

Unmodified iPhone XS Max for fundus montage imaging in cases of retinoblastoma

Amar Pujari, Neiwete Lomi,
Siddhi Goel, Saumya Yadav, Ritika Mukhija,
Prashant Kumar, Atul Kumar

Key words: Fundus montage imaging, Iphone XS MAX, retinoblastoma

Recent ophthalmic innovations have shown that smartphones are able to capture the fundus images with^[1] or without^[2] any attachments. The presence of a near coaxial arrangement in smartphones, i.e., the close proximity of its camera with the light source, is the primary reason that makes the same possible. It is noteworthy that in routinely used direct ophthalmoscope, the light source and the aperture to visualize the fundus findings are also in close proximity, and hence the presence of this simple feature among the newer generation smartphones can be effectively utilized by the ophthalmologist to capture fundus images with great ease. However, this feature is currently present in a few models only, namely, iPhone X and higher version smartphone cameras, making fundus visualisation with other smartphones difficult, as the greater distance between the light source and visualization aperture obviates the coaxial functioning. In addition, the inherent optical qualities of the smartphone camera and features such as wider lens apertures, better pixel quality, optical image stabilisation, and others also play a crucial role in imaging.

Here, a left eye fundus of a two-year-old retinoblastoma patient was imaged with the help of an iPhone XS Max (without any attachments) (Apple incl. California, USA) during routine examination under general anaesthesia. Smartphone camera was switched on in the video mode with a continuous flashlight; 1-minute video was recorded to note the findings along the posterior pole, retinal arcades, periphery, and two retinal lesions (superiorly and nasally). Subsequently, a total of 14 screenshots were obtained from the video, which were

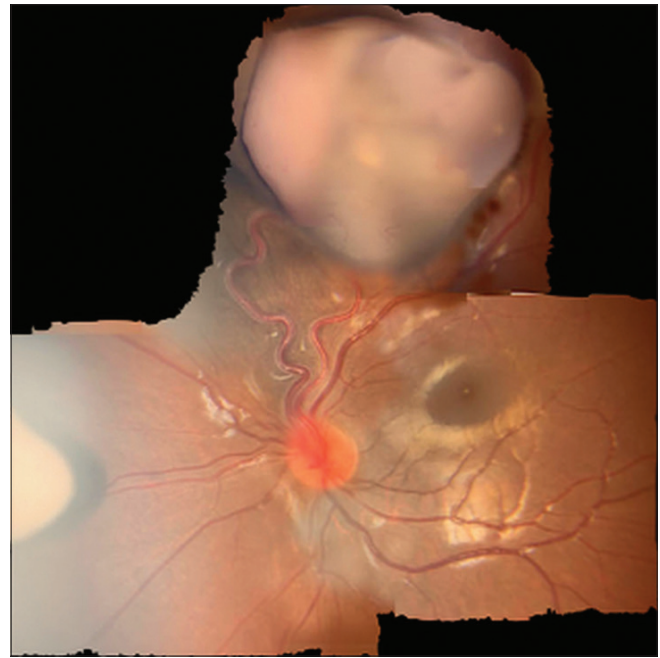


Figure 1: Montage image of the left eye showing good macular details with a well-defined superior tumour mass. In addition, far peripheral nasal tumor mass can also be appreciated

later converted into a montage image using Adobe Photoshop, in order to appreciate maximum retinal area along with the mass lesions [Fig. 1].

Discussion

The newer generation iPhones such as XS Max are able to capture the fundus images with great ease and without the need for any additional attachments. Using this phone, the posterior retinal pole, vascular arcades, and the periphery can be easily visualized, provided the subject is cooperative and the pupils are well dilated. Here, we highlight the concept of montage image creation using these smartphone images in children with retinoblastoma, as good quality fundus image acquisition and maintenance of evidence-based records are of utmost importance in the routine follow up of these cases. The tumour location, its size and shape, number, surrounding retinal changes or any vitreous changes, and the details of macula should be routinely noted, and this is usually performed with the help of a RetCam machine; however, owing primarily to the financial constraint, it may not be readily available in every ophthalmic setup. In this era of prodigious technological advancements and innovations, the

Access this article online	
Quick Response Code:	Website: www.ijjo.in
	DOI: 10.4103/ijjo.IJO_2144_18

Dr. Rajendra Prasad Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, AIIMS, New Delhi, India

Correspondence to: Dr. Amar Pujari, Dr. Rajendra Prasad Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, Room No. 212, RPC-1 Hostel, AIIMS, New Delhi - 110 029, India. E-mail: dramarpujari@gmail.com

Manuscript received: 29.12.18; Revision accepted: 28.03.19

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

Cite this article as: Pujari A, Lomi N, Goel S, Yadav S, Mukhija R, Kumar P, et al. Unmodified iPhone XS Max for fundus montage imaging in cases of retinoblastoma. Indian J Ophthalmol 2019;67:948-9.

ophthalmologists also need to decrease their dependency on expensive equipment and move toward the development of relatively inexpensive and easily available alternative tools. In this regard, the smartphones have so far shown promising results and may play a vital role as potential tools for future ophthalmic examination and monitoring purposes.

To conclude, in this pilot observation, we were able to capture the fundus image with a smartphone camera to a larger extent than previously noted, and without any additional modifications. Such adaptations are proposed for being vital in future ophthalmic practices and may help in furthering the telecommunication in both lower and higher socioeconomic countries.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have

given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Pujari A, Mukhija R, Chawla R, Phuljhele S, Saxena R, Sharma P. Smartphone-based evaluation of the optic nerve head. *Indian J Ophthalmol* 2018;66:1617-8.
2. Gunasekera CD, Thomas P. High-resolution direct ophthalmoscopy with an unmodified iPhone X. *JAMA Ophthalmol* 2018;29:1-2.