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Usefulness of Structured Video Indirect Ophthalmoscope-Guided Education in Improving Resident Ophthalmologist Confidence and Ability

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Purpose: To evaluate the usefulness of the video indirect ophthalmoscope (VIO) to improve resident ophthalmologist skill with indirect ophthalmoscopy (IO) and scleral depression (SD).

Design: Prospective, randomized, double-arm interventional study.

Participants: Ten ophthalmology residents were enrolled in an educational program using the Heine Video Omega 2C VIO (Heine USA Ltd, Dover, NH) and served as the study group. Ten other experience-matched ophthalmology residents functioned as the control group.

Methods: At baseline, all study and control residents completed surveys assessing their subjective comfort and skill with IO. Each resident also completed a standardized full IO examination with SD that was recorded using the VIO. Each resident in the study group received 3 monthly 1-hour teaching sessions using the VIO. Surveys and recorded standardized examinations were repeated for all residents after the 3-month period. Both baseline and final examination videos were graded using a standardized grading scale by 3 independent retina faculty members masked to the identities of the residents and timing of the examination.

Main Outcome Measures: Improved visualization of the peripheral retina (ora serrata) as evaluated by masked graders was the primary outcome measure. Improved examination efficiency grade was the secondary outcome measure.

Results: Both the study group and the control group had significant improvement in ability to examine the peripheral retina and ora serrata compared with baseline ($P = 0.02$ and $P = 0.03$, respectively). The study group also showed significantly improved examination efficiency compared with baseline, which was not noted in the control group ($P = 0.01$ and $P = 0.53$, respectively). The study group self-reported significantly improved confidence in the ability to identify retinal tears, whereas the control group did not ($P = 0.003$ and $P = 0.08$, respectively). Study group participants also reported significantly improved ability to recognize retinal holes ($P = 0.003$), subretinal fluid ($P = 0.02$), and vitreoretinal tufts ($P = 0.02$), whereas the control group did not.

Conclusions: This novel educational study suggests that VIO as part of a structured teaching program may improve resident ophthalmologist confidence and ability with identifying retinal pathologic features using IO with SD. *Ophthalmology Retina 2017;■:1–6 © 2016 by the American Academy of Ophthalmology*

Indirect ophthalmoscopy (IO) and scleral depression (SD) are essential diagnostic tools to assess retinal health and to evaluate an eye for potentially vision-threatening pathologic features such as retinal tears and detachments. Traditional training of ophthalmology trainees in this technique has consisted of theoretical instruction followed by practice on real patients.[1] Because of the nature of IO, the attending physician cannot easily see what the resident sees, limiting opportunity for constructive feedback and refinement of technique. In recent years there has been concern that resident ophthalmologist IO examination skills are inadequate.[2] In response, several alternate methods of instruction, including development of model eyes and virtual reality computer simulations such as the EYESi ophthalmoscope, (VRMagic Holding, Mannheim, Germany) have been developed.[3–7] However, a major disadvantage of devices such as the EYESi is the inability of ophthalmology trainees to practice or be taught SD and to learn to manipulate the periocular anatomic features to optimize IO skills.

The video indirect ophthalmoscope (VIO) is a device that provides video output to a connected monitor or computer.[8] This enables the examination to be viewed by observers in real time or to be saved for future analysis. Although a version of this device has been used to demonstrate retinopathy of prematurity findings in infants, application of this technology to ophthalmology resident education has not been used routinely, perhaps because of a lack of a standardized assessment rubric for indirect ophthalmoscopy.[9,10] Therefore, the current study was designed to investigate the usefulness of a VIO-based educational program to improving

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Survey of Resident Confidence with Indirect Ophthalmoscopy and Scleral Depression (SD)

Confidence examining the fundus
- Optic nerve
- Macula
- Peripheral Retina
- SD examination of ora serrata
- SD examination of retinal tears

Confidence identifying pathology
- Retinal Horseshoe Tears
- Retinal Holes
- Subretinal Fluid
- Lattice Degeneration
- Vitreoretinal Tufts
- Meridional Folds

All categories self-reported on a scale of 1-5, where 1 is no confidence and 5 is complete confidence

Figure 1. Surveys given at baseline and at study completion to all study group and control group residents.

ophthalmology resident confidence and ability with IO and SD examination skills.

Methods

Institutional review board approval was obtained through the Wills Eye Hospital, Philadelphia, Pennsylvania, for a prospective, double-arm interventional study. Research adhered to the tenets of the Declaration of Helsinki and was conducted in accordance with regulations set forth by the Health Insurance Portability and Accountability Act.

