

Ophthalmology – Chronic Visual Loss

SOAP Note

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INTRODUCTION

Chronic visual loss is a very common condition as it is estimated to affect 1% of the population. It is a condition that is age-related as those who are over the age of 65 years are 10x more likely to develop this problem.

Most people with chronic visual loss present with slowly progressive visual loss and they frequently complain that their vision is becoming blurred. This presentation is very different than acute visual loss in which a patient notices a sudden change in their vision whereby they suddenly lose part or all of their central or peripheral vision.

Many patients with chronic visual loss note that their vision is blurred or that they are having an increasingly difficult time doing the things that they enjoy like reading, watching television, and performing leisure activities like painting or driving.

BASIC SCIENCE PEARLS FROM A CLINICIAN

Two critical concepts to ensuring healthy vision include the concept of intraocular pressure and lens clarity.

- Intraocular pressure. All eyes have pressure. Typically this ranges from 10-20 mmHg. The eye's pressure is largely determined by the pressure in the anterior chamber – which is bordered by the corneal endothelium anteriorly and the iris and anterior lens surface posteriorly. A fluid, called the aqueous humor is created by the ciliary body. This fluid is made behind the iris (posterior chamber) and flows anteriorly through the pupil to fill the anterior chamber eventually leaving the eye through the trabecular meshwork – the eye's drainage system. If there is material that deposits in the trabecular meshwork, or the beams of the trabecular meshwork degenerate - egress of fluid may become compromised and the pressure in the eye can rise. High pressure in the eye is a risk factor for glaucoma, a condition in which the nerve fibers in superficial retina that come together to make up the optic nerve can become damaged and die. With open angle glaucoma, significant peripheral vision can be lost without the patient being aware of it.
- The lens is a crystalline structure that sits inside the eye, just behind the iris, tethered to the ciliary body by zonules. It functions, together with the cornea, to bend light rays, such that they are focused onto the retina. The lens also can become fatter or skinnier allowing light coming from objects both near and far to fall precisely onto the retina. The ability of the lens to change its anterior-posterior diameter is called accommodation. In patients with myopia (near-sightedness), the lens is too strong for the eye and the image falls anterior to the retina; a corrective concave lens is necessary to treat this problem. In patients with hyperopia (far-sightedness), the lens is too weak for the eye and the image falls posterior to the retina; a corrective convex lens is necessary to treat this condition. As we age the lens loses its ability to accommodate and a positive lens is needed for

activities that require near vision (such as reading). This loss of accommodation usually occurs in patients who are in their 40's. As we further age, the proteins in the lens change their 3 dimensional structure due to a variety of factors including UV radiation, nutrition status and medications. This leads the lens to lose its clarity and a cataract is formed. If the cataract interferes with day-to-day activities, its removal may be necessary. The general principles regarding cataract surgery include creating a small hole in the lens capsule that holds the lens in place, breaking it up with high frequency ultrasound waves, removing the broken down cataract with aspiration and placing an artificial lens into the lens capsule.

SUBJECTIVE

When presented with a patient with chronic visual loss there are some key questions that you must ask.

- **Is the blurred vision most noticeable at a distance or close-up or both?** Patients with Age-Related Macular Degeneration (AMD) particularly note problems with up-close work including reading.
- **Is it more difficult to see during daylight or at night?** Patients with cataract frequently complain of glare at night – particularly with oncoming headlights. Patients with AMD often complain of transitioning from light to dark because their photoreceptors can be bleached out in bright light.
- **How profound is the visual loss?** Most have relative field defects as opposed to an absolute scotoma (or pure black areas in the vision); absolute blackness is worrisome and likely represents a previous retinal problem like a vascular occlusion of the retina (acute retinal artery or vein occlusion) or of the optic nerve. A dense scotoma can also be seen in patients with geographic atrophy – which is a type of dry macular degeneration in which a significant number of cells are lost.
- **Is monocular diplopia or ghosting of images (seeing two images when the other eye is covered = monocular diplopia) present?** This is a symptom of cataract.
- **Is there peripheral visual loss?** Patients with open angle glaucoma can lose peripheral vision.
- **Is there distortion present with the visual loss?** Distortion can be seen in some patients with dry macular degeneration. It is a symptom that must be taken very seriously though, as it may represent conversion of dry to wet macular degeneration.
- **Is glare present?** This is particularly evident when viewing lights at night from oncoming traffic or street lights. Glare is often seen with cataract, especially a type of cataract that affects the posterior capsule of the lens (called posterior subcapsular cataract). Glare can also be seen in chronic corneal edema which can occur after cataract surgery or a corneal dystrophy.
- **Any known past medical history?** Diabetics are predisposed to the development of diabetic retinopathy and are at higher risk of cataract.

