



FACILE HELP AT HAND FOR RETINAL PATHOLOGIES : MII RETCAM

Ophthalmology

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ABSTRACT

Purpose: The aim is to present the experience of photodocumentation of various retinal pathologies by using MII RetCam.

Methods: This study was conducted over a period of 19 months at a tertiary eye care centre of Western Odisha from July 2017 to January 2019. We included 874 patients with various retinal pathology. Fundus photodocumentation was done using MII Ret Cam.

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. Images have been used for future reference and printouts handed over to the patients.

Conclusion: MII Retcam is an affordable smartphone-based fundus imaging technique. It helps documentation in the form of photographs and thus helps in presentation of accumulated patient data. 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

MI Retcam; Fundus camera; Smartphone; Retinal imaging

INTRODUCTION

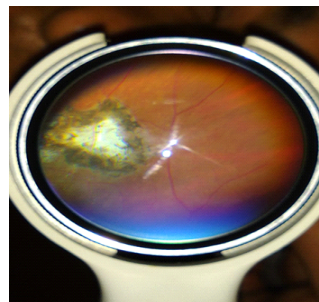
Retinal imaging has considerably improved since the first photographic images of the ocular fundus were taken near the end of the 19th century^[1]. Portable fundus cameras have recently become commercially widespread, but these are often costly or remain difficult to use in an ergonomic, hand-held manner^[2-4]. Retinal photography (fundus photography) is an essential part of ophthalmology practice. Acquisition of high-quality fundus images requires a combination of appropriate optics and illumination usually in the form of a condensing lens and a coaxial light source^[5]. Its affordability can assure all residents to possess MII RETCAM individually for retinal evaluation via photographic recording and case discussion thereof. The MII Retcam bridges the gap between the general ophthalmologists, diabetologists and retina specialists by easy sharing of images and quick consultation leading to prevent millions of people going blind with the disease in a cost effective manner.

MATERIALS & METHODS

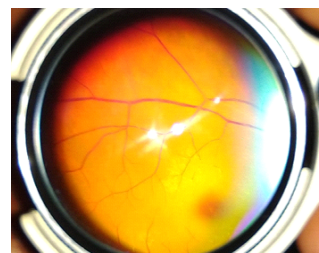
This study was conducted at a tertiary eye care centre of western Odisha from July 2017 to Jan 2019 and included 874 patients with various retinal pathologies attending the Ophthalmology OPD. The distance of Volk +20D lens from the examining eye was about 5 cm, and the distance of the lens to a smartphone was 15 to 20 cm. MII Ret Cam App allowed controlling the illumination intensity to avoid glare during imaging. The procedure was performed in artificial mydriasis (phenylephrine plus tropicamide eye drop) in supine as well as sitting position in the dark room. For fundus imaging, pupillary dilatation is achieved at first, then the user holds the 20D lens close to the eye, and once fundus glow is visualized through the dilated pupil, slowly brings it back until a clear image can be visualized in the smartphone camera. Peripheral fundus imaging can also be done by asking the patient to look at the area of interest. Fundus imaging using MII RETCAM becomes easier if one is well versed with Indirect ophthalmoscopy.



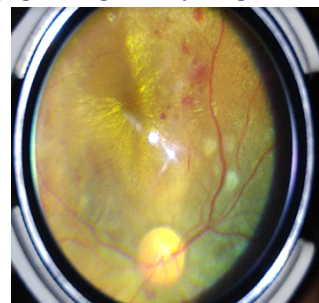
Figure 1: retcam imaging in supine position



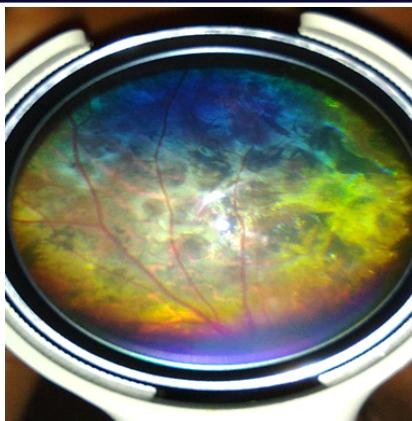
Retcam imaging showing a healed choroiditis patch



