Journal of Advances in Medicine and Medical Research

26(10): 1-10, 2018; Article no.JAMMR.42189
ISSN: 2456-8899
(Past name: British Journal of Medicine and Medical Research, Past ISSN: 2231-0614, NLM ID: 101570965)

Pearls of Clinical Examination of the Eyes for Family Medicine Practitioners

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Authors' contributions

This article was written in collaboration between both authors. Author SCR designed the study and wrote the draft of the paper. Author KAD contributed in the introduction, literature search and corrected the draft of the paper. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMMR/2018/42189
Editor(s):
(1) Barbara Giambene, Department of Translational Surgery and Medicine, University of Firenze, Italy.
Reviewers:
(1) Rodrigo Fabri Berbel, Universidade Estadual de Londrina, Brazil.
(2) Ugur Acar, World Eye Hospital, Turkey.
Complete Peer review History: http://www.sciencedomain.org/review-history/25030

Clinical Practice Article

Received 18th March 2018
Accepted 30th May 2018
Published 7th June 2018

ABSTRACT

Many eye diseases can be diagnosed with penlight and direct ophthalmoscope available in the general practitioner's clinic. Proficient ocular examination technique and visual recognition skill are essential to diagnose them. Examination of the eyes can help in diagnosing systemic diseases and assessing their progression because ocular involvement is observed in a majority of the systemic diseases. The signs observed on clinical examination are unique in the sense that one eye sign is specific of a particular eye disease. All the signs seen in different structures of the eye are summarized with the diseases in which they are seen in this article. Hence, this article is useful as a quick reference to the family medicine practitioners to interpret the eye signs and assist in the diagnosis of the common eye diseases as they are often the first port of call in the community.

Keywords: Eyelids; conjunctiva; cornea; iris; pupil; lens; retina; visual acuity; fundus examination.

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1. INTRODUCTION

Eye conditions are frequently treated in the health centers and district hospitals under the Ministry of Health in any country by medical officers and in the private clinics by family medicine practitioners. All the doctors undergo very little training in ophthalmology during their medical course/ residency period. The prevalence of ophthalmic problems in general practice has been reported to be 1.5% in United Kingdom [1] and 2.2% in Australia [2]. Red eye is the most common presentation of eye problem in general practice and the common clinical diagnosis is infective conjunctivitis followed by allergic conjunctivitis [1]. It is also interesting to note from the available literature that the patients with acute red eye problems presenting to the health care providers were often misdiagnosed or mismanaged [3]. Reddy et al. [4] reported from their community study of patients above the age of 40 years conducted in Sepang district of Selangor state in Malaysia.that refractive errors (56%) are the most common eye problem followed by cataract (20%).

Irrespective of age, regular eye checkup for early detection of eye problems is essential for the whole family and the patients go to their family physicians first for consultation. The eye signs are unique in the sense that one diagnostic sign is specific of one eye disease. Adults as well as children with eye problems (swelling in the eyelids - hordeolum (stye), chalazion; poor vision - refractive error, cataract; deviation of one eye - strabismus etc) consult the family doctors/ general practitioners first, before being referred to the eye specialist. There is also a limited range of equipment in their clinics for eye examination; and therefore, any sight threatening disease should be immediately referred to the eye specialist for further management.

The objectives of this article are (i) to aid in the interpretation of the signs seen in the different structures of the eye which may help the family medicine practitioners to diagnose the eye problems in their clinics and refer the sight threatening lesions to the eye specialist for further management, and (ii) to help the trainees in family medicine residency programme to update their ophthalmology knowledge during their routine work in the clinic/ward when they see patients.

2. HISTORY TAKING

The common eye symptoms which the patients may tell to the doctor includes defective vision (blurring of vision, diminished vision, loss of vision), pain, redness, watering, discharge, sensitivity to light (photophobia), itching, injury to eye, deviation of eye to one side (squint), swelling of eye, double vision (diplopia), sandy feeling in the eyes, irritation, dry eyes, discomfort, ropy/threadlike mucus discharge (symptoms of dry eye), heaviness in the eyes, eye strain, one eye smaller than other eye (ptosis), protrusion of eye (proptosis), headache, black spots in front of eye (floaters), flashes of light, curtain like shadow in one area of vision, defective colour vision. When the following eye symptoms are told by the patients, the family physicians should keep in mind the common eye diseases in which they occur [5].

