"Take your finger out of your eye!"

Common Issues in Pediatric Ophthalmology

By Conrad C. Kavalec MD, FRCSC, DABO

The challenge of assessing the eye in the pediatric population is complicated by the fact that the patient is often uncooperative. There is the added variable of having a parent or two in the room supervising your activities. The only difference between the office practitioner and the local ophthalmologist is about $100,000 worth of equipment. In all practicality, 90% of our work in ophthalmology can be done with a direct ophthalmoscope.

Three scenarios faced by practitioners

1. Child presents with no specific problem and requires routine screening
2. A problem is noted by the parent but none is apparent on exam
3. There is a definite problem, emergent or otherwise.

Initial assessment

When screening newborns the first challenge is getting them to open their eyes. Have the mother lean the baby forward, supporting the chest, and often the eyes will open. Attain fixation by any means necessary. The green filter on the direct ophthalmoscope, jingling keys and your face are baby favorites.

Assess the alignment of the corneal light reflex. Newborns will not fix and follow because the macula is not developed until the age of four

Pediatric Ophthalmology

Congenital Horner's Syndrome

months. Try the doll's eye maneuver which utilizes the vestibulo-ocular reflex. Hold the baby in your arms and spin on your exam stool and you will see the saccades of refixation movement in the direction of the spin. Any lack of extraocular motion should arouse suspicion.

Older children will fix on the light and can be assessed easily, except around the age of two years. A screaming child will eventually open the eyes to see what's going on, so be patient. It is often an exercise in futility to try to force the eyes open.

Pupils

The pupils should be equal, round and reactive. Newborns have very small pupils, so darken the exam room. A blown pupil suggests third nerve pathology, whereas optic nerve disease presents with equal pupils and an afferent pupillary defect. A third nerve palsy is always accompanied by limitations in ocular motion and ptosis.

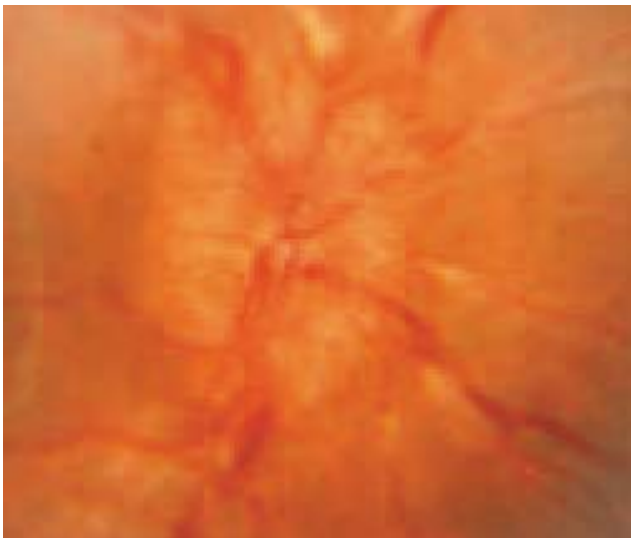
I routinely remind the medical students not to miss an afferent pupillary defect or a third nerve palsy in either the pediatric or adult population. Both problems should prompt immediate referral for neuro-ophthalmological assessment. Anisocoria which is equal in light and dark is usually physiologic. If it is greater in the light then the larger pupil is not constricting, and if greater in the dark, the smaller pupil is usually not dilating. True anisocoria, which is related to neuro-ophthalmic disease, is usually associated with ptosis, as is the case in third nerve palsy and Horner's syndrome. Adie's pupil is a benign condition where the blown pupil can exhibit light-near dissociation whereby the pupil does not constrict to light but will constrict to accommodation at near.

