High-speed angiography sheds new light on choroid and retinal pathologies

Dermot McGrath
in Sao Paulo

HIGH-SPEED angiography is a valuable tool for detecting and monitoring a broad spectrum of pathologies affecting the choroid and retina, including proliferative diabetic retinopathy, macular dystrophies, Best's disease and choroidal neovascularisation, according to Michel Eid Farah, MD, Vision Institute-IPEPO, Federal University of Sao Paulo, Brazil.

"High-speed angiography offers us a great deal of clinically useful information through its excellent high-contrast and high-definition images"  

Discussing the properties of the Heidelberg Retina Angiograph 2 (HRA 2) in more detail, Dr Farah explained that the device is a floor-mounted imaging system comprising a laser imaging unit, patient head support and computer workstation with an image database. The retinal light exposure required for angiography on the HRA 2 is about 1% of the exposure required with a photographic system, making it safer and more comfortable for patients.

Dr Farah noted that the confocal scanning laser principle allows clinicians to image the retina with non- or poorly-dilated pupils. This feature is especially important for diabetics as they typically do not dilate very well and account for a large proportion of patients attending retina clinics.

High-speed movies

One unique feature of the HRA 2, which he emphasised as particularly beneficial, is its ability to acquire dynamic, high-speed movies of up to 16 frames per second in both fluorescein and ICG angiographies used in early-stage detection of choroidal neovascularisation (CNV) secondary to age-related macular degeneration.

The use of high-speed ICG angiography permits the visualisation of blood flow dynamics in the afferent feeder vessel of subfoveal CNV. Pilot studies have shown that feeder vessel closure by direct laser treatment in an extrafoveal position leads to regression of subfoveal choroidal neovascular membrane without decrease in vision.

Such high-speed ICG movies make it possible to analyse blood flow dynamics in the feeder vessels and to better target the ideal treatment area, said Dr Farah. No other technique so far has allowed the identification of blood flow direction in the feeder vessels. Without identification of afferent feeder vessels, there is a greater likelihood of inadvertent occlusion of draining vessels, thereby increasing the risk of subretinal haemorrhage.

Dr Farah noted that the ability to construct composite ICG movies is especially useful in the initial phase of fluorescein angiographies when documentation of the early filling stages is vital. In ICG mode, this feature also enables better detection of choroidal neovascularisation characteristics such as feeder vessels, retinal choroidal anastomosis and retinal angiomatous proliferation. There is also the possibility to extract single images from the movie sequence, which can be viewed separately and printed if necessary.

Simultaneous fluorescein angiography

The possibility of using simultaneous fluorescein angiography and ICG angiography is another useful feature of the HRA 2, said Dr Farah.

"It means that we can observe on the same screen the two examinations going on at the same time after injection of the two dyes," he said.

He illustrated the clinical relevance of this capability by showing a scan of a patient whose fluorescein angiography showed a subfoveal CNV leakage and the simultaneous ICG image revealed a suspected retinal choroidal anastomosis.

The addition of special lenses and image composition techniques also allows for a wider field of view than was previously possible with earlier generation instruments, noted Dr Farah. In standard mode, the HRA 2 provides a 768 x 768 pixel image with a 30-degree field of view. Using add-on lenses, however, the HRA 2 allows photographic angles up to 120° and as high as 150°.

"With red free and infrared we can see through moderate cataracts and we are able to identify very clearly the epiretinal membranes and nerve fibre layers, so this type of device is also very useful for glaucoma studies."

This allows us to visualise peripheral structures of the retina and the choroid with just one view and is very helpful in observing and following patients with more diffuse disease," he said.

The 150° view is especially beneficial for diagnosis of diabetic retinopathy and peripheral retinal disorders and is helpful in documenting retinoschisis and retinal detachments, melanomas and other choroidal tumours; retinal capillary haemangioma, uveitis, retinitis pigmentosa and Stargardt's disease.

Another major plus of high-speed angiography, added Dr Farah, is the device's ability to use non-invasive autofluorescence imaging to confirm diagnosis in such conditions as macular holes, macular degeneration, pseudovitelliform lesions, retinal pigment epithelial atrophy, central serous chorioretinopathy and Best's disease.

Confocality of the HRA 2 also allows the acquisition of images in up to 64 consecutive focal planes to a depth of 8.0mm. The result is a dramatic 3-D image series, which can be especially useful in studying choroidal melanomas among other entities.

Using infrared light on the HRA 2 allows viewing of the fundus with extremely light-sensitive patients such as children and enables viewing through cataract as well, said Dr Farah.

"With red free and infrared we can see through moderate cataracts and we are able to identify very clearly the epiretinal membranes and nerve fibre layers, so this type of device is also very useful for glaucoma studies."

mfarah@uol.com.br