Redness of eye(s): (a) differential diagnosis of painful red eyes includes corneal abrasion, corneal foreign body, corneal ulcer/ keratitis, iridocyclitis, acute congestive (angle closure) glaucoma, endophthalmitis, chemical injury, perforating injury eye, scleritis, acute dacryocystitis.

(b) Differential diagnosis of painless red eyes are conjunctivitis (bacterial, viral, allergic) dry eye, subconjunctival haemorrhage, pterygium, episcleritis, chronic dacryocystitis.

Regarding loss of vision the differential diagnosis includes the following conditions.

Sudden loss of vision: (a) Painful -- acute congestive glaucoma, acute iridocyclitis, corneal ulcer/keratitis, endophthalmitis, retrobulbar optic neuritis, perforating injury of eye.

(b) Painless -- central retinal artery occlusion, central retinal vein occlusion, retinal detachment, ischemic optic neuropathy, vitreous haemorrhage.

Gradual loss of vision: Refractive error, corneal opacity, cataract, open angle glaucoma, retinitis pigmentosa, age related macular degeneration, optic atrophy.

Double vision: (a) monocular -- astigmatism, keratoconus, subluxation of lens, pterygium with symblepheron, (b) binocular -- III, IV, VI cranial nerve palsy, myasthenia gravis, thyroid eye diseases, blow out fracture of the orbit.

Watering of eye: (a) Epiphora due to obstruction of nasolacrimal duct – chronic dacryocystitis, acute dacryocystitis, congenital dacryocystitis in neonates,

(b) Lacrimation due to irritation/inflammation/ infection in the eye -- foreign body on the cornea, entropion, ectropion ,lagophthalmos, conjuncti-vitis, corneal ulcer, iridocyclitis, injury to the eye.

3. CLINICAL EXAMINATION OF EYE

The instruments required for eye examination by family medicine practitioners/medical officers in a clinic are penlight, direct ophthalmoscope, Snellen chart, and fluorescein staining strips, anaesthetic drops (xylocaine), and cotton buds. After taking the history, both eyes are examined (eyelids, conjunctiva, sclera, cornea, anterior chamber, iris, pupil, lens), one after the other, with a penlight showing good illumination. The affected eye should be compared with the unaffected eye to find out the abnormality. Then, extraocular muscle movements are tested to find out III, IV, VI cranial nerve palsies. Intraocular pressure is assessed with digital (fingers) tonometry since the non-ophthalmologists will not have any tonometers (instruments to measure intraocular pressure). Lacrimal sac regurgitation test is performed to find out any obstruction of nasolacrimal duct. Visual fields are tested by confrontation method. Finally, fundus examination (optic disc, blood vessels, retinal background, macula) is done with direct ophthalmoscope.

4. VISUAL ACUITY

Visual acuity is recorded using Snellen charts. It is the measurement of the ability to discriminate two stimuli separated in space at high contrast compared with the background. Since the vision indicates the functional status of the eye, it is very important to test vision before proceeding with examination of eye. Vision chart (English letters or E chart) is kept at 6 meters distance and visual acuity is recorded one eye at a time (the other eye is covered with the hand of the patient or with a paper). The patient is asked to read all the letters in each line from top to bottom. The number written on the chart corresponding to the last line which the patient reads is noted. Visual acuity is written as 6/6 to 6/60. If the patient is unable to read the top letter on the chart, the doctor should show the fingers in front of the eyes of the patient and ask him/her to count the fingers. Depending on the distance at which the fingers are counted correctly, it is written as counting fingers(CF) in (number) meters. If the patient cannot count fingers, then hand movement (HM) is shown; and if appreciated, it is written as HM present. If not, the torch light is shown and patient is asked whether the he/she can appreciate light. If yes, it is written as perception of light present (PL+); if not no perception of light (NPL). After completing vision testing of right eye, left eye is tested. If vision is very poor, irrespective of any complaint, one has to find the cause for poor vision. Such patients need referral to the eye specialist as early as possible.