Red reflex

The direct ophthalmoscope can be used to illicit a red reflex by looking directly at the eye through the eyepiece with the dial adjusted so the pupil is in focus. I like to use the smallest diameter beam

Conrad Kavalec, MD, DABO, FRCSC, lecturer, McGill University, staff, University Health Centre, Royal Victoria Hospital, Montreal Children's Hospital

so the least amount of pupillary constriction is induced. If there is a difference in the intensity of the red reflex then be suspicious for medial opacities but also turn the focusing dial. If the reflex perks up at a different focus then a refractive error may be present. The white pupil is a medical emergency requiring immediate referral to rule out retinoblastoma. The disease can present as late as twelve years of age. Once retinoblastoma has been ruled out then the situation becomes an ocular emergency. In the case of a unilateral cataract, repair must be achieved within a week to avoid permanent visual loss. Bilateral cataracts have a slightly better prognosis. Even partial obstruction in one quadrant of the red reflex should arouse suspicion because vision and alignment can be good until central vision is obstructed.



Swollen disc with nerve fiber layer infarcts

Ocular misalignment

Ocular misalignment is common and is rarely due to neuro-ophthalmologic disease. Most ocular misalignment in the pediatric population is comitant, therefore equal in all fields of gaze. Misalignment in the first year of life requires prompt semi-urgent referral because early amblyopia and strabismus treatment improve the visual prognosis. Accommodative strabismus usually presents in the second and third year of life. Uncorrected hypermetropes (the far-sighted) tend to turn in whereas myopes (the near-sighted) tend to drift out. Beware of the older child who presents with a new onset comitant strabismus as this may be the presenting sign of frontal lobe pathology. It is important to attain fixation by any means available and then cover one eye at a time to see if the other eye moves to re-establish fixation.

I usually place my left hand on the child's forehead and I use my thumb to cover the pupil while the child fixes on the green light of the oph-

thalmoscope in my right hand. If strabismus is detected, then referral is not emergent but should be timely. If incomitant strabismus is detected and a cranial nerve palsy is suspected, then urgent or emergent referral should be considered. Congenital fourth nerve palsies are not rare and the otherwise well child has a head tilt. Third or sixth nerve palsies are cause for concern and a new onset third nerve palsy should be considered a medical emergency. The eye is in with a sixth nerve palsy and down and out with a third. People with third nerve palsies don't complain of diplopia due to total ptosis but congenital third nerve palsies are often atypical and difficult to assess.

It is humbling to realize the amount of the brain and brainstem that is devoted to the eyes. If you include the occipital cortex, the postchiasmal pathways to the occipital cortex, the frontal lobe gaze centers, the lateral geniculate and thalamic input, almost half the brain is directly or indirectly involved with vision. I liken the brainstem to real estate in Manhattan. Every slice in that neuro-anatomy textbook from the midbrain to the medulla has something to do with the eyes. Six of twelve of the cranial nerves are directly involved with ocular function. The bottom line is when you examine the eyes, you are examining the brainstem.

Funduscopic examination

The examination of the fundus in very small children is a challenge. Good technique must be learned by practicing on older children and adults. The goal of routine funduscopic assessment should be to visualize the disc and assess the posterior pole, but leave the macular examination until last because this tends to dazzle the young patient. In the emergency situation, good funduscopic technique is critical because the assessment of the disc can determine the neurologic status of the patient. Papilledema is swelling of both optic discs and is a medical emergency. The vision is usually good and there is no afferent papillary defect. Papillitis is usually unilateral and is associated with poor vision and an afferent defect. It usually is not associated with intracranial pathology. Examination of the fundus is important in patients with systemic disease such as diabetes, hypertension and collagen vascular disease.

