ORIGINAL REPORTS

Improving Resident Performance in Oculoplastic Surgery: A New Curriculum Using Surgical Wet Laboratory Videos

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OBJECTIVE: To develop a new oculoplastic curriculum that incorporates learning theory of skill acquisition. To develop and evaluate the effectiveness of instructional videos for an oculoplastic surgical wet laboratory.

DESIGN: Proof of concept, randomized controlled trial.

SETTING: New York Eye and Ear Infirmary of Mount Sinai—tertiary care academic institution.

PARTICIPANTS AND METHODS: In total, 16 ophthalmology residents were randomly assigned to 1 of 2 groups and given either video and text or text instructions alone for the following 2 procedures: blepharoplasty and eyelid laceration repair. Operating time and esthetic result were measured, and the groups were statistically compared. A brief survey was administered.

RESULTS: We developed a new 6 component oculoplastics curriculum that incorporates concepts of the Fitts and Posner skill acquisition model and mental imagery. In the wet laboratory pilot study, the group that watched the video of the laceration repair showed better esthetic grades than the group that received text alone ($p = 0.038$). This difference was not found for the blepharoplasty ($p = 0.492$). There was no difference between groups in operating time for the laceration repair ($p = 0.722$), but the group that watched the blepharoplasty video required more time to complete the task than those that reviewed text only ($p = 0.023$). In total, 100% of residents reported the videos augmented their learning.

CONCLUSIONS: Methods to optimize surgical education are important given limited operating room time in oculoplastics, a subspecialty in which the number of surgeries performed during residency is relatively low. We developed a curriculum based on learning theory and sought to formally test one important aspect, surgical video for wet laboratories. Our pilot study, despite its limitations, showed that wet laboratory surgical videos can be effective tools in improving motor skill acquisition for oculoplastic surgery. (J Surg Ed ▮:▮▮▮-▮▮▮. © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: surgical training, surgical videos, wet lab, oculoplastic surgery, ophthalmology

COMPETENCIES: Medical Knowledge, Practice Based Learning and Improvement

BACKGROUND

Surgical education in ophthalmology historically has been an apprenticeship with much variability between training programs. This specialty faces the following unique challenges: medical students have limited exposure to the field and most resident's surgical experience occurs during their final year of training. The Accreditation Council for Graduate Medical Education (ACGME) has attempted to standardize surgical education across institutions by mandating minimum numbers of ophthalmic surgeries and a basic competency in specific procedures for each graduating resident. To improve the efficiency of skill acquisition, training programs have incorporated surgical didactic conferences, video libraries, and simulators.[1-12]

Oculoplastics, a subspecialty of ophthalmology encompassing surgery of the eyelids, orbit, and lacrimal system, is a required rotation for ophthalmology residents. However, residents perform relatively few oculoplastic surgeries—for example, the ACGME minimum for cataract surgery is 86 cases, whereas the minimum requirement for blepharoplasty is only 3 cases. Moreover, the frequency of procedures can

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vary greatly between institutions depending on variables such as practice setting (e.g., number of trauma cases), presence of fellows to share cases with, and availability of attending surgeons. Most oculoplastic training happens during 1 or 2-year fellowship after graduation. When residents do have an opportunity to perform these cases, they have traditionally prepared by reading surgical atlases and then performing the procedures for the first time in the operating room under direct supervision by an experienced mentor.

Given the paucity of literature regarding resident oculoplastic surgical training and the need to maximize the limited opportunities for such surgeries, we sought to create a new rational and efficient curriculum that implements known principles in educational theory. Toward this goal, we created a novel surgical wet laboratory curriculum using custom videos of 2 commonly performed procedures. Finally, we implemented a pilot study to evaluate the utility of these wet laboratory videos to residents learning oculoplastic surgery.

Building a Framework

Our curriculum's theoretical foundation is the widely accepted Fitts and Posner model for the acquisition and retention of complex motor skills.[13] This model features a *cognitive* stage, in which a trainee first learns the objective and the mechanics of the task while expending great cognitive effort. This stage is marked by rapid improvements in performance as the learner develops the general framework of the motor task. With a better understanding of the task, she approaches the *associative* stage in which she begins to evaluate and compare the desired movement to the actual outcome. The trainee can focus on specific details of the procedure, exploring solutions, and relying more on proprioceptive cues rather than visual cues. Subtler adjustments are made over multiple repetitions during this time-consuming stage. Finally, in the *autonomous* stage the learner completes the motor task almost automatically with little cognitive activity and explicit knowledge is replaced with implicit procedural knowledge. Such a model can be applied to surgical training, although no guidelines exist for how or when the surgeon accomplishes these stages. In our curriculum, we hope to guide training surgeons through the cognitive phase and into the associative phase before entering the operating room. Multiple learning modalities were used to create a multistep process through which all residents with different learning styles could benefit. As residents are limited in oculoplastic operating room (OR) time, we also employed learning methods that allow residents to gain procedural competency without actually manipulating tissue. One such method is the use of mental imagery, the practice of systematically and repeatedly imagining a movement. This learning model has long been validated in athletics and surgical training in other fields.[14,15] We briefly describe later the implementation of learning model concepts in our new curriculum.

Components of a New Oculoplastics Curriculum

Anatomy-Focused Didactic Lectures

The following 7 core oculoplastics procedures were identified and separate lecture content created: blepharoplasty, full-thickness eyelid laceration repair, internal ptosis repair, external ptosis repair, ectropion repair, entropion repair, and dacryocystorhinostomy. Each lecture provides detailed information on the relevant anatomy, the rationale behind the surgical approach, and steps of the surgery. Reading material paired with each lecture is provided in advance.

Socratic Method Sessions

For each of the 7 core surgeries, 2 attending surgeons work with 2 to 3 residents who have prepared for the surgery in advance. They are encouraged to review the materials from the Anatomy-Focused Didactic Lectures, and surgical atlases are provided for reference. Residents are first asked to draw the relevant anatomy for each surgery. Next, they are prompted for each step of the surgery in order and are not allowed to proceed to the next until they correctly identify the preceding step. They are asked to simulate the movements with their hands and queried for details of instruments and sutures, hand and patient positioning. At each step, the resident is forced to exhaust his knowledge before the attending surgeon intervenes. At the end of the session, the resident completes the exercise by describing all the steps from start to finish.

Surgical Wet Laboratories

Wet laboratory experience is one of the most widely accepted resources implemented by residency programs. The wet laboratory has the unique advantage of providing a risk-free environment in which residents can hone their skills using real tissue. Procedural training on cadaveric and animal specimens has been shown to be effective in teaching cataract surgery to novice ophthalmic residents.[2] In oculoplastics, a supervised wet laboratory experience is particularly valuable because computerized surgical simulators do not yet exist. To maximize the yield of a wet laboratory, we created videos and a matching "surgical atlas" specifically for pig eyelid specimens. Because this is, to our knowledge, the first attempt to use surgical videos in oculoplastics wet laboratories, we created a small pilot study to evaluate the efficacy of this intervention (described later).

Surgical Videos as Final Preparation for the OR

Residents are guided to an institutional online collection of "live" surgical videos of the surgery to be performed. In addition to traditional fixed or "top-mounted" recordings of surgeries, the online library includes several "head-