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EYE DISEASES

Manual

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CONTENT

PREFACE

Blindness knows no geographic, economic, or cultural bounds. It respects neither age nor gender. The number of individuals who are avoidably blind and visually disabled is increasing. Avoidable blindness and visual impairment have become an international public health problem.

Practicing as a Primary Health Care worker you cannot escape the patients with eye problems. The purpose of this manual is to delineate the distinctive and the collaborative roles of Primary Health Care workers and Ophthalmologists in Eye Care, and to help you collect ocular history, perform eye examination, diagnose, treat or refer patients with ocular disorders.

Several special features are intended to enhance manual's value as a ready reference on your office bookshelf:

. Step-by-step instructions of the most important clinical procedures, that simplify screening and treatment
. Detailed algorithms that discuss specific diagnosis and examination methods
. Tables that highlight differential clinical diagnosis and management
. Color photographs of main ocular entities
. The glossary for fruitful cooperation between ophthalmologist and family doctor.

This manual was designed as a practical textbook summarizing the most important ophthalmic problems , facts and eye examinations. If it helps you to manage clinical problems with greater confidence and success, it will have fulfilled its purpose.

CHAPTER I

ANATOMY AND PHYSIOLOGY OF THE EYE

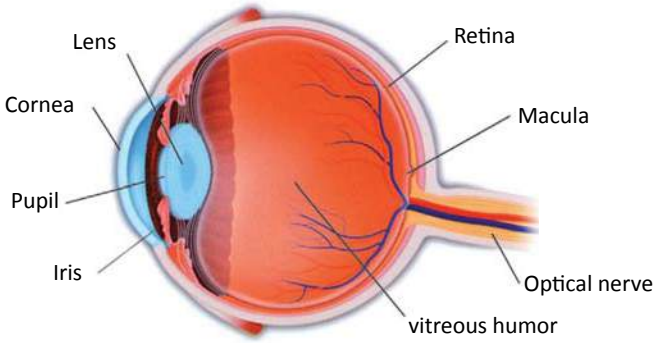


Fig. 1.1 Anatomy of the eye

- ***Eyelids*** The outer structures that protect the eyeball and lubricate the ocular surface. Within each lid is a tarsal plate containing meibomian glands. The lids join at the medial and lateral canthi. The space between the two open lids is called the palpebral fissure.
- ***Cornea*** The transparent front "window" of the eye that serves as the major refractive surface.
- ***Sclera*** The thick outer coat of the eye, normally white and opaque.
- ***Limbus*** The junction between the cornea and sclera.
- ***Conjunctiva*** The thin, vascular mucous membrane covering the inner aspect of the eyelids (palpebral conjunctiva) and sclera (bulbar conjunctiva).
- ***Anterior chamber*** The space that lies between the cornea anteriorly and the iris posteriorly. The chamber contains a watery fluid called aqueous humor.
- ***Iris*** The colored part of the eye that screens out light, primarily via the pigment epithelium, which lines its posterior surface.
- ***Pupil*** The circular opening in the center of the iris that adjusts the amount of light entering the eye. Its size is determined by the parasympathetic and sympathetic innervation of the iris.
- ***Lens*** The transparent, biconvex body suspended by the zonules behind the pupil and iris, part of the refracting mechanism of the eye.

- ***Ciliary*** body The structure that produces aqueous humor. Contraction of the ciliary muscle changes tension on the zonular fibers that suspend the lens and allows the eye to focus from distant to near objects (accommodation).

- ***Posterior chamber*** The small space filled with aqueous humor behind the iris and in front of the anterior lens capsule.

- ***Vitreous cavity*** The relatively large space (4.5 cc) behind the lens that extends to the retina. The cavity is filled with a transparent jelly-like material called vitreous humor.

- ***Optic disc*** The portion of the optic nerve visible within the eye. It is composed of axons whose cell bodies are located in the ganglion cell layer of the retina.

- ***Retina*** The neural tissue lining the vitreous cavity posteriorly. Essentially transparent except for the blood vessels on its inner surface, the retina sends the initial visual signals to the brain via the optic nerve. The retina, macula choroid, and optic disc are sometimes referred to as the retinal fundus or, simply, fundus.

- ***Macula*** The area of the retina at the posterior pole of the eye responsible for fine, central vision. The oval depression on the center of the macula is called the fovea.

- ***Choroid*** The vascular, pigmented tissue layer between the sclera and the retina. The choroid provides the blood supply for the outer retinal layers.

- ***Extraocular muscles*** The six muscles that move the globe medially (medial rectus), laterally (lateral rectus), upward (superior rectus and inferior oblique), downward (inferior rectus and superior oblique), and torsionally (superior and inferior obliques). These muscles are sup plied by three cranial nerves: cranial nerve IV, which innervates the superior oblique; cranial nerve VI, which innervates the lateral rectus; and cranial nerve III, which controls the remain der of the extraocular muscles. ◤

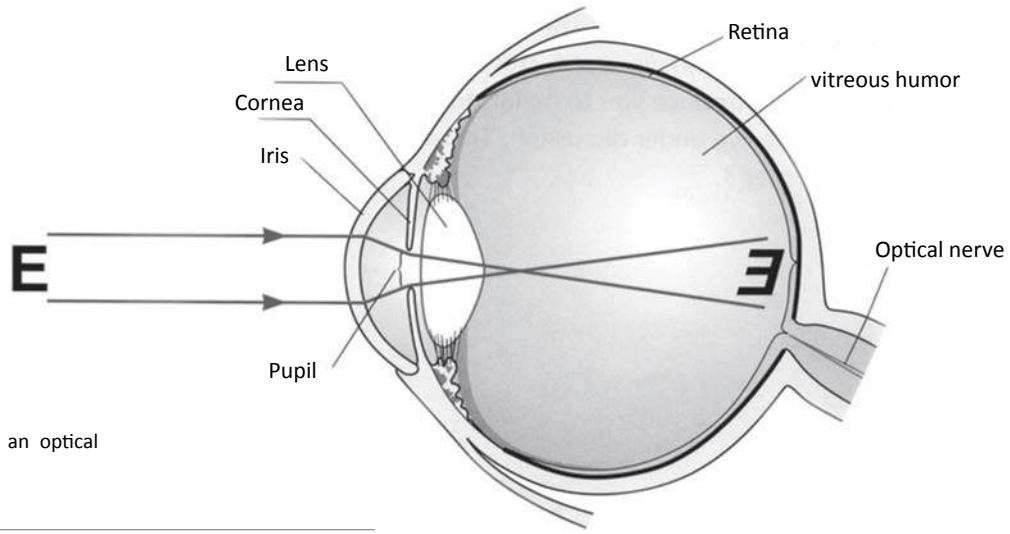


Fig. 1.2
The eye as an optical system

The eye as an optical system

When a person looks at an object, light rays are reflected from that object to the eye. As the rays pass through the optical system of the globe, or eyeball, they are bent to produce an upside-down image of the object at the back of the inner eyeball. In the retina the image is converted to electric impulses that are carried to the brain where the image is translated so that the object is perceived in its upright position.

The first part of the eye's optical system is the clear, round membrane at the front of the globe, called the cornea. The transplant membrane begins the process of focusing the light the eye receives. Behind the cornea is a colored circle of tissue called the iris. The iris controls the amount of light entering the eye by enlarging or reducing the size of the opening in its center, called the pupil.

Immediately behind the iris is the crystalline lens (or, more simply, the lens), the second part of the optical focusing system of the eye. The large space behind the crystalline lens is filled with a clear, jelly-like substance called the vitreous, or vitreous body. Because the vitreous is optically transparent, light rays focused by the cornea and lens can pass through it unaffected to produce an image on the inner back surface of the eye, the retina. The light-sensitive cells of the retina convert the image to electric impulses, which are carried to the brain by the optic nerve. The electric impulses are integrated in the brain's visual cortex to produce the sensation of sight. Figure 1.2 shows the principle structures involved in the eye as an optical system.
Visual acuity is reduced in myopia, hypermetropia, and astigmatism.
Myopia will result if cornea is too steep or an axial length too long.
Hyperopia will result if cornea is too flat or an axial length too short.
Astigmatism will result if corneal curvature is greater in one direction (meridian) than the other, thus making the cornea oval-shaped. This causes images to fall in front and behind the retina, producing a blurred image. Types of refraction are shown on the Fig. 1.3, 1.4, 1.5.These optical defects cam be corrected by the use of spectacles, contact lenses, or,

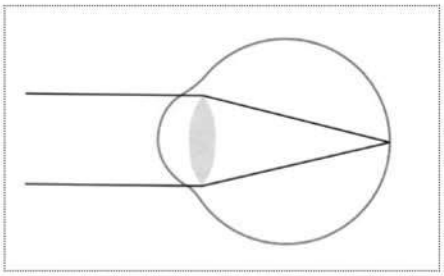


Fig. 1.3

The light rays focuses on the retina in emmetropia.

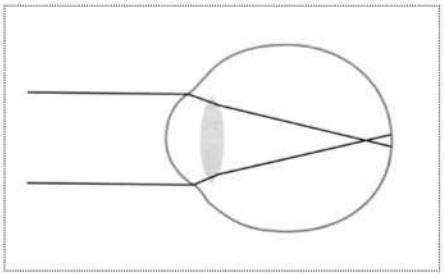


Fig. 1.4

The light rays focuses in front of the retina in myopia.

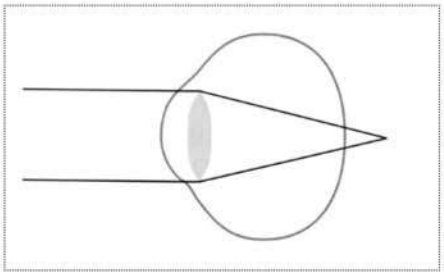


Fig. 1.5

The light rays focuses behind the retina in emmetropia.

in selected cases, refractive surgery. A pinhole placed directly in front of the eye will narrow the effective papillary aperture and thereby minimize the blurring induced by a refractive error. Use of a pinhole device will allow an examiner to estimate a patient's visual potential with proper spectacle correction.

The ability of the ciliary muscle to contract and the lens to become more convex is called accommodation. With increasing age, the lens of every eye undergoes progressive hardening, with loss of ability to change its shape. Loss of accommodation is manifested by a decreased ability to focus on near objects- named presbyopia, while corrected distance visual acuity remains normal. Presbyopia develops progressively with age but becomes clinically manifest in the early to mid 40s, when the ability to accommodate at reading distance (35 to 40 cm) is lost. Presbyopia is corrected by spectacles, either as reading glasses or as the lower segment of bifocal glasses, the upper segment of which can contain a correction for distance visual acuity if needed. Some myopic patients with presbyopia simply remove their distance glasses to read, because they do not need to accommodate in an uncorrected state. ◤

CHAPTER II

THE EYE EXAMINATION

2.1 METHODS OF EXAMINATIONS

Obtaining a thorough ocular history is a key in making the diagnosis and implementing a treatment plan.

Preliminary Ocular and Medical History

- Chief complaints
- What are your symptoms?
  - One eye or both?
- When did the problem start?
- Does the problem seem to be getting worse?

Add questions

1. Status of vision: Has both near and far vision been affected? Has the vision been affected in one eye or both?
2. Onset: Did the problem start suddenly or gradually?
3. Presence: Are the symptoms constant or occasional, frequent or infrequent? Does a specific activity trigger the symptoms or make them worse?
4. Progression: has the problem become better or worse over the time?
5. Severity: Do the symptoms interfere with your work or other activities?
6. Treatment: Have you ever been treated for these complaints?

OCULAR HISTORY

(Present to past)

- Do you wear, or have you ever worn eyeglasses or contact lenses?
- Have you ever had eye surgery?
- Have you ever been treated for a serious eye condition?
- Are you taking any prescription or over-the-counter medications for your eyes, including eye-drops?

MEDICAL HISTORY

(Present to past)

- Are you taking any prescription or over-the-counter medications for health condition?
- Have you ever required treatment for any serious disease? (Ask specifically about diabetes and hypertension).

Family ocular and medical history?

◤ Does anyone in your family have any significant eye or other health problems? (glaucoma, cataract, diabetes, heart disease, hypertension, cancer).

Allergies

◤ Do you have any allergies to medication, pollen, food, or anything else?

STEPS IN EYE EXAMINATION

An accurate history must be obtained before beginning the physical examination.

1. **Measure the visual acuity for each eye, use pinhole if acuity is worse than 20/30=0.7.**
2. **Perform a confrontation field test for each eye.**
3. **Inspect the lids and the surrounding tissues.**
4. **Inspect the conjunctiva and sclera.**
5. **Test the extraocular movements.**
6. **Test the pupils for direct and consensual responses.**
7. **Inspect the cornea and iris.**
8. **Assess the anterior chamber for depth and clarity.**
9. **Assess the lens for clarity through direct ophthalmoscopy.**
10. **Use the ophthalmoscope to study the fundus, including the disc, vessels and macula.**
11. **Perform tonometry if the patient is older than 40 or has a history of glaucoma in the family.**

VISUAL ACUITY TESTING

The very best test of visual function is the visual acuity and it must not be ignored in testing for ocular disease.

PERFORMING THE DISTANCE ACUITY TEST

Patients who wear eyeglasses or contact lenses should wear them for the test. On a first visit, patients may be tested both with and without optical correction. Test and record the visual acuity in each eye separately, beginning with the right eye. Less confusion results in recording information about the two eyes if the right/left sequence is followed habitually.

1. Position the patient 20 feet from an illuminated Snellen chart.
2. Have the patient cover the left eye with an occluder or the palm ofhis/her.their hand. Alterna tively, you may hold the occluder over the patient's left eye. With either method, be sure that the eye is completely covered and that the occluder is not touching the eye. Observe the patient during the test to be sure that patient is not peeking around the occluder. This is especially impor tant with child patients.

3. Ask the patient to read the letters from left to right on every other line down the chart until the patient misses more than half the letters on one of the lines. If a tumbling E chart is being used, ask the patient to indicate the symbols visible on the smallest line by stating the direction or pointing the fingers in the direction the three spokes of the E point- left, right, up or down.
4. Note the smallest line in which the patient read more than half the characters correctly, and record the corresponding acuity fraction (printed at the left or right of each line on the standard Snellen chart) on the patient's record.
5. Repeat steps 2 through 4 for the left eye, with the right eye covered. Record the acuity value for each eye separately.

THE PINHOLE ACUITY TEST

Patients who wear corrective eyeglasses or contact lenses should wear them for the test. Position the patient in the same way as the Snellen distance acuity test, and test each eye separately, starting with the right eye.

1. Have the patient cover the eye not being tested with an occluder or the palm of his/her their hand. Alternatively, you may hold the occluder over the patient's eye.
2. Have the patient hold the pinhole paddle in front of the eye that is to be tested.
3. Instruct the patient to look at the distance chart through the pinhole (or through any of the pinholes on a multi-hole paddle).
4. Instruct the patient to use very small movements to align the pinhole to produce the sharpest image.
5. Ask the patients to begin reading the line with the smallest letters legible without the pinhole, just as was done with the Snellen distance acuity chart.
6. Repeat steps 1 through 5 for the other eye.

PERFORMING THE NEAR ACUITY TEST

Patients who wear eyeglasses or contact lenses for distance vision should wear them for the test.

1. Instruct the patient to hold test card of printed letters at a distance of14 inches.
2. Have the patient cover the left eye with an occluder or the palm of his/hertheir hand. Alterna tively, you may hold the occluder over the patient's left eye.
3. Ask the patient to read with the right eye the line of smallest characters legible on the card.
4. Repeat the procedure with the right eye occluded.
5. Record the acuity value for each eye separately in the patient's chart.

PERFORMING A LOW-VISION TEST

Test and record the visual acuity in each eye separately, beginning with the right eye. Make sure that the eye not being tested is well covered.

1. Starting at a distance of 5 feet, hold up fingers of one hand and ask the patient to count them. Record the distance at which counting is done accurately; for example CF (counting fingers) 3 ft.

2. If the patient cannot count the fingers, move your hand horizontally or vertically before the patient at a distance of 3 feet. Record the distance at which the patient reported seeing your hand movement; for example, HM (hand movement) 2 ft.
3. If the patient cannot detect your hand motion, shine a penlight toward the patient's face from 15 inches and turn it on and off to determine if light perception is present. If the patient cannot see the light, record the response as NLP (no light perception). If the patient can see the light, record the re sponse as LP (light perception).
4. If the patient perceives the penlight, shine the light from different fields of gaze with the patient look ing straight and the non-tested eye occluded. If the patient can see light from different directions, re cord the patient's vision as LP with projection.

CONFRONTATION FIELD TEST

1. Seat the patient at a distance of 2 to 3 feet from you .Confront (face) the patient, cover or close your left eye, and have the patient should fixate on your uncovered eye.
2. Extend your arm to the side at shoulder height and slowly bring two fingers from beyond your periph eral vision toward your nose into the field of vision midway between the patient and your self. Ask the patient to state when the fingers are visible.
3. Repeat the process of moving fingers into the visual field from four different directions. If you pic ture a clock face in front of the patient's eyes, you perform the hand movement from about 2 o'clock, 4 o'clock, 8 o'clock, and 10 o'clock, each time bringing the fingers toward the center of the clock face.
4. The patient should see the fingers at about the same moment you do in each of the four quad rants (upper-left, upper–right, lower-right quarters) of the visual field. (Note: A quadrant of vision is de scribed from the patient's point of view.) If the patient does not see your fingers at the same time you do, the breadth of the patient's visual field in that quadrant is considered to be smaller than normal and additional parametric studies will probably be required.

5. Record the patient's responses in the patient's chart by indicating simply that the visual field is compa rable to yours (normal) or that it is reduced in any of the four quadrants for that eye.
6. Repeat the procedure with the patient's other eye and record the results similarly.

THE AMSLER GRID TEST

1. Have the patient hold a white–on-black test card about 16 inches away with one hand and cover one eye with the other hand, an occluder, or a patch.
2. Direct the patient to stare at the center dot and to report if any portions of the grid are blurred, distorted, or absent. The patient should not move his/her their gaze from the center dot, so that the presence of any distortion can be assessed.
3. If the answer is yes, you may repeat the test with a black–on-white Amsler recording chart, on which you ask the patient to mark the location of visual difficulties.
4. If test results are normal, state so in the patient's record .If abnormal, state so and include the Amsler recording chart in the patient's record .If visual disturbances are noted, the patient is a likely candidate for further studies.

The patient may also repeat this convenient procedure independently at home and report any changes to the ophthalmologist's office. Instruct the patient to perform the test monocular fashion (one eye at a time), always at the same 16-inch distance and under the same illumination.

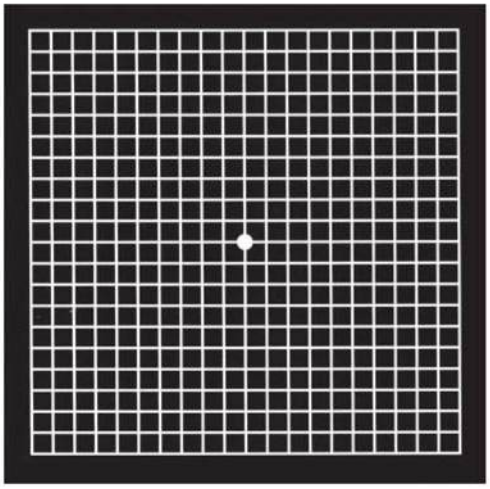


Fig. 2.1 The Amsler Grid

OCULAR MOTILITY TESTING

For evaluation of ocular motility, the examiner holds a small object or displays a finger within the patients central field of vision and asks the patient to follow its movement with the eyes in the six cardinal positions of gaze (Fig. 2.2).

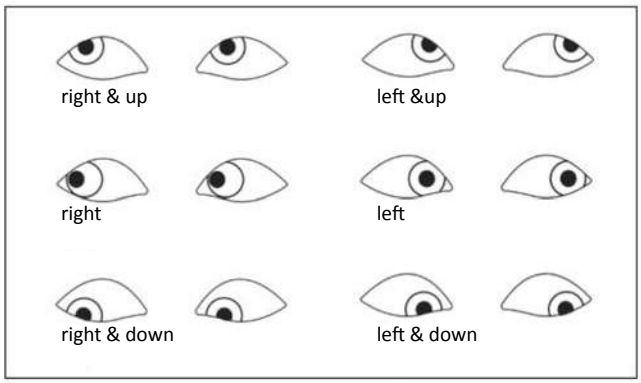


Fig. 2.2

The six cardinal positions of gaze.

