Commentary: Expanding the horizons of red-free examination

Several patients present to an ophthalmologist with the symptoms of flashes and floaters. Such patients need a careful and detailed evaluation of the peripheral retina for the presence of retinal break(s). In spite of the immense technological advances in the last few decades, dilated examination with the binocular indirect ophthalmoscope and scleral indentation still remains the gold standard for evaluation of such patients, as it provides a large field of view along with stereopsis.[1] Hence, it is extremely important to become proficient with this skill, which requires extensive practice.

The first direct ophthalmoscope for medical use was designed by Hermann von Helmholtz. Christian Ruete introduced indirect ophthalmoscopy by adding a concave focusing mirror which provided a stereoscopic and wider fundus view. Giraud-Teulon first introduced the binocular model of an indirect ophthalmoscope. Charles Schepens further modified the model and popularized binocular indirect ophthalmoscope. The instrument had a headband-mounted light source and the patient was examined with the help of stereoscopic mirrors and a condensing lens close to the patient's eye. Since then, the model has undergone multiple modifications to include the latest instrumentations and technologies.[2]

Binocular indirect ophthalmoscopy (BIO) is one of the most difficult and uncomfortable examination techniques for both the ophthalmologist and the patient. The examination requires a lot of cooperation from the patients.[3] However, the patients are troubled by the high retinal illuminance, especially those with high myopia. The poor cooperation can often lead to missed retinal break(s), which can sometimes be disastrous due to the rapid development of retinal detachment (RD). In fact, failure to recognize retinal break(s) is a potential medico-legal issue with heavy fine imposition on the ophthalmologist.[4] It is imperative to mention that the myopic eyes are at a high risk of developing retinal tear(s) and detachment due to the degenerated vitreous. Also, the incidence of myopia is increasing globally.[5] To overcome the problem, several non-mydriatic ultra-wide field imaging (UWFI) systems like Optomap Panoramic 200 Standard Imaging System (Optos, Dunfermline, UK), and Clarus 500 (Carl Zeiss Meditech Inc., Dublin, USA) have been developed. However, their sensitivity in identifying the peripheral treatable retinal lesions is around 70%–80% only. Hence, the currently available UWFI systems cannot replace the conventional BIO, especially in the presence of retinal breaks in the extreme periphery.[1]

A red-free examination has been found to be extremely useful in examining patients with several ocular pathologies. Localized retinal nerve fiber layer (RNFL) damage secondary to glaucoma is better visualized with red-free light. Studies have found a good correlation between the RNFL defects diagnosed with the red-free filter and the RNFL thinning on optical coherence tomography.[6] Red-free imaging has been found to have better ability in detecting intra-retinal microvascular anomalies (IRMA), neovascularization of the retina elsewhere (NVE), and neovascularization of the disc (NVD). Hence, it may help with easier detection of advanced diabetic retinopathy than the standard yellow light photography.[7] Detection of the vitreoretinal interface abnormalities is also facilitated by red-free light.[3] It also helps in better visualization of the complex vitreous flanges and hereditary vitreoretinal degenerations.[3] It is also useful in detecting the level of pigmented lesions. As green wavelength does not penetrate the choroidal layer; the choroidal lesions disappear or diminish while using red-free filter. This phenomenon is useful as the lesions located below the retinal pigment epithelium (RPE), like choroidal nevus, diminish or disappear while the lesions located above the RPE, like congenital hypertrophy of RPE, are highlighted.[3] The increased patient compliance to red-free light allows detailed and prolonged examination of the posterior pole in children and adolescents with hereditary dystrophies like Stargardt disease and fundus flavimaculatus.[3] However, its use in examining the retinal periphery has never been described.

We congratulate the authors for describing the clinical utility and patient satisfaction while using red-free (green) light for BIO.[8] They have shown that the patients were more cooperative, and experienced lesser pain and light sensitivity while being examined with red-free (green) light compared to yellow light for BIO. Other advantages included lesser examination time and similar efficacy in detecting the peripheral fundus lesions.[8] The authors correctly suggested that red-free light can make the learning curve associated with BIO easier for the budding ophthalmologists.

However, the red-free light (green) light is absorbed by cataract, which decreases the light intensity that reaches the fundus. Thus, white light has to be used to examine such patients. Red-free light examination can effectively complement the white light examination, especially in patients who cannot tolerate white light, like children and patients with high myopia and low vision. The ease of access, the additional information provided and high patient tolerance makes red-free examination a valuable addition in the daily ophthalmology practice.

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References

1. Kumar J, Kohli P, Babu N, Krishnakumar K, Arthur D, Ramasamy K. Comparison of two ultra-widefield imaging for detecting peripheral retinal breaks requiring treatment. Graefes Arch Clin Exp Ophthalmol 2021;259:1427-34.
2. Mark HH. On the evolution of binocular ophthalmoscopy. Arch Ophthalmol 2007;125:830-3.
3. Vignal R, Gastaud P, Izambart C, Daubas P, Freton A. Improved

visualization of fundus with green-light ophthalmoscopy. J Fr Ophtalmol 2007;30:271-5.

4. Mathew RG, Ferguson V, Hingorani M. Clinical negligence in ophthalmology: Fifteen years of national health service litigation authority data. Ophthalmology 2013;120:859-64.
5. Dolgin E. The myopia boom. Nature 2015;519:276-8.
6. Jung JH, Park JH, Yoo C, Kim YY. Localized retinal nerve fiber layer defects in red-free photographs versus en face structural optical coherence tomography images. J Glaucoma 2018;27:269-74.
7. Venkatesh P, Sharma R, Vashist N, Vohra R, Garg S. Detection of retinal lesions in diabetic retinopathy: Comparative evaluation of 7-field digital color photography versus red-free photography. Int Ophthalmol 2015;35:635-40.
8. Sharma P, Dhami A, Dhami NB, Dhami GS. Comparison of patient satisfaction with red-free (green) versus yellow light using binocular indirect ophthalmoscope for retinal examination. Indian J Ophthalmol 2022;70:2038-40.

Access this article online

Quick Response Code:

Website: www.ijo.in

DOI: 10.4103/ijo.IJO_601_22

Cite this article as: Soni T, Kohli P. Commentary: Expanding the horizons of red-free examination. Indian J Ophthalmol 2022;70:2041-2.