Multifocal electroretinogram helps quantify functional recovery after macular hole surgery: 3-year follow-up

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Thibaud GARCIN[*1,2], Nicolas Abihaidar[2], Houssem Fadli[2], Vincent M. Borderie[1], Nacim Bouheraoua[1]*

[1]Department 5, CHNV 1520, FRANCE, France; [2]University Jean monnet, SAINT ETIENNE, France

Disclosures: Thibaud GARCIN: Code N (No Commercial Relationship) | Nicolas Abihaidar: Code N (No Commercial Relationship) | Houssem Fadli: Code N (No Commercial Relationship) | Vincent M. Borderie: Code N (No Commercial Relationship) | Nacim Bouheraoua: Code N (No Commercial Relationship)

Purpose

Improvements in surgical techniques for treating idiopathic macular holes (MH) have resulted in high success rates for anatomical closure and subjective functional improvement. The multifocal electroretinogram (mfERG) could objectively and accurately assess the functional recovery of central retina after successful MH surgery.

Methods

Retrospective monocentric study with a minimum follow-up of 1 year and up to 3 years of patients operated on for MH in a French tertiary center by a single experienced operator. Examination especially included: far and near best corrected visual acuity (BCVA), SD-OCT, all mfERG parameters (mean retinal electrical response RMS, amplitude and implicit time of N1, P1) every 6 months postoperatively, with comparison in the fellow healthy eye.
Main outcome measure: RMS evolution within central 20°. Secondary outcomes: evolution of parameters; relationship between mfERG and BCVA; comparison with fellow eye.

Results

47 operated eyes and 47 fellow eyes of 47 patients were included. All had anatomical closure with a single standardized 25G surgery for MH with a mean diameter of 401 ± 155 microns. At baseline, 48% of the eyes were pseudophakic, at M36 90%. There was a statistically significant increase in mean RMS in the foveal (P=0.004) and parafoveal (P=0.02) zones with improvement over 3 years. Far and near BCVA improved significantly over 3 years (P<0.05). In short term (M6-M12 postoperatively), 53.48% of the operated eyes improved their BCVA by >0.3 logMAR, while in long term (M24-M36 postoperatively), this proportion reached 84%. The amplitude of P1 improved significantly between short and long term within the foveal (P=0.009) and parafoveal (P=0.02) zones. Within the foveal zone: the implicit time of N1

increased significantly between short and long term (P=0.01); significant correlations between RMS and near BCVA in short (P=0.01) and long term (P=0.04); mean RMS and amplitude of P1 were significantly lower in the operated eye versus the fellow eye in short term (P=0.009), but no longer in long term (P=0.16).

Conclusions
mfERG showed objectively progressive functional recovery of the inner and outer retina later than 1 year postoperatively in the parafoveal and/or foveal area. Interestingly, mfERG showed correlations with near BCVA in the long-term. Functional recovery of outer retina is only partial even after 3 years compared to the fellow eye.

Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.
Multifocal electroretinogram helps quantify objectively functional recovery after macular hole surgery. It brings new insights into understanding long-term functional changes in the macular area. It helps assess the behavior of different retinal layers: it shows that despite good or excellent structural or visual recovery, eyes operated on for macular hole never have ad integrum functional recovery, even several years after surgery.