Any patients with reduced vision (< 6/6) requires spectacles testing and the patient should be referred to the optometrist for glasses. A simple test to know whether vision can be improved with spectacles or not, is called pin hole test (take a piece of paper 3x3 inches and pierce gently with the ball pen, and a small hole is formed. Keep the paper in front of patient's eye and ask the patient to see through the small hole and read the lines on the Snellen chart). If the patient can read more lines than before, it means the vision can be improved with spectacles.

In very young children, vision is tested by observing if they can follow objects thrown in front of their eyes or pick up scattered 'hundreds and thousands' of cake decorations. In young children who cannot read English alphabets, E chart letters can be explained and then tested; or asking them to match pictures shown to them from six meters distance with the same picture which they are having with them (Sheriden-Gardiner test).

The following clinical signs should be looked for in different structures of the eye during the torch light examination. Since the family physicians/ general practitioners do not have slit lamp, one has to develop skills to diagnose the eye signs with torch light examination. When the doctors find the eye signs in different structures of the eye mentioned below, the diseases written against them should be kept in mind as pathology in the eye.

5. EYELIDS

Swellings: hordeolum (stye), chalazion, blephritis, contact dermatitis.

Common benign tumours --- hemangioma, dermoid, papilloma, xamthelasma.

Common malignant tumours --- basal cell carcinoma, squamous cell carcinoma, malignant melanoma, meibimian gland carcinoma.

Blunt injury: echymosis / black eye, haematoma.

Position of eyelid margin: entropion (inversion/ in-turning of eyelid margin); ectropion (out-turning of eyelid margin); ptosis (drooping of upper eyelid), lagophthalmos (inability to close upper eyelid completely).

Diagnostic signs of ptosis are (i) upper eyelid margin covering the cornea upto upper margin of pupil or more, (ii) narrowing of palpebral fissure, (iii) absence of upper eyelid crease/fold.

Normally the upper eyelid margin covers 1-2 mm of upper cornea; and lower eyelid margin is just below the lower limbus.

Diagnosis of lagophthalmos: Ask the patient to close the eyelids of both eyes (just like sleeping in the bed) and look for any gaping seen between the lid margins (visible conjunctiva) if gaping is seen without complete closure of upper eyelid, lagophthalmos is present.

Eyelashes: madarosis (absence/ loss of eyelashes) is seen in leprosy, chronic blepharitis; in-turning of eyelashes and rubbing the conjunctiva/ cornea (trichiasis) is seen in entropion.

6. CONJUNCTIVA

Congestion/injection (redness/hyperemia of conjunctiva): four types of congestion is seen.

(i) *Conjunctival congestion*: redness in the palpebral/tarsal (under surface of eyelids) conjunctiva and fornix (junction of bulbar and palpebral conjunctiva) --- seen in acute conjunctivitis at the time of onset. When the disease becomes severe or after few days, the whole conjunctiva is congested.

(ii) *Circumcorneal/ ciliary congestion* : redness of conjunctiva around the limbus in early stage of the disease; seen in diseases of cornea (corneal abrasion, foreign body cornea, keratitis, corneal ulcer, perforating injury/ laceration), diseases of anterior uvea (iridocyclitis), and sudden rise of intraocular pressure (acute congestive glaucoma). When the disease becomes severe or after few days, the whole conjunctiva is congested.

(iii) *Diffuse congestion*: redness of whole conjunctiva; this indicates that the above mentioned diseases are severe or present for the past few days.

(iv) *Sectorial congestion*: only a portion of the congentive is red (seen in episcleritis, scleritis subconjunctival haemorrhage, pterygium). Subconjunctival haemorrhage is usually caused by a systemic diseases (hypertension, hematologic disorders), subtle trauma to the eye, use of anticoagulants; and this situation doesn't cause an adverse effect on eye.

Growth in conjunctiva: pterygium, squamous cell carcinoma, limbal dermoid, haemangioma.

Nodules near the limbus: nodular episcleritis, phlycten-- seen in tuberculosis due to endogenous allergic reaction.

