

Double retinal pigment epithelium tears in age-related macular degeneration

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Purpose:

To describe the occurrence of double retinal pigment epithelium (RPE) tears in neovascular age-related macular degeneration (AMD) and to elucidate the mechanism of tear development by means of multimodal imaging analysis

Methods:

This is a multicentric interventional case series study. Eyes with neovascular AMD that developed two RPE tears in different locations were reviewed. Analysis included site of RPE tears occurrence, tears area evaluated on blue FAF images, (Spectralis HRA+SD-OCT, Heidelberg Engineering, Heidelberg, Germany), RPE tears were graded on the basis of tear size according to Sarraf et al. classification (1). We also attempted to evaluate the location of choroidal neovessels with respect to the PED on basis of available FA, ICGA and SD-OCT images, before and after the occurrence of first and second RPE tear.

Results:

Nine eyes of 7 patients (3 males; 4 females; mean age 81.5 ± 7.7 years) that developed double RPE tears, either simultaneously (5 eyes) or at variable interval after repeated intravitreal anti-VEGF administration (4 eyes), were included mean follow-up 67.8 ± 37.5 months. 8 eyes (88.9%) received at least 1 anti-VEGF injection before the development of the RPE tear, for the treatment secondary to AMD complicated by type 1 neovascularization revealed by multimodal imaging. Only 1 eye (11.1%) presented a spontaneous tear without any treatment. First RPE tear developed after a mean of 4.6 ± 3.0 anti-VEGF injections; second RPE tears developed after a mean of 7.6 ± 5.2 anti-VEGF injections.

At time of occurrence, first tear was grade 3 in 7 eyes (77.8%), grade 2 in 1 case (11.1%) and grade 4 in 1 case (11.1%); 1 of these tears (11.1%) disappeared, while the others maintained the same grading during follow up (40.7 ± 23.4 months; 18.6 ± 11.5 anti-VEGF injections) At time of occurrence, second tear was grade 4 in 1 case (11.1%), grade 3 in 7 cases (77.8%) and grade 2 in 1 case (11.1%); all these tears maintained the same grading during follow up (32.8 ± 26.2 months; 11.0 ± 11.3 anti-VEGF injections)

Double tears typically occurred on two opposite sides of vPED. Multimodal imaging revealed in all cases a type 1 neovascularization adherent to the posterior surface of the RPE, and crossing the entire PED area with variable orientation (figure 1); after development of double tears, the RPE appeared retracted on both sides of the neovascular network limits.