- **Is there any family history of eye disease?** Corneal dystrophies, macular degeneration and optic neuropathies are all ocular problems that are known to have a genetic association.

OBJECTIVE

On examination, there are a few things that must be done as a primary care physician.

- **Measure visual acuity-** best to formally measure accurately with Snellen or visual acuity card, but even crude measures are very useful. Can the person read small newspaper print? Large newspaper print? Count your fingers? Perceive movement? See light?
- **Does visual acuity improve when the patient looks through a pinhole?** This is a “litmus” test of sorts, and suggests the presence of a refractive error.
- **Check pupils** and examine for a relative afferent pupillary defect. If an afferent defect is present, this is an optic nerve problem until proven otherwise. Patients with chronic visual loss should not have an afferent pupillary defect.
- **Look at the anterior segment** (even if you don’t have access to a slit lamp). Is the eye red or white? If red, is a ciliary flush present? If it is, think keratitis, iritis or angle-closure glaucoma. Is the globe (eye) intact or is there a rupture (this is important in the setting of trauma). If you see a “peaked” pupil, this is an open eye until proven otherwise. Patients with chronic visual loss should have a white eye. If they present with a red eye think of a more aggressive eye condition.
- **What is the eye pressure?** Even if you don’t have access to a tonometer, if the eye is very firm, angle closure glaucoma must be ruled out. Patients with chronic visual loss will usually have a soft eye. On rare occasions – with very dense cataracts or advanced open angle glaucoma, the eye can be quite firm.
- **Is the cornea clear?** When a penlight is shone on the cornea it should reflect a very sharp reflex. In corneal edema (which can be present for a number of reasons including angle closure glaucoma and iritis) the corneal light reflex can be very dull.
- **Can the red reflex be seen?** In very dense cataracts the red reflex is lost. This loss is not, however, specific for cataract – it can be seen with vitreous hemorrhages and eye tumors, in addition to other causes.
- With your ophthalmoscope look for signs of **retinopathy, macular degeneration, glaucoma and optic neuropathy**.
- Are there any signs of **optic atrophy** – look for a very pale optic nerve.

Because many of these conditions require the use of advanced technology and advanced examination skills, referral to a healthcare professional who is skilled in slit lamp use and dilated funduscopy is necessary.

ASSESSMENT AND PLAN

While many conditions can cause chronic visual loss, it is usually caused by one of the following 5 conditions listed below. Here are some key things to remember about the “big 5”, including how these conditions might be managed by an ophthalmologist (these are the A and P in SOAP):

