

Discussion

Murine typhus is uncommon but the prevalence may be rising¹. To our knowledge, this is only the fourth case describing papilledema and pseudotumor cerebri secondary to *Rickettsia typhi* infection. Although the symptoms and signs may mimic idiopathic intracranial hypertension, patients with murine typhus have symptoms that are not related to increased intracranial pressure (e.g., fever, myalgias, and constitutional symptoms) and abnormal laboratory studies (e.g., elevated acute phase reactants and liver function studies).

Patients presenting with recurrent fever, headache, abdominal pain, and/or a rash should be evaluated for arthropod-borne illnesses, including murine typhus. Ophthalmologists should inquire about fever, rash, and stiff neck in cases of possible pseudotumor cerebri because the imaging and the cerebrospinal fluid, as in our case, can be consistent with idiopathic intracranial hypertension.

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Originally received Jul. 4, 2020. Final revision Oct. 22, 2020. Accepted Jan. 11, 2021.

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Footnotes and Disclosure

The authors have no proprietary or commercial interest in any materials discussed in this article.

Cadaveric simulation improves ophthalmology resident confidence and preparedness for emergent ophthalmic procedures



Simulation-based training programs have become an essential tool in medical education.¹ Surgical simulation on platforms, including the Eyesi, which are now widely adopted throughout ophthalmology training, reduces intraoperative complication rates.² Even virtual training utilizing computer graphics and surgical models, which may be lacking in qualities provided by real-life scenarios or cadavers, helps trainees perform faster and with fewer errors compared with trainees who went without virtual training.³

The majority of ophthalmology residents complete a preliminary medicine or transitional year internship and therefore enter postgraduate year 2 (PGY-2) with limited surgical experience. Additionally, some ophthalmology residents struggle to acquire all of the necessary surgical skills for comprehensive surgical competence by graduation.⁴ Residents often perform emergency procedures outside of clinic and may not be adequately prepared despite the use of virtual intraocular simulators and surgical curricula focusing on cataract surgery.² Lack of confidence regarding urgent surgical procedures may magnify stress and anxiety for residents when on-call and impact patient outcomes.

While boot camps, in-training surgical courses, and simulations have been shown to improve postgraduate medical trainees' clinical skills, knowledge, and confidence, they are not commonly utilized within ophthalmology education.¹ We designed a 1-day procedural simulation program, entitled Ophthalmology Olympics, consisting of didactics and a skills check-off, utilizing cadaver heads to improve resident confidence and preparedness for acute ophthalmology procedures often performed outside of routine clinic visits.

This study is Institutional Review Board approved, Health Insurance Portability and Accountability Act compliant, and adheres to the Declaration of Helinski. A procedural simulation course for ophthalmology residents and medical students was conducted annually. Trainees completed pre- and post-course surveys. Six procedures most commonly performed by ophthalmology trainees on an urgent basis were selected: retrobulbar injection, vitreous tap/inject, anterior chamber paracentesis, eyelid margin laceration repair, temporary tarsorrhaphy, and lateral canthotomy/cantholysis.

Ophthalmology Olympics included didactic sessions: faculty presented each procedure, described the clinical background (when to perform, how to evaluate patients prior to procedure, etc.), and described procedures step-by-step. Students were given several hours to practice in the cadaver laboratory with faculty supervision as well as near-peer teaching from upper-level residents and fellows. Vitreous tap/inject and anterior chamber paracentesis were

performed on donor human eyes secured in a model head. All other procedures were performed on formalin-fixed cadaver heads. For the skills check-off portion, trainees were divided into teams and given 12 minutes to perform each skill. Grading was performed by faculty, with a set point-based scoring system. A rubric was provided to each faculty scorer and included points for each step of the procedure. Real-time feedback and performance-based teaching were incorporated into the end of each round. PGY2-3 residents competed in the skills check-off while PGY4s played a coaching role and provided assistance when needed.