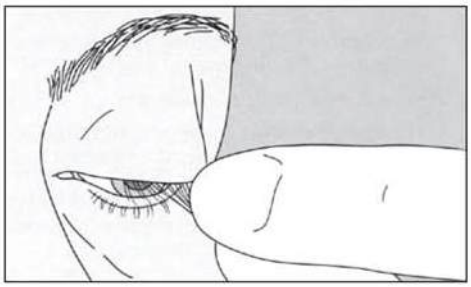


Fig. 2.3. The examiner grasps the upper lid between the thumb and the index finger.

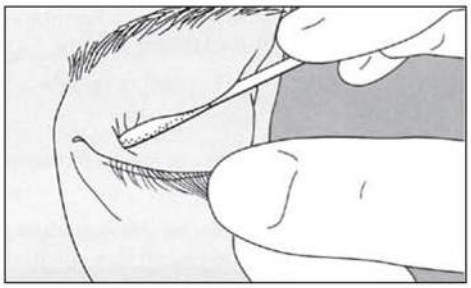


Fig. 2.4 A cotton-tipped applicator is used to press gently downward over the superior aspect of the tarsal plate – approximately 12mm from the lid margin.

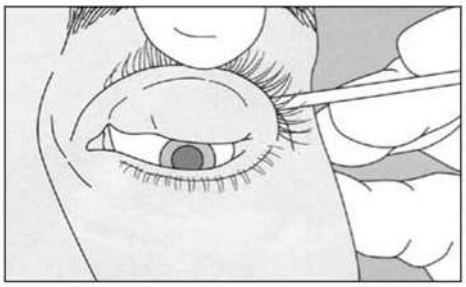


Fig. 2.5 Pressure is maintained on the everted upper lid while the patient is encouraged to keep looking down.

GENERAL INSPECTION

A thoughtful and thorough external examination at the room illumination can yield considerable information that directs the course of the rest of the examination.

The purpose of the external eye examination is to provide an assessment of the orbital soft tissues around the eyes, the eyelids, the lacrimal apparatus, and the visible portions of the external globe the anterior chamber angle.

Inspection of the eyelids and the external eye can be performed with a good focal flashlight- penlight.

THE UPPER EYELID EVERSION

During inspection of eyelids upper eyelid eversion sometimes required search for conjunctival foreign bodies or other conjunctival signs. Topical anesthetic facilitates this procedure.

1. The patient is asked to look down and the examiner grasps the upper lid between the thumb and the index finger (Fig.2.3).
2. A cotton-tipped applicator is used to press gently down ward over the superior aspect of the tarsal plate as the lid margin is pulled upward by the lashes (Fig. 2.4).
3. Pressure is maintained on the everted upper lid while the patient is encouraged to keep looking down (Fig.2.5)

Fig. 2.3. The examiner grasps the upper lid between the thumb and the index finger.

Fig. 2.4 A cotton-tipped applicator is used to press gently downward over the superior aspect of the tarsal plate – approximately 12mm from the lid margin.

Fig. 2.5 Pressure is maintained on the everted upper lid while the patient is encouraged to keep looking down.

FLUORESCEIN STAINING OF CORNEA

Corneal staining with fluorescein (a yellow-green dye) is useful in diagnosing defects of the corneal epithelium. Fluorescein is applied in the form of a sterile filter-paper strip, which is moistened with a drop of sterile water, saline, or topical anesthetic and then touched to the palpebral conjunctiva. A few blinks spread the fluorescein over the cornea. Areas of bright-green staining denote absent or diseased epithelium (Fig. 2.6). Viewing the eye under cobalt-blue light enhances the visibility of the fluorescence (Fig. 2.7).

Fig. 2.6 Staining of cornea with fluorescein. A green spot reveals epithelial defect.

Fig. 2.7 Viewing the eye under cobalt-blue light enhances the visibility of the fluorescence.

Points to remember

1. Fluorescein is applied in the form of a sterile filter-paper strip instead of solu tion, since the solution could be cont ami nated with Pseudomonas.

2. Ask the patient to remove the contact lens to prevent its discoloration.

Fig. 2.6 Staining of cornea with fluorescein. A green spot reveals epithelial defect.

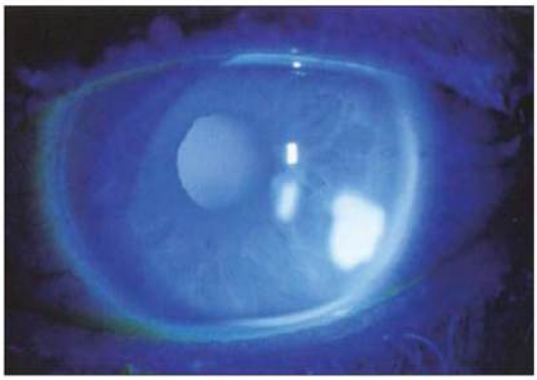


Fig. 2.7 Viewing the eye under cobalt-blue light enhances the visibility of the fluorescence.

THE ANTERIOR CHAMBER DEPTH ASSESSMENT TO REVEAL NARROW ANTERIOR CHAMBER ANGLE

1. Hold a penlight near the limbus of the right eye from the temporal side of the patient.

2. With the penlight parallel to the plane of a normal iris, shine the light across the front of the patient's right eye toward the nose.

3. Observe the appearance of the iris closest to the patient nose. In an eye with a normally shaped anterior chamber and iris, the nasal half of the iris will be illuminated like the tem poral half (Fig.2.8). In an eye with a shallow an terior chamber and narrow chamber angle, about two thirds of the nasal portion of the abnormally curved iris will appear in shadow (Fig.2.9)

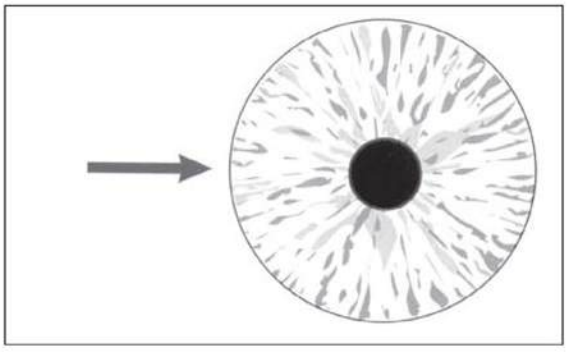


Fig. 2.8 Anterior chamber open angle.

4. Record your observations in the patient record, and repeat the test on the patient left eye. Consult the physician for the ap propriate way to express your observa tions in the chart.

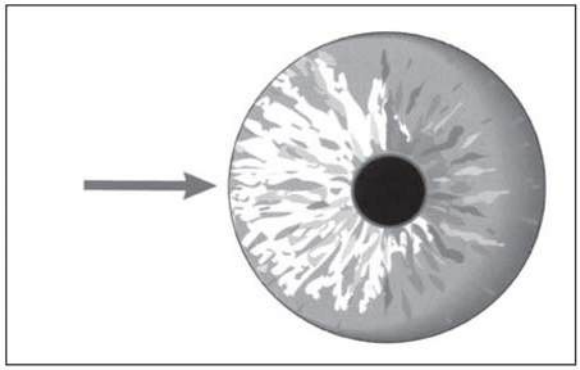


Fig. 2.9 Anterior chamber narrow angle.

PUPILLARY EXAMINATION

TESTING PUPILLARY DIRECT AND CONSENSUAL REFLEXES

1. Seated opposite the patient in ordinary room light, observe the patient's rest ing pupil size for both the right and the left eyes. Both pupils should be di lated equally (Fig. 2.10).
2. In the patient's chart, record the resting pupil size for each eye in millimeters. To gauge size, you may either hold a millimeter rule close to the patient's eye or compare the patient's pupil size with relative pupil sizes printed on most near vision cards.

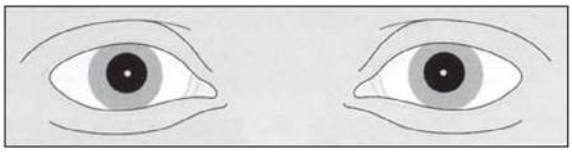


Fig. 2.10 Both pupils should be dilated equally.

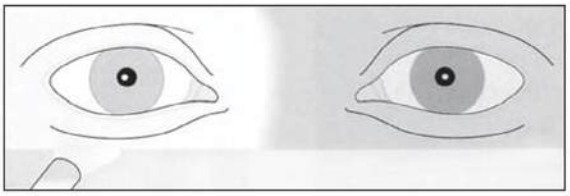


Fig. 2.11 Pupillary direct reflex.

3. As shown in Fig. 2.11, shine a penlight (a small flashlight) into the patient's right eye and ob serve if the pupil constricts in response to the direct light stimulus. Look immediately at the left pupil to see if it constricts consensually.
4. Remove the penlight from the patient's vision briefly to allow the pupils to return to resting state and then repeat step 3 for the left eye.
5. In the patient's chart, record the results for each eye. If the results are normal, record "Reac tive to light, direct and consensual"; if the results are abnormal , record either "No direct re sponse " or "No consensual response," which ever applies.

6. The penlight beam is moved from the right eye to the left eye, the pupil of the left eye may continue to dilate instead of stay constricted due to consensual reaction. This is an afferent pupillary defect.
7. Any abnormal papillary response should be dis cussed with the ophthalmologist before pupil lary dilation.

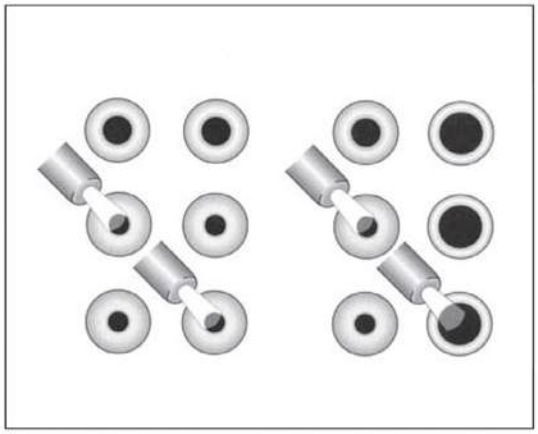


Fig. 2.12 Pupillary reflexes.

DILATING THE PUPIL

Pharmacologic dilation of the patient's pupils will greatly facilitate ophthalmoscopy. Recommended agents include either **tropicamide 1%** or **phenylephrine hydrochloride 2.5%.**

Dilation of the pupil should not be done under following conditions.

1. If assessment of anterior chamber depth suggests a shallow anterior chamber and a narrow angle, because an attack of angle-closure glaucoma might be precipitated.
2. If a patient is undergoing neurological observation and papillary signs are being followed (e.g., a head-injured patient), do not dilate until the neurologist thinks it is safe to do so.

DIRECT OPHTHALMOSCOPY

1. Have the patient comfortably seated. Instruct the patient to look at a point on the wall straight ahead, trying not to move the eyes.
2. Set the focusing wheel at approximately +8. Set the aperture wheel to select the large, round, white light.
3. Begin to look at the right eye about 1 foot from the patient. Use your right eye with the ophthalmoscope in your right hand. When you look straight down the patient's line of sight at the pupil, you will see the red reflex (see the next section).
4. Place your free hand on the patient's forehead or shoulder to aid your proprioception and to keep yourself steady.
5. Slowly come to the patient at an angle of about 15° temporal to the patient's line of sight. Try to keep the pupil in view. Turn the focusing wheel in the negative direction to bring the patient's retina into focus.

6. When a retinal vessel comes into view, follow it as it widens to the optic disc, which lies nasal to the center of the retina.
7. Examine the optic disc, retinal blood vessels, retinal background, and macula in that order (see the next section).
8. Repeat for the left eye.

RED REFLEX

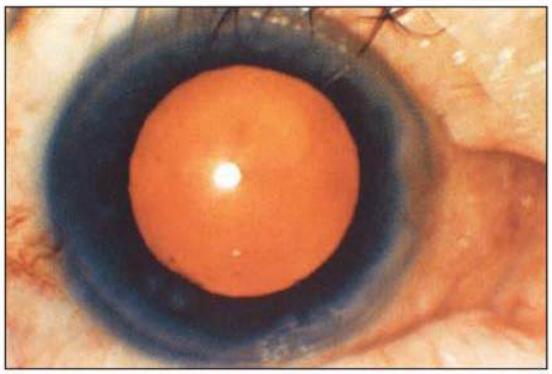


Fig. 2.13 The red reflex

Light reflected off the fundus of the patients produces a red reflex when viewed through the ophthalmoscope at a distance of 1 foot. A normal red reflex (Figure 2.13) is evenly colored, is not interrupted by shadows, and is evidence that the cornea, anterior chamber, lens, and vitreous are clear and not a significant source for decreased vision. Opacities in the media (such as corneal scarring, cataract, and vitreous hemorrhage) appear as black silhouettes and can be best appreciated when the pupil has been dilated.

OPTIC DISC

In most cases, when viewed through the ophthalmoscope, the normal optic disc (Figure 2.14) is slightly oval in the vertical meridian and has a pink color due to extremely small capillaries on the surface. Detail of these small vessels cannot be discerned, which differentiates them from pathologic vessels on the optic disc. The disc edge or margin should be identifiable (sharp). A central whitish depression in the surface of the disc is called the physiologic cup. The optic disc can be thought of as the yardstick of the ocular fundus. Lesions seen with the ophthalmoscope are measured in disc diameters (1 disc diameter equals approximately 1.5 mm.).
A great deal of normal variation exists in the appearance of the optic disc. The size of the physiologic cup varies among individuals. (See Chapter V for a discussion of glaucomatous cupping). The pigmented coats of the eye, the retinal pigment epithelium and the choroid, frequently fail to reach the margin of the optic disc, producing a hypopigmented crescent (Figure 2.15). Such crescents are

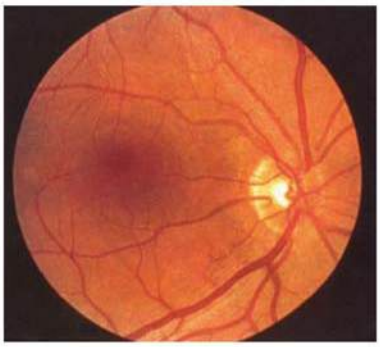


Fig. 2.14 Normal posterior pole. A normal optic disc is shown, with a small central physiologic cup. Major branches of the central retinal artery emanate from the disc, whereas the major branches of the central retinal vein collect at the disc. Temporal to the disc is the macula, which appears darker; no blood vessels are present in the center.

especially common in myopic eyes on the temporal side of the optic disc. Conversely, an excess of pigment may been seen in some patients, producing a heavily pigmented margin along the optic disc (see Figure 2.15). The retina nerve fibers (i.e. ganglion cell axons) ordinarily are non-myelinated at the optic disc and on the retina, but occasionally myelination may extend on the surface of the optic disc and retina, producing a dense, white superficial opacification with feathery edges (Figure 2.16).

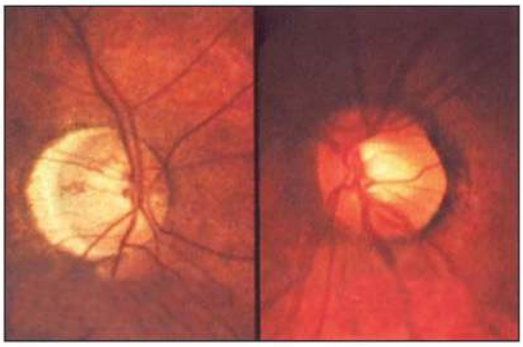


Fig. 2.15 Scleral crescent and pigmented crescent.

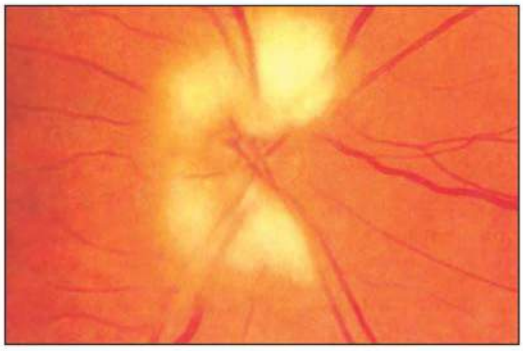


Fig. 2.16 Myelinated nerve fibers.

RETINAL CIRCULATION

The retinal circulation is composed of arteries and veins, visible with the ophthalmoscope (compare Figure 2.14 with Figure 2.17). The central retinal artery branches at or on the optic disc into divisions that supply the four quadrants.

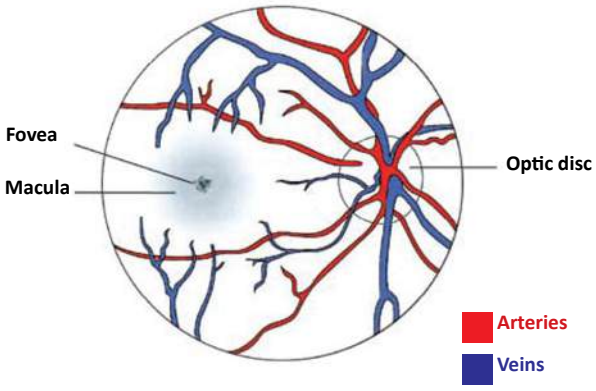


Fig. 2.17 Fundus diagram.

INTRAOCULAR PRESSURE MEASUREMENT

Intraocular pressure varies among individuals. An IOP of 15 millimeters of mercury (mm Hg) represents the mean in a “normal” population. However, an IOP in the range from 10 to 21 mm Hg falls within 2 standards deviation of the mean.

Measurement of IOP is part of a glaucoma screening examination, along with ophthalmoscopic assessment of the optic cup. Diagnosing open-angle glaucoma requires additional testing not available to primary care physicians. IOP determination can be useful when the diagnosis of acute-closure glaucoma is being considered. Different techniques exists, including Schiotz tonometry and Maklakov tonometry (Fig. 2.18, 2.19).

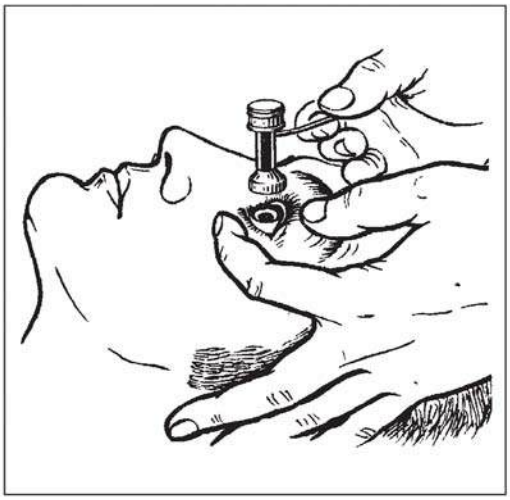


Fig. 2.18 Intraocular pressure measurement by Maklakov tonometer.

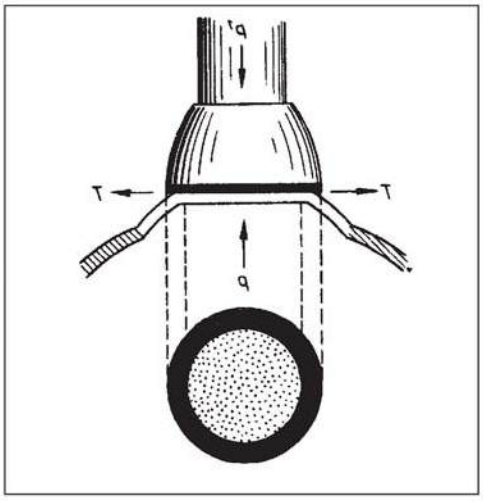


Fig. 2.19 The Maklakov tonometer.

