

MII Ret Cam: A Boon towards Retinal Disease Imaging and Documentation

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Abstract

Purpose: The aim is to present the experience of fundus photo documentation by using MII Ret Cam.

Methods: This study was conducted over a period of 3 months, at a tertiary eye care centre of Western Odisha from March 2017 to May 2017. It includes 100 patients with retinal pathology. Fundus evaluation was done using MII Ret Cam. The concern App has utilised for demographic data record and image storage.

Results: The Make In India MII Ret Cam is an inexpensive, innovative imaging technique enabling easy and efficacious documentation of the fundus picture. It captures good quality fundus images of both central and peripheral retina. By using the smartphone and computer peripherals, images have used for future reference and printouts handed over to the patients.

Conclusion: MII Retcam is an affordable smartphone-based fundus imaging technique. It helps clinicians to document and monitor diseases affecting both central and peripheral retina. It helps the patients to understand their disease and clinicians to convince their patients regarding the need of treatment.

Keywords: MII Retcam; Fundus camera; Smartphone; Retinal imaging; Peripheral retina

Introduction

Fundus imaging of the human eye is an important diagnostic tool in Ophthalmology. It offers the chance for an early diagnosis, monitoring and management of retinal pathology. Digital fundus imaging is extensively used in this regard. However access to fundus photography is often limited by patient morbidity, high equipment cost and the shortage of trained personnel in developing countries like India [1]. Hence the use of innovative, simple, cost-effective, portable and efficacious tools and techniques are highly desirable. The Make in India (MII) Ret Cam, offers a revolutionary ophthalmic diagnostic technology and is a need of the present scenario.

MII Ret Cam developed by Retina specialist Dr Ashish Sharma and team. It is an inexpensive, innovative smartphone-based fundus camera device that can capture central as well as peripheral retinal pictures. It is designed in the form of a device that has slots to fit a smartphone (built-in camera and flash) and 20-D lens. With the help of the instrument, high-quality fundus pictures and videos can be taken.

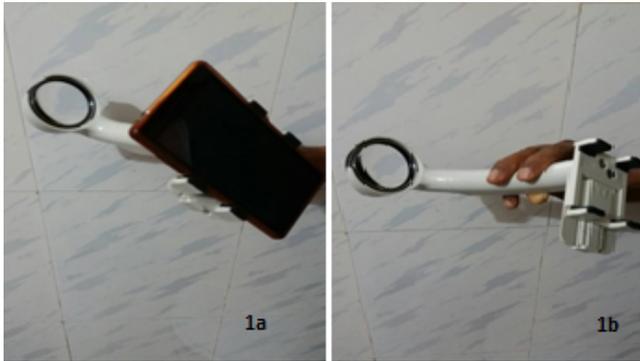
aterial and Methods

This study was conducted at a tertiary eye care centre of western Odisha from March 2017 to May 2017 and includes 100 patients with retinal pathology attending the Ophthalmology OPD. Institutional Review Board approval was obtained, and informed consent was acquired from all the study participants. The study adhered to tenets of Declaration of Helsinki.

The distance of Volk +20D lens from the examining eye was about 5 cm, and the distance of the lens to a smartphone was 15 to 20 cm (Figure 1). The light source was exclusively built-in LED flash on a smartphone. MII Ret Cam App allowed controlling the illumination intensity to avoid glare during imaging. Furthermore, MII Ret Cam App was used to keep the data of each patient along with fundus pictures. The procedure was performed in artificial mydriasis (phenylephrine plus tropicamide eye drop) in supine as well as sitting position in the dark room (Figures 2-6).

Results

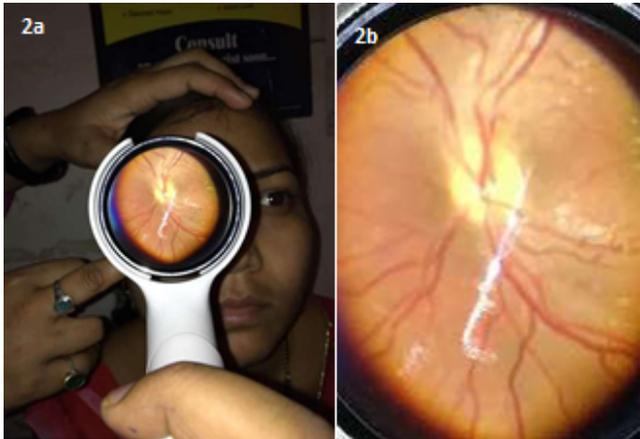
All 100 patients underwent ophthalmologic examination (visual acuity test, anterior segment finding, fundoscopy). We had recorded our fundus findings by Volk +20 D lens and a smartphone using the MII Ret Cam. The image quality was found to be good. We had captured the central fundus along with peripheral retina to the oral bays. In recording the paediatric fundus, it is particularly useful because of the portability. We showed the patients the status of the retina at presentation, its progression in the follow-up visits. Patients were convinced quickly regarding the treatment by seeing the printouts by themselves.



