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View Abstract

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Study Group: (none)

ABSTRACT

TITLE: Optical Coherence Tomography Navigated Laser Retinopexy for Retinal Breaks

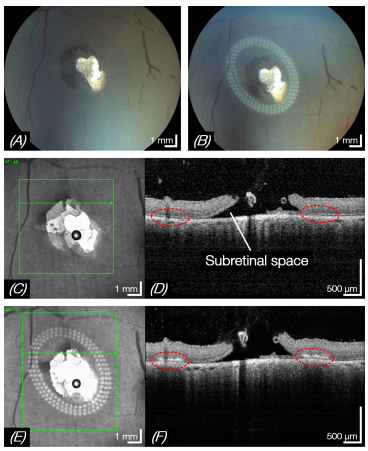
ABSTRACT BODY:

Purpose: The prevalent cause of retinal detachment is a full-thickness retinal break, which allows fluid to enter the subretinal space from the vitreous cavity. To prevent progression of the detachment, laser photocoagulation (LPC) lesions are placed around the break in clinical practice to seal the tissue. The treatment is usually performed under indirect ophthalmoscopy. Therefore, the subretinal damage can be difficult to delineate and an experienced operator is required for a successful outcome. In this work, optical coherence tomography (OCT) is used for optimal treatment planning, and LPC is subsequently applied in a navigated and user-friendly procedure.

Methods: The novel method was integrated in a modified OCT diagnostic system (SPECTRALIS OCT, Heidelberg Engineering, Heidelberg, Germany) with integrated treatment laser (Merilas 532 shortpulse, Meridian, Thun, Switzerland). To reliably seal the break, LPC lesions must be applied in regions of still attached retina. Therefore, OCT B-scans were used to manually mark the boundary of the surrounding detachment, which allowed to compute an optimally placed elliptical treatment area. To evaluate the method, artificially provoked retinal breaks were treated accordingly in 10 ex-vivo porcine eyes and the outcome was assessed by fundus photography and OCT imaging.

Results: Ex-vivo experiments showed that OCT-based laser treatment is feasible and the visibility of the subretinal space allows precise treatment planning. A total of 99 to 227 automatically applied lesions per eye at 200 ms and 200 mW were evident as coagulation in color fundus photography. Furthermore, OCT cross-sectional scans showed the required ruptures of the retina at the LPC application sites (Figure 1).

Conclusions: The results indicate the potential of OCT navigated laser retinopexy to achieve high treatment accuracy, efficiency, and safety. Future studies should address treatment of peripheral breaks and the integration of the existing tracking and follow-up functionalities to further enhance and facilitate the treatment.



Retinal break treatment outcome in an ex-vivo porcine eye. Fundus photographs before (A) and after (B) treatment, infrared scanning laser ophthalmoscope images before (C) and after (E) treatment with the corresponding OCT B-scans (D)(F). The effect of LPC treatment is visible in (B)(E) as spots of whitened tissue and in (F) as ruptures in the retina at the treatment sites (marked in red).

DETAILS

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CURRENT SECTION: Retina

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Other Registry Site (Abstract): (none)

Registration Number (Abstract): (none)

Date Trial was Registered (MM/DD/YYYY) (Abstract): (none)

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