

Commentary: Multicolor imaging in optic disc swelling

Crowded disc, disc drusen, tilted disc, and other congenital variants are often difficult to distinguish from papilledema. Diagnosing pseudo disc edema is of utmost importance. Not only does it spare patients with pseudo disc edema unnecessary investigations but also prevents the mental distress of knowing what true disc edema might portend.

Clinical examination of the disc has been validated as a powerful tool to make the distinction between true and pseudo disc edema. Frisen grading of papilledema allowed this distinction to become easier, especially in higher grades of disc edema.^[1] In the earlier grades of papilledema, a nasal margin of the disc is first involved followed by the superior and inferior margins. Progressively, the entire disc circumference is involved. The axonal swelling causes the blood vessels crossing the disc margin and the major vasculature over the disc to be variably obscured depending on the grade of the edema. B scan ultrasonography has been regularly employed, where in the hyperreflective echo of the disc drusen is easily recognized in cases with diagnostic confusion. However, Carter *et al.* in their study utilizing orbital ultrasonography found that 21% of pseudopapilledema eyes had dilated optic nerve sheaths (a feature of papilledema). They thus advised caution in the interpretation of ultrasonography results in patients with pseudopapilledema.^[2] Optical coherence tomography (OCT) has also been studied to help distinguish between optic nerve head drusen (ONHD) and papilledema. ONHD is known to have a lumpy, bumpy appearance, whereas papilledema has a "lazy V contour" due to subretinal fluid.^[3] Scott *et al.* went a step further in comparing clinical assessment of papilledema and OCT findings. They concluded that OCT was more helpful in lower grades of papilledema when the diagnosis was doubtful and unhelpful in higher grades because of segmentation errors.^[4] The sensitivity and specificity of OCT in diagnosing papilledema is 80% and 70%, respectively.^[5] Autofluorescence is another important tool that picks up a disc drusen by its characteristic hyperautofluorescence, although it may not help in buried drusen. There is no single test possessing high sensitivity and specificity to definitively distinguish between true and pseudo disc edema.

The authors have described the use of multicolor imaging in three cases. They have attempted to distinguish between pseudo disc edema (one case of disc drusen) and disc edema (one case

each of ischemic optic neuropathy and papilledema). Malem *et al.* studied multicolor imaging in 20 pediatric patients with suspected papilledema and characterized the findings of true disc edema and pseudo disc edema in these cases.^[6] Although it was a small sample size, they laid down some general points favoring papilledema on multicolor imaging.

1. The presence of a hyperreflective ring with a green shift, best seen on blue and green reflectance and a central dark ring best seen on IR photography
2. Indistinct disc margins best seen on combined, blue and green reflectance images
3. Obscuration of disc vessels best seen on combined, blue and green reflectance images.

It is noteworthy that this study did not take into account the grade of papilledema. The images in this article show variable obscuration of blood vessels, keeping with the grade of the papilledema. Thus, the obscuration of blood vessels on multicolor imaging would correlate with the amount of obscuration on clinical fundus photographs as well. It is thus unclear what additional information multicolor imaging would provide. Moreover, in the article in question, the authors have described a hyperreflective although "well defined" ring on disc drusen as well. This ring was not described by Malem *et al.* in their case of disc drusen. Malem *et al.* also state that hyperreflective rings are a feature of papilledema and not seen in cases of pseudopapilledema such as disc drusen and hypermetropic discs. Hence, it is unclear whether the hyperreflective green ring is a feature of true disc edema or pseudo disc edema. The ring in papilledema is probably only because of the elevation of the disc and thus seen better on the shorter wavelength reflectance images. Hence, this ring would also be seen in ONHD that causes an elevation of the optic nerve head. Furthermore, the superotemporal and inferonasal vessels seem obscured in Fig. 3, and are best seen on combined, blue and green reflectance (E, G, H) although the vessels are well delineated on IR imaging [Fig. 3f]. Thus, obscuration of vessels too is a point of conflict.

Multicolor imaging is a newer technology. There is a paucity of literature on its use in discerning disc findings. Although it shows some potential in situations where it provides better contrast, such as epiretinal membranes, optic disc cupping, and retinal edema,^[7] its use in the distinction between true disc edema and pseudo disc edema remains to be seen. At present, there are very little data in this area. The conflicts in the existing data suggest that a larger sample size and kernel-based machine systems are needed to validate its use.^[8]

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