT is not traditionally adopted, subtle features provide insight into strategies that can yield optimal outcomes
 - II. Referrals for 'unknown' pathologies or unexplained symptoms that rely on a wider scope of imaging to discern marginal changes or when differentiating between clinical masqueraders
 - III. Telemedicine initiatives where precise diagnoses and management of these entities are obligated to occur in remote settings where retinal specialists may not be as readily available.

This novel, UWF, SS-OCT peripheral imaging approach provides high-quality anatomical information that allowed confirmation of diagnoses, especially in surgical cases. Montage or steering techniques to reach the periphery could have been used, but our approach forgoes the need for these techniques, thus increasing the speed and resolution of imaging while providing patient facileness. In a retinal practice, this approach offers a novel addition to the ophthalmic clinical exam thereby providing comprehensive options to routine clinical imaging for virtually all pathologies.

REFERENCES

1. Choudhry N, Duker JS, Freund KB, et al. (2019) Classification & Guidelines for Widefield Imaging Recommendations from the International Widefield Imaging Study Group. *Ophthalmol Retin* 3(10):843-849.

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