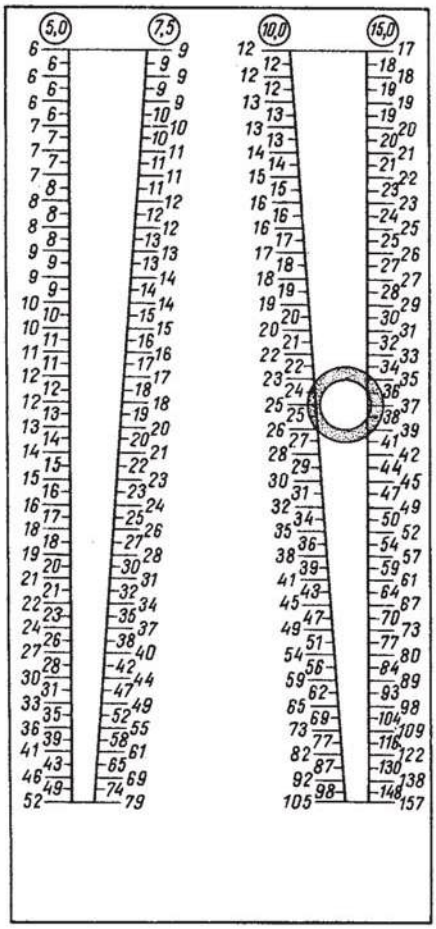


Fig. 2.20 The measurement rule for Maklakov tonometer.

Currently, handheld electronic tonometers are available in some hospital emergency departments to measure intraocular pressure (Fig. 2.20). These battery-operated devices can be used with the patient in any position, as opposed to other devices that require the patient to be either seated or supine. The intraocular pressure results are obtained rapidly with the electronic tonometer and correlate highly with those obtained by the Goldmann applanation tonometer (a slit-lamp-mounted instrument used by ophthalmologists). Electronic tonometers are expensive and require daily calibration.
To perform electronic tonometry, the practitioner instills topical anesthetic in the patient's eyes, separates the lids, and gently applies the calibrated tonometer to the patient's cornea. The pressure reading and reliability rating displayed on the device are noted in the patient's record.

GUIDELINES FOR PATIENTS REFERRAL REDUCED VISUAL ACUITY

The following guidelines apply for patients in whom reduced visual acuity is found, unless the patient has been seen by ophthalmologist and the condition has been confirmed as stable.
Visual acuity less than 20/20 in one or both eyes should be referred to an ophthalmologist if visual symptoms are present.

- **Reduced visual acuity is the best single criterion by which to differentiate potentially blinding conditions from less serious ocular disorders.**

! **Visual acuity less than 20/40** in both eyes is an equally important candidate for referral, even in the absence of complaints. Although many such patients suffer only from uncorrected refractive errors,

- undetected painless but progressive loss of vision does occur in many disorders of the eyes and visual system.

  Asymmetry Any patient with a difference in visual acuity between the eyes of 2 lines or more on the Snellen chart should be referred promptly, even if visual acuity in one or both eyes is better than

- 20/40. Generally, visual function is nearly identical between the eyes; thus, in the absence of known causes of reduced vision, asymmetry of visual acuity may be a sign of ocular disease.

  Presbyopia is manifested by reduced near vision with no change in distance visual acuity. Middle-aged or elderly patients complaining of this combination will benefit from a referral for the pre-

- scription of corrective lenses.

FUNDUS DISORDERS

Only after performing numerous fundus examinations will the practioner be able to recognize the great range of normal ophthalmoscopic appearances. When an abnormality is suspected, further studies or consultation may be required because fundus abnormalities can indicate significant ocular or systemic diseases. Ophthalmologic consultation should be sought for fundus changes accompanied by acute or chronic visual complaints or in patients with systemic disease known to manifest in the eye.

SHALLOW ANTERIOR CHAMBER DEPTH/ELEVATED INTRAOCULAR PRESSURE

A patient suspected of having shallow anterior chamber depth (at risk for angle-closure glaucoma) should be referred to an ophthalmologist for further evaluation.

2.2 CLINICAL SKILLS

ADMINISTERING EYEDROPS AND OINTMENTS

Preliminary steps

1. Have the patient sit or lie down.
2. Wash your hands thoroughly.
3. Check the physician's instructions: what medication and which eye?
4. Select the correct medication and check the expiration date. Always read the label. Many ophthalmic medication bottles look alike.
5. If the medication to be used is a suspension, shake the container well to ensure the drug is distributed consistently throughout the liquid.
6. To maintain sterility of the bottle contents, do not allow the inside edge of the bottle cap to contact any surface or object other than the bottle. Avoid touching the bottle tip to the lids, lashes, or sur face of the eye.

Instilling Eye drops

Improperly instilled eye drops do not reach the eye. The following technique helps ensure optimal drug delivery.

1. Have the patient recline or tilt the head far back .If patient has difficulty bending the neck back, have him or her recline in the exam chair.
2. Ask the patient to look up, with both eyes open.

3. Use the little finger or ring finger of the hand holding the bottle to gently pull down the skin over the cheekbone, pulling the lower lid down and out. This motion exposes the conjuctival cul–de-sac, creating a cup to catch the drops.
4. Squeeze the bottle gently to expel a drop of med ication. Try to direct the drop toward the sensi tive surface of the cornea (Fig. 2.21).
5. Instruct the patient to close both eyes gently. Use your index finger to apply light pressure over the lacrimal sac for 15-30 seconds (Fig. 2.22). These actions help prevent systemic absorption by reducing the amount of the drug that drains into the lacrimal system, nose, and throat.
6. Wipe any excess drops from the patient's lids with a clean tissue.
7. Record the following information in the patient's chart :
   a. Medication name and strength
   b. Time administered
   c. Which eye received the medication

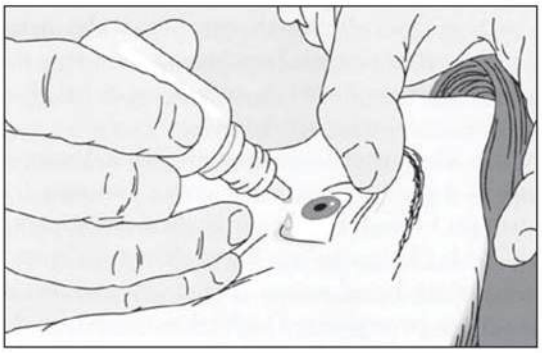


Fig. 2.21

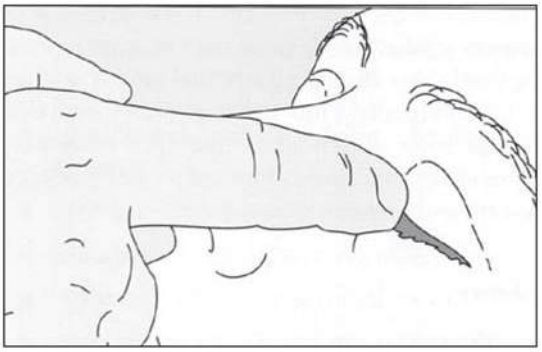


Fig. 2.22

Applying Ointments

Perform steps 1through 6 of the section "Preliminaries" earlier in this box. Then continue with steps 1 through 5 below.

1. **If the tube of ointment has been opened prior to this use, express 1 inch of ointment onto a fresh cotton ball, gauze, or tissue, and discard it.**
2. Squeezing the tube lightly and with even pres sure, apply the ointment along the conjunctival surface of the lower lid, moving from the inner to the outer canthus (Fig. 2.23). Usually ½ to 1 inch of ointment is sufficient. **Avoid touching the tip of the tube to the eye, eyelashes, or skin to prevent contamination of the ointment tube.** With a twisting motion, detach the ointment from the tip of the container.

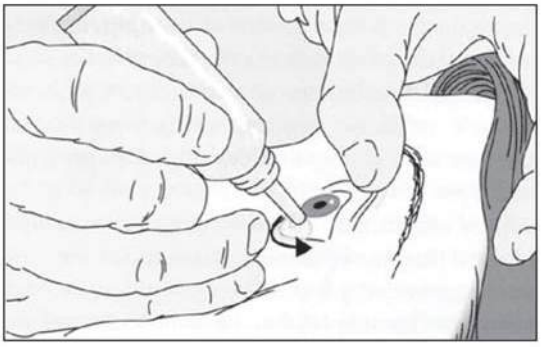


Fig. 2.23

3. Instruct the patient to close the eyes gently.
4. Wipe any excess ointment from the skin with a fresh cotton ball, gauze, or tissue; then discard it properly.
5. Record the application of ointment in the patient chart, as described in step 7 under “Instilling Eye drops” above.

IRRIGATING THE EYE

1. Immediately upon arrival, ask the patient to lie down on a stretcher, sofa, examining table, or a chair with a tilted back.
2. If the ophthalmologist requires and permits, and if the patient has no known allergy to an esthetic medication, instill one drop of topical anesthetic solution.
3. Holding a gauze pad to help you keep your grasp, use your gloved fingers to separate the lids of the affected eye. Gently but firmly hold the lids open to counter the spasm and forceful closure of the eye during irrigation. A lid speculum may also be used to hold the lids open.
4. Give the patient a towel to hold against the face to absorb the excess fluid. In addition, you can position a basin next to the patient’s face to catch the fluid.
5. Perform irrigation with a bottle of ready-made balanced salt solution. IF not available, then use ANY available water source. If available, a con tinuous-rapid-drip bottle (suspended like an in travenous drip) is easier as you will not have to continue squeezing the bottle; merely direct the stream into the patient ‘s eye. Direct the irrigating stream away from the nose to avoid contaminat ing the other eye (Fig.2.24).

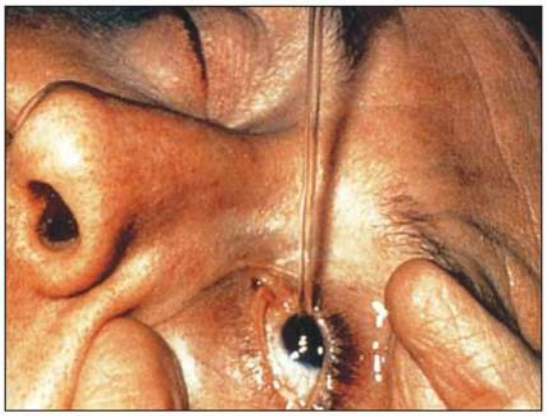


Fig. 2.24 IRRIGATING THE EYE (The first option)

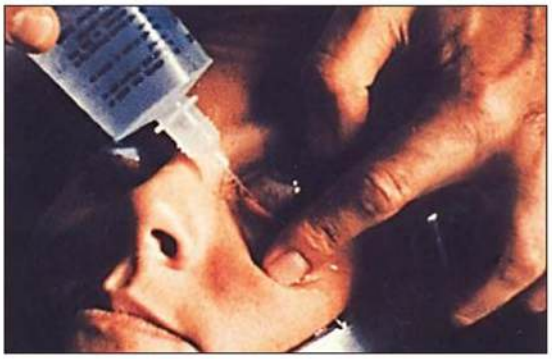


Fig. 2.25 IRRIGATING THE EYE (The second option)

6. You may need to evert (turn out) the upper lid while irrigating to wash away parti cles of chemical that may have become lodged there. To evert the lid:

a. With the thumb and forefinger of one gloved hand, grasp the lashes of the upper lid and pull it out and down slightly (Figure A)

b. Using your other hand, place the stick por tion of a cotton-tipped applicator horizon tally on the upper eyelid, approximately ½ inch above the margin of the eyelid (Figure B).

c. Rotate the lid up and over the applicator stick to expose the conjunctival surface (Figure C).

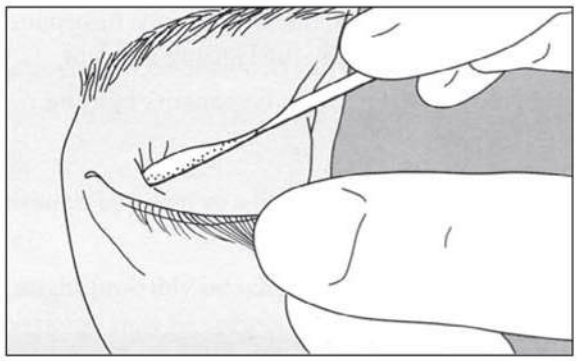


Fig. B Using your other hand, place the stick portion of a cotton-tipped applicator horizontally on the upper eyelid, approximately ½ inch above the margin of the eyelid .

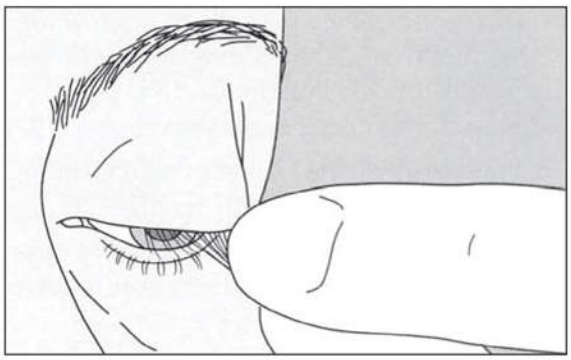


Fig. A With the thumb and forefinger of one gloved hand, grasp the lashes of the upper lid and pull it out and down slightly .

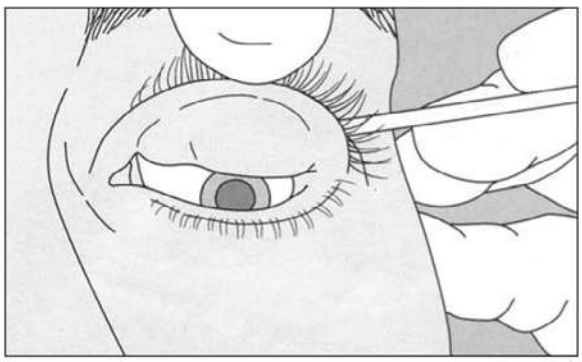


Fig. C Rotate the lid up and over the applicator stick to expose the conjunctival surface

APPLYING PRESSURE PATCHES AND SHIELDS

1. Set out two sterile eye pads and adhesive surgical tape. Tear the tape into 5-to 6-inch lengths to facil itate the patching process.
2. Instruct the patient to close both eyes tightly.
3. Clean the forehead and the area around the cheekbone and toward the ear with an alcohol pad to remove the skin oils. This helps the tape stick to the skin.
4. Fold one pad in half, place it over the closed eye, and hold it in place with one hand.

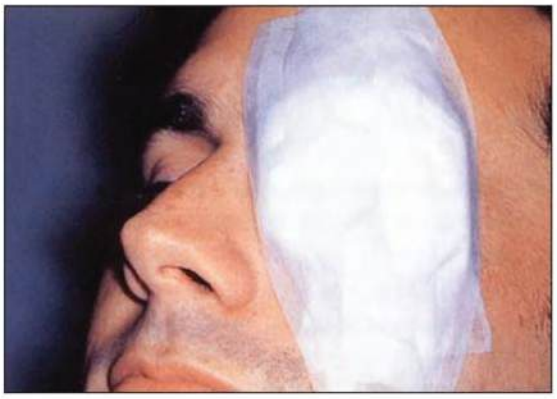


Fig. 2.26 Pressure patch

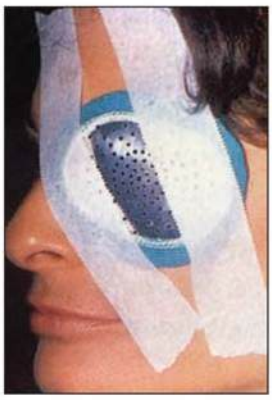


Fig. 2.27 The fenestrated aluminum (Fox) shield

5. Apply an unfolded eye pad over the folded pad.
6. Tape the unfolded eye pad firmly to the forehead and cheekbone (Fig. 2.26). To prevent blinking, fur ther bleeding, or swelling, the patch must exert some pressure on the lids. The patient should not be able to open the eyelid beneath the patch .The tape should not extend to the jawbone because jaw movement could loosen the patch.

! **If the patient has any contusions or lacerations of the globe or its adnexal structures, apply and tape a fenestrated aluminum (Fox) shield, instead of a pressure patch, over the globe, to protect these tissues from further damage until healing occurs or definitive repair is performed. Rest the shield on the bony eyebrow and cheekbone (Fig. 2.27). Do not patch an open globe tightly.**

FOREIGN BODY REMOVAL

To remove a superficial foreign body from the cornea or conjunctiva, instill a topical anesthetic such as proparacaine 0.5%, and then gently roll a cotton-tipped applicator across the globe to pick up the object (Fig. 2.28 A, Fig. 2.28 B). A forceful stream of irrigating solution delivered from a squeeze bottle will often dislodge a superficial conjunctival or corneal foreign body. A sharper instrument may be required if the foreign body remains embedded, and the patient should be referred to an ophthalmologist. The orange-brown “rust ring” resulting from an embedded iron foreign body is a common problem that requires special attention. ◤

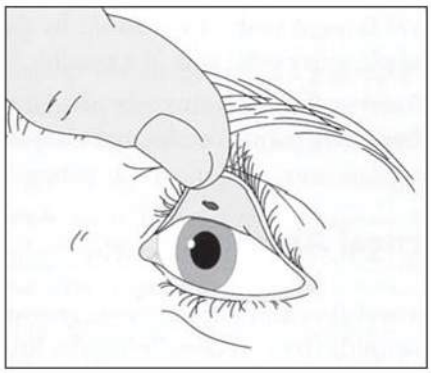


Fig. 2.28A The foreign body on the conjunctiva

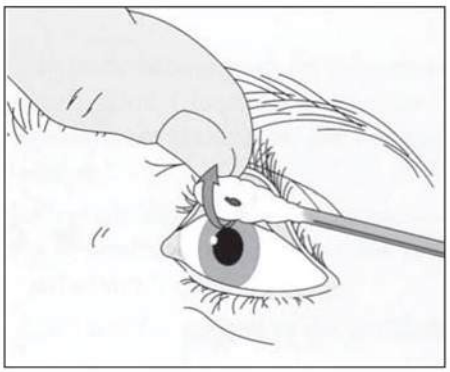


Fig. 2.28B The foreign body removal from the conjunctiva

CHAPTER III

EYE DISEASES

(presented following anatomy starting from lids and orbit and ending by fundus disorders)

LIDS/ORBIT

A. Blepharitis: a chronic lid margin inflammation – (Fig.3.1)

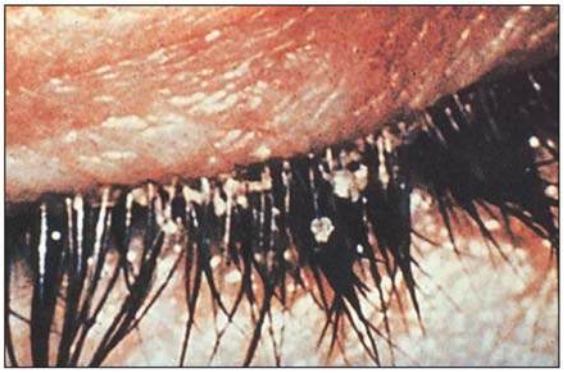


Fig.3.1 Blepharitis

❑ **1. Sx/sx**

Burning

b. Foreign body sensation
c. Red lid margins with crusting
d. Lids often stuck together in a.m.
e. Possible loss of lashes

❑ **2. Treatment**

Warm compresses to loosen crusting

b. Proper lid hygiene, clean lids thoroughly with wash cloth and warm water, plus nonirritating sham poo in a.m. and h.s.
c. Topical ophthalmic antibiotic ointment h.s. x 2-3 weeks (bacitracin, erythromycin)
d. Topical ophthalmic antibiotic solution if these is an associated conjunctivitis (10% sulfacetamide or gentamicin Q.I.D. x 5-7 days).
e. Oral antibiotics (Doxycycline) in refractory cases only

B. Stye/chalazion: Inflamed glands or lid due to occluded orifices (often complicates blepharitis) - (Fig. 3.2, 3.3)

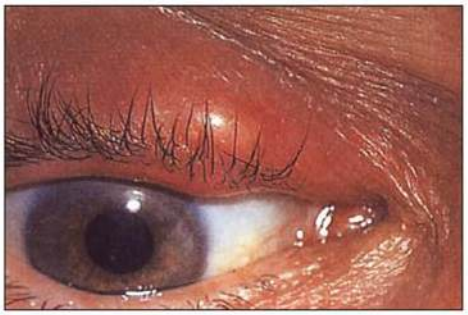


Fig. 3.2 Stye

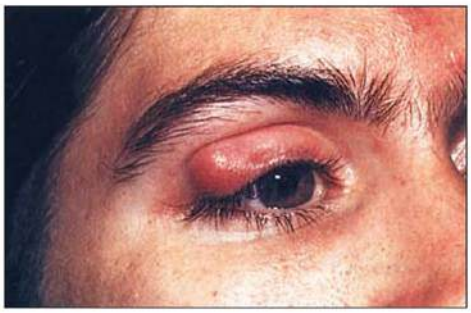


Fig. 3.3 Chalazion

❑ **1. Sx/sx**
a. lid tenderness,
b. pain,
c. swelling,
d. edema

❑ **2. Treatment for acute**
a. Treat blepharitis if present
b. Warm compresses 2 minutes QID until draining occurs or 2 weeks.
c. Sulfa based topical antibiotic administered after above

