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Developing a Consensus-Based Optometry Residency Military Unique Curriculum
Christopher S. Alferrez, OD, FAAO, Anita Samuel, PhD, Holly Meyer, PhD, and Kevin M. Jackson, OD, MPH, FAAO | Optometric Education: Volume 48 Number 3 (Summer 2023)

Background

The Defense Health Agency (DHA) supports medical readiness in two aspects: It promotes a ready medical force, which is the preparedness of military health personnel to care for the warfighter, and it promotes a medically ready force, which is the preparedness of the warfighter against health threats. Vision readiness is one of the key components of medical readiness. It is defined as the visual ability required of military personnel to perform their mission safely and efficiently. Military optometrists serve at the forefront of vision readiness as the primary eyecare providers for the nation’s service members. Like their civilian counterparts, they perform eye examinations, prescribe glasses and contact lenses, and diagnose and treat ocular conditions. However, due to their status as service members and the special population they serve, they perform duties that differentiate them from civilian optometrists when they address ocular and visual issues unique to the warfighter. Because military optometry is crucial for vision readiness, a curriculum tailored specifically for the armed forces is necessary. To ensure this, military optometrists need to be able to address military-specific issues. Examples of such issues include triaging/treating combat ocular trauma, managing visual complications of traumatic brain injury (TBI), examining patients in austere deployed environments, and performing military vision readiness physicals.

Currently, there are five optometry residency programs in U.S. military facilities. The Army has two Primary Care Optometry residencies and one Vision Rehabilitation (Brain Injury Rehabilitation) Optometry residency. The Navy has one Primary Care/Ocular Disease Optometry residency. Lastly, there is one Tri-Service Vision Rehabilitation residency program. Currently, there is no optometry residency specific to the Air Force. Given the vast resources available in their respective facilities, each of these residency programs is fully capable of providing military-specific optometric training. However, this military-specific training is either significantly underdeveloped or completely absent within these military optometry residency programs. Without such training, the programs risk residents being unprepared to face the challenges unique to military optometry. Consequently, military vision readiness will be at stake.

Military optometry residencies can implement a Military Unique Curriculum (MUC) to address this issue. The DHA defines MUC as “the integrated educational activities for trainees to learn and apply their specialty expertise to the scope of practice required for expeditionary medicine and unique issues of the MHS [Military Health System] patient population.” In fact, the DHA has mandated the implementation of MUCs within all military graduate medical education (GME) programs. The Uniformed Services University of the Health Sciences (USUHS) has championed the concept of MUCs. Further, during the 16th Annual Conference on Military Medicine at USUHS, a group of experts developed a model to identify and prioritize MUC content for GME programs within the military. De Lorenzo emphasized that MUC implementation is important because solely developing clinical skills and medical knowledge during training is not enough to prepare learners to face military-specific operational challenges. As a result, MUCs have been implemented in various medical programs throughout the military, including anesthesia, internal medicine, emergency medicine and infectious disease. Of these MUCs mentioned in the literature, a wide range of military-specific topics are described, including tactical combat casualty care, combat stress, military occupational health, and force health protection. Studies of MUC effectiveness demonstrated greater perceived readiness for post-residency military operational assignments and improved deployment medicine knowledge. These studies demonstrate practical benefits of implementing a MUC within military medical training programs.

Currently, all military optometry residencies do not have well-defined MUCs. It is also noteworthy that the Association of Schools and Colleges of Optometry currently does not define a residency category or emphasis area related to military practice. The Accreditation Council for Optometric Education (ACOE) states that all optometric residencies should define specific goals and outline curricular content. A MUC could be implemented within the goals and curricular content of an optometric residency. Thus, a needs assessment was conducted in this study to define the elements of a military-specific optometry curriculum that can serve as the first steps for military optometric residencies to fulfill the DHA mandate of MUC implementation.

This study aims to answer the question: What elements should be integrated into an optometry residency MUC to address the unique challenges that military optometrists encounter?
Methods

Methodological framework

To develop the MUC, a modified nominal group technique (NGT) was implemented. This technique effectively reaches consensus through collaboration and prioritizes information discussion. The NGT process generally involves five steps: (1) introduction, (2) silent generation of ideas, (3) sharing of ideas, (4) group discussion and (5) voting. The modified NGT process was modeled after the peer coaching NGT study by Bell et al. and the military refractive surgery curriculum NGT study by Evangelista et al. The NGT was selected to answer the research question because it enables equal representation of expert voices and has been successfully utilized for curriculum development.

Kern’s Six-Step Approach to Curriculum Development for Medical Education provided the conceptual framework for this study. The six steps are: (1) problem identification and general needs assessment, (2) targeted needs assessment, (3) goals and objectives, (4) educational strategies, (5) implementation and (6) evaluation and feedback. Because this study was primarily a needs assessment, steps 1-3 were the focus of this study. Step 1 involves problem identification, where a healthcare need or problem is identified, and general needs assessment, which is an evaluation of the ideal approach vs. the current approach of the curriculum. Step 2 assesses the needs of the curriculum’s targeted learners and their learning environment. Step 3 defines the curriculum’s broader goals and the specific objectives that would achieve the goals.

This study was submitted to the institutional Human Research Protections Office, which determined that Institutional Review Board review was not required.

Study sample

To determine the elements of the optometry residency MUC, an expert panel was identified. The panel consisted of four military optometry residency program directors and the three optometry service branch leaders (the Army Optometry Consultant, the Air Force Optometry Consultant and the Navy Optometry Specialty Leader) for a total of seven panelists. These panelists were selected based on their extensive teaching and/or military optometric expertise. The majority of the panelists had military operational or deployment experience. Furthermore, the service branch leaders were included due to their seniority and broad, strategic overview of military optometry in their respective branches. Panelists consented to participate in the NGT through email response, but they could also opt out of the study at any time before or during the session. All seven invited panelists agreed to and participated in the NGT. Table 1 provides a summary of the panelist demographics.

Data collection and analysis

Data collection involved three phases (Figure 1 and Appendix A). The first phase was a six-question questionnaire emailed to the panelists. This questionnaire was guided by Kern’s Six-Step Approach to Curriculum Development for Medical Education. A list of 18 military optometry-related topics was derived from the USUHS Ocular Trauma Skills Laboratory (Jackson KM. Uniformed Services University of the Health Sciences Ocular Trauma Skills Laboratory, Military Optometry Education Assessment Presentation. May 2021) and panelists were invited to suggest additional topics (Table 2). The questionnaire sent to the panelists is included in Appendix A.

The second phase was the synchronous live NGT session conducted via online video conferencing and recorded for data analysis. The session consisted of five steps (Figure 1, Phase II). Panelists were provided an outline of the session and then given the de-identified panelist responses from the questionnaire in Phase I. Afterwards, the panelists silently generated ideas after reviewing the results. Next, the panelists individually held the floor and shared their ideas on the responses in a round-robin format. Responses were then discussed among the panelists. Lastly, the panelists anonymously voted on a consensus response for each question. Consensus was defined as the result with the most votes. This process was repeated for each of the six questions from the questionnaire.
The third phase involved member checking the voting results, which enabled the panelists to validate the votes and ensure the responses resonated with them (Figure 1, Phase III). After member checking, the NGT was determined to be complete and ready for data analysis. Data analysis involved both qualitative and quantitative methods. The votes were quantified to identify consensus responses. CA, HM and AS conducted a thematic analysis of the transcribed recording. They independently coded the data and met to discuss their findings. Through an iterative process of qualitative coding, themes and subthemes were identified, which allowed further contextual insight.  

Results

The synchronous live NGT session results are organized below by themes: MUC goal, MUC topics, learning environment and capacity.

**Goal of an optometry residency Military Unique Curriculum**

The group discussion on the goal of an optometry residency MUC raised three themes: visual rehabilitation, ocular disease and the need to be prepared for operational environments (i.e., combat deployment). The panelists agreed that visual rehabilitation should be integrated into residency training because TBI is a frequent warfighter injury. Ocular disease was directly related to operational environments because optometrists need the knowledge to independently manage ocular diseases in remote and under-resourced locations typical of wartime deployments. After the discussion, the following consensus MUC goal was identified: The goal of an optometry residency MUC should be to train military optometrists in advanced practice and procedures related to TBI/vision rehabilitation, ocular disease, as well as military-centric issues to increase KSA (knowledge, skills and abilities) for wartime deployments. Note that for the purposes of this study, the term “military-centric” is synonymous with “military-specific.”

**Military Unique Curriculum topics**

In addition to the 18 MUC topics provided in the questionnaire, the panelists identified four topics: ocular disease, management of acute TBI, advanced laser and minor surgical skills, and how to transition the skills and knowledge to the limitations of the optometric equipment field sets. During the synchronous NGT, these four options were added to the original list of topics; thus, the panelists voted on 22 topics (Table 2). Panelist consensus was based on the result with the highest number of votes (Table 2).
Nine topics were identified as high-priority. During the discussion, one of the panelists asserted that the Ocular Trauma Skills Laboratory at USUHS should be mandatory for residents. This comment was consistent with the panel’s unanimous vote of ocular trauma and ocular disease as high-priority topics. Other high-priority topics included battlefield triage and ophthalmic rehabilitation for TBI patients. Six topics, including military vision readiness and retention standards and aviation optometry, were considered moderately important. The importance of understanding aviation optometry’s dynamics, perceptions and misperceptions was mentioned during the discussion, but overall it was seen as a topic of moderate priority. Four topics were considered low priority, and three did not achieve consensus in the voting.

Learning environment

Panelists agreed that an optimal learning environment would provide opportunities for hands-on training with high volume and/or high complexity of patients. The panelists also emphasized the importance of exposure to austere or under-resourced environments to help prepare residents for deployment. Consequently, the panelists reached a consensus that an optometry residency MUC should “provide access to both field training and advanced clinical care for TBI (i.e., Centers of Excellence) and have high volume and/or high complexity of patients along with access to subspecialists.”

Capacity

Residency programs have a finite time to accomplish their goals. Recognizing this constraint, participants were asked how many military-specific topics should be implemented in a MUC. The panelists selected three ranges to vote on: 1-3, 4-6 and 8-10. Considering only military context-specific topics, the consensus was that 4-6 topics (50%, n=3) would be optimal (Table 3).

The panelists also voted on the number of hours per month devoted to the MUC within an optometry military residency program. The panelists selected three voting choices for the number of hours per month: 3-4, 16 and 80. The panelists discussed that 16 hours is based on one-half day per week, and one of the panelists suggested 80 hours, arguing that half of the residents’ total of 160 working hours per month should be dedicated towards MUC topics. The consensus was that 16 hours a month (57%; n=4) should be devoted to the MUC (Table 3).

Discussion

Military healthcare providers are in a unique position relative to their civilian counterparts because they must be both proficient in their medical specialty and knowledgeable in military-specific issues. Currently, military optometry residencies do not sufficiently address military-specific issues within their curricula. Implementation of a MUC could serve as a means to address this gap. In this study, we utilized Kern’s Six-Step Approach to Curriculum Development for Medical Education to help identify elements of the MUC. The NGT was employed to address Kern’s steps 1-3: (1) problem identification and general needs assessment, (2) targeted needs assessment and (3) goals and objectives.