Participants filled out pre- and post-course questionnaires to evaluate confidence level and prior familiarity with each skill. Participants were asked how the Olympics impacted their confidence performing procedures, procedural knowledge, familiarity with anatomy, team building, morale, and decreasing anxiety.

Statistical analysis was performed using IBM SPSS, version 22.

Data were collected over a 3-year period. Participants included visiting medical students, interns, and ophthalmology residents. There were 12-14 trainees who participated in Olympics each year. A total of n = 36 and n = 34 participants completed the pre-survey and post-survey, respectively. This represented 3 medical students, 4 PGY-1 trainees, 11 PGY-2s, 8 PGY-3s, and 10 PGY-4s. Survey response rate was 100%. Among the participants, 100% of lower-level trainees, including medical students, PGY-1s, and PGY-2s (n = 17) had never performed any of the 6 procedures independently, and only 4 had observed any of the procedures (Fig. 1).

Average pre-course comfort level on a scale of 1–4 ranged from 1.75–2.33 (Table 1). Average anxiety on a 0–4 scale with 0 = no anxiety and 4 = severe anxiety was 2.14. Three trainees rated their anxiety performing acute procedural skills as a 4/severe.

Average comfort level increased from pre- to post-Olympics in each procedure. This increase was statistically significant for all procedures except retrobulbar injection (Table 1).

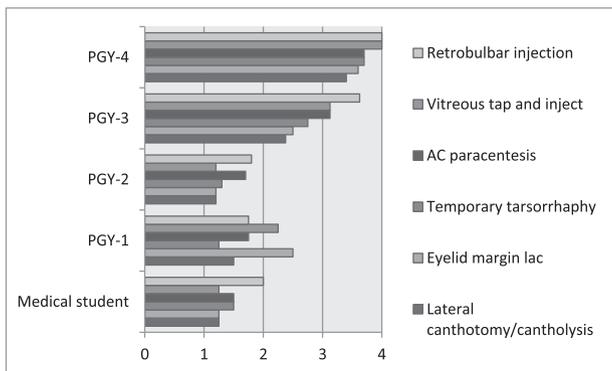


Fig. 1—Prior experiences observing or performing each procedure. Survey question: Have you observed or assisted with this procedure? 1 = no, 2 = observed only, 3 = assisted once, 4 = assisted multiple times.

Table 1—Average pre- and post-Olympics comfort level performing each skill on a 1–4 scale with 1 = not comfortable at all, 2 = somewhat comfortable if I had assistance, 3 = moderately comfortable, could perform independently, 4 = very comfortable to perform independently.

Procedure	Average Comfort Level Pre-course	Average Comfort Level Post-course	p
Lateral canthotomy/cantholysis	2.11	2.94	<0.01
Temporary tarsorrhaphy	2.31	3.2	<0.01
Eyelid margin laceration	2.31	2.89	0.01
Retrobulbar injection	2.83	3.1	0.14
Vitreous tap and inject	2.52	3.1	0.01
AC paracentesis	2.53	3.18	0.01

Significant p-values (less than 0.05) were bolded to highlight the statistical significance.

When asked to rate the utility of skills learned for performing procedures while on-call on a scale of 1–5 with 1 = not useful at all and 5 = extremely useful, the average response was 4.57. The majority of participants (62%) reported that the skills learned during the course would be “extremely useful,” whereas 32% found these skills “very useful.” When asked to rate the utility of Olympics in increasing confidence performing procedures, procedural knowledge, familiarity with anatomy, team building, and morale, and decreasing anxiety, all categories received a score between 4 and 5.

Formal cadaver-based surgical simulation enables trainees to prepare for emergent ophthalmic procedures in an educational environment. Hands-on training significantly enhanced resident confidence level related to performing 6 essential ophthalmology procedures frequently performed on-call and outside of the routine clinic setting. Lower level trainees reported minimal prior experiences observing, assisting, or performing all six procedures. In all levels of training, post-course confidence level was significantly higher than pre-course, with the largest improvement seen in lower-level trainees.