❑ **3. Treatment for chronic**
Refer to ophthalmologist if chalazion fails to re solve and becomes nontender and localized (which may take several weeks)

C. Cellulitis

❑ **1. Anterior cellulites**

a. Sx/sx
(1) Swollen, red lids
(2) May be tender
(3) Vision, ocular motility are normal

❑ **b. Treatment**
(1) Warm compresses
(2) Systemic antibiotics
(3) Topical antibiotics for blepharitis and chalazion if present

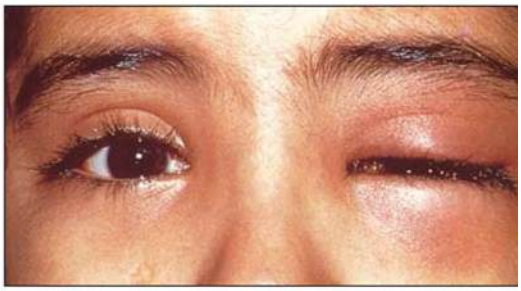


Fig.3.4 Orbital cellulitis

!! ❑ **2. Posterior or orbital cellulitis (Fig.3.4)**
Fig.3.4 Orbital cellulitis

a. Sx/sx
i. Swollen red lids and conjunctiva
ii. Impaired ocular motility with pain on eye movement
iii. Proptosis

iv. If optic nerve involvement: decreased vision afferent papillary defect, optic disc edema
b. Management - Urgent Referral

D. Nasolacrimal drainage obstruction

❑ **1. Sx/sx**
a. Persistent tearing and discharge, often associated with redness
b. + - Dacryocystitis (infected tear scar)

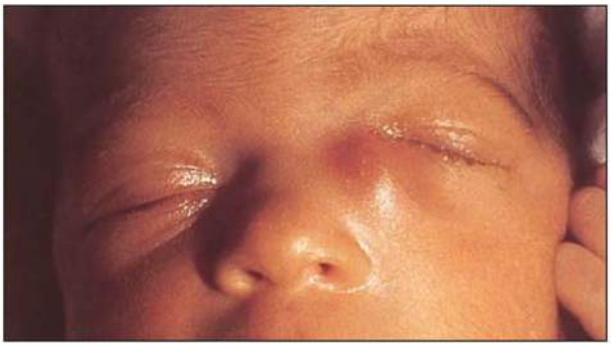


Fig. 3.5 Dacryocystitis

❑ **2. Treatment**
a. Congenital obstruction (due to imperforate lacrimal duct).
a. Massage lacrimal sac daily
b. Topical antibiotic solution (Tobra mycin 0.3% Q.I.D. for 1-2 weeks) if purulent discharge
c. Systemic antibiotics if dacryocystitis
d. Refer to ophthalmologist if no res olution in 6-8 months

❑ **b. Acquired obstruction**
(1) R/o nasal inflammation, polyps, tumors
(2) Systemic antibiotics if dacryocystitis
(3) Nasal decongestants
(4) Chronic/recurrent: refer to ophthalmologist

II CONJUNCTIVA
A. Conjuctivitis

❑ **1. Sx/sx**

a. Pattern of redness: palpabral or diffuse
b. Discharge: characteristic of cause
(1) Allergic: watery, with white, stringy mucus
(2) Bacterial: purulent:
(3) Viral or chemical: watery, serous
c. Palpable, tender preauricular lymphadenopathy: characteristic of viral conjunctivitis

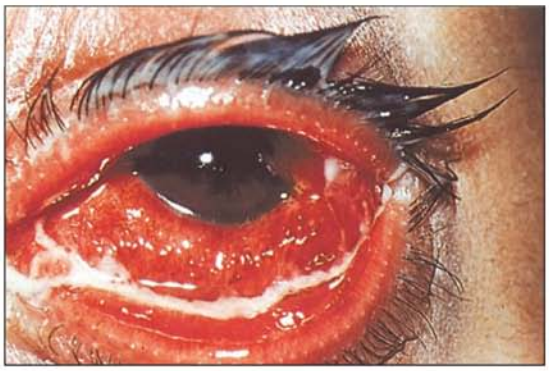


Fig. 3.6 Bacterial conjunctivitis

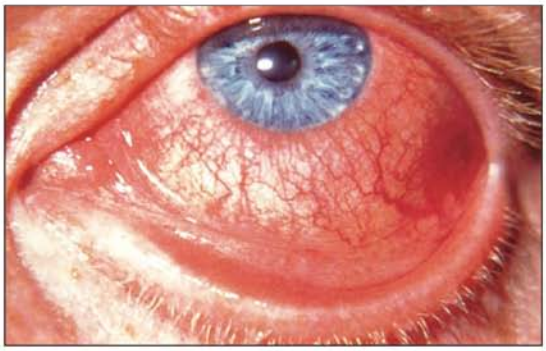


Fig. 3.7 Viral Conjunctivitis

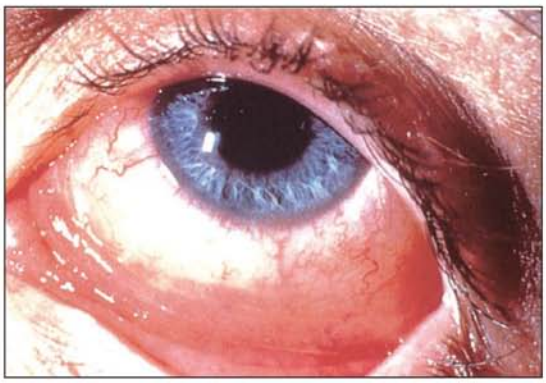


Fig. 3.8 Allergic conjunctivitis

❑ **2. Bacterial conjunctivitis (Fig. 3.6)**

a. Most common: staph, strep., H flu, Pseudomonas

b. Treatment

(1) Warm compresses

(2) Clean lids of discharge

(3) Topical antibiotics Q.I.D. x 5-7 days (10% of sulfacetamide or gentamicin) and ointment h.s. 7-10 days (bacitracin, erythromycin, or gentamicin)

(4) Refer to ophthalmologist if not im proved in 3-4 days

c. Copious purulent discharge

(1) Start gram strain, culture (R/o gono coccus, Pseudomonas)

(2) Refer to ophthalmologist

❑ **3. Viral Conjunctivitis (Fig. 3.7)**

a. Contagious (adenovirus)

b. No effective therapy except time (2-6 weeks)

c. Refer to ophthalmologist if pain, photophobia, decreased vision

❑ **4. Allergic conjunctivitis (Fig. 3.8)**

a. Itching, burning eyes

b. + - Lid/conjunctival edema

c. Treatment: symptomatic

(1) Topical/oral antihistamines (napha zoline Q.I. D. prn)

(2) 4% cromolyn Q.I.D. to prevent itching

(3) Refer if refractory to treatment

B. Subconjunctival hemorrhage (Fig. 3.9)

1. Usually spontaneous without known cause
2. Patient often presents with bright red eye, nor mal vision, no pain
3. No treatment except time approximately - 2 weeks) and reassurance

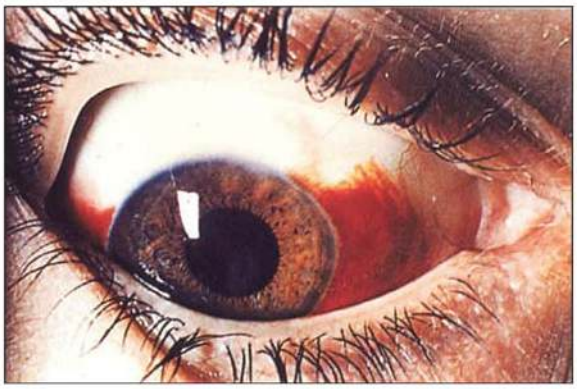


Fig. 3.9 Subconjunctival hemorrhage

C. Dry Eyes

❑ **1. Tear deficiency ("keratitis sicca")**

a. Burning, "gritty" sensation (symptoms exceed the signs)

b. Treatment

(1) Artificial tears instilled frequently

(2) Lubricating ophthalmic ointment h.s.

(3) Protective sun goggles for outdoor wear

c. Common with aging and post menopausal women

d. Associated conditions

(1) Rheumatoid arthritis, Stevens-Johnson syndrome, systemic meds (diuretics, antihista mines, antidepressants, dermatologic drying agents)

(2) If severe, refer to an ophthalmologist

D. Pingueculum/pterygium (Fig. 3.10)

1. Pathologic tissue change caused by exposure to sun, wind, dust, dryness
2. Arises from bulbar conjunctiva at palpebral fis sure (nasal and/or temporal)
3. Pingueculum: confined to conjunctival tissue
4. Pterygium: extension onto tire cornea

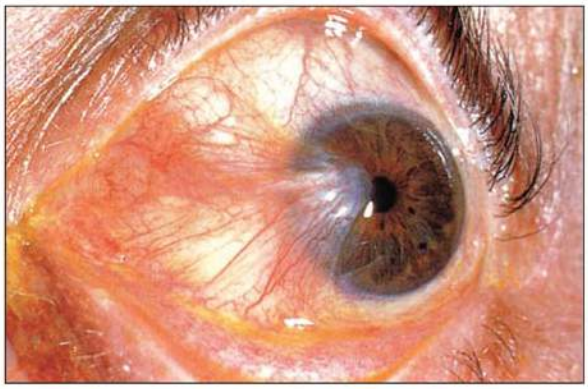


Fig. 3.10 Pterygium

5. Respond to irritants in environment (e.g. smoke, fumes) becoming red and inflamed, thereby attracting attention

6. Treatment

a. Frequent use of artificial tears

b. Sungoggles for outdoor wear

c. Topical vasoconstrictors alleviate redness temporarily. Beware: causes chronic redness if used frequently.

d. Refer to ophthalmologist if actively growing pterygium growth advances to dilated pupillary margin is present or if inflammation is severe

! E. Episcleritis/scleritis (Fig. 3.11)

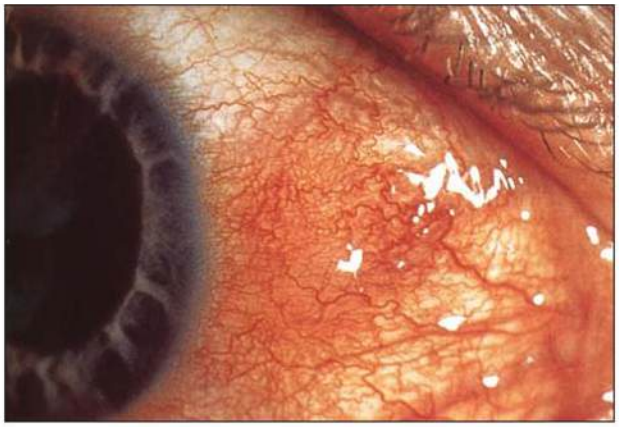


Fig. 3.11 Episcleritis

1. Localized redness associated with discomfort

2. Most cases are idiopathic

3. + - Associated conditions, autoimmune disorders, e.g. rheumatoid arthritis

4. May be vision-threatening with extension into the eye

5. Always refer to an ophthalmologist as a ur gent referral (within a few days)

III CORNEA

A. Corneal abrasion (Fig. 3.12)

Fig. 3.12 Fluorescein staining of corneal abrasion

1. Sx/sx

redness, tearing, photophobia, pain

2. Treatment

a. Relieve pain

(1) Cycloplegic eye drops (1-2% cyclopen tolate, 2-5% homatropine)

(2) Oral analgesics with codeine if severe pain

b. Prevent infection
(1) Topical antibiotics
c. Promote rapid healing
1) Pressure patch (2-3 eye pads) for at least 24 hours
2) Refer to ophthalmologist in 24-48 hours if not pain-free

Fig. 3.14 Herpetic keratitis (diagram)

B. Keratitis (Inflammation of the cornea)

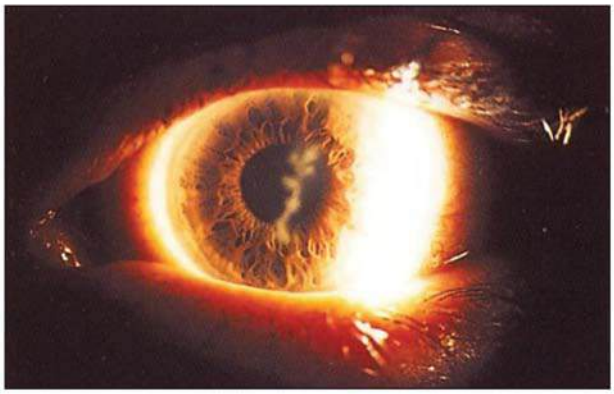


Fig. 3.13 Herpetic keratitis

❑ **1. Viral (Fig. 3.13; 3.14)**
a. Herpes simplex type I most common
(1) Sx/sx: red eye, watery discharge and foreign body sensation
(2) Dendrite, or branching figures characteristic epithelial lesion cornea best seen with fluorescein stain

❑ **2. Bacterial (Fig. 3.15)**
a. Sx/sx: red, painful eye, purulent discharge and decreased vision
b. Discrete corneal opacity seen with penlight
c. Immediate referral to ophthalmologist

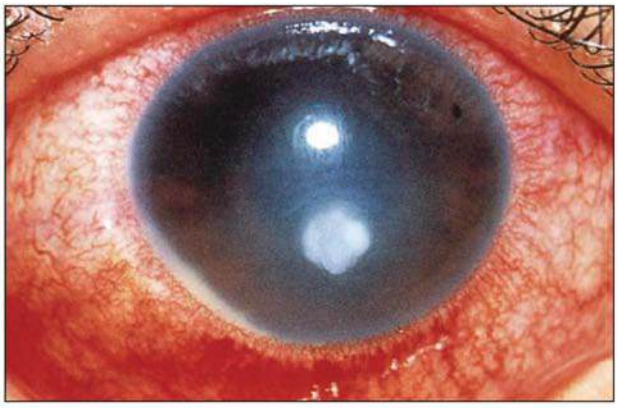


Fig. 3.15 Bacterial keratitis

IV ANTERIOR CHAMBER: VISION – THREATENING CONDITIONS

❑ **1. Hyphema: blood in the anterior chamber (Fig. 3.16)**
a. Usually follows blunt trauma
b. Sx/sx: decreased vision, pain, redness, blood in the anterior chamber
c. Immediate referral to ophthalmologist stat

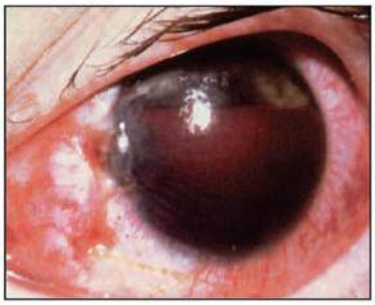


Fig. 3.16 Hyphema

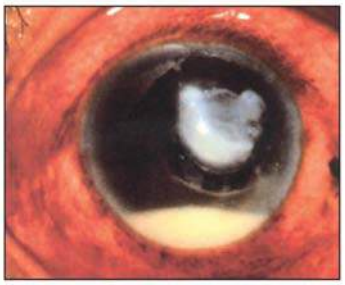


Fig. 3.17 Hypopyon

! ❑ **2. Hypopyon: pus in the anterior chamber (Fig. 3.17)**

a. Usually follows endophthalmitis, corneal ulcer

b. Sx/sx: decreased vision, pain, redness, pus in the ante rior chamber

Immediate Referral

!!! ❑ **3. Angle-Closure Glaucoma (Fig. 3.18)**

1. Sx/sx: severe eye pain, headaches, nausea and vomiting, the percep tion of rainbow-colored halos around light and blurring or smoky vision.

2. Signs: ciliary flush (violaceous hue surrounding the limbus), corne al edema, shallow anterior cham ber, mid-dilated pupil, high intraocular pressure.

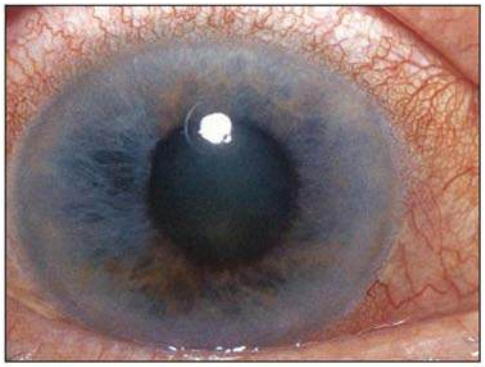


Fig. 3.18 . Angle-Closure Glaucoma

3. Treatment

Medical treatment is used initially to break the acute attack, paving the way for definitive surgical treatment

a) Instill a topical beta blocker 1 drop of timolol 0.5% and pilocarpine 1 %-2% q. 15 minutes x 3

b) Administer Acetazolamide 250 mg. PO (avoid in case of sulfa-allergies) and administer systemic osmotic agents (glicerol PO).
Avoid this medication in patients with congestive heart failure

c) Administer systemic analgesics.

d) IMMEDIATE referral to an ophthalmologist for laser or surgical treatment.

V. IRIS IRITIS/ UVEITIS (FIG. 3.19)

❑ **1. Sx/sx:** moderately severe pain, pho-tophobia, decreased vision, circumcor-neal injection,ciliary flush, constricted pupil, normal to low IOP.

❑ **2. + - Associated condition:** inflamma-tion, rheumatoid arthritis, sarcoidosis, dental abscesses, urethritis, inflamma-tory bowel disorders, syphilis, toxoplas-mosis, tuberculosis.

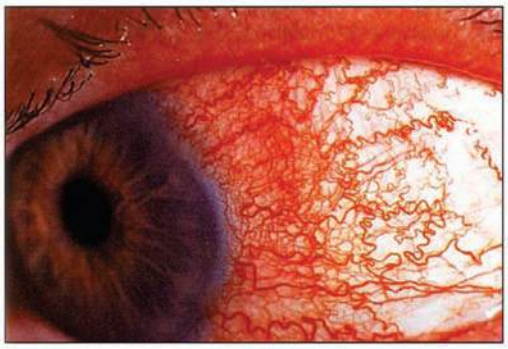


Fig. 3.19 Circumcorneal injection-ciliary flush

Treatment

Dilate the pupil with atropine 1%; **Semi-urgent referral within one week**

VI. LENS
Cataract (Fig. 3.20; 3.21)

❑ **1. Sx/sx:** painless gradual loss of vision, either distance or near, glare significant degradation of vision in bright sunlight or by oncoming car headlights at night.

❑ **2. Signs:**
A dull red reflex, dark central opacity or white pupil when the lens is totallyfully opacified.
Myopic shift in refractive error - reading glasses no longer required but distance vision is poor

Management - surgery
Refer if a patient loses ability to function in usual capacity.

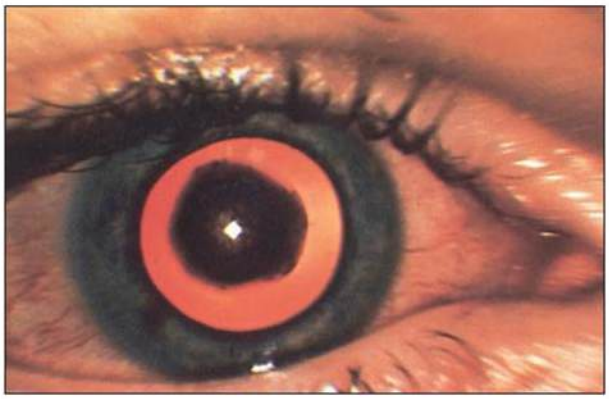


Fig. 3.20 Non mature cataract

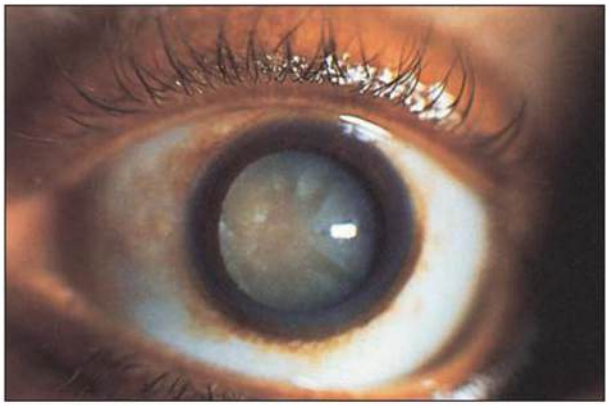


Fig. 3.21Mature cataract

! IMPORTANT: Not to assign visual loss to cataract before ensuring that other more serious causes of visual loss have not been overlooked (i.e. detached retina clouded cornea, macular degeneration, glaucoma, vitreous hemorrhage).