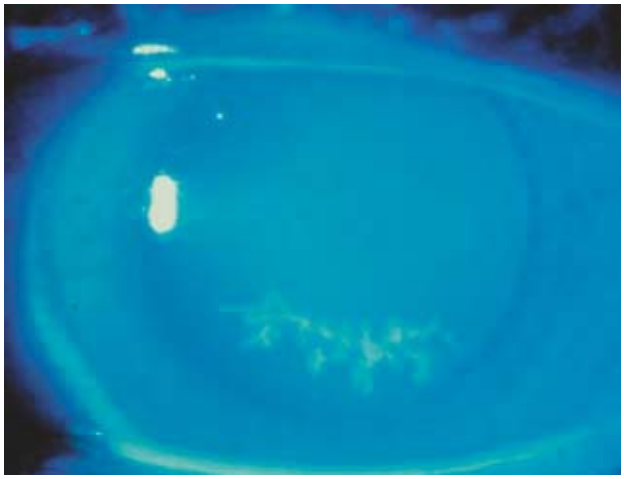
The presence of retinopathy should prompt urgent referral if it approaches the macular region, as early treatment of diabetic retinopathy is one of the most important steps in the prevention of blindness in these young patients. Laser treatment for diabetic retinopathy rivals any treatment in medicine as one of the most effective procedures for the maintenance of quality of life and function. In the near future we will see digital photography evolve as an important tool in diabetes screening, whereby non-ophthalmologists can transmit data to ophthalmologists via the Internet and many more people can be screened more efficiently, especially those who live far from urban centers. The retinopathy of hypertension only occurs when the blood pressure is extremely high and hypertensives need not undergo routine ophthalmologic screening.

The eye exam is normal but mother has a complaint

Always believe the mother and even if you find nothing on examination, be careful. Mothers are often right. If you are comfortable that all is well, then instruct the parents to examine the eyes with a flashlight and show them the normal corneal reflex in your eyes. If you are orthophoric and have no strabismus and you are able to converge your eyes to mimic strabismus, this is a valuable method of teaching the family about pseudostrabismus but a sensitive tool to detect real strabismus, which may be latent and about to become manifest. When in doubt, refer.

Something is obviously wrong with the eye

As office practitioners who do emergency work, the kinds of problems that you see routinely are different than your referral ophthalmologist. Red eyes are your domain, preseptal cellulitis is your disease and most mild ocular trauma such as abrasions and corneal foreign bodies need never be seen by the ophthalmologist. The only suggestion I have if you think you have a serious eye problem is please assess the vision. If you are dealing with a preverbal child, then fixation behavior is important. If you cover one eye and the child becomes uneasy, then there may be a problem. Always assess vision with the patients glasses if they have them, and if all else fails, have them read printed material that is readily available. If you are dealing with a red-eyed patient that has a profound decrease in vision in the red eye, you may not treat it as conjunctivitis and your referral ophthalmologist will be very interested to know that there is some visual loss. I tell the medical students that you would not call the cardiologist before listening to the heart and maybe doing an electrocardiogram. If you call me at midnight then the first thing I am going to ask you is about the vision. The first rule we teach our residents is that anything less than 20/20 vision must be explained.



HSV Dendrite

Red eyes

The end result of most ocular diseases is a red eye. Therefore I will not attempt to cover the causes in a comprehensive fashion. Most red eye is conjunctivitis and most conjunctivitis is viral. The only cure for viral infection is chicken soup and you need not instill it in the eye. If you choose to treat conjunctivitis then try to use products that cause as little trouble as possible. When you do a routine history, you find the most common allergies are to penicillin and sulfa. To choose an antibiotic that contains sulfa is just asking for trouble because the drop will cause further redness. You may even create a sulfa allergy. When they test cosmetic

Congenital lacrimal sac mucocoele

products for allergy they place them in the eyes of rabbits. To choose an aminoglycoside for the treatment of conjunctivitis is misguided because pseudomonas are only an issue in contact lens wearers. Aminoglycosides are toxic to the cornea. Therefore, if you take someone with no ocular disease and give them aminoglycosides they will develop a red eye in four to five days.

My advice to patients is if conjunctivitis is suspected, then buy an over-the-counter antibiotic product and, if there is no response after a few days, then consult the primary-care physician. In the case of the newborn with tearing and morning secretions the diagnosis is congenital nasolacrimal duct obstruction and there is no real infection. Use antibiotics as needed, usually three days before the mother-in-law is coming to dinner and the eye will be somewhat cleaner in appearance. If the white of the eye is red then there may be infection and antibiotics may be warranted. Massage is of little benefit. Twenty-five percent of children tear by one month of age and ninety-five percent resolve by one year of age.