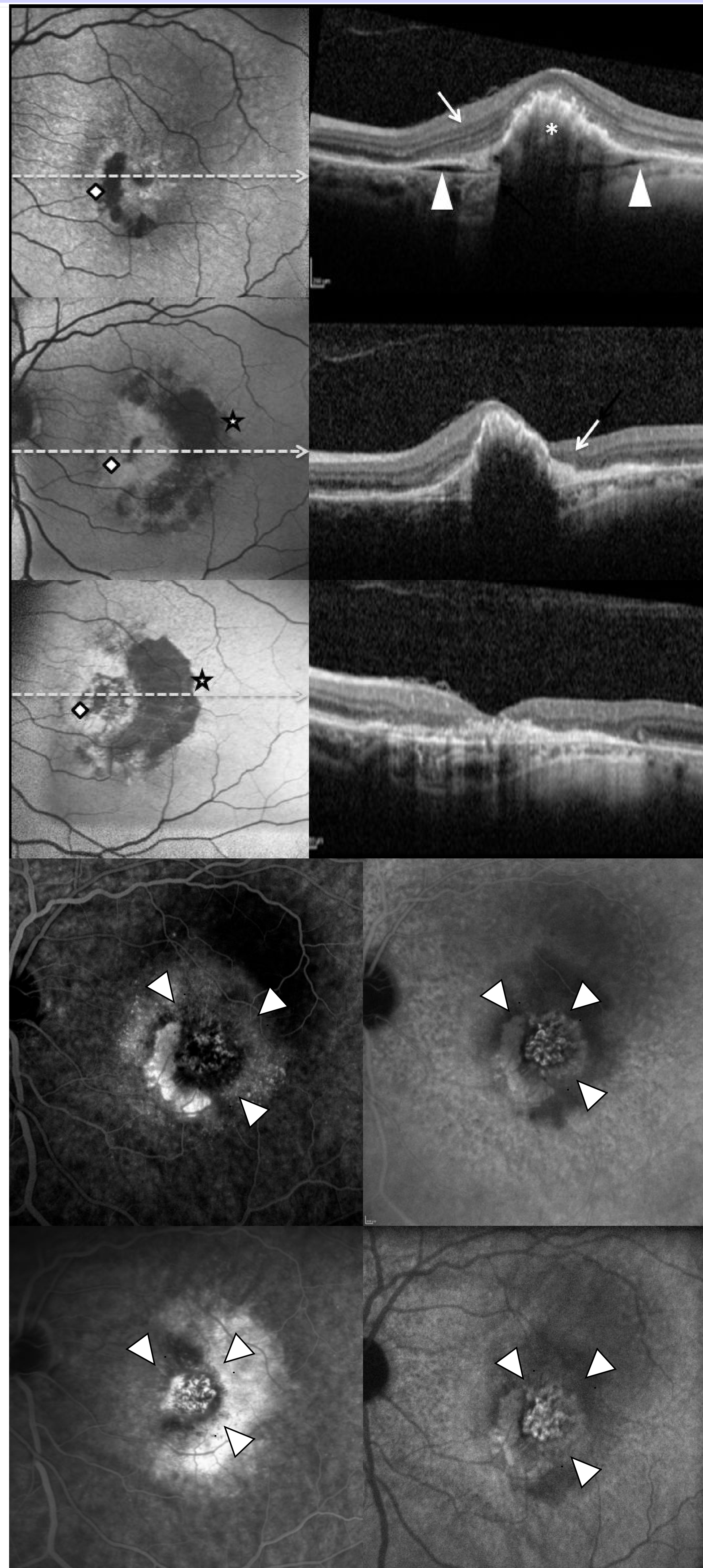


Figure 1: Multimodal imaging including fundus autofluorescence (FAF), spectral-domain optical coherence tomography (SD-OCT), fluorescein angiography (FA), indocyanine green angiography (ICGA) of Case #1 illustrating type 1 neovascularization (CNV) in an eye presenting double retinal pigment epithelium (RPE) tear development after intravitreal ranibizumab injection for neovascular age-related macular degeneration.

On FAF image, the squares indicate the first tear, the stars indicate the second tear.

On SD OCT, white arrows indicate the RPE tears, the arrowheads indicate the pigment epithelium detachment (PED) limits, the asterisk indicates the CNV. On FA and ICGA arrowheads indicate the CNV network limits.

