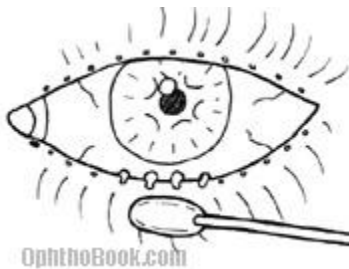


We encounter many pts with orbital/ocular complaints; ranging from orbital trauma to infections. In the majority of times the OMFS resident is the first responder to see the pt after the initial ED evaluation. Therefore, it is very important that our residents are able to perform a thorough ocular exam. **It is our responsibility to be able to assess the acuity of the ocular injury** and determine the need for immediate surgical intervention (eg lateral canthotomy and cantholysis) or call for immediate ophthalmology consult (vs waiting for 3-4 hours).

It is unacceptable to say that you were unable to perform an eye exam because the eye was closed shut! Use Q-Tips on the upper and lower eyelids to evert them and evaluate the globe.



Ophthalmologic exam:

Appearance:

The vertical palpebral aperture and the position of the lids (relative to the cornea) should be noted; scleral "show" at the upper limbus being due to either primary levator overaction—typically due to thyroid eye disease—or fibrosis within the levator muscle. Without prior inferior rectus recession, lower scleral show (often misleadingly termed lower lid "retraction") is almost exclusively due to **proptosis**, rather than overaction of the lower lid retractors.

Anteroposterior displacement: Proptosis refers to axial (posteroanterior) displacement of the globe, with the analogous term **exophthalmos** generally being restricted to thyroid eye disease. Examination of a patient from above or below may allow a comparison between the two sides, but formal documentation requires measurement with an exophthalmometer.

Vertical displacement can be assessed by using a ruler with reference to symmetrical landmark like the eyebrows. Any vertical displacement of one eye with respect to the other is then noted.

Horizontal displacement is measured by comparing the distance from the center of the bridge of the nose to the center of the pupil on each side.

Terminology clarification:

By definition, **orbital dystopia** is any type of abnormal displacement of the **entire** orbital cones and their contents that can occur in three different dimensional planes. Orbital dystopia in horizontal and vertical

planes have been given the terminology orbital **hypertelorism** and **vertical orbital dystopia**. In defining orbital hypertelorism, Tessier (the father of craniofacial surgery) stressed the displacement of the entire orbital cones. The severity of the hypertelorism was based on the measurements of the intercantal distance and shape of frontal-orbital region. Following Tessier's principles, vertical orbital dystopia was defined as an abnormal displacement of the entire orbital cones in the vertical plane, *not just displacement of one, two, or three orbital segments*. Both orbital hypertelorism and vertical orbital dystopia initially referred to congenital conditions, but later were used to describe facial trauma, muscular torticollis, facial skeletal tumors, and iatrogenic and idiopathic causes. Nevertheless, it is extremely important to emphasize that the acute displacement of the orbital walls does not necessarily accompany the displacement of the orbital rims and **should not be referred to as orbital hypertelorism or vertical orbital dystopia**. In this line of thinking, facial trauma with a low impact force does not lead to orbital dystopia, mainly because there is not enough energy to provoke mobilization of the entire orbital cone. Therefore, it is our belief that, other than congenital and tumoral causes, only facial trauma with very high energy may cause displacement of the entire orbital cones.

Vision:

Testing central vision:

Use Snellen chart. Each row is designated by a number corresponding to the distance in feet or meters from which a normal eye can read all the letters in that row. For example, the letters in the "40" row are large enough for the normal eye to see from 40 feet.

Distance acuity is always tested separately for each eye.

Acuity is scored as a set of two numbers (eg 20/40). The first number represents the testing distance in feet between the chart and the pt, and the second number represents the smallest row of letters that the pt's eye can read from the testing distance.

20/20 vision is normal; 20/60 vision indicates that the eye can only read from 20 feet letters large enough for normal eye to read from 60 feet.

Uncorrected visual acuity is measured without glasses or contact lenses. Corrected acuity means that these aids were worn. Corrected visual acuity is a more relevant assessment of ocular health.

If the pt is unable to read the largest letter on the chart (20/200 letter) should be moved closer to the chart until the letter can be read. This distance should be then be recorded (5/200). Meaning the pt can read the 200 feet letters from 5 feet distance.

If the pt is unable to read any letters, you should test the ability of finger counting (FC). FC at 2 feet means that the pt can able to count fingers held 2 feet away but not farther away.

If the pt is still unable to do FC, you should assess if the eye is able to detect a hand moving vertically or horizontally (Hand Motion "HM" vision).

If fails to detect hand motion, you check the ability to perceive light (Light perception “LP”). An eye that cannot perceive light is considered totally blind (No light perception “NLP”).

Color desaturation is done to assess the **central** visual function. The pt is instructed to look at a red object with each eye in turn and compare color. Color desaturation, or decrease intensity of color, is present in **optic neuropathy**.

Testing peripheral vision:

This can be performed using **confrontation testing**. Again, each eye must be checked separately because the visual fields of the two eyes overlap.

The pt is seated facing the examiner and begins by covering the left while the right eye fixes on the examiner’s right eye. This way both the examiner and the pt should have the same fields. The examiner then shows one finger peripherally in one of the four quads. The examiner and the pt’s fields should be the same.

Pupils:

Assess symmetry, size, shape (circular, irregular), reactivity to both light and accommodation.

The pt is asked to stare in the distance as the penlight is directed toward each eye, this helps to avoid accommodation. Do your exam in a dim room to help accentuate the papillary response.

The **direct response** to light refers to constriction of the illuminated pupil. The reaction may be graded as either **brisk** or **sluggish**.