The panelists in this study agreed that the MUC goal should be to “train military optometrists in advanced practice and procedures related to TBI/vision rehabilitation, ocular disease, as well as military-centric issues to increase KSAs (knowledge, skills and abilities) for wartime deployments.” As with other MUCs, the panelists in this study focused on commonly encountered military-specific issues to maximize the effectiveness of the MUC. Nine topics were voted as high-priority, two of which were topics added by the panelists (ocular disease and management of acute TBI). The curricular limitations and time constraints of residency training as outlined by the ACOE residency standards were acknowledged in the suggestion for 4-6 military-specific topics covered over 16 hours. The panelists also reinforced the need within residency programs for contextual training and advanced competency, also emphasized by the ACOE.

This study focused on the creation of a curriculum designed for military optometry residency programs. However, the framework and findings have implications for civilian optometric educators as well. Methodologically, this study further supported utilizing the NGT as an effective strategy for consensus decisions. Also, the NGT can be conducted fully online, enabling access to geographically dispersed subject experts. Delphi studies and expert interviews have been used to formulate curricula. However, these are resource intensive in time and money. Optometric educators therefore may find value in
utilizing the NGT when designing or revising curricula.

This study also highlighted the effectiveness of using a curriculum development framework such as Kern’s six-step model. The model provides a structured approach to designing curricula and ensures that all elements of curriculum design are considered. The Kern model has been used extensively in medical education. This study demonstrated that Kern’s evidence-based curriculum development model can also be used in optometric education.

The limitations of this study included addressing only Kern’s steps 1-3, leaving Kern’s steps 4-6 (educational strategies, implementation, and evaluation and feedback) for future research. The notable time and resource commitments of Kern’s curriculum development model precluded inclusion of all steps. Future studies to develop this optometry residency MUC could consider including the other elements of Kern’s Six-Step Approach that were not included in this study, especially educational strategies and implementation. In addition to the consensus data from the NGT, epidemiological data from prior wars and conflicts would further augment the curriculum material. Lastly, the service branch leaders did not have resident teaching experience; however, their feedback was valuable, given their broader knowledge of military optometry at the strategic level.

Conclusion

Through the consensus of a military optometry expert panel, we developed a framework for a formalized Tri-Service optometry residency MUC. With this consensus curriculum, military optometry residency programs can prepare residents to become a readiness force, from fixed-facility locations stateside to deployed locations worldwide. Consequently, the curriculum can promote a medically ready force by enhancing vision-saving eye care on the battlefield, improving visual rehabilitation of injured service members returning from combat, and ensuring vision readiness for deployable forces, fully leveraging the unique role of the military optometrist.

References


Neuroretinitis Due to Cat Scratch Disease: a Teaching Case Report
Anju Kanikunnel, OD, FAAO, and Sonali Singh, MD | Optometric Education: Volume 48 Number 3 (Summer 2023)

Background

Neuroretinitis is the most common posterior segment complication of cat scratch disease. This condition presents as unilateral optic disc edema with macular exudation in a star-shaped pattern resulting in partial or complete stellate maculopathy. Macular star formation is usually seen within 2-4 weeks after the onset of optic disc edema. Cat scratch disease is the most common cause of infectious neuroretinitis. Serological evidence of cat scratch disease in patients with neuroretinitis was established in the late 20th century. Cat scratch disease is a chronic systemic bacterial infection that predominantly affects the lymphatic system, especially the lymph nodes around the head, neck and arms. It is a self-limiting condition; however, it can be life-threatening when the central nervous system is involved. Annually, approximately 22,000 cases of systemic cat scratch disease are estimated to occur in the United States, and approximately 2,200 patients are hospitalized for treatment.

This report identifies a patient with optic disc edema and serous macular detachment as posterior segment findings of neuroretinitis due to cat scratch disease. The patient was treated with oral doxycycline 100 mg twice a day for 1 month, which resulted in complete vision recovery.

Case Description

A 55-year-old Hispanic male presented to the clinic complaining of “vision worsening in the right eye” with a dull frontal headache for 2 weeks. The patient reported longstanding reduced vision due to refractive amblyopia in the right eye of “20/100 since childhood.” He denied any symptoms of diplopia, amaurosis fugax, eye pain, recent weight loss, scalp tenderness, neck pain or jaw claudication. He also denied any recent history of tick bites. He reported having a fever of 101°F Fahrenheit approximately 1 month ago but denied any other symptoms along with the fever. His blood pressure at presentation was 129/83 mmHg (right arm, sitting). His ocular history was unremarkable for trauma or ocular surgeries. The patient’s medical and family history was unremarkable and he denied taking any medications.

Best-corrected visual acuity (BCVA) measured 20/200 in the right eye and 20/20 in the left eye. Pupils were round and reactive with a grade 1 afferent pupillary defect (APD) in the right eye. Color vision testing with Hardy Rand Rittler pseudoisochromatic plates measured 4/12 in the right eye and 12/12 in the left eye. Results of extraocular motility testing, cover test and confrontation visual field testing were normal. Slit lamp examination was unremarkable. Intraocular pressure was 12 mmHg in each eye by Goldmann applanation tonometry. Dilated funduscopy examination of the right eye revealed a swollen elevated right optic nerve with obscuration of the optic disc margin that was worse along the temporal disc margin with associated neuroretinal rim hyperemia and hemorrhages. The cup-to-disc ratio of the right optic nerve was difficult to assess, and no evidence of Paton’s folds was seen. A small flame-shaped retinal hemorrhage was noted along the inferior temporal arcade in the right eye. Mild macular retinal pigment epithelial changes and retinal vessel tortuosity were also noted in the right eye (Figure 1A). Funduscopic examination of the left eye was unremarkable (Figure 1B).
Figure 1A. Color fundus photograph of the right eye at initial presentation revealed obscuration of the optic disc margin, worse temporally, with associated neuroretinal rim hyperemia. No signs of Paton’s folds or overlying disc drusen were seen. A small flame-shaped retinal hemorrhage was seen along the inferior-temporal arcade (arrow). Click to enlarge

Figure 1B. Color fundus photograph of the left eye showed a normal optic nerve with distinct disc margin and normal macula. Click to enlarge
Humphrey visual field central 30-2 threshold testing of the right and left eye was clear and reliable. Optical coherence tomography (OCT) of the peripapillary retinal nerve fiber layer showed significant thickening temporally consistent with the clinical appearance of optic disc edema (Figure 2A). OCT also confirmed the presence of serous macular detachment with scattered areas of hyper-reflectivity along the inner retinal layers (Figure 2B). B-scan ultrasonography of the optic disc was unremarkable for buried drusen of the optic nerve in the right and left eye.
Intravenous fluorescein angiography (FA) of the right eye showed leakage at and around the optic nerve head during the early and late phases. Higher fluorescein leakage during the late phase suggested optic nerve head edema (Figure 3).

Given the findings from the initial exam, the patient was diagnosed with optic disc edema with serous macular detachment due to unknown etiology OD. The differential diagnoses considered in the case at this point were:

- Malignant hypertension. Malignant hypertension (stage IV hypertensive retinopathy) presents with extremely elevated blood pressure typically greater than 140/90 mmHg. Retinal arteriole narrowing, copper- or silver-wire arteriole, arteriovenous crossing change, cotton wool spots, microneurysms, flame-shaped hemorrhages, hard exudates, macular star (acute) and Elschnig spots are seen on clinical examination.
- Idiopathic intracranial hypertension. Due to elevated intracranial pressure, idiopathic intracranial hypertension can lead to bilateral optic disc edema, i.e., papilledema. It is commonly seen in overweight young females. A computerized tomography (CT) scan or magnetic resonance imaging (MRI) and lumbar puncture aid in the diagnosis.
- Leber’s hereditary optic neuropathy (LHON). This condition presents initially as acute unilateral vision loss usually in males age 15 to 50. Contralateral eye involvement occurs within a week to a month in these patients. Because the condition is due to mitochondrial DNA mutation, a family history of vision loss or Leber’s optic neuropathy among maternal family members is seen. Visual acuity ranges from 20/100 to count fingers with an APD, abnormal color vision, reduced contrast sensitivity and subnormal electroretinography results. Visual field testing shows bilateral cecocentral or central scotoma. In LHON, the optic nerve may appear normal or pseudo-edematous. No leakage is seen at the optic nerve head on FA. Enhancement of the optic nerve and optic chiasm is seen on MRI. Visual prognosis in these patients is poor, and patients are considered legally blind due to severe bilateral visual field deficits.
- Metabolic or toxic optic neuropathy. Metabolic or toxic optic neuropathy is often bilateral and presents as progressive painless vision loss due to poor nutrition or pernicious anemia. Certain medications, such as antimicrobials, immune modulators and suppressants, chemotherapy drugs, ethambutol, digitalis and chloroquine, can also play a role. Visual field testing shows bilateral cecocentral or central scotoma in these patients.
- Vascular etiologies. Vascular etiologies considered in this case included nonarteritic anterior ischemic optic neuropathy (NAION), arteritic anterior ischemic optic neuropathy (AION) and perioperative anterior ischemic optic neuropathy (PION). NAION typically presents in patients older than 50 years as acute painless vision loss usually upon waking. Patients often have a small cup-to-disc ratio (disc at risk) with an underlying systemic condition such as hypertension, diabetes or other vascular condition. An inferior altitudinal defect is the most common visual field defect seen, and patients have a poor visual prognosis. AION is commonly seen in patients older than 70 years. It is an acute unilateral painless vision loss due to giant cell arteritis. Patients experience headaches, jaw claudication, scalp tenderness, fatigue or weight loss. Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) are significantly elevated. PION is acute, often unilateral, vision loss due to systemic hypertension or significant blood loss during head, neck, cardiac or spinal surgery, but it can be bilateral.
- Neoplastic and compressive etiologies. Potential neoplastic and compressive etiologies include conditions such as optic nerve glioma, optic nerve sheath meningioma or intracranial mass. They present as progressive vision loss or visual deficits that respect the vertical midline with an APD. The optic nerve could appear normal, pale or edematous. MRI of the brain and orbits are warranted.
- Inflammation. Potential inflammatory etiologies in this case included demyelinating diseases such as multiple sclerosis (MS). MS presents with acute unilateral often painful vision loss that worsens within 2 weeks. It is often seen in patients age 18 to 40 years. Visual field testing reveals a central scotoma. MRI shows an increased optic nerve signal and white matter lesions in the brain. MS patients have a good vision prognosis of 20/40 visual acuity or better. Ocular clinical findings in other inflammatory conditions, such as sarcoidosis, include bilateral optic neuropathy, conjunctival nodules, bilateral anterior granulomatous uveitis, sheathing over retinal veins (vasculitis and the appearance of “candle wax drippings”), neovascularization and cystoid macular edema. These patients have an elevated serum angiotensin converting enzyme (ACE) level and pulmonary involvement (chest X-ray).
- Infectious causes. Infectious etiologies considered in this case included syphilis, Lyme disease, tuberculosis (TB) and cat scratch disease. Syphilis can be either congenital or sexually transmitted. It is caused by the spirochete Treponema
Syphilitic optic neuropathy is often seen in stage 3 (secondary) and stage 5 (tertiary) of the disease. A macular star may be present. These patients have positive fluorescent treponemal antibody absorption (FTA-ABS) and rapid plasma reagent (RPR) (in untreated cases) test results. Lyme disease is caused by the spirochete *Borrelia burgdorferi*, which is transmitted through a tick bite. Some of the ocular signs of Lyme disease are conjunctivitis, uveitis, vitritis and optic neuropathy. TB is caused by *Mycobacterium tuberculosis*. Some of the ocular signs of TB are conjunctival nodules, granulomatous uveitis and optic neuropathy.

