Retinal Vasculature
A Window on the Brain

J. David Spence, J. Alexander Fraser

The classification by Ong et al of retinopathy into none, mild, moderate, or severe is a simplified approach compared with historical classifications, such as the Keith–Wagener classification, but is helpful to clinicians. Also helpful was their pointing out that retinal photographs are readily available, even in optical shops in the community, and therefore, assessment of retinopathy is available even to clinicians not skilled in ophthalmoscopy.

One diagnostic trap is worth mentioning: as discussed by Matas, simple obscuration of the venular wall behind a thickened retinal arteriole is a result of atherosclerotic wall thickening and should not be mistaken for arteriovenous nicking. In arteriovenous nicking, the venule tapers in diameter behind the arteriole as it is strangled by its common sheath. These differences are illustrated in the Figure.

That retinopathy predicted the risk of stroke was not surprising; retinopathy is more common in patients with stroke or TIA, and retinopathy also predicted risk in the Multi-Ethnic Study of Atherosclerosis; however, the finding of Ong et al that the increased risk of stroke was independent of blood pressure was unexpected. Possible reasons include masked hypertension, inadequate data to assess blood pressure control over the 13 years of follow-up, and perhaps individual susceptibility of some participants to hypertensive small vessel disease.

Such susceptibility might include structural factors affecting the resistance of the arteriole to pressure, such as abnormalities of collagen or elastin. An interesting hint of such possibilities comes from mutations of COL4A1, which encodes procollagen type IV α1. Some mutations of this gene are associated with tortuosity of retinal arterioles in addition to cerebral aneurysms and abnormalities of basement membranes in skin and kidneys.

Although we encourage our medical students to examine the fundi in every patient they see until they are skilled at this technique and have a good understanding of the range of normality, we acknowledge that many practicing physicians’ aptitudes have waned since medical school. Although ophthalmoscopy is a skill that takes time, practice, and perseverance to master, proficiency pays dividends in the hypertension clinic and the stroke prevention clinic, as this study and others clearly show. The retina is the one place in the body where the physician can actually directly inspect the body’s microvasculature, the tissue most directly at risk from hypertension. Like measurement of carotid plaque burden, which predicts cardiovascular risk much more strongly than a score based on risk factors, ophthalmoscopy is another approach to actually assessing the disease of interest. It is a skill that can be relearned (when lost), particularly when retinal photographs are available for comparison with one’s own ophthalmoscopic examination.

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References


Figure. The retinal photograph shows several features of retinal vascular effects of hypertension and atherosclerosis. The white arrow shows obscuration of the underlying vein by thickening of the arterial wall (probably because of atherosclerosis) seen on edge; this is commonly mistaken for true hypertensive arteriovenous nicking, shown by the blue arrow, in which the obscured venule tapers in its caliber on either side of the arteriovenous crossing. The green arrow shows an enhanced retinal arteriolar light reflex (silver wiring), which probably represents concentric laminar thickening from chronic hypertension.
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