

Chapter 2

Technologic Advances in Neurologic Practice and Education: The Cell Phone Replaces the Direct Ophthalmoscope

Charles Donohoe

University of Missouri – Kansas City School of Medicine, USA

Sean M. Gratton

University of Missouri – Kansas City School of Medicine, USA

Vivek M. Vallurupalli

University of Missouri – Kansas City School of Medicine, USA

Steven D. Waldman

University of Missouri – Kansas City School of Medicine, USA

ABSTRACT

Although the visualization of the ocular fundus yields important clinical information regarding the optic nerve and retinal vasculature, proficiency in using the traditional handheld direct ophthalmoscope by both practicing physicians and medical students continues to deteriorate. A replacement for the direct ophthalmoscope is long overdue. The authors suggest a role for non-mydriatic fundus photography as having potential to resurrect the dying art of visualizing the fundus in both clinical practice and medical education. This chapter reviews the substantial barriers in both patient care as well as graduate and undergraduate medical education created by technical difficulties encountered using the direct ophthalmoscope to visualize the ocular fundus. The authors propose that a smartphone-compatible adaptor to view the ocular fundus will replace the direct ophthalmoscope.

DOI: 10.4018/978-1-5225-6289-4.ch002

INTRODUCTION

Although the visualization of the ocular fundus yields important clinical information regarding the optic nerve and retinal vasculature, proficiency in using the traditional handheld direct ophthalmoscope by both practicing physicians and medical students continues to deteriorate. A replacement for the direct ophthalmoscope is long overdue. The authors suggest a role for non-mydriatic fundus photography as having potential to resurrect the dying art of visualizing the fundus in both clinical practice and medical education. This chapter reviews the substantial barriers in both patient care as well as graduate and undergraduate medical education created by technical difficulties encountered using the direct ophthalmoscope to visualize the ocular fundus. The authors propose that a smartphone compatible adaptor to view the ocular fundus will replace the direct ophthalmoscope. This device is a technological 'work in progress' and is just becoming commercially available but will ultimately fill the current unacceptable void in patient care and in educating students on the importance of funduscopy.

A CHANGING LANDSCAPE

Advances in technology have been a primary driving force in medical progress. The direct ophthalmoscope introduced by Herman von Helmholtz in 1851 dramatically changed the practice of ophthalmology and provided the first view of the human fundus and the first in vivo views of central retinal artery occlusion in 1855 and papilledema in 1860 (Swanson, Ku, & Chou, 2011)

The handheld version of this device was introduced in 1915 and traditionally medical students have been expected to own and carry this instrument with the goal of becoming proficient in its use in examining patients. Over time technical difficulties using the direct ophthalmoscope have frustrated medical students and non-ophthalmologists to a point where funduscopy is now routinely omitted from the physical exam. The magnitude of these technical difficulties has created avoidance behavior in clinicians allowing crucial clinical findings such as papilledema, optic disc swelling due to increased intracranial pressure, to escape detection with tragic consequences including blindness.

The authors, practicing neurologists, routinely encounter pseudotumor cerebri syndrome (PCS). This condition frequently seen in obese females is characterized by increased intracranial pressure not associated with a tumor or mass. Over time, this pressure can damage the optic nerve. Brain imaging findings are often negative or non-specific and the only diagnostic marker is a swollen optic nerve visualized on funduscopy. These patients present with headaches associated with visual complaints

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