! VII. VITREOUS
Vitreous Hemorrhage (Fig. 3.22)

1. Sx/sx: Floaters, cobwebs, light flashes, partial or total visual loss
2. Signs
Blood in the vitreous usually obscures the red reflex
3. Associated conditions: diabetes, retinal detachment, trauma, subarachnoid hemorrhage
4. IMMEDIATE REFERRAL

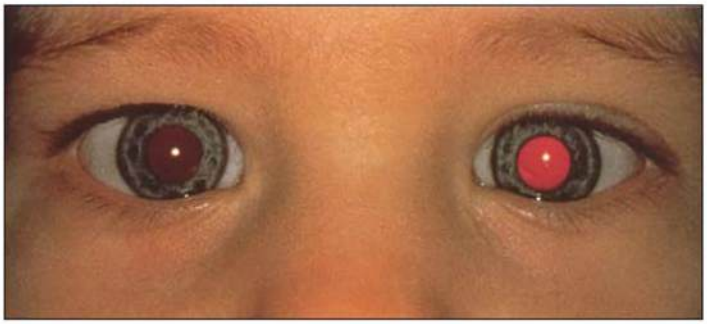


Fig. 3.22 Vitreous Hemorrhage

VIII. FUNDUS

OPTIC NERVE

Open-angle glaucoma (Fig. 3.23)

❑ **1. Sx/sx:** Gradual slow loss of vision, gradually declining peripheral vision.

❑ **2. Signs:**

a. Increased intraocular pressure

b. Glaucomatous optic nerve damage-cupping
- an optic cup diameter one half or more of the disc diameter
- Cup: disc asymmetry of more than 0.1

❑ **3. Non urgent referral**

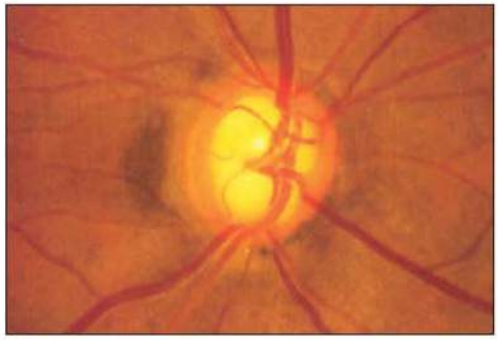


Fig. 3.23 Cupping in open-angle glaucoma

OPTIC ATROPHY (Fig. 3.24)

❑ **1. Sx/sx:** Loss of vision

❑ **2. Signs:** Pale optic nerve

❑ **3. Non urgent referral**

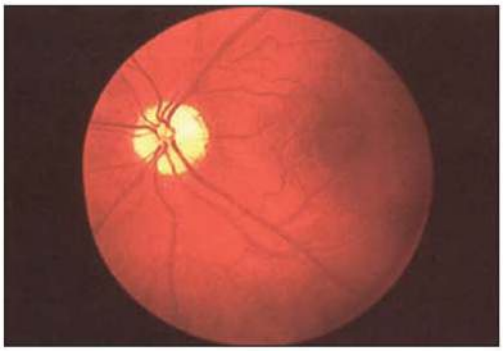


Fig. 3.24 Optic atrophy

! ❑ **OPTIC NEURITIS (Fig. 3.25)**

❑

1. Sx/sx: Reduced visual acuity, desaturation of colors.

❑ **2. Signs:** A relative afferent pupillary defect, the optic disc hyperemia ,and the disc margin is blurred.

3. URGENT REFERRAL

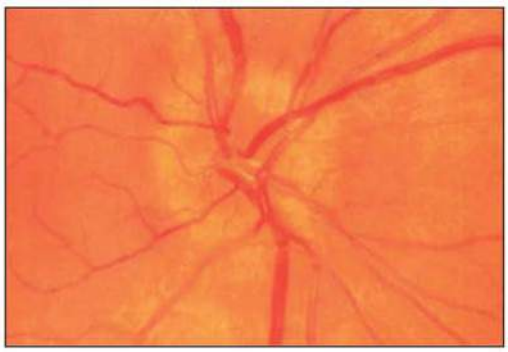


Fig. 3.25 Optic neuritis

! **RETROBULBAR OPTIC NEURITIS**

❑ **1. Sx/sx:** Reduced visual acuity, pain on movement of the eye.

2. Signs: A relative afferent pupillary defect, no abnor mality on ophthalmoscopic examination.

3. URGENT REFERRAL

! **PAPILLEDEMA (Fig. 3.26)**

- ❑ **1. Sx/sx:** Momentary blurring on transient ob scuration of vision, minor alterations in vision
- ❑ **2. Signs:** Swelling of one or both optic discs from increased intracranial pressure.
- ❑ **3. IMMEDIATE REFERRAL** to a neurosurgeon

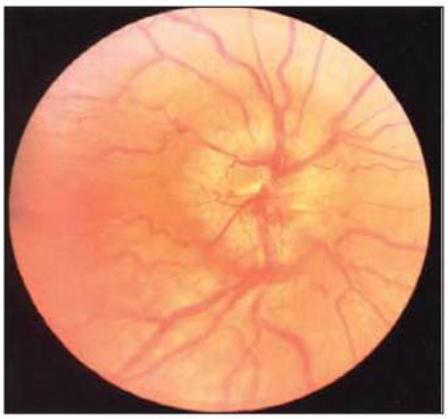


Fig. 3.26 Papilledema

! **ISCHEMIC OPTIC NEUROPATHY (Fig. 3.27)**

- ❑ **1. Sx/sx:** Visual loss, visual field loss in the superior or interior part
- ❑ **2. Signs:** A pale, swollen disc, accompanied by splinter hemorrhages.
- ❑ **3. URGENT REFER** for cardiovascular workup

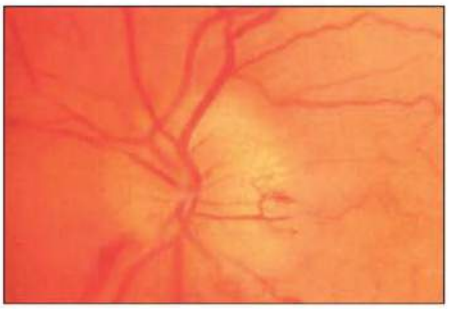


Fig. 3.27 ischemic optic neuropathy

!!! **CENTRAL RETINAL ARTERY OCCLUSION (CRAO) - (Fig. 3.28) - see "True Ocular Emergencies"**

CENTRAL RETINAL ARTERY OCCLUSION

- ❑ **1. Sx/Sx:** acute, painless, severe loss of vision.
- ❑ **2. +-** May be associated with giant cell (temporal) arteritis, collagen vascular disease, hypercoagulation disorders, and trauma.
- ❑ **3. Signs:** afferent pupillary defect, white or grey retina, a cherry-red spot at the fovea, retinal arterial narrowing and blood column segmentation.

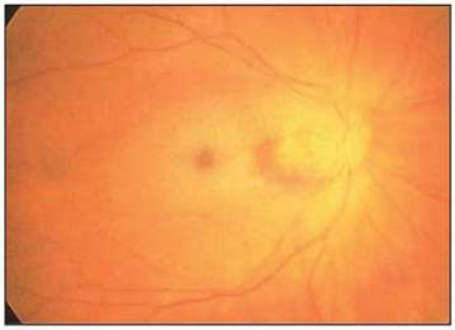


Fig. 3.28 central retinal artery occlusion (crao)

Treatment

a) Massage the globe digitally with enough pressure that it would take to dent a tennis ball
b) Administer acetazolamide 500 mg PO and/or instill topical timolol 0.5%.
c) Produce arterial dilation by having the patient breathe into a paper bag
d) Administer Papaverine 40 mg. IM.
URGENT REFERRAL

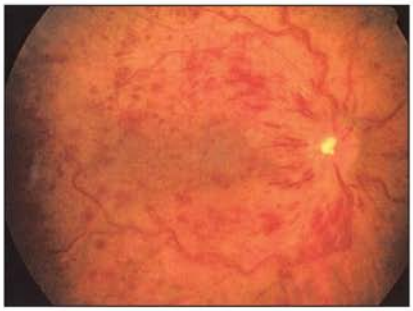


Fig. 3.29 central retinal vein occlusion (crvo)

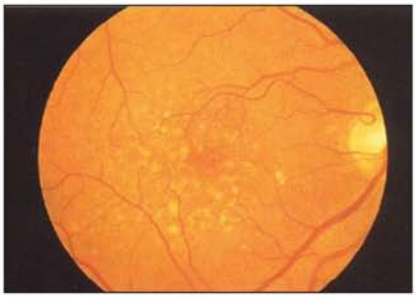


Fig. 3.30 Macular drusen (hyaline nodules)

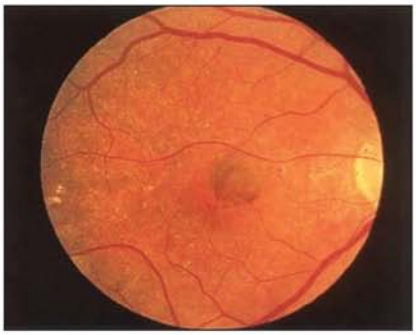


Fig. 3.31 Choroidal neovascularization associated with subretinal hemorrhage/ exudates

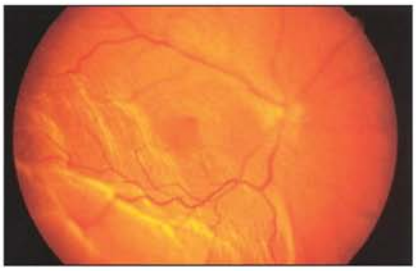


Fig. 3.32 retinal detachment

CENTRAL RETINAL VEIN OCCLUSION (CRVO) AND BRANCH RETINAL VEIN OCCLUSION(BRVO) (Fig.3.29)

- ❑ **1. Sx/sx:** Subacute loss of vision
- ❑ **2. Signs:** Disc swelling, venous engorgement, small white patches on the retina (cotton wool spots) diffuse retinal hemorrhages in CRVO and hemorrhages along the distribution of the involved vein in BRVO.
- ❑ **3. Associated conditions:** Hypertension, diabetes, glaucoma, vasculitis
- ❑ **4. SEMI-URGENT REFERRAL**

MACULA

AGE ¬– RELATED MACULAR CHANGES

- ❑ **1. Sx/sx:** Blurred or distorted central vision
- ❑ **2. Signs:**

a. If "dry" type: irregularities on the Amsler Grid, macular pigmentary changes, and drusen (hyaline nodules) (Fig. 3.30)

i. NON URGENT REFERRAL

b. If wet type: recent vision worsening on the Amsler grid, grey or severe distortions, choroidal neovascularization associated with subretinal hemorrhage/ exudates (Fig. 3.31)

c. Urgent Referral to retina specialist for laser

RETINA

RETINAL DETACHMENT (Fig. 3.32)

- ❑ **1. Sx/sx:** Acute visual loss, flashing lights followed by large number of floaters, a shade over the vision in the eye or a curtain blocking peripheral vision
- ❑ **2. Signs:** The retina appears elevated, sometimes with folds, and the choroidal background is indistinct.
- ❑ **3. Associated conditions:** prior retinal detachment or cataract surgery, high myopia, family history of detachment, ocular trauma
- ❑ **4. IMMEDIATE REFERRAL**

DIABETIC RETINOPATHY (Fig. 3.33; 3.34)

❑ **1. Sx/sx:** Mild, moderate or profound visual loss. Visual loss may be due to macular edema, exudates deposition, proliferative disease, vitreous hemorrhage (see Vitreous), and retinal detachment (see Retina).

❑ **2. Signs:** Microaneurysms, macular edema, lipid exudates. Intraretinal hemorrhages, cotton¬wool spots, new blood vessels (neovascularization) form in the area of the optic disc or elsewhere on the retinal surface; or on the surface of the iris, causing severe glaucoma.

❑ **3. Semi-urgent referral to retinal specialist**

! **IMPORTANT: Unless the changes involve the fovea directly, patients may develop extensive retinopathy without any visual symptoms. This underscores the importance of routine ophthalmoscopic examination in diabetics.**

HYPERTENSIVE RETINOPATHY (Fig. 3.35)

1. Sx/sx: Arteriolar sclerosis including copper-wire arterioles (the light reflex occupies most of the width of the vessels), silver-wire arterioles (the left reflex is obscured totally), A/V crossing (nicking) resulting in dilation of the distal portion of the vein and tapering of the hemorrhages, malignant hypertension the optic disc swelling CRVO, BRVO (See Optic Disc).

2. Semi-urgent referral for management of blood pressure to preserve the integrity of the celebral, cardiac, and renal circulations.◤

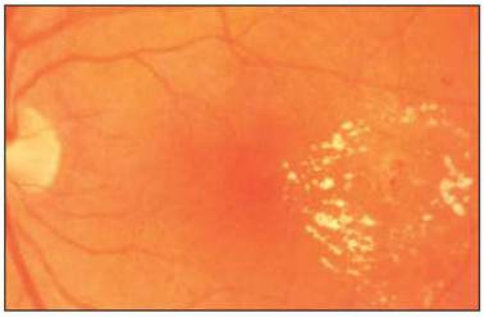


Fig. 3.33 Microaneurysms, macular edema, lipid exudates

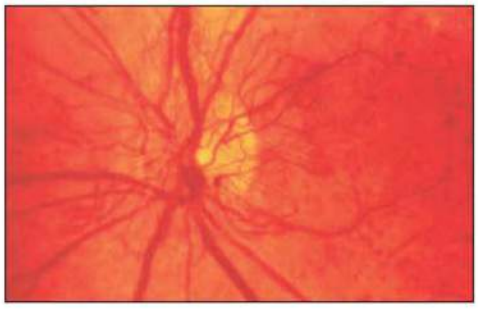


Fig. 3.34 New blood vessels (neovascularization) on the optic disc

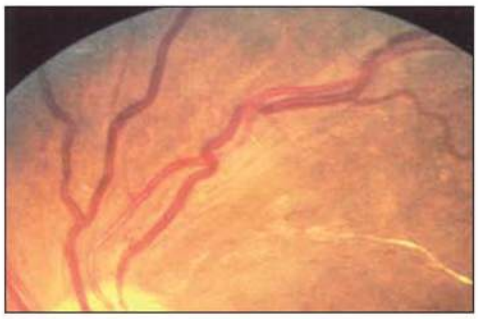


Fig. 3.35 hypertensive retinopathy

CHAPTER IV

True Ocular Emergencies

!!! OCULAR CHEMICAL BURNS

Chemical burns of the eye are among the few true ocular emergencies. **Begin eye irrigation immediately, even before completing the history or measuring the vision. Acid** burns cause denaturation of tissue proteins, which act as a barrier to prevent further diffusion. For this reason, they are generally less devastating than alkali burns, but they can still be very severe. **Alkali** burns do not cause denaturation of tissue proteins. Therefore, caustic alkaline chemicals tend to penetrate deeper than acid bums and tend to be generally more destructive to ocular tissues. They may cause corneal melting, blanching of the conjunctiva, severe corneal scarring, and intraocular complications such as uveitis and secondary glaucoma. Clinical findings in mild burns of either type include conjunctival hyperemia, chemosis and corneal erosions and mild haziness. More severe cases show corneal opacification and limbal ischemia.

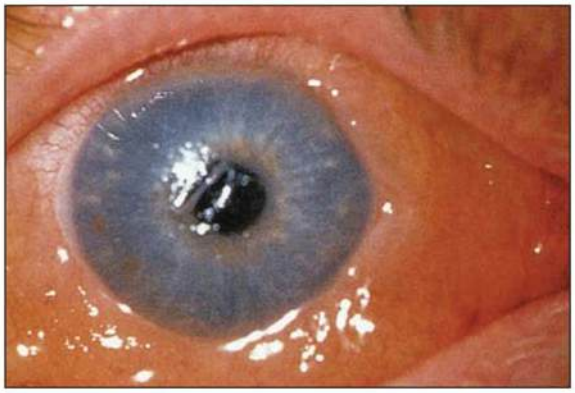


Fig. 4.1 Alcali burn acute stage chemosis of conjunctiva and mild opacification of cornea.

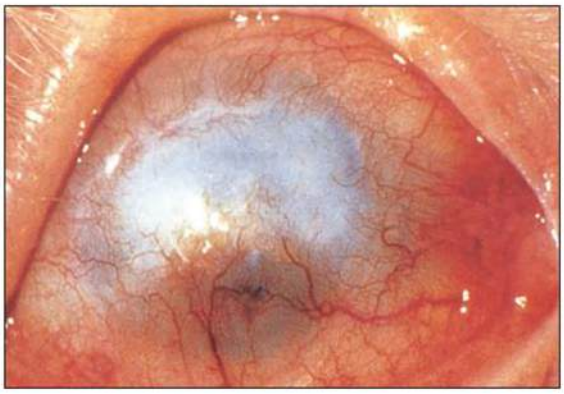


Fig. 4.2 Alcali burn late stage– total opacification of cornea with neovascularizion on the blind eye.

Treatment

The most important step in the treatment of acute chemical burns of any type is prompt, copious irrigation of all exposed tissues for a minimum of thirty minutes.

IRRIGATING THE EYE

1. Immediately upon arrival, ask the patient to lie down on a stretcher, sofa, examining table, or a chair with a tilted back.
2. If the ophthalmologist requires and permits and if the patient has no known allergy to anesthetic medication, instill one drop of topical anesthetic solution
3. Holding a gauze pad to help you keep your grasp, use your gloved fingers to separate the lids of the affected eye. Gently but firmly hold the lids open to counter the spasm and forceful closure of the eye during irrigation. A lid speculum may also be used to hold the lids open.
4. Give the patient a towel to hold against the face to absorb the excess fluid. In addition, you can position a basin next to the patient's face to catch the fluid.
5. Perform irrigation with a bottle of ready-made balanced salt solution. IF not available, then use ANY available water source. If available, a continuous-rapid-drip bottle (suspended like an intravenous drip) is easier as you do not have to continue squeezing the bottle; merely direct the stream into the patient's eye. Direct the irrigating stream away from the nose to avoid contaminating the other eye (Fig.2.24).
6. You may need to evert (turn out) the upper lid while irrigating to wash away particles of chemical that may have become lodged there. To evert the lid :

a. With the thumb and forefinger of one gloved hand, grasp the lashes of the upper lid and pull it out and down slightly (Figure A)

b. Using your other hand, place the stick portion of a cotton-tipped applicator horizontally on the upper eyelid, approximately ½ inch above the margin of the eyelid (Figure B).

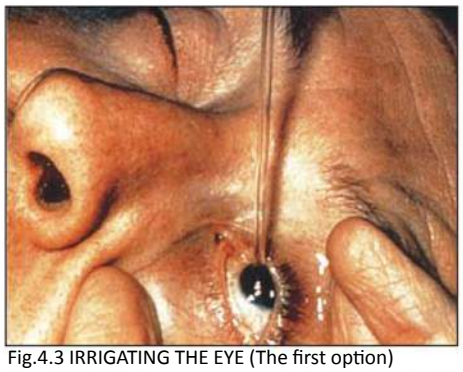


Fig.4.3 IRRIGATING THE EYE (The first option)

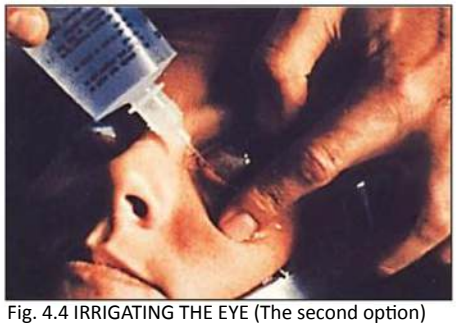


Fig. 4.4 IRRIGATING THE EYE (The second option)

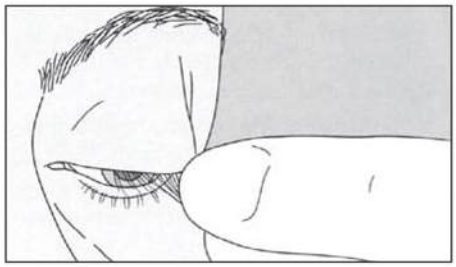


Fig. A With the thumb and forefinger of one gloved hand, grasp the lashes of the upper lid and pull it out and down slightly .