In consultation with a neuro-ophthalmologist and retina specialist, a comprehensive workup for potential systemic and neurological etiologies of the patient’s optic nerve edema was performed. The workup included MRI of the brain and orbits with contrast. Laboratory studies included ESR, CRP, complete blood count, comprehensive metabolic panel, ACE, lysozyme, human leukocyte antigen B27, RPR, (FTA-ABS), antinuclear antibody panel, homocysteine, antithrombin III, factor V Leiden, serum protein, lipid panel, cytoplasmic antineutrophil cytoplasmic antibodies, perinuclear antineutrophil cytoplasmic antibodies, PPD panel, chest X-ray, Lyme and *B. henselae* antibody panel (Table 1).

### Follow-up #1 (5 days)

At his 5-day follow-up visit the patient reported slight improvement in his headaches but no changes in his vision since his last exam. BCVA remained 20/200 in the right eye and 20/20 in the left eye. Dilated fundus examination of the right eye showed slight improvement of the optic disc edema with more visible, yet still obscured, disc margins and no signs of improvement in the serous macular detachment compared with baseline. Evaluation of the macula of the right eye also showed possible macular star formation with a few new retinal hemorrhages and hard exudates inferior-temporal to the fovea.

The patient was asked about any recent history of cat scratch and he reported having several flea bites while he was cleaning under his trailer more than a month ago. He also reported that his wife had brought home six stray kittens around the same time.

Results of the comprehensive workup revealed no neurological abnormalities that would account for optic nerve edema. MRI of the brain and orbits were unremarkable with no space-occupying lesions or areas of abnormal enhancement. The results of all serological studies were normal, except for a positive finding of *B. henselae*.

The diagnosis of neuroretinitis in the right eye secondary to cat scratch disease was made based on the findings of positive *B. henselae* serology, history of exposure to feral kittens and flea bites. The patient was started on oral doxycycline 100 mg twice a day for 4 weeks and instructed to return in 4 to 5 weeks for a follow-up visit.

### Follow-up #2 (1 month)

At this visit the patient’s BCVA was 20/100 in the right eye and 20/20 in the left eye. Dilated fundus examination showed marked improvement of the optic disc edema and no active serous macular detachment. Evaluation of the macula of the right eye still showed a few hard exudates at the fovea (Figure 4). The patient reported that his headaches had resolved, and his right eye’s vision had returned to “what it used to be.”
Education Guidelines

Learning objectives

1. Become familiar with the ocular presentation of neuroretinitis due to cat scratch disease
2. Become familiar with ophthalmic testing, neuroimaging and laboratory testing to be ordered for patients presenting with unilateral optic disc edema
3. Become familiar with appropriate lab testing and imaging needed in cases of optic disc edema to rule out any life-threatening conditions

Key concepts

1. Ocular manifestations of cat scratch disease
2. Criteria for an accurate diagnosis of cat scratch disease
3. Laboratory investigation needed to confirm the diagnosis of cat scratch disease
4. Treatment and management of cat scratch disease

Discussion questions

1. What is neuroretinitis and its most common cause?
2. What are the signs and symptoms of cat scratch disease?
3. What are the ocular manifestations of cat scratch disease?
4. What findings are necessary for making an accurate diagnosis of cat scratch disease?
5. What systemic treatment is indicated for patients with neuroretinitis due to cat scratch disease?

Discussion

What is neuroretinitis and its most common cause?

Neuroretinitis is inflammation of the optic nerve and inner sensory retinal layers at the macula resulting in stellate maculopathy. It is most commonly caused by cat scratch disease. The bacterium that causes this condition, *B. henselae*, has been identified in specimens taken from the lymph nodes of patients with cat scratch disease. *B. henselae* is an aerobic, oxidase-negative, gram-negative rod bacterium. In humans *B. henselae* invades the vascular endothelium initiating an acute inflammatory reaction resulting in lymphadenopathy and visceral organ involvement. It is not known why some patients...
What are the signs and symptoms of cat scratch disease?

Symptoms occur within 1 to 2 weeks of the cat scratch, cat bite or flea bite. Common symptoms include redness and swelling of the skin, swollen lymph nodes around the head, neck and arms, fever, headaches, fatigue and loss of appetite. Cat scratch disease primarily affects the lymph nodes along the head, neck and arm, but the disease can affect the skin or cutaneous membrane near the inoculation site, visceral organs such as liver and spleen, the eyes, and the musculoskeletal and central nervous systems.

What are the ocular manifestations of cat scratch disease?

Ocular manifestations are the second most common clinical presentation of cat scratch disease after lymphatic involvement. The most common ocular signs of cat scratch disease are Parinaud’s oculoglandular syndrome and neuroretinitis. Neuroretinitis occurs in approximately 2% of patients with cat scratch disease.

Parinaud’s oculoglandular syndrome is the most common ocular finding in symptomatic cat scratch disease. Patients present with symptoms of unilateral red eye, discomfort, mild lid swelling and epiphora with serous discharge. In rare cases, purulent discharge is seen with the formation and rupture of abscess. Clinical signs of Parinaud’s oculoglandular syndrome consist of unilateral granulomatous conjunctivitis with regional lymphadenopathy involving the preauricular, submandibular or cervical lymph nodes. Conjunctival lesions consist of granulomatous nodules with an ulcerative epithelium and necrotic center involving either the bulbar or palpebral conjunctiva. Although the etiology of Parinaud’s oculoglandular syndrome is not fully understood, it is believed that direct inoculation of the conjunctiva with infected flea feces may be the route of infection.

Neuroretinitis is the most common posterior segment complication of cat scratch disease, and cat scratch disease is the most common cause of infectious neuroretinitis. Infectious neuroretinitis is characterized by unilateral optic disc edema followed by formation of partial or complete macular star in 2 to 4 weeks. Formation of intraretinal or subretinal macular exudates (macular star) is usually seen in cases with severe optic disc swelling.

Less common ocular manifestations are anterior and intermediate uveitis, vitritis, retinal vasculitis and a variety of multifocal retinochoroiditis findings. Multifocal retinochoroiditis manifestations include retinal white dot syndrome, retinal artery occlusions, retinal vein occlusions, focal choroidal infiltrates and subretinal angiomatous mass lesions.

What findings are necessary for an accurate diagnosis of cat scratch disease?

Although signs and symptoms aid in the diagnosis of cat scratch disease, accurate diagnosis must include two or three of these findings:

1. history of cat exposure, cat scratch or bite or flea bite regardless of an inoculation site lesion
2. positive serology for B. henselae (IFA: indirect fluorescence assay or EIA: enzyme immunoassay) with a titer ratio ≥ 1:64
3. positive Bartonella polymerase chain reaction assay, negative serology for other causes of adenopathy, sterile pus aspirated from a lymph node, and/or liver or spleen lesions seen on CT scan
4. positive Warthin-Starry silver stain or biopsy showing granulomatous inflammation consistent with cat scratch disease

The patient in this case met criteria 1 and 2. He reported a recent history of flea bite with exposure to stray kittens, and his testing confirmed a positive serology result.

IFA serology is used in detecting anti-B. henselae IgG and is considered the gold standard in detecting antibodies to B. henselae. It has high specificity but low sensitivity. This test also has significant cross-reactivity between B. henselae and Bartonella quintana for IgG assays. IFA IgG titers < 1:64 indicate a negative Bartonella infection or a past infection. IFA IgG titers between 1:64 and 1:256 indicate a possible infection and repeat testing is recommended within 10 to 14 days. IFA IgG titers > 1:256 indicate an active infection. EIA is used in detecting anti-B. henselae IgG and IgM. A positive IgM test
indicates acute disease. The patient in this case had a *B. henselae* IgG titer > 1:2560 and a positive *B. henselae* IgM titer of 1:200 (normal is 1:100). He also had negative *B. quintana* IgG and IgM titers.

**What systemic treatment is indicated for patients with neuroretinitis due to cat scratch disease?**

Cat scratch disease is a self-limiting condition and most patients with the typical systemic manifestation of the disease have a gradual resolution of symptoms without any antimicrobial therapy. As long as the immune system is intact, in the mild to moderate stages of the disease, patients weighing more than 100 pounds are treated with 500 mg of azithromycin for the first day then 250 mg for the next 4 days. Patients weighing less than 100 pounds (typically children) are treated with 10 mg/kg of azithromycin for the first day then 5 mg/kg for the next 4 days. Clarithromycin, rifampin, trimethoprim-sulfamethoxazole or ciprofloxacin can be used for patients intolerant to azithromycin.

Cat scratch disease with liver and spleen involvement is typically treated with either azithromycin or gentamicin and rifampin for 10 to 14 days. Gentamicin dosing consists of an intravenous loading dose of 2 mg/kg then 1.5 mg/kg every 8 hours depending on normal renal function. Rifampin oral dosage consists of 300 mg twice a day in adults and 10 mg/kg every 12 hours with a maximum dose of 600 mg daily in children. Because doxycycline has better central nervous system penetration, it is typically used to treat patients older than 12 years with neuroretinitis and neurological manifestation. Doxycycline oral dosing consists of 100 mg twice a day for 4 to 6 weeks. In the severe stages of the disease patients are given intravenous antibiotics with or without oral rifampin for 2 to 4 weeks.

Neuroretinitis is a self-limiting condition and treatment with antibiotics remains controversial. During the initial presentation of the condition, patients should be co-managed with a neuro-ophtalmologist and followed weekly with a dilated fundus examination until etiology for the neuroretinitis is determined. The patient can be followed every 3 to 4 weeks until resolution and then every 6 months or yearly thereafter.

Several measures can be taken to prevent the spread and transmission of cat scratch disease. As irresistible as they are for many humans, avoiding handling or playing with felines can reduce the chances of a bite or scratch. It is important to immediately wash and disinfect any cat scratch or bite. Treating cats with topical parasiticides such as selamectin or dinotefuran/pyriproxyfen can prevent flea infestations and thereby prevent transmission of *B. henselae* from fleas to cats.

**Conclusion**

Cat scratch disease is an important differential diagnosis in cases of unilateral optic disc edema. It is important to obtain a thorough case history and inquire about any recent flea bite, cat scratch or exposure to stray cats in addition to tick bites. In a patient presenting with unilateral disc edema, it is also important to rule out the numerous differential diagnoses for both unilateral and bilateral optic disc edema. Timely and appropriate lab testing and imaging need to be ordered to rule out possible life-threatening conditions. Cat scratch disease is a self-resolving condition and patients with infectious neuroretinitis secondary to cat scratch disease often have a good vision prognosis.