Twenty ophthalmology residents volunteered to participate in the study and were randomized based on level of training into 2 groups. Ten residents were enrolled in a teaching program using the Heine Video Omega 2C VIO (Heine USA Ltd., Dover, NH) and served as the study group. This included 4 residents at the postgraduate year (PGY) 2 level, 4 residents at the PGY-3 level, and 2 residents at the PGY-4 level. Ten other ophthalmology residents of the exact same training level (4 at the PGY-2 level, 4 at the PGY-3 level, and 2 at the PGY-4 level) were assigned to the control group. Consent was obtained from all 20 residents participating in the study. The study was initiated in October 2015, which allowed 3 months for new residents to learn basic ophthalmic skills.

At baseline, all study and control residents completed surveys assessing their confidence with IO and SD maneuvers (Fig 1). All residents were required to complete a baseline standardized full IO examination with SD that was recorded using the VIO. Residents were instructed to complete an examination of the posterior pole, including the optic nerve and macula, and the retinal periphery in each quadrant with 360° SD of the ora serrata. This was performed on the right eye of the same patient by one of the authors (J.S.). After all baseline surveys and examinations were collected, the 10 residents in the study group received 1-hour teaching sessions each month for 3 months using the VIO with retina faculty supervision (S.M., S.J.G., A.C.). Using the VIO, faculty offered real-time feedback and instruction to modify and improve resident IO and SD examination skills on both right and left eyes (Fig 2). Control group residents continued with normal residency clinical training, including outpatient clinics, inpatient consultations, and ophthalmic emergency room patient care, without exposure to VIO teaching. After the 3-month training period, surveys and recorded standardized examinations on the

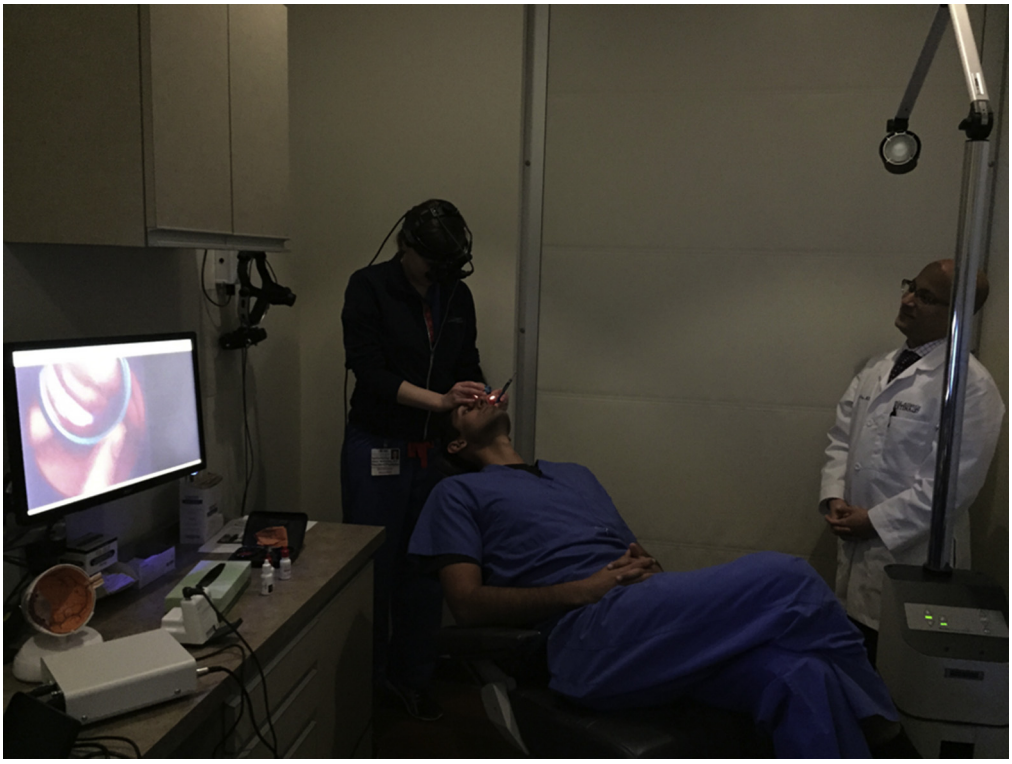

Figure 2. Photograph showing a teaching session performed using the Heine Video Omega 2C video indirect ophthalmoscope with faculty supervision.