Figures 1a and 1b: MII Ret Cam with smartphone and volk +20D lens.



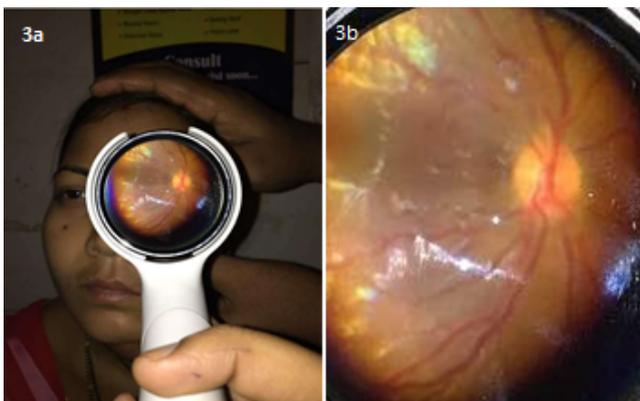
Figure 4: MII Ret Cam demonstrating intraretinal haemorrhage.



Figures 2a and 2b: MII Ret Cam demonstrating optic atrophy.



Figure 5: MII Ret Cam demonstrating macular coloboma.



Figures 3a and 3b: MII Ret Cam demonstrating normal optic disc.

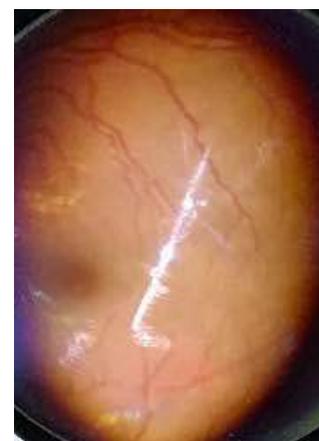


Figure 6: MII Ret Cam showing macular area.

Discussion

Disorders of the anterior segment of the eye are possible to capture by digital camera [2]. Whereas diseases of the posterior segment are difficult to obtain cost-effectively. This leads to the development of smartphone-based solutions such as MII Ret Cam which is very efficient, simple and cheap in developing countries [3,4].

Achieving a high-quality picture in a fundus camera can be frustratingly difficult for clinicians. Design of a conventional fundus camera makes it tricky for operators to be sure that the positioning is exactly perfect. The team at MIT Media Lab has developed a prototype device christened eyeSelfie (as in Eye Self-Imaging), a retinal imaging platform that uses novel optics and an interactive user-interface to provide users with a visual fixation cue indicating when the alignment is perfect [5].

Another device capable of capturing the eye fundus is a smartphone adapter Peek Retina that slips neatly over the in-built camera on a smartphone. The high image quality enables ophthalmologist to view cataracts apparently for treatment classification, detect signs of glaucoma, macular degeneration, diabetic retinopathy, hypertensive retinopathy and optic neuropathies [6].

Oluleye et al. have used iPhone 5 with 20 D lens to examine the fundus for the screening of retinopathy of prematurity in preterm infants. The images captured by the system were satisfactory for staging and determining the need for treatment in ROP screening in resource-poor settings [7].

MII Ret Cam which was used in our study helps clinicians to diagnose, monitor diseases affecting both central and peripheral retina. It can help patients to understand their disease and clinicians convincing their patients regarding the need of treatment. Imaging peripheral retina has not been demonstrated in any of the existing smartphone-based fundus imaging techniques. MII Ret Cam is the first smartphone based fundus imaging tool and method to capture high-quality pictures of central as well as the peripheral retina. It is an inexpensive tool for mass screening [8]. This technique is one of the easiest and requires only basic, available equipment such as smartphone and Volk lens.

This new portable handheld smartphone-based fundus camera is capable of capturing high-quality, wide field fundus images. The use of smartphone platform creates an entire embedded system capable of acquisition, storage and analysis of fundus images that can be directly transmitted from the phone via the wireless telecommunication system for remote evaluation.

Conclusion

Out of the 12 million visually impaired people in India, approximately 80% belongs to the category of avoidable blindness. To decrease the burden, we need not only extra efforts and resources but also straightforward and cost-effective solutions that can reach every corner of our country.

The examination of eye fundus by using the smartphone and Volk lens with plus 20 D is unpretentious and manageable technique, allowing capture images of the inner eye surface with high quality and reproducibility. Hopefully, it becomes a standard examination procedure for patients with retinal pathology in developing countries where affording a fundus camera in all hospitals is quite difficult.

Acknowledgement

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Conflicts of Interest

There are no conflicts of interest.

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