A **consensual constriction** will simultaneously occur in the opposite nonilluminated pupil.

Ocular motility:

The objective of the ocular motility testing is to evaluate the **alignment** of the eye s and their **movements**.

- **Alignment:**

Binocular diplopia is double vision arising as a result of the misalignment of the two eyes relative to each other, such as occurs in esotropia or exotropia.

More rarely, diplopia can also occur when viewing with only one eye; this is called **monocular diplopia**. This is usually due to structural defect within the eye (eg sub-luxation of the lens).

Binocular diplopia can be corrected by covering either eye; **monocular diplopia** persists in one eye despite covering the other eye.

The simplest test of **binocular** alignment is performed by having the pt look toward a penlight held several feet away. A pinpoint light reflection “reflex” should appear on each cornea and should be centered over each pupil if the two eyes are straight in their alignment.

If the eye positions are convergent (one eye points inward “esotropia”), the light reflex will appear temporal to the pupil in that eye. If the eyes are divergent (one eye points outward “exotropia”), the light reflex will be located more nasally in that eye. This test can be used in children and infants.

The cover test:

This test is a more accurate method of verifying normal alignment.

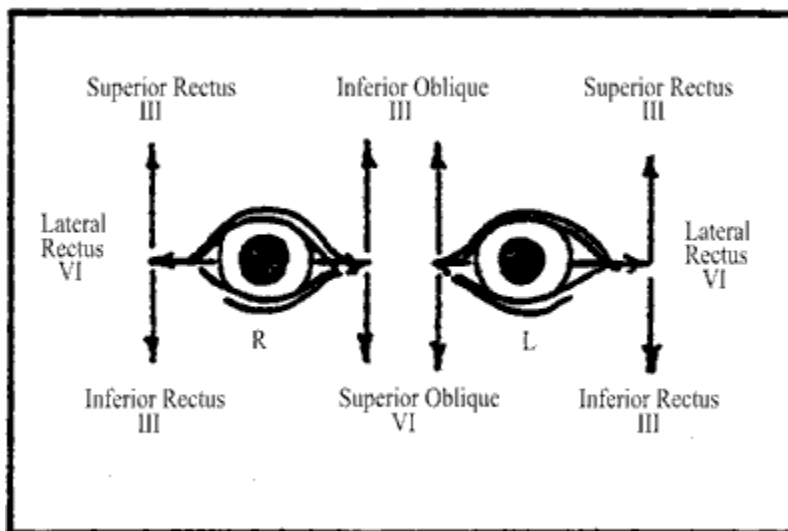
The examiner suddenly covers one eye and carefully watches to see that the second eye doesn’t move (indicating that it was fixating on the same target already). If the second eye was not identically aligned but was instead turned abnormally inward or outward, it could not have been simultaneously fixating in the target. Thus, it will have to quickly move to find the target once the previously fixating eye is covered.

<http://www.youtube.com/watch?v=TxEQWtIXtrl>

- **Extraocular movements:**

The pt is asked to follow a target with both eyes as it is moved in each of the four cardinal directions of gaze. The examiner notes the speed, smoothness, range and symmetry of movements and observes for unsteadiness of fixation (eg nystagmus).

Impairment of eye movements can be due to neurologic problems (cranial nerve palsy), primary extraocular muscular weakness (eg myasthenia gravis), or mechanical constriction (orbital floor fx with inferior rectus entrapment).



Forced duction test:

When eye motility is restricted, this test helps differentiate between incarcerated muscle and a paretic muscle. In a pt with an elevation deficit of one eye, either the *inferior* rectus is entrapped or the *superior* rectus is paretic. The test is performed by instilling a topical anesthetic (tetracaine or proparacaine) onto the surface of both eyes. A small forceps is used to grasp the conjunctiva and extraocular muscle insertion about 8mm from the cornea, and the globe is rotated toward and away from the muscle. The contra lateral eye is used as a control. Resistance with upward rotation means muscle entrapment, and no resistance means the *superior* rectus is paretic.

This test should be done preoperatively in pts with entrapped muscles undergoing repair, and repeated after the repair is done to assess success.

Tonometry:

Tonometry is the method of measuring the intraocular fluid pressure. Pressure between 10-24 mm Hg is considered within normal range.

<http://www.youtube.com/watch?v=IYT7tUoLkLw>

Absolute indications for lateral canthotomy include retrobulbar hemorrhage **resulting in acute loss of visual acuity, increased IOP, and proptosis**. In the unconscious or uncooperative patient, an IOP greater than 40 mm Hg is an indication for lateral canthotomy.

Lateral canthotomy may also be considered in patients with retrobulbar hemorrhage along with any of the following: afferent pupillary defect, ophthalmoplegia, cherry-red macula, optic nerve head pallor, and severe eye pain. However, these findings are subjective, less reliable, and nonspecific. A CT scan of the orbit may help to clarify the diagnosis.

Suspected globe rupture is a contraindication to lateral orbital canthotomy. Signs of globe rupture include **hyphema**; a peaked, teardrop-shaped, or otherwise irregularly shaped pupil; exposed uveal tissue, which appears reddish-brown; and extraocular movement restriction that is greatest in the direction of the rupture. Subtle signs of globe rupture include subconjunctival hemorrhage, enophthalmos, or a conjunctival laceration.



Copyright ©2006 by The McGraw-Hill Companies, Inc.
All rights reserved.

Hyphema: accumulation of blood in the anterior chamber.

This website offers a nice atlas of ocular injuries that we should be familiar with:
<http://atlas-emergency-medicine.org.ua/ch.4.htm>