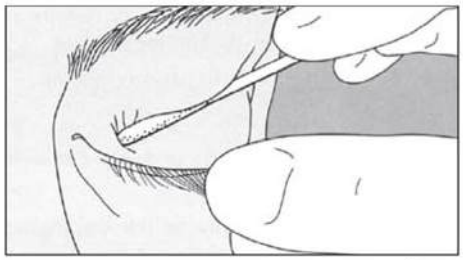


Fig. B Using your other hand, place the stick portion of a cotton-tipped applicator horizontally on the upper eyelid, approximately ½ inch above the margin of the eyelid .

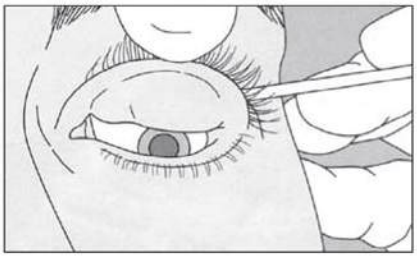


Fig. C Rotate the lid up and over the applicator stick to expose the conjunctival surface

c. Rotate the lid up and over the applicator stick to expose the conjunctival surface (Figure C).

After irrigation examine the eye carefully, apply a topical anesthetic, evert the lid and sweep with a wet cotton tipped swab to remove all blebs that might have an alkaline pH inside. Check for epithelial defects, corneal melting and other injuries . Administer topical cycioplegics, antibiotics and corticosteroid drops, then patch the eye and refer to ophthalmologist with your **record of treatment.**

!!! CENTRAL RETINAL ARTERY OCCLUSION

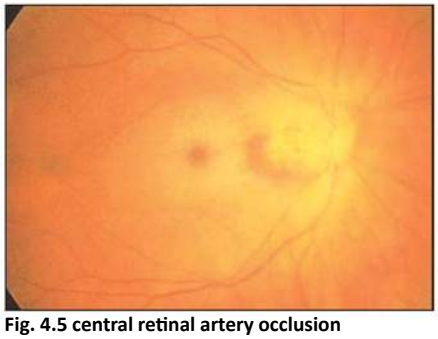


Fig. 4.5 central retinal artery occlusion

Patients with central retinal artery occlusion present with unilateral, acute, painless, severe loss of vision. It may result from embolic episodes in patients with carotid or cardiac disease and possibly be associated with giant cell (temporal) arteritis, collagen vascular disease, hypercoagulation disorders and trauma.
Affected patients show an afferent pupillary defect meaning that the pupil of the affected eye does not constrict to a bright light when the other eye is covered but does constrict when the opposite eye has the light shined in it. Fundus examination reveals retinal arterial narrowing and blood column segmentation. The retina is white or grey except for a cherry-red spot at the fovea, because it is perfused by the choroid. Over time, patients will develop inner retinal and optic atrophy. The prognosis of central retinal artery occlusion is generally poor (Fig. 4.5).

Treatment

Treatment for central retinal artery occlusion is urgent. Irreversible retinal damage is said to occur within 90 minutes, but treatment should be considered in a patient presenting within 24 hours of onset. The goal of treatment is to restore retinal blood flow.

1. Massage the globe digitally with enough pressure that it would take to dent a tennis ball
2. Administer acetazolamide 500 mg PO and/or instill topical timolol 0.5%.
3. Produce arterial dilation by having the patient breathe into a paper bag
4. Administer Papaverine 40 mg. IM.
5. Refer to ophthalmologist for a through medical evaluation.

!!! ACUTE ANGLE - CLOSURE GLAUCOMA

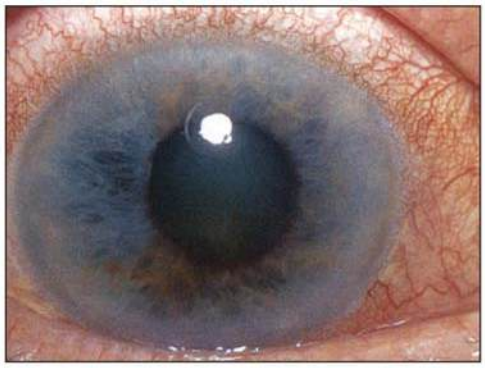


Fig. 4.6 acute angle–closure glaucoma

Aqueous humor normally flows from the posterior chamber to the anterior chamber through the pupil and then drains through the trabecular meshwork back to the venous circulation. Acute angle-closure glaucoma occurs when the iris becomes opposed to the trabecular meshwork, thus blocking aqueous humor drainage. Predisposing factors include a small, hyperopic eye, and a narrow chamber angle. Pupillary block leads to build-up of aqueous humor behind the iris, forward bowing of the iris, closure of the anterior chamber angle, and acute rise in the intraocular pressure. Pupillary block is more likely to occur when the pupil is mid-dilated. Therefore, attacks can be precipitated by topical mydriatics, systemic anticholinergics, stress, excitement, or dim illumination.

Because of the acute rise in IOP, patients may present with headaches, severe eye pain, nausea, and vomiting. Ocular injection is present and the cornea may be steamy due to epithelial edema. This gives the patient the perception of rainbow-colored halos around light and blurring or smoky vision.

On examination, patients show high IOP and ciliary flush (violaceous hue surrounding the limbus). The pupil is mid-dilated and sluggish. The anterior chamber is shallow (Fig. 4.6)

Treatment

Medical treatment is used initially to break the acute attack, paving the way for definitive surgical treatment

1. Instill a topical beta blocker 1 drop of timolol 0.5%
2. Instill pilocarpine 1 %-2% q. 15 minutes x 3
3. Administer Acetazolamide 250 mg. PO
   ! **Avoid in case of sulfa allergy**.
4. Administer systemic osmotic agents (glicerol PO)
   ! **Avoid this medication in patients with congestive heart failure**
5. Administer systemic analgesics.
6. IMMEDIATE referral to an ophthalmologist for laser or surgical treatment.

! OCULAR TRAUMA

Trauma to the eye or adjacent structures requires meticulous examination to determine the extent of injury. Conjunctival and corneal foreign bodies are the most common eye injuries but intraocular,-foreign bodies also occur.

SEEMINGLY MINOR TRAUMA CAN BE SERIOUS IF OCULAR PENETRATION IS UNRECOGNIZED OR IF SECONDARY INFECTION FOLLOWS A CORNEAL INJURY.

Trauma in which the globe has been or is likely to be disrupted or penetrated constitutes an emergy.

Because some lacerated globes may appear normal, you should maintain a high index of suspicion in cases that have a suggestive history.

Symptoms and signs of ocular perforation include significantly decreased vision, shallow or flat anterior chamber, altered size, shape, or position of pupil, marked conjunctival chemosis (clear fluid under the conjunctiva) or subconjunctival hemorrhage, and total (or large) hyphema.

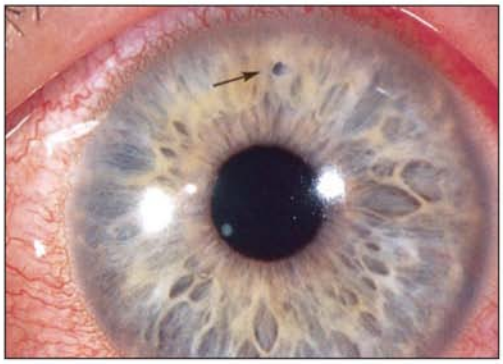


Fig. 4.7 Corneal foreign body

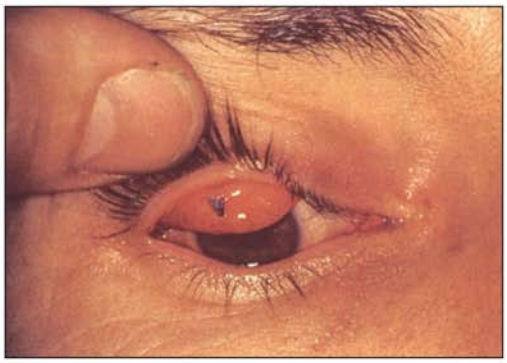


Fig. 4.8 Conjunctival foreign body

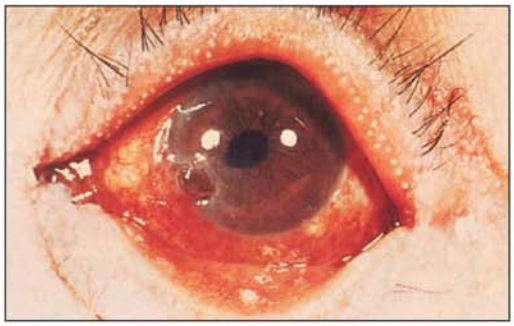


Fig. 4.9 Corneal perforation with iris prolapsed

POINTS TO REMEMBER

Avoid the following actions during the evaluation of a patient with a potentially ruptured globe:

- Manipulating the eyelids

- Performing motility testing (to avoid extrusion of intraocular contents)

- Applying pressure on the globe during the examination – (tonometry)

- Do not dilate the pupil in patients with head trauma (papillary signs might be important for neurologic evaluation) and patients with shallow anterior chamber.

- A shield should be taped over the eye as an interim measure to protect the eye from rubbing, pressure, and further injury prior to treatment by an ophthalmologist. The shield may consist of a perforated, malleable piece of metal, plastic, or a trimmed-down paper cup. Neither a patch nor an ointment is advisable.

- The patient should be prevented from eating or drinking anything in anticipation of surgical intervention. ◤

CHAPTER V

GLAUCOMA

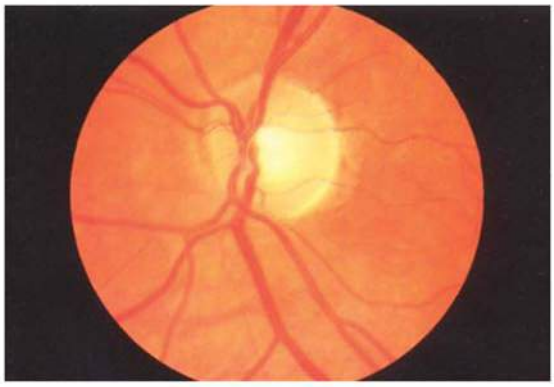


Fig.5.1

Glaucoma is an eye disease, which causes blindness due to increased intraocular pressure. The color of the optic nerve can be important in determining atrophy of the optic nerve due to glaucoma or other causes. Temporal pallor of the optic nerve (Fig. 5.1) can occur as a result of diseases that damage the nerve fibers, such as brain tumors or optic nerve inflammation, or in conjunction with glaucomatous cupping.

The term glaucomatous cupping refers to an increase in the size of the optic cup relative to the optic disc that occurs in glaucoma. The increase in the cup is due to loss of nerve fibers bundled in the optic nerve. This so-called cup-disc ratio is determined by comparing the diameter of the disc to that of the cup (Fig.5.2). The optic discs generally should appear symmetric between the eyes, an asymmetric cup:disc ratios should arouse suspicion of glaucoma. The larger the cup, the greater the probability of a glaucomatous optic nerve. A cup measuring one half the size of the disc or larger(a cup-disc ratio of 0.5 or more)raises suspicion of glaucoma (Fig.5.3).Disc hemorrhages (Fig.5.4) are also a possible sign of glaucoma. A large cup should be suspected if central pallor of the disc is prominent. Because the cup is a depressed area of the disc, retinal vessels passing over the disc are seen to bend at the edge of the cup, a useful sign in evaluating cup size.

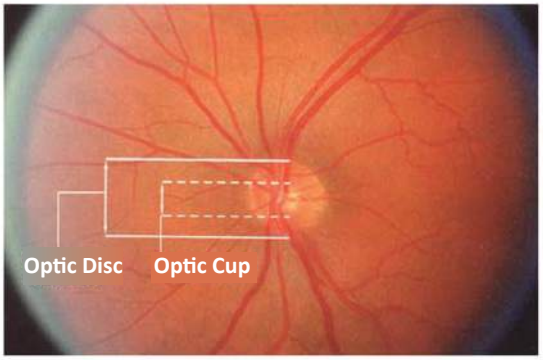


Fig.5.2

Fig.5.1 Temporal pallor of the optic nerve. Diseases that damage optic nerve fibers may result in temporal pallor of the optic nerve. Note the normal nerve color present only on the nasal aspect of the disc.

Fig.5.2 Cup-disc ratio. In this non-diseased optic disc, the cup is less than one half the diameter of the disc, indicating absent or low level of suspicion of glaucoma.

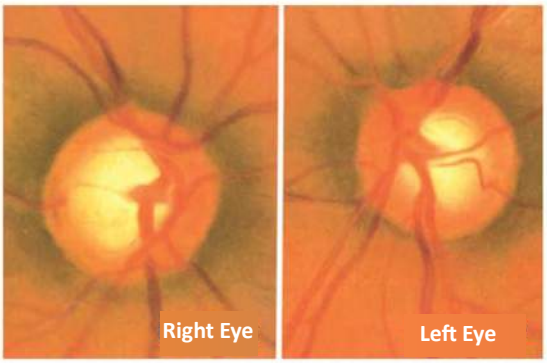


Fig. 5.3

Fig. 5.3 Glaucomatous cupping. Patient's right eye shows a cup-disc ratio of 0.8 (high level of glaucoma suspicion); the left eye shows a cup-disc ratio of 0.6 (moderate level of glaucoma suspicion). The asymmetry of cup-disc ratios here also raises suspicion of glaucoma.

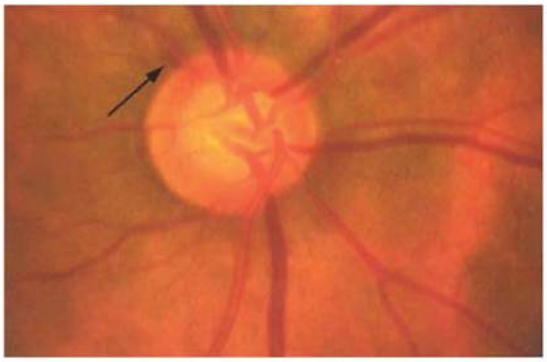


Fig. 5.4

Fig. 5.4 Disc hemorrhage. A hemorrhage on the optic disc may indicate glaucomatous damage. ◤

CHAPTER VI

OCULAR MANIFESTATIONES OF SYSTEMIC DISEASE

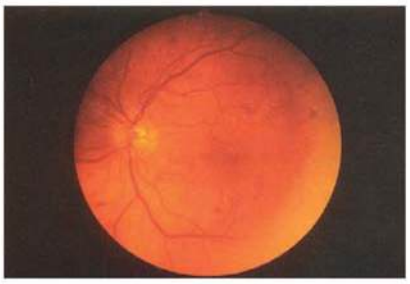


Fig.6.1

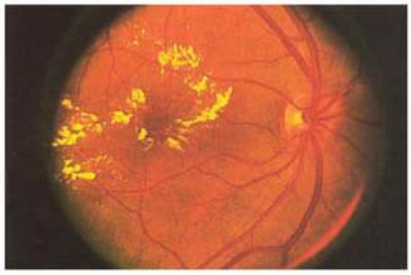


Fig.6.2

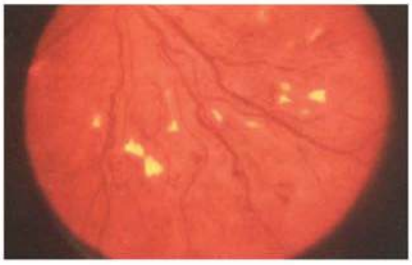


Fig.6.3

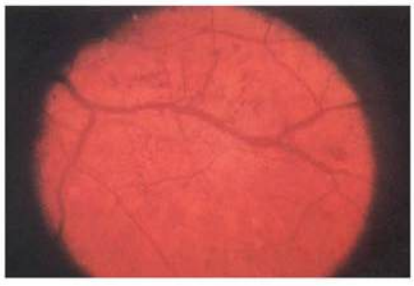


Fig.6.4

6.1 DIABETES MELLITUS

Diabetes mellitus is emphasized as an important example of a systemic disease that may have serious ocular manifestations: diabetic retinopathy. Treatment of diabetic retinopathy is geared toward the prevention of visual loss.

Fig.6.1 Non-proliferative diabetic retinopathy. Dot-and-blot hemorrhages and exudates are shown scattered throughout the posterior pole. Microaneurysms (pin-point dots) are difficult to see without high magnification.

Fig.6.2 Exudates in non-proliferative diabetic retinopathy. Clusters of hard, yellowish exudates are prominent in the superior aspect of the macula. The exudates extend to the fovea, threatening the central vision.

Fig.6.3 Cotton-wool spots in non-proliferative diabetic retinopathy. Microinfarctions of the nerve fiber layer produce the lesions shown. Cotton wool spots are opaque and white, have feathery edges and obscure the underlying blood vessels. Venous beading and telangiectasia of the retinal vasculature are shown.

Fig.6.4 Preproliferative diabetic retinopathy. Venous beading, intraretinal microvascular abnormalities, and dot and blot hemorrhages are shown.

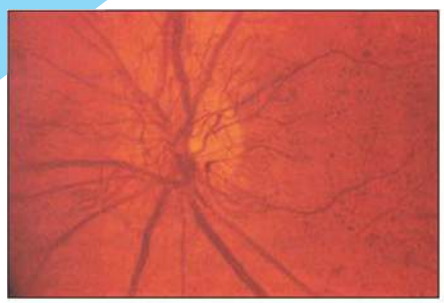


Fig.6.5

Fig.6.6

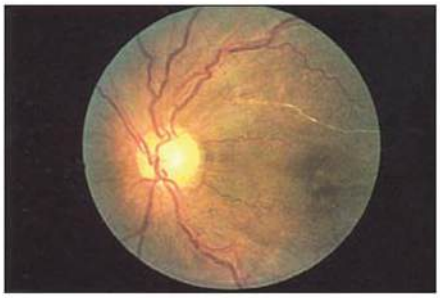


Fig.6.7

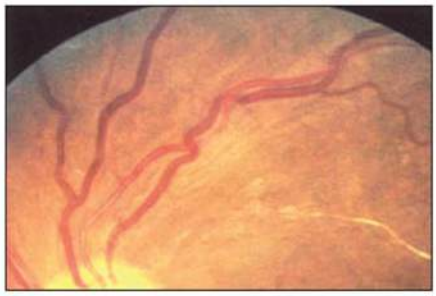


Fig. 6.8

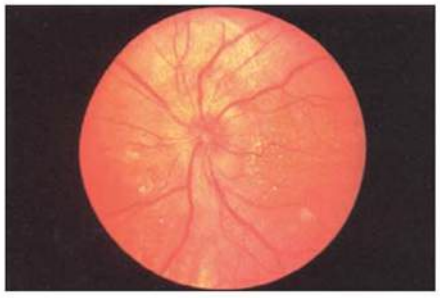


Fig. 6.9

Fig.6.5 Proliferative diabetic retinopathy. Shown here is more advanced neovascularizationof the optic nerve. These new vessels proliferate and extend into vitreous.

Fig.6.6 Panretinal argon laser photocoagulation. Shown here are old argon laser burns in the posterior pole of a diabetic patient with proliferative retinopathy. Initially the burns are white, but with time they develop variable pigmentation from chorioretinal scarring.

6.2 HYPERTENSIVE RETINOPATHY

Systemic hypertension causes hypertensive retinopathy

Fig.6.7 Hypertensive retinopathy. A single vessel with areas of copper-wiring and silver-wiring is visible in this fundus photograph of a patient with longstanding chronic hypertension.

Fig. 6.8 Arteriovenous (A/V) crossing changes. In this magnified view of previous photo, an abrupt right-angle change of a vein is visible at the first AV crossing, and nicking of the vein is seen at the second AV crossing.