1. **Diabetic retinopathy.** Patients with type 1 diabetes need to be seen at the 5-year point and those with type 2 diabetes need to be assessed by a healthcare professional who is comfortable performing a dilated screening exam to rule out the presence of retinopathy.¹ Signs of retinopathy include microaneurysms (outpouching of the capillary bed), intraretinal hemorrhage (especially dot and blot hemorrhage), exudate (yellow lipid crystals), cotton-wool spots, disc or retinal neovascularization, and venous beading.² Retinal angiograms and ocular coherence tomography (a type of imaging test that is similar to an ultrasound except that it uses light rays instead of sound waves to create images of the retina) can show microaneurysms, hemorrhage, cotton-wool spots and fluid indicative of diabetic retinopathy. These patients are treated with watchful waiting, laser, eye injections with anti-VEGF compounds, steroids and eye surgery.¹⁻⁵
2. **Macular degeneration.** This is an age-related condition in which the photoreceptors, retinal epithelium and underlying basement membrane (Bruch’s membrane) are damaged. There are 2 types: dry and wet (90% of those with macular degeneration have the dry type). It is the leading cause of blindness – and most cases of severe visual loss is due to wet macular degeneration or geographic atrophy (a type of dry macular degeneration). Look for drusen (yellowish lesions at or below the level of the retinal pigment epithelium (RPE)), RPE hyperplasia or atrophy, exudate (a sign of wet macular degeneration) or hemorrhage (also a sign of wet macular degeneration).^{6,7} OCT can demonstrate subtle aging changes of the retina and the presence of fluid in wet macular degeneration. This modality can also show loss of the nerve fibre layer in patients with glaucoma. Patients with dry macular degeneration will benefit from vitamin supplementation and a diet rich in antioxidants⁸. They should always use an Amsler grid to monitor for new distortion at home (this is a somewhat sensitive test for the conversion of the dry to wet type of macular degeneration). Those with the wet type require intra-vitreous injections with anti-VEGF agents.^{6,9}
3. **Open angle glaucoma.** There are two types of glaucoma – angle closure or open angle. This refers to the status of the angle in the front of the eye which consists of the anterior surface of the iris, the trabecular meshwork in the angle itself and the back side of the cornea. If the anterior surface of the iris bows forward and moves toward the cornea, the angle can become closed and aqueous humour will not be able to exit the trabecular meshwork. Angle closure glaucoma presents with a red, painful eye and acute visual loss requiring emergent care (a laser is used to punch a hole at the root of the iris to allow fluid that is trapped behind the iris to freely move into the anterior chamber). The vast majority of cases of glaucoma are associated with an open angle and are linked to degeneration of the trabecular meshwork (the eye’s drainage system).¹⁰ If undetected, this condition can cause chronic visual loss which, if progressive, can cause blindness. High eye pressure (usually over 21 mmHg) is a risk factor (although this can be seen in eyes with normal or low pressure), but open angle glaucoma should be thought of as optic neuropathy. Signs of open angle glaucoma include “cupping” (or an increased cup to disc ratio) as the neuronal axons are lost and the collagen of the lamina cribrosa

becomes much more visible, nasal migration of the blood vessels in the cup and the presence of hemorrhages on the surface of the optic disc. Glaucoma is confirmed with OCT looking for damage of the nerve fibre layer, and visual field testing.

4. **Cataract** – or clouding of the lens - is a very common cause of visual loss. Most cases are age related; nearly all people over 80 will have had surgical removal of their cataract and insertion of an artificial lens. Modern techniques use ultrasound to break up and suction the cataract (phacoemulsification).¹¹ Many people will have re-growth of some cells after cataract extraction, often called a “secondary cataract” and will require an additional laser to reopen the capsule in which the new artificial lens is placed.
5. **Refractive errors.** It is always important to remember that any refractive error can cause chronic visual loss, including myopia (near-sightedness), hyperopia (far-sightedness) and astigmatism (irregular corneal curvature). Refractive errors can be treated with glasses, contact lenses, or refractive surgery.¹²

SUMMARY

There are **3 key things that you must remember** when you encounter a patient who is either at risk for developing chronic visual loss or one who presents with this condition:

- **Patients with diabetes need an annual eye exam** from an eye health professional; many patients with diabetes have eye disease but are not aware of this.
- **Patients over the age of 65 need an annual eye exam** to rule out preventable causes of visual loss including cataract, glaucoma, and macular degeneration.
- **Any patient with chronic visual loss needs a referral** to rule out the big 5 causes of chronic visual loss: cataract, refractive error, glaucoma, macular degeneration and diabetic retinopathy.

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