In summary, this patient’s BCVA at resolution was measured at 20/100 in the right eye due to refractive amblyopia. Findings from OCT and FA helped confirm optic disc edema. Macular star formation was not noted on the initial visit, but hard macular exudates were prominent in the follow-up visits. This raised the suspicion for infectious optic disc edema as the primary etiology for the ocular findings. However, it is important to rule out life-threatening causes of optic disc edema with MRI of the brain and orbits and other etiologies with necessary labs. The patient in this case showed slight improvement in clinical signs and symptoms before treatment was initiated. Per the recommendation of the on-staff neuro-ophtalmologist, the patient was treated with oral doxycycline 100 mg twice a day for 1 month.

**References**

Neuromyelitis Optica Spectrum Disorder and MOGAD Optic Neuritis: a Teaching Case Series
Raman Bhakhri, OD, FAAO, Christopher J. Borgman, OD, FAAO, and Leonard V. Messner, OD, FAAO | Optometric Education: Volume 48 Number 3 (Summer 2023)

Introduction

Typical optic neuritis (ON) has historically been described as inflammatory demyelination, most commonly associated with multiple sclerosis (MS). However, a new era of biomarkers has expanded the identification of atypical causes of ON to include neuromyelitis optica spectrum disorder (NMOSD) and myelin oligodendrocyte glycoprotein antibody-associated disease (MOGAD). Historically, there has been significant discussion about whether MS, NMOSD and MOGAD are different entities or similar presentations of a same-spectrum disease. However, with the identification of these new biomarkers, it is now accepted that they are indeed separate entities. As prognosis and chronic treatment options vary among these conditions, eyecare practitioners need to be aware of typical clinical findings and available testing for biomarkers to help identify and differentiate these separate diseases. This case report highlights two cases of atypical ON, NMOSD ON and MOGAD ON, which were ultimately diagnosed with the aid of ancillary testing and multimodal imaging.

Case #1 Description

A 30-year-old Hispanic male presented with sudden, painful vision loss over 3 days in both eyes. He reported mild photophobia, pain on eye movement, and that vision in his right eye was worse than in his left eye. The patient reported he had presented to a local emergency department 2 days prior where computed tomography of his brain was found to be normal. However, he sought a second opinion at our clinic because his vision continued to decline. His ocular and medical history were unremarkable. Medications included acetaminophen 500 mg as needed. He had no known allergies to medications and his social history was unremarkable. Entering visual acuity was 20/800 in the right eye and 20/125 in the left eye, with no improvement with pinhole testing. Pupils were equal in size, round and responsive to light. Swinging flashlight test revealed a right relative afferent pupillary defect (RAPD). Extraocular muscle motility was full in both eyes, but the patient reported pain with eye movement in all gazes. Slit lamp examination was unremarkable, and intraocular pressure (IOP) measured 12 mmHg in each eye with Goldmann applanation tonometry. Dilated fundus exam revealed bilateral ON edema (Figure 1). The macula and peripheral retina were unremarkable in both eyes. Threshold 30-2 visual field testing was performed and showed overall depression in both eyes (Figure 2). Baseline spectral-domain optical coherence tomography (OCT) of the optic nerves was obtained. A large amount of retinal nerve fiber layer (RNFL) thickening was noted in the right eye, more so along the superior and inferior portions of the optic nerve head. Thickening was also noted inferiorly in the left eye. Unfortunately, the data for the superior portion of the left optic nerve was not reliable due to scanning artifact (Figure 3). Emergency magnetic resonance imaging (MRI) revealed bilateral optic nerve enhancement consistent with bilateral ON (Figure 4). Given the bilateral ON findings and entering visual acuities, NMOSD was suspected and confirmed with positive aquaporin-4 immunoglobulin G (AQP4-IgG) titers.

Figure 1. Fundus images of the right (A) and left eye (B) showing mild to moderate disc edema. The edema is noted to be greater in the right eye. Click to enlarge

Figure 2. Humphrey visual field testing (30-2 protocol) showing severely depressed visual fields in both eyes, with greater depression in the right eye. This corresponds with the more severe initial presentation of the right eye (Figure 1) and with the larger amounts of retinal nerve fiber layer thickening seen in Figure 3. Click to enlarge
The patient underwent intravenous methylprednisolone treatment and was prescribed chronic treatment with mycophenolate mofetil (MMF), which resulted in a full recovery of his vision. Unfortunately, the patient has been unable to follow-up in the clinic due to travel issues. He is currently monitored by an outside neurologist. In a phone conversation, the patient reported that with the prescribed treatment he had no NMOSD recurrence in approximately 3 years.

**Case #2 Description**

A 51-year-old African American woman presented complaining of painful, sudden vision loss in her right eye approximately 1 week earlier. The pain was noted upon eye movement in all gazes. She stated that her vision was improving since the initial onset of vision loss. Medical history was unremarkable with no known allergies. Entering visual acuity was 20/20- in the right eye and 20/20 in the left. Trace RAPD was observed in the right eye with corresponding 10% dyschromatopsia as measured by red cap desaturation. Extraocular muscle motility was full in both eyes. Confrontation visual field test results were normal in each eye. External ocular exam and slit lamp exam were unremarkable, and IOP measured 14 mmHg in each eye with Goldmann applanation tonometry. Dilated fundus examination revealed an essentially normal appearance of both optic nerves with a cup to disc ratio of 0.45/0.45 in the right eye and 0.35/0.35 in the left eye. OCT RNFL scans revealed one clock hour of borderline thinning inferior-temporal in the right eye and one clock hour of severe thinning inferior-temporal in the left eye. Ganglion cell complex (GCC) analysis showed generalized 360-degree thinning in the right eye with mild inferior-temporal thinning in the left eye (Figure 5). Retrobulbar ON was suspected, and MRI of the brain with and without contrast was performed and found to be essentially normal. Orbital imaging was not obtained. The patient was diagnosed with idiopathic retrobulbar ON and asked to return for follow-up in 3 to 4 months.
The patient was lost to follow-up but presented again 7 years later complaining of similar painful vision loss, this time in the left eye, for 1 to 2 weeks. Her entering visual acuity was 20/20 OD and 20/60 OS with a 1+ RAPD in the left eye. Entrance testing was otherwise unremarkable. Slit lamp examination was also unremarkable. IOP measured 19 mmHg in the right eye and 18 mmHg in the left eye. Dilated fundus examination revealed generalized optic disc pallor in the right eye. The pallor corresponded to the patient’s history of ON. Examination of the left eye revealed an edematous and hyperemic optic nerve. Cup to disc ratios were stable compared with previous exams. OCT raster scans showed a flat optic nerve in the right eye and nasal elevation and edema of the left optic nerve (Figure 6). Optic nerve head OCT of the right eye showed advanced, generalized thinning of both the GCC and RNFL (Figure 7). This correlated with the patient’s history of ON and her optic nerve presentation (pallor). Optic nerve head OCT scanning of the left eye revealed significant RNFL thickening combined with an inferior-temporal zone of GCC thinning (Figure 7). A recurrence of ON was suspected and repeat MRI of the brain and orbits was performed with and without contrast. The results were essentially normal with patchy, longitudinal enhancement of the left intraorbital segment of the optic nerve (Figure 8). AQP4-IgG and myelin oligodendrocyte glycoprotein (MOG) antibody testing was performed and showed positive anti-MOG titers. A diagnosis of MOGAD ON was established and the patient was treated with pulsed intravenous methylprednisolone followed by an oral prednisone taper. Follow-up visits showed rapid improvement of vision to 20/25 in the left eye in the presence of resultant disc pallor. No RAPD was noted. Repeat OCT showed stable findings of advanced and generalized thinning of both the GCC and RNFL in the right eye. OCT of the left eye showed advanced and generalized thinning of both the GCC and RNFL, which corresponded to the new disc pallor (Figure 9). In the next 2 years, the patient experienced several episodes of ON involving both the right and left eye. With each relapse, she reported rapid vision improvement following treatment with intravenous steroids. She was subsequently placed on maintenance therapy with oral MMF and her condition has remained stable with no further recurrences.
Education Guidelines

Key concepts

1. The pathophysiology of MOGAD ON and NMOSD ON
2. Clinical signs and symptoms to help differentiate between NMOSD ON, MOGAD ON and similar conditions
3. Understanding medical treatments for both conditions
4. Long-term vision implications for patients with either NMOSD ON or MOGAD ON

Learning objectives

1. Define and recognize the clinical presentation of NMOSD ON and MOGAD ON, including signs and symptoms
2. Know the importance of signs and symptoms and results of additional testing in determining a correct diagnosis
3. Understand the pharmacologic treatments used for each condition

Discussion questions
1. Knowledge, understanding and facts related to the case and condition
   a. Describe the typical appearance and presentation of NMOSD ON
   b. Describe the typical appearance and presentation of MOGAD ON
   c. Explain the pathogenesis of each condition. How are they similar? How do they differ?

2. Differential diagnosis
   a. What other condition(s) should be considered as differential diagnoses for NMOSD ON and MOGAD ON?
   b. How can a clinician differentiate between these similar conditions based on presentation (history, signs, symptoms)?

3. Patient management and role of the optometrist
   a. What additional testing should be ordered for MOGAD ON and NMOSD ON?
   b. What are the similarities and differences of test results for the respective conditions?

4. Critical-thinking concepts
   a. When should a patient start pharmacological treatment for either condition?
   b. What medications are indicated initially for each condition? Why?
   c. What type of treatment outcomes can be expected for NMOSD and MOGAD?

Assessment of learning objectives

As MOGAD ON and NMOSD ON are fairly novel and advanced topics, these teaching case reports are best-suited for third- and fourth-year students and residents who have already been taught the foundational knowledge associated with ON, specifically MS-related ON. Formal assessment could be conducted in a variety of ways, such as:

- The case reports could be used as a part of a journal club at a student’s school, optometric rotation site or residency site. The students and/or residents could work in small groups or independently to answer the discussion questions. Open dialogue of the discussion questions would be encouraged so that the students and residents can learn from each other and from any mistakes made during the process. Follow-up meetings to discuss other specific literature cited in these case reports could also be scheduled.
- The cases could be presented to third- or fourth-year optometry students in a classroom setting. The case details could be presented to students who would then be responsible for arriving at a final diagnosis and proper management plan based on the given findings and test results. Comprehension and knowledge could be assessed through open-ended questioning to the class or through formal testing with multiple-choice questions.
- The case descriptions along with the results of any additional testing could be presented online to third- or fourth-year optometry students. Students could then be tested with multiple-choice questions on concepts involving pathophysiology, signs and symptoms, differential diagnosis, test interpretation, and treatment and management. Students would be required to answer a question correctly before moving on to the next question. Feedback and further elaboration on tested concepts could be provided if the question is answered correctly or incorrectly. This would allow students to learn from their potential mistakes and/or strengthen their existing knowledge base.

