Contrast Enhancement Improves the Diagnostic Accuracy of Color Doppler Ultrasonography for Differentiating Retinal Detachment from Vitreous Membrane

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Purpose: This study aimed to evaluate the diagnostic yield of contrast-enhanced color Doppler ultrasonography (CECD-US) as a diagnostic modality for differentiation between retinal detachment (RD) and vitreous membrane (VM) in patients with vitreous opacity.

Methods: The study included 26 patients presented by vitreous opacities in one eye (26 eyes) after clinical evaluations, all patients underwent US examination. During all Doppler studies the diagnostic criterion for RD and VM was whether or not color signals were visualize din the membranous structure.

Results: There were 12 eyes (46.2%) with VM, 6 eyes (23.1%) had VM and RD, 6 eyes (23.1%) had partial RD and 2 eyes (7.6%) had complete RD. examined eyes were categorized as 12 eyes (46.2%) with VM and 14 eyes (53.8%) with RD. The diagnoses were confirmed by surgery in 23 patients, and by clinical follow-up in one with RD and two with VM. Gray scale US examination showed 3 false positives and 3 false positives with 100% specificity and positive predictive value (PPV); however, CD without contrast falsely excluded RD in only one eye with a sensitivity rate of 92.9%, negative predictive value (NPV) of 92.3% and accuracy of diagnosis of 96.2%. There was a significant increase of diagnostic validity characters of CECD-US in comparison to CD-US and gray-scale US, \( \chi^2 = 3.471, p<0.01 \) and \( \chi^2 = 7.181, p<0.001 \). Evaluation of the specificity of evaluated diagnostic modalities using ROC curve analysis as judge by area under curve defined the use of CE-CDUS was the most specific diagnostic modality for identification of eyes with RD and for differentiating in it from VM with AUC = 0.964.

Conclusion: Contrast-enhanced color Doppler US, with accuracy of 96.2%, was the most accurate US modality for differentiating RD from VM. In addition, contrast enhancement improved the signal detection rate in RD from 57.1% to 92.9%.

Today there is a strong suggestion that all symptomatic retinal ruptures should be treated. Ruptures with small and shallow retinal detachments should be treated. If there is vitreoretinal traction and retinal defect, these eyes should be treated. There are some medical eye conditions; aphakia, pseudophakia, myopia, retinal changes in fellow eye, vitreous hemorrhage, trauma, where it is wise to perform laser treatment for retinal rupture.\(^1\)

Retinal detachment refers to separation of the inner layers of the retina from the underlying retinal pigment epithelium (RPE, choroid). The choroid is a vascular membrane containing large branched pigment cells sandwiched between the retina and sclera. Separation of the sensory retina from the underlying RPE occurs by the following 3 basic mechanisms: a hole, tear, or break in the neuronal layer allowing fluid from the vitreous cavity to seep in between and separate sensory and RPE layers, i.e., rhegmatogenous RD; traction from inflammatory or vascular fibrous membranes on the surface of the retina, which tether to the vitreous, or exudation of material into the subretinal space from retinal vessels such as in hypertension, or papilledema. RDs may be associated with trauma including previous ocular surgery. The incidence rate for retinal detachment was significantly higher in pseudophakic eyes than in the background population for at least 6 years after surgery.\(^2\).

The retina is a structure which is attached to the optic disc posteriorly and ora serrata anteriorly. If the retina is for any reason detached, it is seen at US as a