Fig. 6.9 Malignant hypertension. This figure depicts the ocular findings associated with severe hypertension: optic disc swelling comparable to that of papilledema, hemorrhages, exudates, and cotton-wool spots. ◤

CHAPTER VII

POST-OPERATIVE CARE IN OPERATED PATIENTS

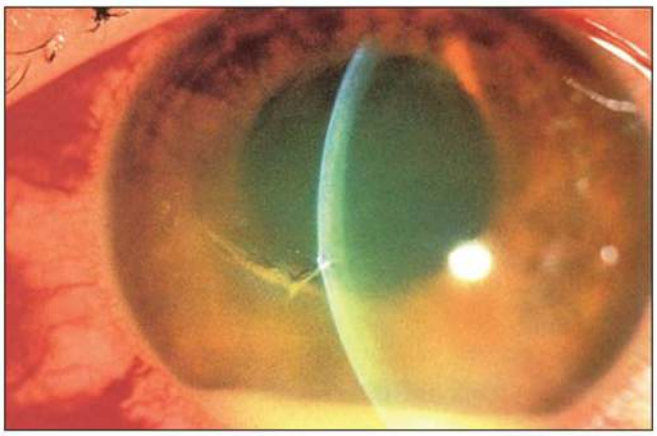


Fig. 7.1 Endophthalmitis

POST-OPERATIVE CARE

Postoperative care should be directed toward maintaining a clean and healthy post-op. eye. Healing and visual rehabilitation usually requires 4 to 5 weeks.
Although serious postoperative complications are not common, the family doctor must be able to recognize, diagnose them and immediately refer a patient.

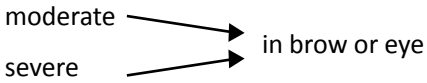
ENDOPHTHALMITIS (Fig. 7.1)

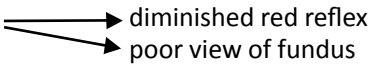
Salvaging an eye with endophthalmitis will usually depend on early diagnosis.

Symptoms

+ 1. Vision → decreasing vision
→ significantly decreasing vision
→ near loss of vision

± 2. Erythema and edema of lid
± 3. Discharge purulent on the ocular surface





+ symptoms present
- symptoms absent

Emergent Referral Necessary if

the patient in the post-op period has:

!
- ❑ **Sudden vision loss**
- ❑ **Severe pain**
- ❑ **Nausea or vomiting**
- ❑ **Severe swelling around the eye**

Immediately needed treatment

- ❑ 1. Warm compresses
- ❑ 2. Antibiotic drops **each hour -** Ciprofloxacine 0.3 % or
  Moxicin 0.5 % or
  Tobramycine 0.3 %

After glaucoma surgery if a patient has a painful eye
and a shallow anterior chamber is not present, prescribe:

- ❑ 1. Warm compresses
- ❑ 2. Antibiotic drops (Ciprofloxacine 0.3 % or Moxicin 0.5 % or Tobramycine) each hour
- ❑ 3. Diamox 250 mg oral. ◤

Chapter VIII

HOW TO KEEP THE HEALTHY EYES THROUGHOUT THE LIFE SPAN

- Children eye exams, starting from 2-3 years old.
- Child eye exams completed by the mother (alternatively covering the eye). Consult a doctor in a case of difference between eyes and evidence of strabismus.
- Wear protective eye glasses working with severe chemicals and during dangerous work possibly causing injury of the eye.
- Wear sunglasses to protect the eyes from harmful sunlight.
- Regular eye check-ups for the individuals 40 years old or younger in case of family history of glaucoma or other eye diseases.
- Regular annual eye check-ups by ophthalmologist for patients suffering from **diabetes mellitus.**
- Management of blood pressure and sugar levels can helpprevent future ocular complications.
- Light flashes and swimming spots in front of the eye can represent the first signs of retinal detachment, specifically in cases with high myopia, requiring urgent referral.

Information on the Eye Chemical Burns.

Many individuals Everybody will be familiar with the following main postulates:

1. Chemical burn could cause severe eye damage in a short period.
2. In case of a chemical burn, each person is able to help himself or everybody.
3. Prior to the doctor's consultation, conducting continuous irrigation for 30 minutes, keeping the eye open with clean tap water or any available water or sink the face into a basin.
4. Prolonged irrigation of the eye will prevent further damage and could potentially save the vision.

Chapter IX

DIAGNOSTIC GUIDE

A family doctor frequently encounters patients with moderate symptoms, but also patients whose complaints correspond to severe ocular disorders.
A family doctor will be able to differentiate severe and mild ocular disorders and make a decision in which case he/she is able to treat the patient himself/herself or if the patient will be referred to an ophthalmologist.
Find below eight Diagnostic flow sheets, four of them are on the "Red Eye". The list of symptoms and signs, presented below are intended for more successful use of diagnostic flow sheets.

THE RED EYE

History
Signs to be revealed

- ❑ itching
- ❑ burning sensation
- ❑ sand sensation
- ❑ tearing
- ❑ foreign body sensation
- ❑ pain
  - intermittent / permanent
  - diffuse / local
- ❑ photophobia
  - mild / severe
- ❑ cloudy vision

  Preliminary history: trauma or eye surgery or contact lens or working with metal (striking metal on metal)
- ❑ co-existing signs
  - nausea / vomiting
- ❑ Halo vision
  - rainbow circles surrounding a light source

  Pay attention on the following symptoms
- ❑ exophthalmus / enophthalmus
  - trauma : yes / no
- ❑ ptosis
- ❑ abnormalities of the lower eyelid.
  - everted eyelid
  - eyelid droop
  - inverted eyelid
    - constantly
    - after pressure
- ❑ eyelid edema
  - diffuse / local
  - in the nasal corner
- ❑ eyelashes touch upon the eye
- ❑ both eyes eyelid crusting
- ❑ conjunctiva
  - discharge

  serous / purulent
  - redness in the nasal corner
  - nodule
  - subconjunctival hemorrhage
- ❑ opacification of the cornea

- foreign body on the cornea

❑ anterior chamber
- hyphema
- hypopyon

❑ pupillary abnormalities
- Trauma History: yes / no
• irregularity
• distortion

❑ Pupillary reaction to light
- pupillary reaction to light: yes / no
- dilate to mid-dilated position and remain fixed
- constrict
- afferent pupillary defect

❑ Double vision
- monocular (in one eye)
- binocular (in both eyes)

Obligatory examinations

❑ Visual acuity measurement
- with lenses
- with pinhole

❑ Intraocular pressure measurement

❑ Ocular motility testing
- volume of movements
- presence of pain: yes / no

❑ In case of eyelid / nose edema
- purulent discharge after pressing
- dacryocystitis

❑ In case of injury
- do not press the eye

❑ If injury is not clearly present
- evert the eyelid to check for foreign body or chalazion

❑ Nodule on the conjunctiva
- episcleritis
- scleritis

❑ Topical anesthetic
- decrease of
• pain
• foreign body sensation

❑ After topical Phenylephrin differentiate
- conjunctival hyperemia
- episcleritis

❑ Fluorescein Staining of Cornea

❑ Consensual pupillary reaction
- pupil remains dilated
- pupil remains constricted

❑ Preauricular lymphatic nodule
- pain: yes / no

GLOSSARY

TERM	EXPLANATION
A	
accommodation	The change in the curvature of the crystalline lens which helps to focus images of objects close to the eye
age-related macular degeneration	A disease in which sensory cells of the macula degenerate, resulting in a loss of central vision; affects older people
Amsler grid test	A test for determining the presence and location of defects in the central portion of the visual field
anisocoria	A condition in which the pupils are of unequal size
anterior chamber	The small compartment between the cornea and the iris that is filled with a clear, transparent fluid called aqueous humor
anterior chamber angle	The junction of the cornea and the iris, from which aqueous humor leaves the eye. Also called filtration angle
aphakia	Absence of the lens, usually because of cataract extraction
aphakic correction	The use of a contact lens, eyeglasses, or an intraocular lens correct for the removal of the human natural lens.
aqueous humor	The clear, transparent fluid that fills the anterior chamber
astigmatism	The refractive error of an eye whose corneal surface curvature is greater in one direction than another; both distant and near objects appear blurred and distorted
B	
binocular vision	The blending of the separate images seen by each eye into one image; occurs when both eyes are directed toward a single target and perfectly aligned
blepharitis	A common inflammation of the eyelid margin
blowout fracture	An injury due to blunt trauma, in which orbital bones, usually inferior, are broken
C	
cardinal positions of gaze	The six points to which a patient's eye are directed to test extraocular muscle function: the positions are right and up, right, right and down, left and up, left, and left and down

cataract	An opacified (clouded) lens
chalazion	A nontender lump that may become visible on the outer lid; due to long-term inflammation and infection of a meibomian gland
chief complaint	The principle reason for the patient's visit to the doctor, defined by the nature and duration of the patient's symptom and by whether the problem is worsening
choroid	A layer of tissue, largely made up of blood vessels, that nourishes the retina, it lies between the sclera and the retina in the uveal tract
ciliary body	A band-like structure of muscle and secretory tissue that extends from the edge of the iris and encircles the inside of the sclera
ciliary muscle	The muscle fibers in the ciliary body of the uveal tract that are involved in accommodation
concave lens	A piece of glass or plastic in which one or both surfaces are curved inward. Also called negative lens or minus lens
confrontation field test	A test comparing the boundaries of the patient's field of vision with that of the examiner, who is presumed to have a normal field
congenital glaucoma	A rare disease that occurs in infants; due to a malformation of the anterior chamber angle
conjunctiva	The thin, translucent mucous membrane that lines the inner surface of the eyelids and outersurface of the globe, excluding the cornea
conjunctivitis	A swelling of the small conjunctival blood vessels, making the conjunctiva appear red. Also called pink eye
convex lens	A piece of glass or plastic in which one or both surfaces are curved outward. Also called positive lens or plus lens
cornea	The clear membrane at the front of the globe that begins the process of focusing light the eye receives
corneal abrasion	A scratch of the corneal epithelium
corneal epithelium	The outermost layer of the cornea, providing defense against infection and injury
corneal ulcer	A lesion after an infection of or injury to the corneal epithelium
cover-uncover test	A test performed by alternately covering and uncovering each eye to determine if a patient's eyes are misaligned

D

dacryocystitis	Inflammation of the lachrymal sac, usually caused by blockage obstruction of the nasolacrimal duct
dendritic keratitis	"Branch-shaped" defect of corneal epithelium anomalies, such as the corneal ulcers seen after infection with the herpes simplex virus
diabetic retinopathy	A progression of pathologic changes in the retina; produced by long-standing diabetes mellitus
diplopia	Double vision
direct and consensual pupillary reaction	The response of the pupils when light is shone in one eye: that eye constricts (direct reaction) and the other eye also constricts, even when light does not reach it (consensual reaction)
direct ophthalmoscope	A hand-held instrument with a light-and-mirror system that affords an upright, monocular view of a narrow field of the fundus, magnified 15-fold
distance between optical centers (DBC)	The distance between the optical center of the right lens and that of the left; corresponds to the patient's interpupillary distance

E

ectropion	A condition in which the lower eyelid margin is pulled away from the eye; caused by malformation of or damage to the eyelid tissues
endophthalmitis	A serious ocular bacterial infection with inflammation of the vitreous and adjacent tissues
entropion	A condition in which the upper or lower lid margin is turned inward
episcleritis	Inflammation of the surface layer of the sclera
exophthalmos	A condition characterized by a protruding eyeball; caused by an increase in volume of the orbital contents. Also called proptosis
external hordeolum	A reddened, sore lump near the outer edge of the eyelid; caused by an inflamed lash follicle. Also called stye
extraocular muscles	The six muscles that attach to the outside of the globe and control its movements
eyeball	The eye, without its surrounding structures. Also called globe
eyelid	The moving fold of skin that covers the outer portion of the globe

F

flashlight test	A simple test for estimating the depth of the anterior chamber and the chamber angle
floaters	Small particles of dead cells or other debris that become suspended in vitreous, or particles of the vitreous itself that degenerate in the normal aging process; they cast shadows on the retina and appear as spots or cobwebs
fornix	The loose pocket of conjunctival tissue where the eyelid and globe portions of the conjunctiva meet beneath the upper and lower lids. Also called cul-de-sac
fovea	The center of the macula
fundus	A collective term for the retina, optic disc, and macula
funduscopic examination	Examination of the vitreous and fundus by ophthalmoscope. Also called posterior segment examination

G

glaucoma	An eye disease in which the intraocular pressure is high enough to cause damage to the optic nerve, resulting in visual loss; caused by impaired drainage of the aqueous fluid out of the eye

H

hyperopia	Farsightedness; the eye is too short for its optical system
hyphema	The pooling of blood in the anterior chamber as a result of trauma or certain diseases
hypopyon	The accumulation of pus in the anterior chamber

I

internal hordeolum	A lump on the inner or outer eyelid; caused by inflammation and infection of a meibomian gland
intraocular pressure	Fluid pressure within the eye
iris	The color circle of tissue that controls the amount of light entering the eye by enlarging or reducing the size of its aperture, the pupil
iritis	Inflammation of the iris

K

keratitis	Inflammation of the cornea

L

lacrimal gland — The gland that produces the watery substance making up the middle layer of the tear film; located in the lateral part of the upper lid

lacrimal sac — The sac that holds tears after they pass through the canaliculi, which empty through the nasolacrimal duct into the nasal cavity

lens — Part of the optical focusing system of the eye, immediately behind the iris. Also called crystalline lens

limbus — The junction between the sclera and the cornea

M

macula — The specialized area of the retina close to the center of the back of the eye that provides detailed central vision

macula meibomian gland — A specialized gland that secrets the oily part of the tear film that lubricates the outer surface of the globe; located on the inner margin of the eyelid (the edge closest to the globe)

myopia — Nearsightedness; the eye is too long for its optical system

N

near visual acuity — The ability to see clearly at a normal reading distance

nystagmus — A condition in which the eyes continually shift in a rhythmic side-to-side or up-and-down motion and then snap back to the normal position

O

oculomotor nerve — The third cranial nerve, which supplies the impulses that activate the superior, medial, and interior rectos muscles, the interior oblique muscle, and the orbicularis oculi muscle

opacification — Clouding of the lens; occurs in many people over age 65

ophthalmia neonatorum — Conjunctivitis in a newborn

ophthalmoscope — An instrument for examining directly or indirectly the vitreous and fundus

optic disc — The location where the central retinal artery enters and the central retinal vein, as well as the nerve, exits. Also called optic nerve head

optic nerve — The nerve that carries electric impulses to the brain's visual cortex, where they are integrated to produce the sensation of sight

optic neuritis	Inflammation of the optic nerve; can produce a sudden, but reversible, loss of sight
orbit	The bony cavity in the skull that houses the globe, extraocular muscles, blood vessels, and nerves
orbital cellulitis	A defuse infection of tissue in the orbit, causing grossly swollen eyelids and red eye, sometimes without proptosis

P

papilledema	A swelling of the optic disc with engorged blood vessels; caused by increased fluid pressure within the skull
peripheral vision	The visual perception of objects and space that surround the direct line of sight
pigment epithelium	The outer layer of the retina; lies against the choroid
presbyopia	The progressive loss of the accommodative ability of the lens, due to natural processes of aging
primary angle-closure glaucoma	A form of glaucoma in which the natural age-related increase in the size of the lens, lens blocks the flow of aqueous through the pupil, gradually bowing the iris
primary open-angle glaucomav	A form of glaucoma in which the pressure inside the eye is elevated because of increased resistance to aqueous drainage in the outflow channels; accounts for 60% to 90% of glaucoma in adulthood
pterygium	A wedge-shaped growth on the bulbar conjunctiva
ptosis	Drooping of and inability to raise the upper eyelid; caused by the levator muscle's inability to function
pupil	The opening in the center of the iris that enlarges (admitting more light) and constricts (admitting less light)

R

refractive error	A nonpathologic deficiency in the eye's optical system
retina	The inner lining of the posterior segment of the eyeball; consists of a layer of light-sensitive cells that convert images from the optical system into electric impulses sent along the optic nerve for transmission to the brain
retinal detachment	The separation of the sensory layer from the pigment layer of the retina

retinitis pigmentosa	A hereditary, progressive retinal degeneration that may lead to blindness

S

sclera	The outer fibrous tissue of the globe, which surrounds the cornea and forms the wall of the eye; protects intraocular contents
scleritis	Inflammation of the sclera
strabismic amblyopia	The tendency of a child's brain to suppress the image from the deviating eye
strabismus	A misalignment of the eyes that may cause vision to be disturbed; occurs when the extraocular muscles do not work in a coordinated manner
subconjunctival hemorrhage	A rupture of a conjunctival blood vessel that allow blood to flow under the tissue and produces a bright-red flat area on the conjunctiva

T

tarsus	The dense, plate-like framework within the middle layer of each eyelid that gives the eyelids their firmness and shape. Also called tarsal plate
tonometer	An instrument for measuring intraocular pressure
tonometry	The measurement of intraocular pressure by means of a tonometer; useful in the diagnosis of glaucoma

U

uveal tract	The pigmented layers of the eye (iris, ciliary body, and choroid) that contain the majority of the blood vessel supply. Also called uvea

V

visual acuity	The ability to discern fine detail
vitreous	The clear, jelly-like substance that fills the space behind the lens. Also called vitreous body

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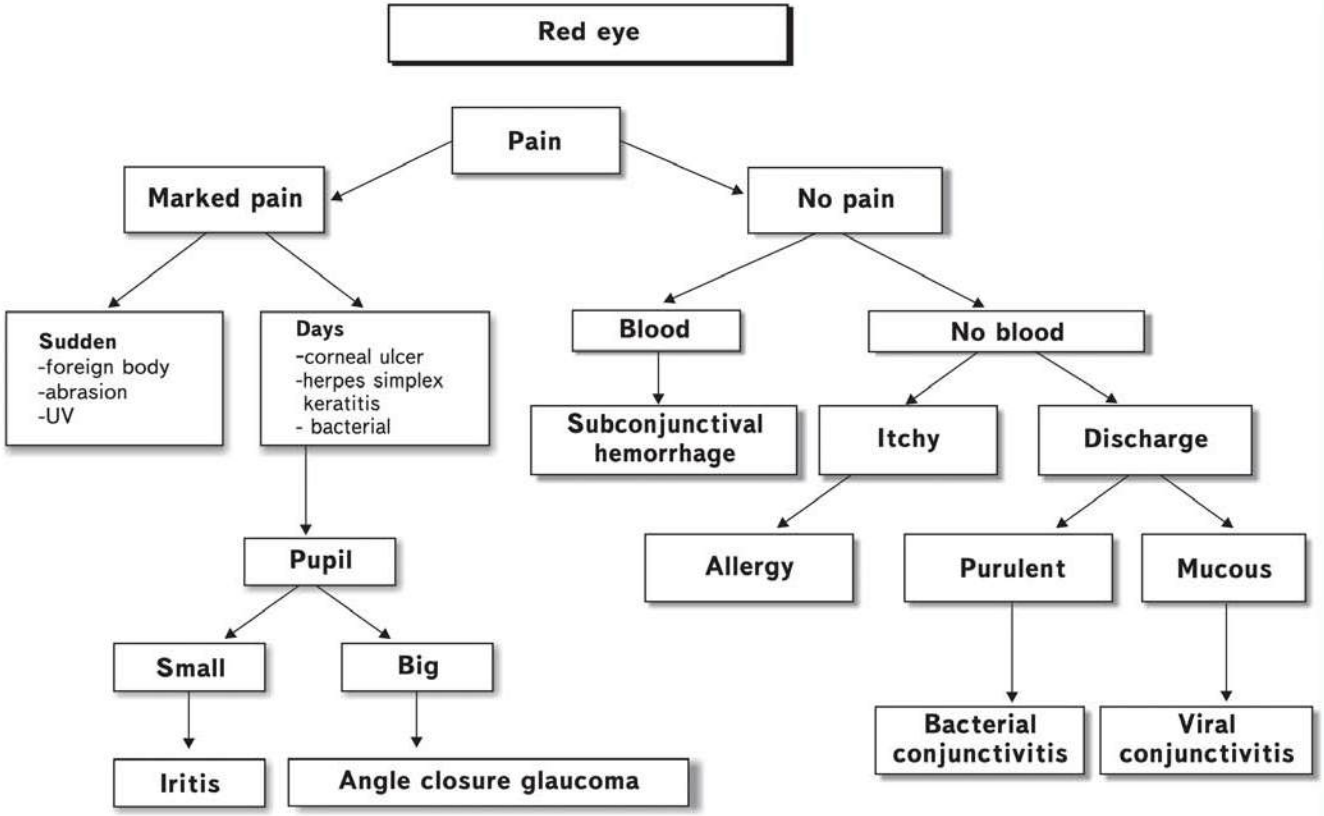
PAINFUL AND PAINLESS RED EYE