Discussion

While MS has been associated with ON in 57-80% of cases, clinicians must keep in mind that other etiologies exist. Studies have shown that idiopathic (14-29%), MOGAD (5-12%) and NMOSD (3-5%) ON can also occur.\(^7,9\) Clinical presentations of ON secondary to MS, NMOSD and MOGAD can be difficult to distinguish based on clinical findings and presentation alone.\(^1,3,10\) Typical MS ON presents as a demyelinating autoimmune condition at approximately 30 years of age. As the condition is autoimmune in origin, women are more likely to be affected. Patients usually present with unilateral visual acuity and visual field loss, a corresponding RAPD, dyschromatopsia and pain upon eye movement.\(^1\) The amount of visual acuity loss varies but has been found to be better than 20/200 in more than 50% of patients.\(^1\) Examination of the posterior segment can reveal disc swelling, or as seen in a majority of cases, the inflammation can be retrobulbar.\(^11\) Neuroimaging with MRI produces abnormal results with the presence of periventricular white matter lesions. In terms of treatment, in the Optic Neuritis Treatment Trial (ONTT) intravenous methylprednisolone led to faster vision recovery but had no real effect on the final visual outcome. ONTT also established that intravenous methylprednisolone treatment should be followed by oral prednisone as this led to lower rates of MS within the first 2 years of the ON attack.\(^12\)

As not every presentation follows these norms or responds to the above treatment guidelines, cases outside these parameters should be considered atypical and etiologies such as NMOSD ON and MOGAD ON should be considered. Quick and accurate identification of underlying associated disorders in atypical acute ON episodes is important to prevent permanent vision loss.\(^13\)
The risk of permanent vision loss ≤ 20/200 is approximately 3% for MS ON, 6-14% for MOGAD ON and > 33% for NMOSD ON. This underscores the importance of identifying non-MS causes of ON in a timely manner.\textsuperscript{1,10,14}

**NMOSD and MOGAD pathophysiology**

The pathophysiology of NMOSD has been shown to be an autoimmune attack on AQP4 water channels in astrocyte foot processes (AQP4 immunoglobulin) in the central nervous system.\textsuperscript{1} The specific antibody that targets the AQP4 water channel on astrocytes is therefore referred to “AQP4-IgG” or “NMO-IgG.”\textsuperscript{9,12,15} This leads to complement activation and ultimately to secondary cytotoxic demyelination.\textsuperscript{1} Areas of the brain that are rich in AQP4 channels include the optic chiasm, spinal cord and the area postrema in the dorsal medulla. Thus, these areas are most commonly involved with NMOSD-associated disease.\textsuperscript{1} Discussion of the clinical phenotypes of NMOSD other than ON are beyond the scope of this paper but include transverse myelitis, area postrema syndrome (resultant nausea and vomiting), acute brainstem syndrome, narcolepsy and cerebral syndrome.\textsuperscript{1}

The pathophysiology of MOGAD has also been shown to be an autoimmune attack; however, the pathophysiology differs when compared with NMOSD. MOG is a transmembrane protein expressed on myelin sheaths (MOG immunoglobulin) in the central nervous system.\textsuperscript{1,6,14} Antibodies targeting them lead to primary demyelination in the central nervous system, but notably spare astrocytes, unlike NMOSD.\textsuperscript{1,6,14} The clinical phenotype is also diverse when compared with NMOSD phenotype, but similarities exist as both conditions can present with ON and transverse myelitis. Interestingly, MOG-IgG is positive in approximately one-third of seronegative NMO patients notably in the setting of transverse myelitis.\textsuperscript{1,6,14} However, the diseases rarely co-exist due to their different mechanisms. Other signs seen with MOGAD include acute demyelinating encephalomyelitis and brainstem encephalitis.

**Clinical presentation of NMOSD ON and MOGAD ON and comparisons to MS ON**

Although NMOSD ON, MOGAD ON and MS ON all lead to demyelination, clinicians can use clinical presentation, neuroimaging and laboratory studies to help differentiate them. MOGAD ON has an equal prevalence among males and females with most patients initially presenting in their 30s.\textsuperscript{1,16} In contrast, NMOSD ON patients are much more likely to be female and to present in their 40s while MS ON patients are more likely to be females in their 30s.\textsuperscript{1} Clinicians should note that MOGAD ON can be present in childhood, which is rare with NMOSD.\textsuperscript{1,17} All three conditions may present with eye pain upon movement (of the involved eye), but pain is seen more frequently with MOGAD ON. Other characteristics include bilateral presentation (although MOGAD ON can be unilateral at times), severe vision loss, and recurrences for NMOSD ON and MOGAD ON.\textsuperscript{1} In contrast, MS ON presents unilaterally, thus it presents with a corresponding RAPD. It also has a possible relapsing course with the amount of vision loss at nadir having been found to be less severe when compared with NMOSD ON and MOGAD ON.\textsuperscript{1} Examination of the optic nerve reveals edema, which tends to be more severe in MOGAD ON than in NMOSD ON.\textsuperscript{1,17,18} MS ON is distinct in this sense as it tends to present as retrobulbar in a majority of cases. Therefore, no edema is visible.\textsuperscript{11} In terms of outcomes, MOGAD ON patients tend to recover rapidly when intravenous steroids are initiated, which is not seen with NMOSD ON. As the recovery is rapid, MOGAD ON patients also tend to have better visual outcomes. Studies have indicated that only 6-10% of patients with MOGAD ON have final visual acuities worse than 20/200 compared to a third of NMOSD ON patients.\textsuperscript{1,16,19} Table 1 summarizes the similarities and differences between MOGAD ON, NMOSD ON and MS ON.

**Neuroimaging**

MRI findings between the conditions can be similar but with key differences. Enhancement of the ON with longer segments of involvement is seen with MOGAD ON and NMOSD ON, while MS ON tends to show shorter segments of involvement. MOGAD ON also shows enhancement of the perineural tissue of the optic nerve, which can also extend into the orbit. In contrast, NMOSD ON shows enhancement of the optic nerve extending to the optic chiasm and optic pathways.\textsuperscript{1} Thalamic and pontine lesions are more common in MOGAD ON than in NMOSD ON. MS-related brain neuroimaging is abnormal with the presence of periventricular white matter lesions not seen with either of the other two conditions. Cerebrospinal fluid analysis frequently shows oligoclonal bands that are rarely associated with the other two conditions.\textsuperscript{11}

**Laboratory testing**

Serum samples are preferred over cerebrospinal fluid testing and should include AQP4-IgG cell assays as well as MOGAD IgG. The AQP4-IgG antibody has 75% sensitivity and > 99% specificity for NMOSD.\textsuperscript{1,15} In both cases presented, AQP4-IgG antibody and MOGAD IgG tests were ordered. The AQP4-IgG results were positive for the first patient, confirming NMOSD ON. MOGAD ON was confirmed for the second patient based on her positive MOGAD IgG titer.

Testing is more sensitive prior to initiation of treatment, and repeat testing can be considered a few months after an initial negative test if clinical signs and symptoms are strong for either condition. As ON can have many causes other than
demyelinating conditions, clinicians should also be thorough in testing for infectious and inflammatory disease, such as syphilis and sarcoidosis.

**Treatment and outcomes/prognosis**

With phenotypic overlap, namely ON, it can be difficult to distinguish between NMOSD ON and MOGAD ON. Therefore, clinicians should be cognizant of the underlying etiology and results of ancillary testing. This can help guide decision-making toward the ideal treatment options and best possible outcomes.

**MOGAD ON**

Although standard treatment criteria and guidelines have not been created, general guidelines can be followed. The treatment of MOGAD ON can be grouped into acute and chronic options with overlap between the two. For acute bouts, and because 50% of MOGAD ON is monophasic, standard treatment is a 3- to 5-day course of intravenous high-dose steroid therapy, usually methylprednisolone. MOGAD ON responds more positively to steroids than MS ON and NMOSD ON do; however, high doses are indicated as lower doses have been associated with relapse. In one study, 95% of patients who were given at least 20 mg of prednisone for 6 months after the initial event had no repeat attacks for more than a year. After the initial high dose of intravenous steroids, oral prednisone can be initiated and then tapered for 1 to 3 months. Plasma exchange and intravenous immunoglobulins are also options but should be reserved for cases of severe vision loss (< 20/100) or when recovery is not seen with initial intravenous steroid treatment.

As recovery occurs rapidly with positive vision outcomes with steroid treatment, long-term or chronic therapy is less likely to be needed. Clinicians should note, however, that even in the absence of corticosteroid treatment, many patients recover normal or near-normal visual acuity. Long-term maintenance therapy for single-event MOGAD ON is not indicated as 50% of these individuals remain monophasic. However, cases can be relapsing despite steroid treatment, and immunotherapy can be initiated to prevent long-term visual disability. Immunomodulators can also be used if the initial attack leads to residual deficits or if MOGAD-IgG titer is still positive 6 months after the initial attack, which have been associated with higher rates of relapse. Immunosuppressants that can be considered include rituximab, azathioprine (AZA) and MMF. This treatment paradigm was evident in our case #2. Although the patient initially responded well to steroid treatment, recurrences were noted necessitating chronic immunotherapy with MMF. Clinicians can also combine treatments to prevent further relapse as studies have shown that patients using oral steroids for an extended period in conjunction with immunosuppressive drugs were less likely to have a recurrent attack than patients taking only immunomodulators. Caution should be taken when prescribing rituximab because relapses have occurred after the first rituximab infusion in approximately 30% of patients. Promising results with newer monoclonal antibody treatments such as tocilizumab are emerging, but more research is required at this time. It must be remembered that these are off-label uses of these medications, and further clinical trials are necessary to confirm their therapeutic value.

**NMOSD ON**

Treatment for NMOSD ON can be similar to treatment for MOGAD; however, outcomes can be drastically different. As mentioned previously, despite treatment, NMOSD ON patients tend to have worse vision outcomes. Again, the treatment can be divided into acute and chronic categories with overlap between the two in certain situations. Treatment is further divided into classic or new treatment due to the introduction of novel medications. Although a multitude of treatment options exist, there are no clinically established guidelines, and treatment patterns vary from clinician to clinician.

Classic options for initial treatment of acute NMOSD ON include intravenous methylprednisolone, which is transitioned to a slow taper with oral steroids. Complete vision recovery is possible and is more likely when steroids are started promptly, underscoring the need for immediate treatment. Next, evidence exists for the benefit of plasma exchange, especially if a patient’s vision does not respond to initial steroid treatment. Similar to steroid treatment, plasma exchange should occur promptly as better outcomes have been noted when compared with delayed treatment. Plasma exchange can also be combined with steroid treatment, which can lead to better outcomes than with intravenous steroids alone. Next, although rarely given, due to limited data sets, immunoglobulin therapy can also be considered. Newer options for acute disease are becoming widely available and include monoclonal antibody medications such as intravenous bevacizumab and ublituximab in conjunction with traditional intravenous steroid treatment. Although these medications show promise, data is limited at this time.