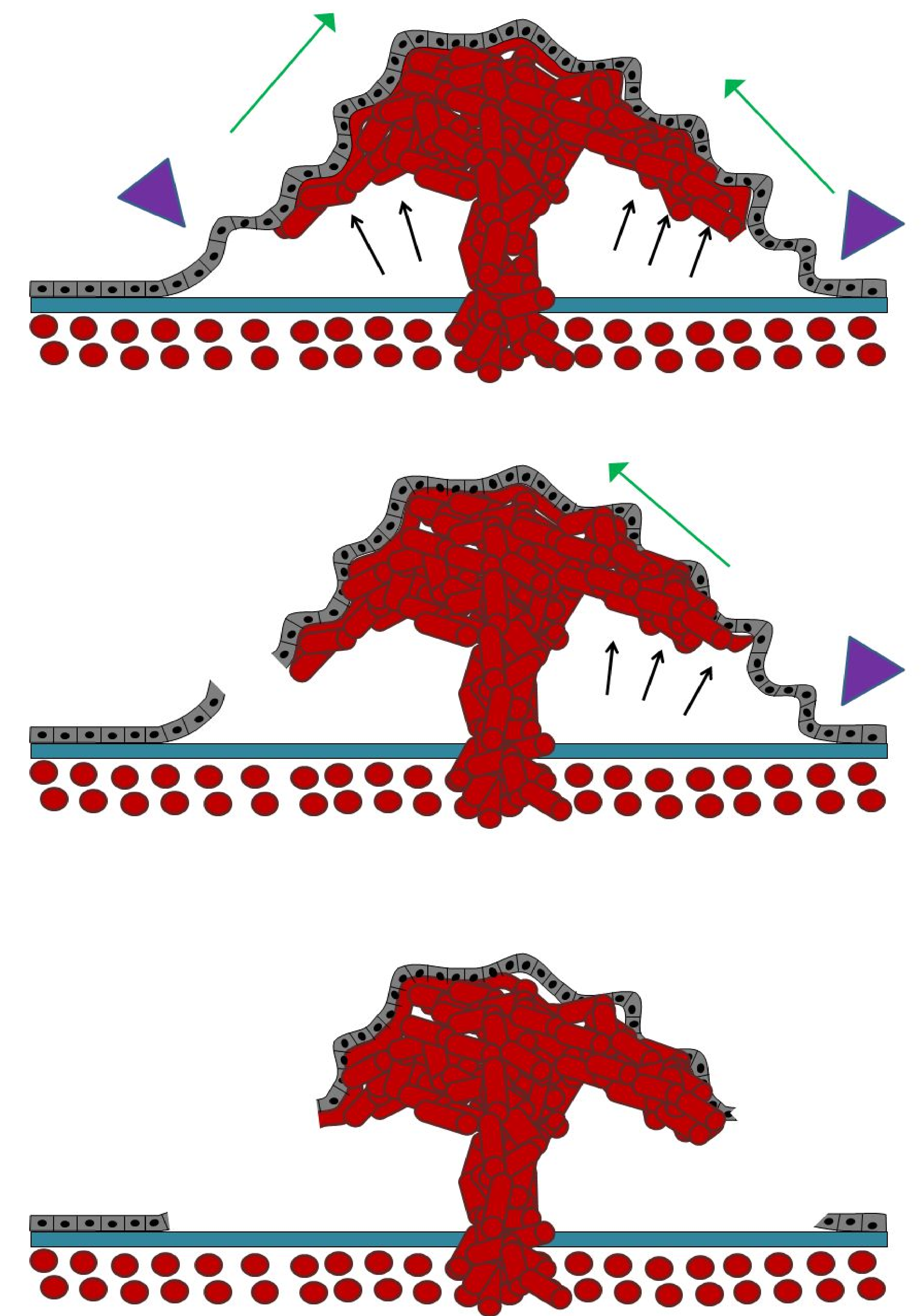


Figure 2 : Illustration model for double retinal pigment epithelium tear formation in eyes treated by intravitreal anti-vascular endothelial growth factor (VEGF) injections in neovascular age related macular degeneration. Choroidal type 1 neovascularization (red circles) starting from the choroid and adherent to retinal pigment epithelium (grey cells monolayer), the Bruch membrane is in blue. Black arrows represent hydrostatic pressure induced by exudation, green arrows represent the tensile forces due to CNV contraction, purple arrows heads represent weakness zones where tears will occur.

Conclusion :

Two simultaneous or subsequent RPE tears (double RPE tears) may occur in eyes treated for vPED due to neovascular contraction on each side of a type 1 neovascularization adherent to the posterior surface of the RPE, and crossing the entire PED area.

References :

- Sarraf D, Reddy S, Chiang A, Yu F, Jain A and al. A new grading system for retinal pigment epithelial tears. *Retina*. 2010 Jul-Aug;30(7):1039-45. doi: 10.1097/IAE.0b013e3181cdf366.