G115 A Simple Model for Teaching Postmortem Monocular Indirect Ophthalmoscopy

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After attending this presentation, attendees will understand the enhanced potential for skill acquisition in postmortem monocular indirect ophthalmoscopy using a simple and inexpensive model simulating the ocular fundus.

This presentation will impact the forensic community and/or humanity by demonstrating a teaching model that can be used to enhance skill acquisition in postmortem monocular indirect ophthalmoscopy and be assessed to accurately identify and describe fundal abnormalities of pathological significance such as retinal hemorrhages.

Postmortem examination of the fundus oculi has relied on direct ophthalmoscopy or ocular evisceration, but recently the techniques of postmortem ophthalmic endoscopy and monocular indirect ophthalmoscopy have been delineated. Direct ophthalmoscopy has been used to attempt estimates of postmortem interval and identify retinal abnormalities but its usefulness is hindered by postmortem corneal clouding (swelling), inherent limited field of view, an inability to view the peripheral retina and lack of stereopsis. In most medical examiner/coroner jurisdictions ocular enucleation is not a standard autopsy procedure unless child abuse is suspected, thus invariably inuring observational bias when citing the prevalence of certain fundal findings (e.g., retinal hemorrhages). Postmortem endoscopic funduscopy permits viewing and documentation of retinal abnormalities; however, the equipment is costly and training necessary to gain expertise in operating the endoscopic equipment and subsequent image acquisition. The material necessary for postmortem monocular indirect ophthalmoscopy (PMIO) is inexpensive and when compared to direct ophthalmoscopy the technique is less affected by corneal clouding, cataracts, or vitreous hemorrhage. Other advantages include a relatively large field of view, high resolution and an ability to visualize the peripheral retina. Disadvantages include low magnification and a projected aerial image that is inverted and laterally reversed.

A valuable skill for forensic pathologists, the technique of postmortem monocular indirect ophthalmoscopy can be challenging for pathology residents and forensic pathology fellows to master. Indirect ophthalmoscopy is not routinely taught in most medical schools so with the exception of ophthalmologists-in-training most residents and fellows have a limited exposure to the technique. Because the projected aerial image is inverted and laterally reversed precise descriptions or recording of fundal abnormalities can be challenging. Since the image cannot be viewed simultaneously by the instructor and student, learning PMIO can be intimidating because the more experienced forensic pathologist must teach the technique and describe the orientation of any fundal abnormalities observed.

To facilitate skill acquisition in PMIO, a simple and inexpensive teaching model can be constructed from hinged, cylindrical plastic containers having an internal diameter of 35 mm and a depth of 30 mm. A 9-mm hole drilled in the center of the hinged lid from a 1-oz cylindrical plastic canister creates an artificial pupil. Fundal images depicting hemorrhagic retinopathy printed on 8 x10-inch matte photographic paper are cropped into 3.5 mm circles with available imaging software. Trimmed images from the photographic paper are fitted into the canister's base. The lid of the canister marked as to the appropriate eye and correct orientation completes the model. Using a procedural headlight and an aspherical indirect condensing lens, the resident or fellow can practice viewing the simulated fundal image. Multiple funduscopic abnormalities with retinal hemorrhages can be created for teaching with variations in the number, location (preretinal, intra-retinal, subretinal), distribution and orientation relative to the optic disc. Using this simple teaching model, the pathology resident or fellow can be assessed as to his/her ability to accurately identify and describe the number, location, distribution and orientation of retinal hemorrhages and various other fundal abnormalities of pathological significance.

Postmortem Monocular Indirect Ophthalmoscopy, Ocular Fundus, Retinal Hemorrhage

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