Long-term or chronic therapy is prudent for patients with NMOSD as relapses are common and can lead to further disability. Again, with recent advances, therapy can now be classified as classic or new. Classic therapy for chronic NMOSD consists of immunosuppressive agents such as AZA, MMF, rituximab and tocilizumab.
Numerous studies have shown AZA and MMF to be effective in terms of preventing relapses. When comparing the two drugs, MMF proved to be superior in terms of efficacy in preventing annual relapses and in terms of side effects. The effects of this treatment approach were noted in our case #1. The patient was initially started on systemic steroids as was warranted. He was then transitioned to chronic treatment with MMF with no recurrence to date. Unfortunately, these medications usually take 4 to 6 months to exert their clinical effect and therefore must be given in conjunction with oral steroids.

Rituximab is another option for clinicians. It has been shown to be more effective than AZA or MMF in terms of relapse severity and relapse prevention. Although the number of randomized controlled studies is limited, one multicenter randomized double-blind placebo-controlled study by Tahara et al. revealed that 7 of 9 patients treated with placebo relapsed vs. none treated with rituximab. It can also be considered when there are contraindications to MMF and AZA. The monoclonal antibody tocilizumab can also be considered. It has been shown to be effective in stabilizing relapses when compared with the previously mentioned treatment options and can be used as an alternative for patients who do not respond appropriately to rituximab.

With advancements in the understanding of the pathophysiology of NMOSD, three newer monoclonal antibody treatments have been approved by the FDA: eculizumab, inebilizumab and satralizumab. Each offers a distinctive mechanism of action in terms of preventing NMOSD relapses.

Eculizumab targets the terminal complement system to decrease inflammation. Although previous studies showed eculizumab to be beneficial, the seminal study was the PREVENT trial, which assessed the efficacy and safety of eculizumab as add-on or monotherapy compared with placebo. Results showed a 94% reduction in relapse risk in patients with NMOSD. Inebilizumab decreases NMOSD relapses by depleting CD19-positive B-cells. The largest study in NMOSD to date was the N-MOmentum trial, which showed a 73% relative risk reduction in number of relapses with inebilizumab vs. placebo. A more robust response was noted in patients who were positive for the AQP4 antibody. Satralizumab targets the interleukin 6 (IL-6) receptor. The cytokine IL-6 is thought to be a key driver of inflammation in NMOSD. The phase 3 SAkuraSky study showed a 62% reduction in relapse risk when satralizumab was added to immunosuppressive treatment.

Although many treatments exist for NMOSD, most are based on small and retrospective studies. New treatment options show promise; however, long-term data on them is not available. Ultimately, large multicenter studies for a longer period of time are needed to establish clinical guidelines.

Conclusion

The historical paradigm of ON management is evolving. In our opinion, standard of care for ON should now include testing for NMOSD and MOGAD biomarkers in all acute cases. This allows earlier identification and potentially better outcomes in NMOSD- and MOGAD-associated ON, which have worse vision prognoses compared with MS ON. Neuroimaging has previously been recommended for all cases of acute ON and should be standard of care going forward. Promising new treatment options for both conditions, which differ from treatments used for MS ON, are now available. Therefore, it is appropriate to recommend utilizing MOG-IgG and NMO-IgG testing/titers for all cases of acute ON in hopes of achieving optimal outcomes.

References


Graduating Optometry Student Perceptions of Their Scleral Lens Fitting Knowledge
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Optometric Education: Volume 48 Number 3 (Summer 2023)

Background
Following their introduction in 1983, scleral lenses (SLs) were primarily utilized by providers in tertiary care centers or specialty contact lens practices to treat severe eye disease. As SLs have become more commercially available, their prescription has expanded into community eyecare practices. With this expansion, SL education has been incorporated into the contact lens curricula of U.S.-based schools and colleges of optometry. A 2019 survey of optometric educators showed that ideal SL fitting characteristics taught include central corneal clearance of $206.3 \pm 44 \mu m$, $62.1 \pm 23.6 \mu m$ of limbal clearance, and one clock hour or less of conjunctival vascular compression at the landing zone. Thus, graduating students theoretically have at least cursory experience with SL evaluation prior to entering practice.

The 2019 survey of educators also revealed considerable variability in the number of SL evaluations performed by students during their optometric training. Because SL education is relatively new and many current practitioners had to learn fitting after graduation from optometry school, recent graduates should possess some initial advantage in their SL knowledge and experience before entering practice compared with previous generations of students. Given the limited clinical experience of new graduates, didactic SL education will guide their initial prescription and management of SLs as they enter practice. Quantifying and qualifying these students’ experience and understanding of SLs will provide guidance for ongoing development of SL education programs. In this study, fourth-year students at U.S. optometry schools and colleges were directly queried about their SL fitting experience during their training and were asked to define aspects of what they considered an ideal SL fit.

Methods
This study was reviewed and approved by the Institutional Review Board at the University of Illinois at Chicago. An electronic REDCap (Research Electronic Data Capture) 24-item survey was designed by the Scleral Lenses in Current Ophthalmic Practice Evaluation (SCOPE) study team and hosted by the university. The complete survey is shown in Appendix A. A representative (American Optometric Association/American Academy of Optometry student liaison, contact lens educator, contact lens clinic chief, dean or director) from 23 of the U.S.-based schools and colleges of optometry was asked to distribute the survey link to fourth-year students at their respective institutions. The survey was active from February 15, 2020, through May 15, 2020. Two reminders were sent to representatives, but it was not verified that the survey was distributed to all fourth-year students. Surveys were completed anonymously with a chance to win a $100 gift card. Participants were not asked to identify the institution at which they received their training.

Participants were asked to identify the year in which SLs were introduced during their optometric education, and to estimate the number of SL evaluations they had personally performed during their clinical training. They were asked to describe aspects of what they considered ideal SL fitting characteristics (central corneal clearance, limbal clearance, landing zone alignment) along with methods they utilized to clinically evaluate SL fits (estimation of central and limbal clearance, assessment of landing zone alignment, and use of sodium fluorescein). Participants were able to type values for clearance estimations and SL diameters, which were then put into categories upon analysis. Additional aspects of SL prescription and management queried included identification of characteristics of poor lens fit that would prevent SL dispensing, and timing and components of follow-up exams. Finally, participants were asked to identify sources they planned to utilize to stay informed about new developments and best practices in SL prescription and management following graduation.

Participants were not required to respond to every question. Several items allowed participants to select multiple responses. Descriptive statistics are reported. Median scores for numerical responses are reported, with interquartile range (IQR) and range of all responses given. The IQR provides the range of the middle half of the data set rather than the spread of the whole data set.

Results
Of the estimated 1,725 potential graduating students from U.S. schools and colleges of optometry in 2020, 323 (19%) fourth-
year students completed the survey. More than half of all participants (58%, 187/323) reported SL education was introduced during their second year of optometry school. Thirty-one percent of students (101) were introduced to SLs during their third year. Two individuals reported SL education was not taught. The median (IQR) reported number of SL evaluations completed during training was 5 (13); (range 0-110; n = 323). Sixty-two percent (201) reported they had fit fewer than 10 SLs. The distribution of the number of SL fits reported by students can be found in Table 1.

Students were asked what they considered to be the ideal SL diameter. Of the 255 students who responded to this question, 237 indicated a diameter of 14 mm or larger was ideal. The median (IQR) ideal SL lens diameter was 16 (2) mm; (range 8-22) (Table 2).

Students were also asked to provide numerical responses to items related to ideal SL design and fitting characteristics (Table 3). The median (IQR) minimum acceptable central corneal clearance reported by students was 150 (100) µm; (range 0-500 µm; n = 272), and the median (IQR) maximum acceptable central clearance was 300 (150) µm; (range 0-700 µm; n = 271) (Table 2). The median (IQR) reported values for minimum and maximum acceptable limbal clearance were 50 (25) µm; (range 0-350 µm; n = 254) and 100 (125) µm; (range 0-600 µm; n = 253), respectively. Respondents indicated their willingness to accept vascular blanching or compression with SL wear, and most (71%, 190/266) reported no vascular blanching or compression should be considered acceptable. Approximately one-third of participants (20%, 52) indicated that up to one clock dial (30 degrees) of blanching or compression was acceptable, 8% (20) of students reported one quadrant (90 degrees) to be acceptable, 1.6% (4) reported two quadrants (180 degrees) to be acceptable, and no student reported three or more quadrants of blanching of conjunctival vasculature beneath the landing zone to be acceptable.

Most (86%, 225/263) students indicated they would plan to schedule SL follow-up visits at a specific time of day after a defined amount of wearing time. Ideal wearing time before a SL follow-up examination was reported as at least 2 to 4 hours by 59% (156) of students, 5 to 6 hours by 14% (36), 7 to 8 hours by 3% (7) and 30 to 60 minutes by 8% (20). There were 323 students who responded to questions regarding evaluation of corneal and conjunctival tissue following SL removal at a follow-up examination. Many students (70%, 227) reported evaluating for corneal staining, 61% (197) evaluated conjunctival staining, and 61% (196) looked for signs of persistent conjunctival impression following SL removal. Nine percent (30) reported routinely measuring corneal thickness following SL removal, and 2% (5) indicated they did not evaluate anterior ocular structures without the SL during follow-up evaluations. Approximately half of the students (48%, 124/261) reported that SL patients should be instructed to remove and re-apply their lenses during the day. Most participants (92%, 242/264) reported they educate their patients not to rinse their SLs with water.

There were 263 students who responded to how they intended to stay up to date on future developments with SLs following graduation. In-person and online continuing education were identified as anticipated primary sources of information (41%, 108 and 38%, 101; respectively). Only 9% (23) of participants intended to receive their SL information from industry representatives, and even fewer participants indicated they planned to personally utilize information presented in either contact lens trade journals (6%, 15) or peer-reviewed literature (6%, 17) to maintain updated knowledge regarding SLs following graduation.

Discussion

Although SLs are now included in didactic curricula for all optometric students, the amount of clinical experience with SLs that students attain during their training is highly variable and relatively limited. The responses of fourth-year optometric students were compared to a previously reported survey of scleral lens educators. More than half of the fourth-year students in this survey had completed fewer than 10 SL evaluations by the time of graduation. Some students (9%) reported no clinical exposure to SLs at all. In the 2019 survey, educators estimated students complete an average of 18 SL evaluations during training, suggesting overestimation of students’ SL clinical experience. Optometry students could potentially benefit from having at least 10 clinical opportunities to evaluate SLs.
Lack of clinical experience may explain deficits in students’ understanding of the basic definition of a SL. In some cases, students did not recognize essential features of scleral lens prescription and management including 7% of students who indicated the ideal SL diameter was less than 14 mm. Another potential area of improvement identified is related to clinical evaluation of patients using SLs. While educators nearly unanimously recognized the importance of removing SLs for anterior segment evaluation during follow-up examinations, only slightly more than half (61%) of students indicated they would evaluate for corneal or conjunctival staining at follow-up examinations. On the other hand, students appeared to be more concerned about other aspects of the SL fit compared with educators. While most students reported no scleral landing zone vascular blanching or compression was acceptable, most educators (46%) found one clock hour of blanching or compression (30 degrees) to be acceptable. This suggests students are relying on didactic education alone due to a lack of experience fitting SLs. Educators, who presumably have more experience fitting SLs, appear to accept that a perfect fit cannot always be achieved.