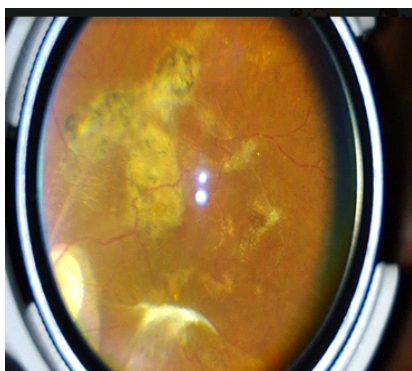
Retcam imaging showing a Cherry red spot



RETCAM imaging showing hypertensive retinopathy with macular star



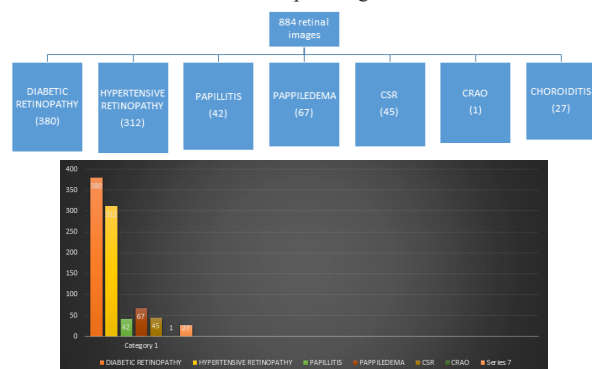
Retcam imaging showing serpiginous like choroiditis



RETcam imaging showing serpiginous like choroiditis in extrapulmonary tuberculosis

RESULTS

All 874 patients underwent thorough ophthalmoscopic examination. We recorded our fundus findings by Volk +20 D lens and a smartphone (can be any smartphone not necessarily being an iPhone) using the MII Ret Cam or directly from the auto DSLR app. Central as well as the peripheral retina was captured upto the ora serrata after the findings were seen through an indirect ophthalmoscope. High quality fundus image was taken both in cases of pediatric patients under sedation as well as in awake patients. The images were easy to transfer and printouts were given to the patients or the images were shared so that they could understand the nature of the disease, its progression and impact and the need for intervention regarding the same. Photodocumentation was done in the app along with the serial numbers with maintenance of a register for the same which helped in taking reference in future. Various retinal pathologies were recorded.



DISCUSSION

Simplicity, portability, and effectiveness of smartphone-based fundus photography make it a useful tool for screening and detection of blinding retinal pathologies at every ophthalmic setup. Disorders of the anterior segment of the eye are possible to capture by digital camera, whereas diseases of the posterior segment are difficult to obtain cost-effectively [6]. This leads to the development of smartphone-based solutions such as MII Ret Cam which is very efficient, simple and cheap in developing countries [7,8]. 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 [9]. 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 [10]. 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 of various retinal pathologies. 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.

However, the fundus imaging systems used in clinics are generally complicated in structure, bulky, poor in portability, and relatively expensive. Therefore, the fundus imaging method based on the intelligent terminal is proposed in this study, which shows better portability and much lower cost compared with the traditional fundus imaging systems used clinically. The system combines a network of communications, information processing and family doctors to achieve a promising emerging medical solution that provides each individual user with complete healthcare. Its accuracy and reliability have been fully verified. To some extent, the system has alleviated the time-consuming, laborious, expensive and difficult problem of fundus examination for the majority of ordinary patients, proposed and realized a promising new portable medical solution, which can provide complete medical care for each individual user. In recent years, as the problem of global aging has become increasingly serious, the medical market has developed rapidly. The application of mobile communication technologies on diagnosis and prevention of diseases has become a new trend in medical development. The retina is one of the most important clinical observation targets. By identifying the changes in the retina, the diagnosis of retinal diseases and even cardiovascular and cerebrovascular diseases can be achieved.

Smartphone photography currently plays a vital role in outreach programs where there is a lack of providers and limited availability of traditional fundus cameras. Recent Findings Smartphones are an attractive option in portable ophthalmoscopy due to their widespread availability. Newer techniques have allowed the acquisition of high-quality images that compare to images obtained with the more expensive conventional fundus cameras. Available options include slit lamp attachments, adapters for direct ophthalmoscopy, and the use of smartphones with handheld or mounted lenses as an indirect ophthalmoscope.

CONCLUSION

MII RETCAM is thus a facile help at hand to substantiate the clinical ophthalmoscopic diagnosis. It further helps documentation in the form of photographs and thus helps in presentation of accumulated patient data. The affordable cost enables every ophthalmic student own this handy instrument and carry it with them to the clinics.

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