Preparation for the operating room in residency often focuses on intraocular training with simulators or skin suturing curricula.⁵ Virtual simulations have become commonplace in ophthalmology, which makes procedures like lateral canthotomy/cantholysis, margin laceration repair, and tarsorrhaphy difficult to practice. Ophthalmology Olympics specifically focuses on a subset of procedures more likely to be performed outside normal clinic hours and for which early exposure, formal teaching, and confidence by frontline trainees may improve prompt, high-quality care. Inconsistent experience with urgent procedural skills often results in anxiety and stress for trainees. Simulation-based programs have been shown to decrease anxiety and increase clinical performance across multiple surgical subspecialties.⁶ Early exposure to these procedures may also improve surgical readiness. Residents requiring intervention to improve surgical skills earlier in training may be identified and proactive measures instituted.

This structured program has provided our students with early exposure and hands-on training and could be widely

adopted or translated into a virtual event. Limitations to this study include the small number of participants as well as the inherent bias of a survey design. Additionally, as Olympics is an annual event, resident confidence may increase year to year. Future studies will be helpful to better understand the long-term impact of such a course.

Ophthalmology Olympics is a training course focusing on acute ophthalmologic procedures that are often overlooked in surgical training. Early exposure to surgical procedures decreases resident anxiety and increases surgical confidence.

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Originally received Dec. 18, 2020. Final revision Jan. 24, 2021.
Accepted Feb. 15, 2021.

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Late-onset recurrent *Acremonium* fungal keratitis after therapeutic penetrating keratoplasty



Fungal keratitis is a prominent cause of blindness worldwide. Therapeutic penetrating keratoplasty (TPK) has been demonstrated as an effective treatment for fungal keratitis that does not respond to antifungal medications. Recurrent fungal infection after TPK is uncommon but occurs typically within 2 weeks after surgery.¹

Acremonium species are a group of filamentous fungi isolated from vegetation matter and are a rare cause of fungal keratitis. We present here an unusual, delayed case of recurrent fungal keratitis with *Acremonium* species that recurred over 2 months after successful treatment with TPK.

Case Report

An 86-year-old woman presented with increased pain and foreign body sensation in her right eye for several weeks. Her past medical history was significant for Sjögren syndrome, for which she had been taking azathioprine 50 mg daily for many years. She had no history of previous eye trauma. Past ocular history was significant for wet age-related macular degeneration for which she was undergoing regular treatment with intravitreal bevacizumab. On presentation, visual acuity in the right eye was light perception. Slit lamp examination showed moderate

conjunctival injection with a subtotal corneal ulcer overlying a corneal infiltrate located paracentrally, with 50% corneal thinning centrally and 80% corneal thinning inferotemporally. The anterior chamber was deep with a 1-mm hypopyon (Fig. 1A).

Corneal scraping revealed presence of oval conidia noted on Gram stain, and the patient was diagnosed with fungal keratitis. She was started on topical antifungal amphotericin B 0.15% every 1–2 hours in the right eye. Two weeks later, the microbiological report of the culture from a national mycology reference laboratory identified the presence of *Acremonium* species. The patient started a tapering course of topical voriconazole 1% along with the amphotericin B 0.15% and progressively improved (Fig. 1B), with ultimate healing of the ulcer in 3 months' time. Topical loteprednol 0.5% was used sparingly for control of inflammation only upon disappearance of the ulcer and infiltrate.

Four months after her initial presentation, upon suspension of the antifungal medications, the patient presented with large, recurrent multifocal infiltrates and corneal ulcer (Fig. 1C), with precipitous worsening of the clinical picture (Fig. 1D) and rapid evolution towards perforation. Uncomplicated TPK was performed. Postoperatively, she continued topical amphotericin B 0.15% daily and topical voriconazole 1% daily hourly for 1 week and then 4 times daily, along with topical tacrolimus 0.1% 4 times daily to prevent graft rejection (Fig. 1E). No topical or systemic steroids were used to reduce the chance of recurrence of the infection. While still on antifungal medications, the patient developed