While most students who participated in the current study received didactic education on SL prescription and management and had some clinical exposure to SLs during their clinical rotations, the responses suggest a sufficient level of clinical skill in SL management was not attained at the time of graduation. Developing both efficiency of the fitting process and proficiency in the management of conditions treated with SLs should be considered as SL curricula continue to evolve. Efficiency in the SL fitting process involves the ability to progress through initial evaluation and the fitting process with minimal delay. Although Macedo-de-Araújo et al. reported that the number of diagnostic lenses applied during initial evaluation and the total number of revised lenses ordered during the fitting process decreased significantly once a practitioner had completed 60 SL fits, it may not be necessary for students to see that many patients to achieve visual and physiologically successful fits. However, students who have minimal exposure to SL fitting during training might find incorporation of these devices into their practices financially and logistically challenging following graduation. Developing true proficiency in SL fitting does not necessarily directly correlate with the number of SL patients evaluated. Students who have evaluated a relatively large number of lenses on healthy eyes may be less proficient at identifying and managing issues related to SL wear than those who have evaluated a small number of lenses on more complex eyes.

Whenever possible, contact lens educators should emphasize the role of SLs in overall disease management in addition to identifying acceptable SL fitting characteristics when working with students. Concentration on the disease being treated would increase awareness of the importance of careful evaluation of the eye during SL follow-up visits. To provide more experience for students, clinical educators could consider allowing multiple students to work together on SL fitting in appropriate patients or offering additional fitting opportunities with educational workshops. Students who intend to incorporate specialty contact lens prescription into their practices may benefit from additional learning opportunities such as a contact lens residency (Accreditation Council on Optometric Education’s Cornea and Contact Lens Residencies) or fellowship (American Academy of Optometry, Sceral Lens Education Society). Referral to colleagues within the optometry community is an option for those who do not wish to engage in specialty contact lens practice. Limited experience with SLs during optometric education may lead some graduating students to avoid fitting them in private practice and may be one reason the number of SL practitioners entering this specialty each year appears to be plateauing.

One limitation of the study may have been created by the sampling method used to recruit participants. Participation may have been impacted by the administrators’ willingness to circulate the survey to current fourth-year students, and student participation could have been impacted by the amount of emphasis placed on SLs in their respective institutions. This survey was deployed after the onset of the COVID-19 pandemic. Disruptions in clinical practice due to the pandemic potentially reduced the total number of patients (including patients wearing SLs) evaluated by students in the graduating class of 2020. Participants responding after their clinical experiences were put on hold at their institution conceivably influenced the number of SL fits evaluated and completed by the graduating class of 2020. The variability in the number of SL patients evaluated may also be explained by the type of externships completed. Students who match with schools with large specialty contact lens clinics or busy private practices perhaps gained considerably more experience in fitting and evaluating SLs compared with those who chose other externship opportunities.

**Conclusion**

There is considerable variability in the number of SL evaluations students are exposed to during their optometric training. While didactic training necessarily focuses on observation of aspects of the alignment between the SL and ocular surface, clinical emphasis on disease entities treated with scleral lenses along with concentration on the physiological effects of SL wear on the ocular surface may help students develop true proficiency in both SL fitting and disease management. Allowing students to work in groups or teams could provide additional opportunities to gain SL experience and to learn from each other. If students intend to incorporate SLs into their clinical practices, they may do well to avail themselves of additional educational opportunities, specifically residencies or fellowships, to further develop their SL knowledge and experience.
References


Appendix A. Click to enlarge
SCO Faculty Members Win ASCO’s 2023 Dr. Lester Janoff Award for Writing Excellence

Optometric Education: Volume 48 Number 3 (Summer 2023)

Southern College of Optometry faculty members Melissa Zarn Urankar, OD, FAAO, Gregory S. Wolfe, OD, MPH, FAAO, FNAP, and Janette D. Pepper, OD, FCVD, FAAO, are the winners of ASCO’s 2023 Dr. Lester Janoff Award for Writing Excellence.

The award recognizes an outstanding research paper published in the previous 2 years in ASCO’s online peer-reviewed journal, Optometric Education. A committee of members of the journal’s Editorial Review Board selects the winning paper based on significance of the topic chosen, quality of the paper and potential impact. Read this year’s winner — “Training Implicit Bias and Awareness of the Impact of Systemic Racism on Health: a Preliminary Study of Second-Year Optometry Students” — at the journal website. Aurora Denial, OD, FAAO, DAAO (OE), talks more about the paper’s impact in this video presented during ASCO’s Annual Business Meeting.

The award is named in honor of the late Dr. Lester E. Janoff, who was Editor of the journal from 2002-2005 and a longtime member of the Editorial Review Board. Dr. Janoff was known not only as an exceptional optometric educator, administrator, contact lens clinician and researcher but also as a beloved mentor of young writers. The winners of the writing excellence award receive certificates and $2,000, which is divided among the authors.
ASCO and its Ethics Educators Special Interest Group are pleased to announce Zebin Dholasaniya, OD, as the winner of the 2023 Student Award in Clinical Ethics. Dr. Dholasaniya is a recent graduate of the University of Houston College of Optometry. Her winning essay, “The Ethical Dilemma: a Pediatric Patient’s Right to Truth vs. Parents’ Nondisclosure Request” appears below.

The Student Award in Clinical Ethics competition, sponsored by Alcon, is open to optometry students during any point in their professional program at an ASCO-affiliated school or college of optometry. The winner receives an engraved plaque and $1,000.

ASCO thanks all students who submitted essays this year.

The Ethical Dilemma: a Pediatric Patient’s Right to Truth vs. His Parents’ Nondisclosure Request

By Zebin Dholasaniya, OD

Optometrists are often forced to walk a tightrope in maintaining the delicate balance between their moral obligations and their legal duty. Medical decision-making in the pediatric population is a balancing act between respecting the autonomy and decision-making privileges of the parent and ensuring the well-being and health of the child. The following case illustrates the complex relationship between an optometrist’s duty to care for a pediatric patient and the legal authority of the parents to make decisions on the child’s behalf.

Case Description

A 15-year-old African American male presented for a low vision evaluation with the goal of acquiring a Texas driver’s license. His ocular history was positive for X-linked retinitis pigmentosa diagnosed at age 5. At the patient’s initial visit to the clinic 2 and a half years ago, per the parents’ request, the child was not made aware of his ocular diagnosis and only informed that his eyes were “different.” At his most recent visit, his best-corrected distance visual acuities were 20/60-2 in the right eye and 20/70-2 in the left eye. Fundoscopic examination revealed bilateral bone spicules 360 degrees in the peripheral retina and arterial vessel attenuation consistent with the diagnosis of retinitis pigmentosa. Esterman visual field testing (binocular) showed restriction to approximately 20 degrees right and 15 degrees left horizontally with some sparing in the far periphery. Additionally, a 30-2 SITA Standard test demonstrated bilateral severe generalized depression on both pattern and total deviation with a mean deviation of -25.74 dB in the right eye and -25.84 dB in the left eye. According to the Texas Medical Advisory Board, the vision requirements for a Texas driver’s license are visual acuity of 20/40 or better in each eye and visual field of 140 degrees horizontally.¹ The qualifications for a restricted driver’s license in Texas are visual acuities between 20/50 and 20/70 and visual field of 140 degrees horizontally.¹ Patients with visual acuities better than 20/200 can potentially be eligible for a Texas driver’s license if their visual acuity improves to 20/40 or better with a bioptic.¹ Based on these guidelines, the patient did not meet the vision requirements for obtaining a Texas driver’s license with or without a
bioptic due to the visual field restriction.

The challenge that presented itself was determining the extent to which the patient knew about his condition. In the patient’s absence, the parents clarified that the patient knew he had retinitis pigmentosa but was not informed about the progressive blindness associated with the condition, and they preferred to keep it that way. It was recommended the parents be honest and fully transparent with the patient about his condition, and resources to retinitis pigmentosa support groups were provided to assist the parents in navigating this difficult conversation. When the patient returned to the exam room, the family was informed that he did not meet the vision guidelines for obtaining a Texas driver’s license. The parents implored whether low vision devices could aid in qualification. The family was educated that although a low vision device would not make him eligible, there were devices that could aid in reaching career or education goals. The patient was interested in becoming a veterinarian and committed to extracurricular activities, courses and certification programs involving animals. However, he was currently struggling to perform in his dissection course at school. A clip-on binocular magnifier was presented to the patient. Initially, he refused the device. Previously he had been given a handheld telescope and pocket magnifier but he did not use them due to feeling “different” among his peers in school. However, a month after the most recent visit, the patient requested the clip-on magnifier.

Managing the patient’s retinitis pigmentosa mainly consisted of navigating a difficult conversation about the ineligibility to drive and enhancing vision to promote success in education. However, it was complicated by the parents’ request to not disclose the progressive permanent vision loss and the realization that the truth would only make the child feel further ostracized by his peers.

Discussion

As healthcare providers, optometrists must abide by the medical code of ethics. The principles central to decision-making in eye care include autonomy, beneficence, non-maleficence and veracity. In this case, the ethical principles challenged by parental involvement in an optometrist’s management of a pediatric patient include the defiance of trust and omission of truth from a child at the authority of the parents.

Patients have the right to make decisions about their medical care, and optometrists have a duty to respect these decisions. This is known as autonomy. However, in children, the capacity to engage in informed decision-making is limited, and until a child reaches age 18, the child’s parents have the legal authority to determine what is in the best interest of the child. In this case, there was a conflict between the child’s right to know about the progressive blindness associated with his diagnosis, which has the potential to impact his adult life, and his parents’ desire to protect their child’s emotional well-being. The parents’ desire to protect their child paralleled the optometrist’s duty to safeguard an especially vulnerable patient from a diagnosis that may compromise his emotional well-being. On the other hand, it was important the patient be made aware of the permanent and progressive nature of his condition so that he may learn to accept his diagnosis and the use of low vision devices to enhance his prospects of becoming a veterinarian. Although there are no guidelines barring a visually impaired individual from the practice of veterinary medicine in Texas, the extent of the visual impairment and its hindrance of the ability to perform surgery may render an individual unable to practice as a veterinarian.

While the patient was not of legal age to be a fully autonomous decision-maker, children exhibit varying degrees of intellectual and emotional aptitude. The patient’s cognitive and emotional development was assessed to determine his emotional resilience in handling the prognosis of his condition and his maturity in making decisions regarding his diagnosis. Ultimately, the parents’ wishes to withhold the prognosis of the patient’s condition was respected. The parents were advised to fully disclose to the child the nature of his condition and were provided retinitis pigmentosa support group resources in hopes they would use them to help navigate that conversation. It was believed that giving the parents some say in how the disclosure is handled would facilitate acceptance of disclosure and show respect for the patient’s relationship with his family. Although it is unknown whether the disclosure had taken place following the visit, the patient’s desire to have the low vision device after initially refusing it inspires hope. When managing and treating pediatric patients, optometrists must consider their moral and ethical obligations to their patient and the legal authority vested in parents and their nondisclosure requests.