Be very careful with corticosteroids because, as in systemic disease, they are a double-edged sword. Combination antibiotic-steroid products are popular because they immediately make the eye white, but most general ophthalmologists will tell you that they rarely use steroids in their practice even for surgical patients. Steroids cause glaucoma, can exacerbate herpes simplex in the short term and can cause cataracts in the long term. If you must use a combination product that contains corticosteroids, then please stain the cornea with fluorescein first to rule out herpes simplex infection.

Neonatal Conjunctivitis

Conjunctivitis during the first two months of life is a medical emergency requiring a full systemic workup to rule out gonococcal, herpetic and chlamydial infections. This is not necessarily an ophthalmological emergency but there is a risk of corneal perforation with gonococcus and Herpes simplex can cause corneal infection. These children need intravenous therapy and careful followup. We do not see toxic conjunctivitis anymore because silver nitrate has been replaced by Erythromycin as the drug of choice in the neonatal nursery. The child who is born with a medial canthal firm mass most likely has a congenital lacrimal sac mucocele and should be referred due to the risk of a mid-facial infection. This is one situation where massage may resolve the problem and the child will require surgery if there is infection or the problem has not resolved in two weeks.

Trauma

Corneal abrasions are common and the pain can be excrutiating. When a drop of topical anesthetic is placed in the eye, the patient completely relaxes and the vision returns to normal. Fluorescein dye and the blue or green light on the ophthalmoscope will confirm the diagnosis. The current recommendations for treatment are topical, NSAID drops such as

diclofenac sodium, or ketorolac tromethamine, plus an antibiotic ointment. The patient should be instructed to recline in a darkened room and the problem should resolve within 24 hours. If a patch is necessary, you are allowed to use only four pieces of tape. Place antibiotic ointment in the eye then fold one eyepad in half and place it on the upper lid. The second patch is placed over the first. Each piece of tape should be measured prior to placement and they are to be attached at the mid forehead extending to the angle of the jaw. Do not approach the corner of the mouth or the patch will dislodge. The first piece is placed down the middle, the second around the upper edge, the third around the lower edge and the last down the middle. Only four pieces can be used otherwise the entire patch must be discarded. If the eye is able to open under the patch then discard the patch.

Corneal foreign bodies may be removed with a Q-tip or a small sterile needle. It is virtually impossible to perforate the cornea with a 25-gauge needle, but scarring can occur if Bowman's layer is aggressively manipulated. Peripheral lesions should be removed but objects in the visual axis should probably be referred for removal. Rust rings are not rust, but denatured protein. They do not need to be removed, if they are not in the visual axis as they disappear in six months. Post foreign body removal, treat the patient as a corneal abrasion and follow them until there is no more corneal staining with fluorescein. Beware of the contact lens patient. Never patch an abrasion related to contact lens wear as the eye may proceed rapidly to perforation secondary to pseudomonas infection. Treat all contact lens related red eye problems with fluoroquinolone antibiotic drops and err on the side of referral.

The critical rule in all ocular emergency is document the vision. Always remember to test best corrected visual acuity so ask about glasses. If significant head trauma is associated with ocular trauma then evaluation of the C-spine and cranium should preceed ophthalmic treatment. If penetrating trauma is evident or suspected, then minimize eye manipulation. Place a shield and not an eye pad on the eye and always suspect a foreign body. Plain films are of some use, but rapid CT scanning should be the initial imaging procedure of choice and ask for orbital views, otherwise the cuts will be too large to adequately evaluate the orbit and the test will need to be repeated.

The proper evaluation of the pediatric eye is not as mysterious as one would believe. The systematic approach to the examination and the proficient use of the direct ophthalmoscope are all that are needed to obtain the requisite information to detect any major local ophthalmic disease and significant neuro-ophthalmologic problems. CME