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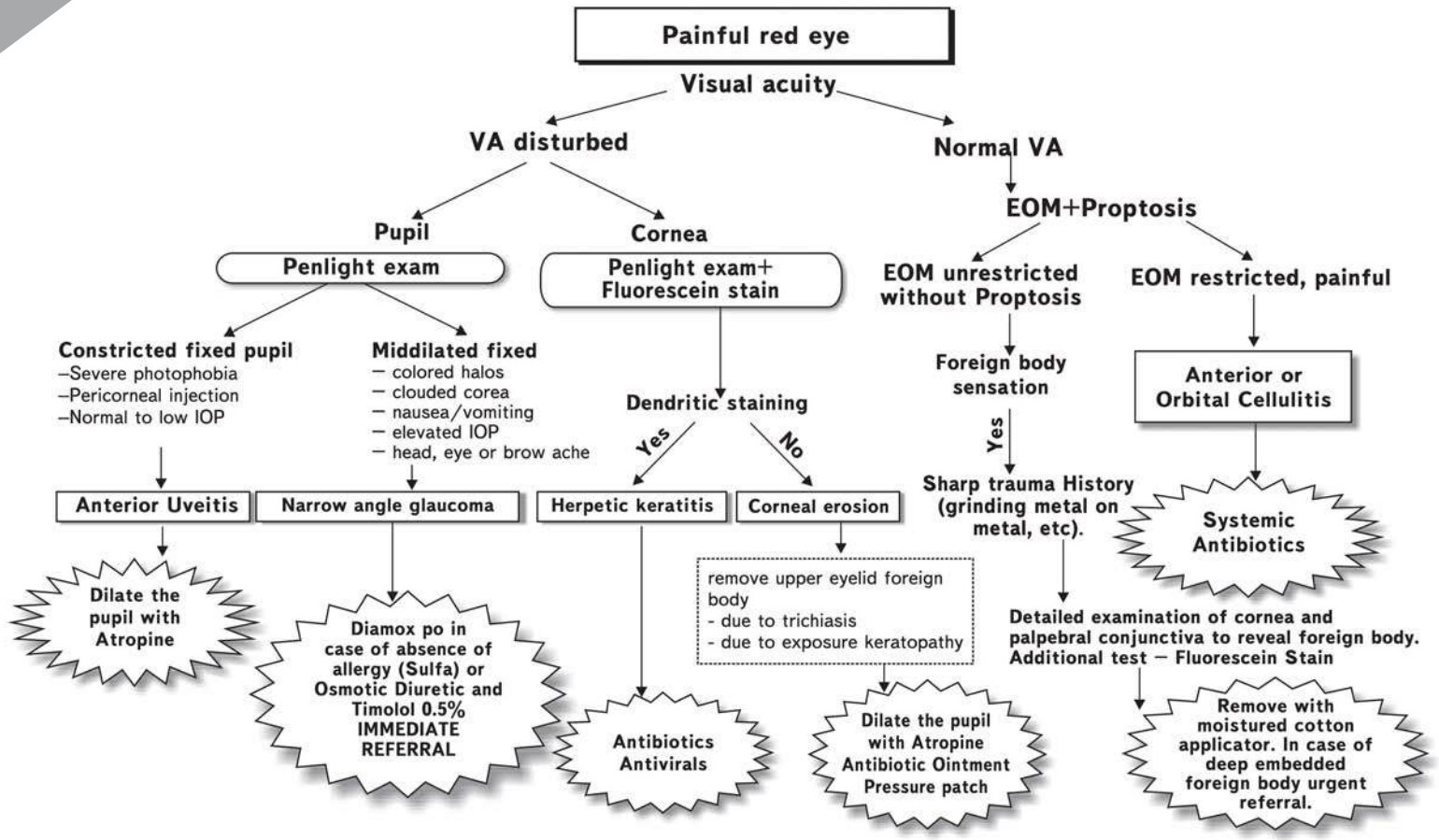
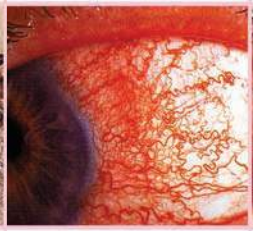
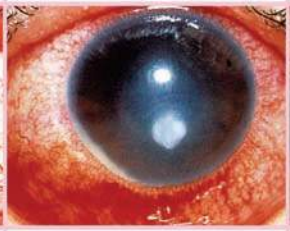
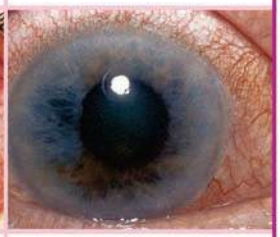
RED EYE WITH AND WITHOUT VISION LOSS

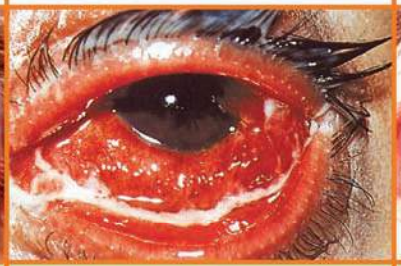
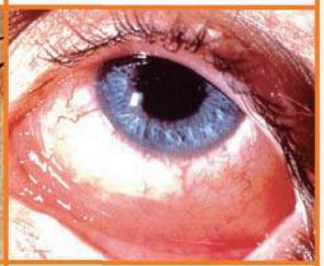


19.3 THE RED EYE: DIFFERENTIAL DIAGNOSIS

Diagnosis / Signs	Conjunctivitis	Iritis	Keratitis (corneal inflammation or foreign body)	Acute Glaucoma
Vision	Normal or intermittent blurring that cleans on blinking	Slightly blurred	Marked blurring	Marked blurring
Discharge	Usually significant with crusting of lashes	None	None to mild	None
Pain	None or minor and superficial	Moderately severe, aching and photophobia	Sharp,severe foreign body sensation	Very severe head, brow or eyeache, frequent nausea and vomiting
Pupil size	Normal	Constricted	Normal or constricted	Dilated
Conjunctiva; injection	Diffuse	Circum corneal	Circum corneal	Diffuse with prominent circum corneal injection
Pupillary response to light	Normal	Minimal further constriction	Normal	Minimal or no reaction of dilated pupil
Intraocular pressure	Normal Caution: After measurement clean the instrument thoroughly	Normal to low	Normal Caution: Do not measure	Elevated
Appearance of cornea	Clear	Clear or slightly hazy	Opacification present: altered light reflex; positive fluorescein staining	Hazy, altered light reflex Poor iris details compared with opposite eye
Anterior chamber depth	Normal	Normal	Normal	Shallow
DIAGNOSIS				
MANAGEMENT	Antibiotic drops (0.3% Gentamycin 4 times a day) and ointment (Erythromycine or Gentamycine) at bedtime for 5 days	Dilate the pupil with Atropine 1% 2x daily Steroids topically, if not responding then periocular injections, in severe cases systemic steroids	In case of keratitis or corneal ulcer Antibiotics+Antivirals	Timolol 0.5% and Pilocarpine 1-2% 3 times each 15 min. Diamox 250mg per os in case of absence of allergy (sulfa) or osmotic diuretic

4

DIFFERENTIAL DIAGNOSIS OF CONJUNCTIVITIS

Ethiology / DIAGNOSIS	Viral	Bacterial Purulent	Allergy
Discharge	Minimal	Copious	Minimal
Tearing	Copious	Moderate	Moderate
Itching	Minimal	Minimal	Marked
Injection	General	General	General
Preauricular Node	Common	Uncommon	-0-
Associated Sore Throat and Fever	Occasional	Seldom	-0-
DIAGNOSIS			

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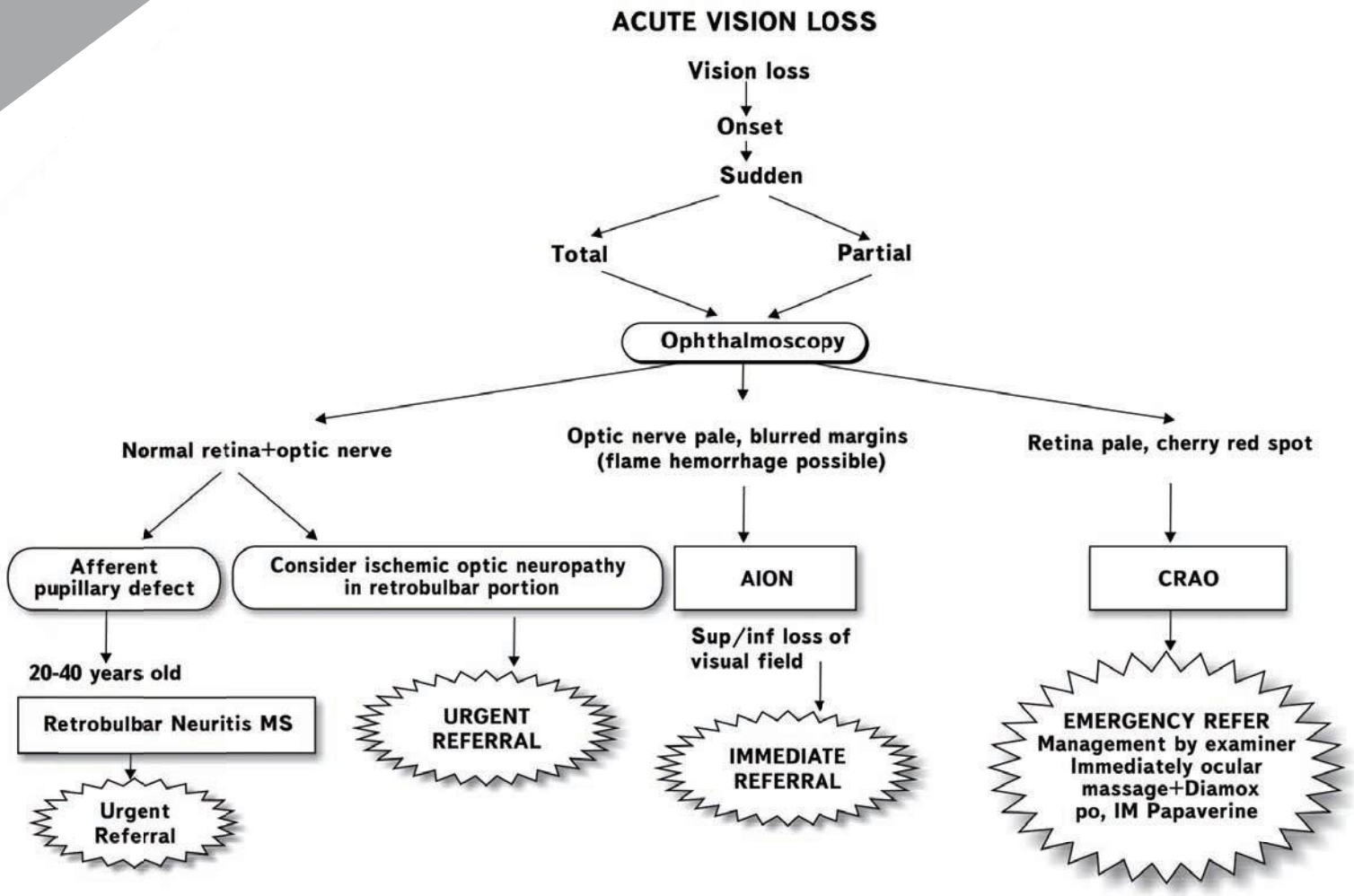
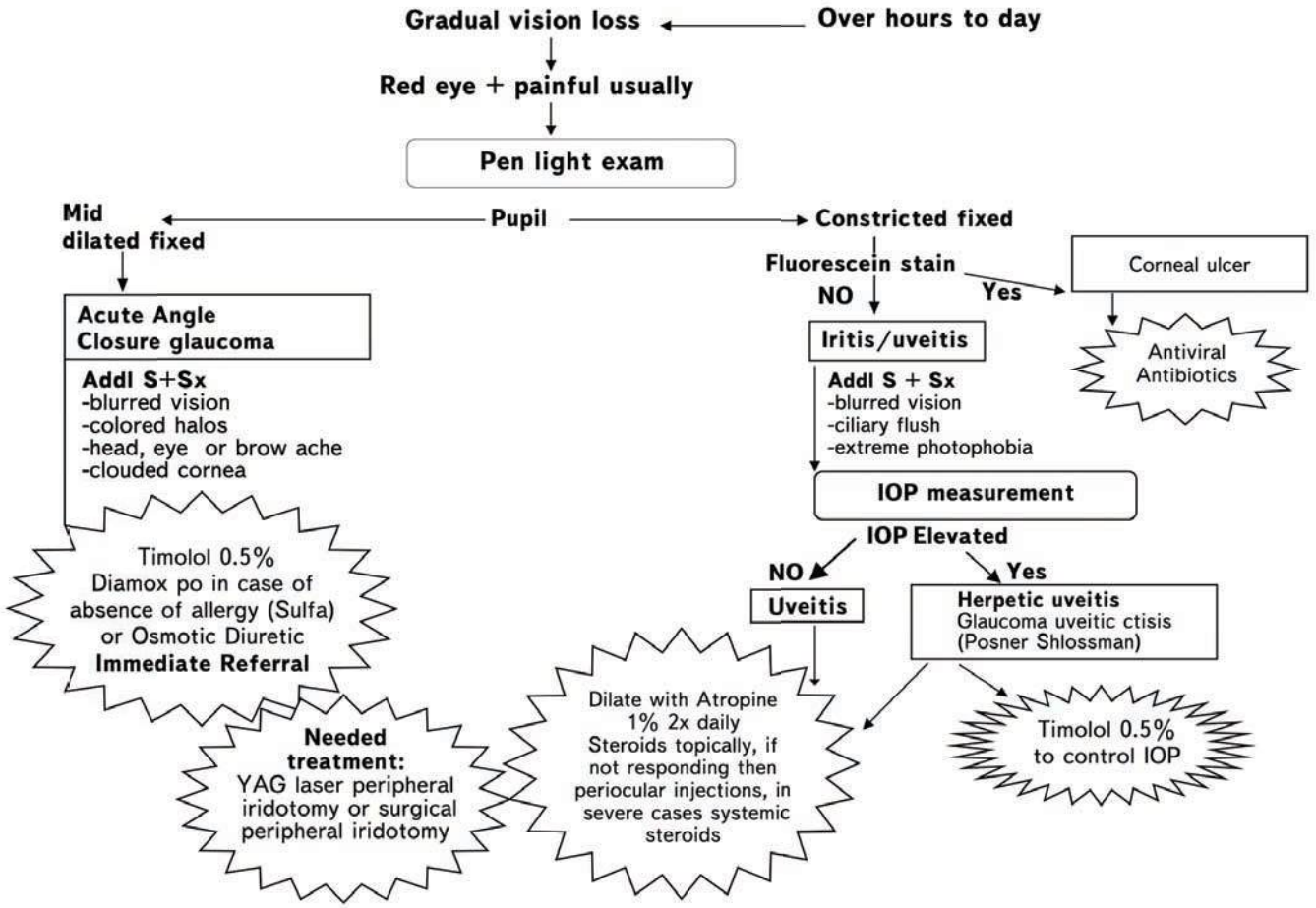

ACUTE VISION LOSS
Vision loss
Onset
Sudden
Total
Partial
Ophthalmoscopy
Normal retina+optic nerve
Optic nerve pale, blurred margins (flame hemorrhage possible)
Retina pale, cherry red spot
Afferent pupillary defect
Consider ischemic optic neuropathy in retrobulbar portion
AION
CRAO
20-40 years old
Retrobulbar Neuritis MS
Urgent Referral
URGENT REFERRAL
Sup/inf loss of visual field
IMMEDIATE REFERRAL
EMERGENCY REFER
Management by examiner
Immediately ocular massage+Diamox po, IM Papaverine

GRADUAL VISION LOSS OVER HOURS TO DAY



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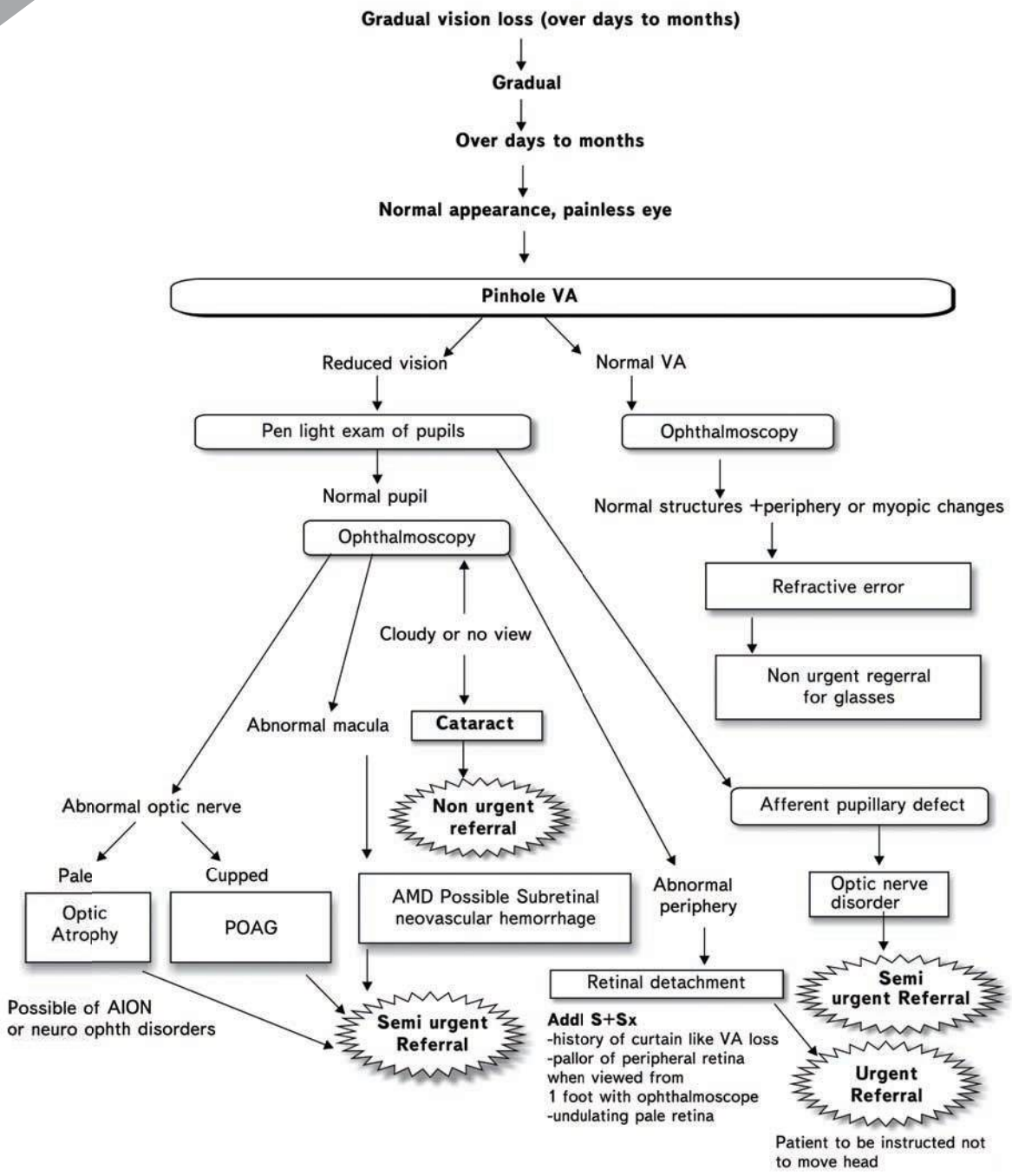
GRADUAL VISION LOSS OVER DAYS TO MONTHS



8

DOUBLE VISION