Nondisclosure requests challenge the principle of veracity. Veracity refers to optometrists’ obligation to be honest and truthful with their patients about their conditions and treatment options. In this case, initially not disclosing to the patient the specific disease and then its severity per the parents’ request was done out of respect for the parents’ trust, but at a cost to the patient. Withholding a medical diagnosis or prognosis from a child poses risks to the optometrist-patient relationship. If the patient were to discover the optometrist was hiding information about his ocular diagnosis, he may harbor resentment and distrust the management of his condition. Furthermore, the patient’s own curiosity about his diagnosis may have prompted him to conduct his own research. As a consequence, he may know more about his diagnosis than he may be letting on. However, information acquired from non-vetted sources could put him at risk of having inaccurate information or imagining worst-case scenarios. If
the patient had the full picture in regard to his diagnosis, he might be more likely to comply with management recommendations such as using low vision devices at home and in school. Transparency may improve acceptance and contribute to better long-term adjustment to the condition. This is despite the discomfort and stress the patient may endure now in realizing he will have to rely on low vision aids and will never be able to acquire a Texas driver’s license when his peers can. However, disclosing this to the patient along with providing the resources to his parents were the initial steps toward facilitating acceptance.

**Conclusion**

Optometrists often serve as bearers of difficult truths when delivering a diagnosis to patients. In pediatric populations, optometrists must weigh the burden of the truth on the child’s emotional health against the child’s future and right to know. Furthermore, they must juggle the parents’ legal privileges to make decisions on the child’s behalf and what is in the child’s best interest. In this case, the obligations to protect and care for the pediatric patient and to cooperate with the parents’ nondisclosure request were reconciled by encouraging disclosure among the family.

**References**

3. Imaging studies: anterior segment photos (Figures 2 and 3)

**Figure 2.** Photograph of patient #3’s eyelid position to demonstrate ptosis, worse medially in both eyes and more pronounced in the right eye. Click to enlarge

**Figure 3.** Anterior segment photograph of patient #3’s left eye showing significant inferior-temporal stromal scarring secondary to exposure keratopathy. Click to enlarge
As My Tenure as Editor of this Journal Comes to an End ...

Aurora Denial, OD, FAAO, DAAO (OE)

This is my final editorial as Editor of *Optometric Education*. I started this journey as Associate Editor in 2009 and moved into the role of Editor in 2010. The saying “it takes a village” certainly applies to publishing a journal. As Editor, I worked with a team of people whose dedication and hard work led to the successful publication of 39 issues of the journal in the past 13 years.

Many Thanks

I would like to thank the former and current Executive Directors of ASCO, Marty Wall, MPA, CAE (Ret.), CPC, and Dawn Mancuso, MAM, CAE, FASAE, for their unwavering support. The behind-the-scenes ASCO staff led by Communications Director Kimberly O’Sullivan were always available and a pleasure to work with. Independent contractors Kerri McTigue (graphic designer), Mia Jordan (website developer) and Desiree Ifft (managing editor) have been instrumental in the production of the journal. I have worked most closely with Desiree. She is highly organized, a great editor, communicates well with authors and reviewers and has been an enormous support and help to me. Desiree’s expertise and skills are a critical component in publishing the journal. I also thank all current and former volunteer members of the Editorial Review Board, whose work ensures the quality of the journal. Reviewing a manuscript for publication often takes several cycles of revisions, is time-consuming and by the time of publication greatly appreciated by the authors. Finally, I would like to thank all of the contributors to the journal. Without this group there would be no journal to publish. I commend the authors who submitted articles that were not published. Successful publications involve a learning curve that is often frustrating. Feedback provides an opportunity to grow, develop and improve.

Over the past 14 years, it has been a privilege to oversee the journal and contribute to the optometric education literature. My first task in 2010 was to increase inventory and get faculty excited about scholarship. Faculty are often not formerly trained in research and scholarship. Interest is always present, but many are also intimidated. Over the course of a few years, I visited 20 schools and colleges of optometry. This was a great opportunity to meet faculty and discuss scholarship opportunities. In 2011, ASCO initiated the Educational Starter Grants. These grants (supported by The Vision Care Institute, LLC, an affiliate of Johnson & Johnson Vision Care) funded short-term projects and were designed to help faculty get started. The grants were able to support many faculty members. In addition to increasing inventory, the journal introduced new venues for publication such as Educator’s Podium and Educator’s Toolkit. The journal also tackled important issues such as interprofessional education, diversity, and cultural competency in the form of theme editions. The writing of editorials produced a small amount of stress for me but also gave me the opportunity to communicate my thoughts and ideas to the education community. I enjoyed writing all of them. The two that received the most reader response were “Should We Require Class Attendance?” (Fall 2015) and “The Four-Year Optometric Education Program: Something’s Got to Give” (Summer 2021). I Leave You in Capable Hands (and with an AI-generated poem)

Looking to the future, I am thrilled that one of the journal’s Associate Editors, Keshia Elder, OD, MS, MS, FAAO, will be assuming the role of Editor. I have worked with Dr. Elder over the past year to ensure a smooth transition. Dr. Elder is the current Dean of the College of Optometry at the University of Missouri-St. Louis. She holds two Master’s degrees, one in Vision Science and a second in Instructional Design, from the University of Alabama at Birmingham in addition to her Doctor of Optometry degree. She has been on the journal’s review board for many years and is always willing to help with additional projects. I predict that the future of the journal will include significant scholarship in the areas of artificial intelligence (AI) and mental illness in the student population. AI will have a major impact on the practice of optometry as well as the education process. How to use AI in an ethical and efficient manner will be a hot area for education research. AI is an amazing tool that requires a sophisticated reader with good critical-thinking skills to utilize it to the maximum. It is disruptive technology with the potential to change the way we educate. Over the years we have also seen a rise in mental health issues that impact our students and the learning environment. How we teach and educate will need to take this into consideration. We cannot change the culture of a generation of students. We will need to provide a learning environment that supports them while maintaining...
high education standards. In closing, I thank ASCO for its enormous support and giving me the opportunity to contribute to the profession over the past 14 years. And, thank you AI for generating a poem reflecting on the meaning of an editor:

Being an editor is a privilege
To contribute to the field
It's a way of advancing science
And making discoveries revealed
I am the editor for a journal
That educates the optometrists
I select and publish the articles
That teach them how to practice best
I cover topics from the basics
To the latest innovations
I aim to provide a resource
That supports their education
I work with authors and reviewers
To ensure the quality and relevance
I also seek to foster a dialogue
And a community of peers
I am the editor for a journal
That educates the optometrists
I hope to contribute to their growth
And their professional success
Emiliano Teran, PhD

Optometry holds immense potential to change lives by improving vision health, particularly among vulnerable groups such as children and the elderly. As a faculty member of an optometry program in Mexico, I have a strong interest in promoting initiatives that benefit vision health. This is what drew me to the Optometry Program in Advocacy and Leadership (OPAL) course offered by the World Council of Optometry (WCO). OPAL is a 10-week program offered to members of WCO. It is designed to provide optometry professionals with a comprehensive understanding of the principles and practices of advocacy and leadership so they may advocate for optometry on the global, national or local level. The program expanded my knowledge and skills in these areas, which will enable me to be a more effective faculty member and champion for children’s vision issues. I have participated in numerous initiatives aimed at promoting children’s vision health and overall wellness, and OPAL was an opportunity to further my commitment. Taught by experienced educators Don Lyon, OD, MS, and Luisa Casas Luque, OD, PhD, the 2022 OPAL course covered a wide range of topics including strengths-based leadership, stakeholder engagement, message development and risk management. A combination of online lectures, live events and engaging activities created a dynamic learning atmosphere. 

Opportunities and Insights

Meaningful opportunities and insights I gained from the experience included the following.

Connecting with a diverse group of optometric professionals: The WCO OPAL course provided a rich opportunity for me to connect with a varied group of global optometric professionals. Prior to the course, I often found myself working in solitude and facing difficulties accessing relevant resources and support. Through OPAL, I connected with classmates from diverse nations and learned from their experiences and perspectives, which helped me understand my work in a wider context. The chance to interact with seasoned instructors, who possess vast knowledge and expertise in the field, was another remarkable aspect of the course. A standout aspect of the course was working with my mentor Sandra Block, OD, MEd, MPH, FAAO, FCVD. Her support and expertise proved to be invaluable as I progressed through the material and strove to reach my advocacy targets. Dr. Block’s guidance was instrumental in my success and I am thankful for her mentorship during the program. I am grateful to have learned and been motivated by all of these individuals. This exceptional opportunity has already made a significant impact on my work, and I am confident that the connections made through the course will be invaluable as I progress in my career.

Understanding and leveraging my strengths as a leader: A key result of the OPAL course was recognizing and utilizing my personal strengths as a leader. Before the course, I did not give much thought to how my individual strengths may affect my leadership approach. But through the course’s concentration on strengths-based leadership, I was able to identify my unique strengths and contemplate more deliberately how to use them for a positive outcome. For instance, I realized that one of my assets is the capability to establish strong connections with others and motivate those around me. Knowing this has helped me to be a more productive faculty member, as it enabled me to cultivate a sense of community and collaboration within my program.

Connecting with key stakeholders: The OPAL course also provided participants with practical tips and strategies for success. One especially beneficial lesson was the process of identifying and connecting with key stakeholders. To advance an advocacy cause, it is important to recognize stakeholders and form meaningful connections with them. OPAL educated attendees on techniques and tools for achieving this goal such as stakeholder analysis and stakeholder mapping. I am eager to apply the skills I gained in stakeholder engagement to form stronger partnerships with local organizations and community leaders. These alliances will be crucial in determining the needs of the children in my community and creating tailored solutions.

Crafting effective messages: Additionally, the course taught me how to communicate effectively through message crafting. I learned how to craft clear, concise, impactful messages using language and storytelling. I aim to use these newfound skills to reach a wider audience and inspire more action surrounding my cause of promoting children’s vision health.

A Worthwhile Investment in the Future: I am grateful for the fulfilling and transformative experience of OPAL. Being part of a community of like-minded individuals dedicated to creating positive change was truly enriching. While the journey of creating change and making an impact is not always smooth, OPAL has equipped me with the necessary strategies and confidence to tackle challenges. I learned the significance of resilience and discovered ways to remain determined and
enthusiastic even when faced with obstacles. The skills and knowledge I gained will be priceless as I continue working toward 
better vision health for children in my community and making a difference in the world.
We are pleased to announce a theme edition of the journal that will be dedicated to global optometric education. We welcome manuscript submissions that highlight research, curricula, pedagogy, public health initiatives and other projects that align with the theme edition’s mission of sharing ongoing efforts to advance the profession of optometry worldwide. You may submit your manuscript in the customary format [https://journal.opted.org/publication-guidelines/] or as an informational report or article. Content-specific reviewers will be assigned to support atypical submissions. The submission deadline for this theme edition is January 2024. Send your cover letter with an intact and blind copy of your manuscript to submissions@opted.org. Email Optometric Education Editor Keshia Elder, OD, MS, MS, FAAO, if you have any questions about the theme edition.