Eversion of the upper lid: Keep the torch light nearby and ask the patient to look down. Hold the eye lashes with index finger and thumb of left hand and gently pull the upper eyelid downwards and flip the upper eyelid with little finger of right hand. If the patient is not looking downwards, it is impossible to perform this procedure. Shine the torch light on the inner surface of the upper eyelid and look for the following on the tarsal conjunctiva: (i) Papillae (reddish elevated epithelial areas of conjunctiva) – seen in allergic conjunctivitis, vernal conjunctivitis, (ii) Follicles (yellowish white areas) – seen in viral and chlamydial conjunctivitis, (iii) Pseudo membrane (smooth whitish or yellowish white membrane on the tarsal conjunctiva) – seen in acute conjunctivitis due to severe pathogens, viral conjunctivitis, and (iv) Sub tarsal foreign body conjunctiva – history of foreign body in the eye, and it is not found on the cornea or conjunctiva. However, there will be linear vertical abrasion of cornea because of rubbing of foreign body on the cornea during blinking.

7. CORNEA

Shine the light from nasal or temporal side so that the central light spot does not cover the lesion on the cornea; and the whole cornea is illuminated to identify the pathology.

Surface: shiny (normal), dull in the area where there is loss of epithelium (corneal abrasion),

Bullae - epithelial elevation like bubbles (severe corneal edema),

Corneal abrasion is confirmed by fluorescein staining (yellowish green appearance of cornea in the area where there is no epithelium).

Corneal ulcer is loss of continuity of epithelium (epithelial defect) associated with infection/ inflammation; described as corneal haziness.

Transparency: Clear -- transparent, iris and pupil can be seen clearly; hazy -- iris and pupil can be seen but blurred; opaque -- iris and pupil cannot be seen.

Corneal ulcer description: Corneal ulcer is an active lesion showing signs of inflammation while the corneal opacity is a healed lesion without signs of inflammation.

Size: corneal ulcer size is determined in comparison to corneal diameter (normal is 12 mm) and pupil size (normal is 4 mm).

Shape: circular –only one measurement is written in mm diameter; irregular – two measurements, length and width in mm

Location: central -- corresponding to pupillary area; peripheral -- towards the limbus (by clock position).

Depth: superficial and deep depending on the thickness of cornea involved (difficult to assess with torch light)

Neovascularization: new blood vessels seen on the cornea (seen as red lines on the cornea) – usually seen in long standing corneal disease. Normal cornea is avascular (no blood vessels).

Corneal sensation: Ask the patient to look at the torch light directed in 'up and in' position so that more space is available and one can see the tip of fine cotton whisp touching the cornea. Care should be taken not to touch the eye lashes during the procedure. If there is complete ptosis of one eye, it is possible to test corneal sensation in that eye by lifting the upper eyelid and performing the procedure as usual; one has to observe the blinking of other eye in such a case.

The result is expressed as normal (spontaneous blinking of both eyes), diminished (delayed blinking) and absent (no blinking at all). Corneal sensation is diminished or absent in viral keratitis, leprosy, acoustic neuroma, diabetes, contact lens wearers.

8. ANTERIOR CHAMBER

Depth: is appreciated by shining the pen torch light on the temporal side and looking for the illumination of light on the iris. If the whole iris is illuminated, the anterior chamber depth is normal; if the iris on the nasal side near the limbus is not illuminated, the anterior chamber is shallow. This is expressed as (i) normal; (ii) deep -- seen in aphakia, posterior dislocation of the lens, pseudophakia, myopia; (iii) shallow -- seen in acute congestive glaucoma, hypermetropia.

Contents: normal: clear aqueous.

Red colour fluid – blood (hyphaema following blunt injury).

Yellowish pus (hypopyon -- seen near the lower limbus, crescent in the lower part and its upper margin is horizontal); seen in corneal ulcer, iridocyclitis.

Whitish material: due to rupture of anterior capsule of the lens in cases of perforating injury of cornea resulting lens material (cortex) to come into anterior chamber; rarely accumulation of malignant cells in retinoblastoma and leukemia.

9. IRIS

Color: grey, brown, black, blue (other colours besides black is due to lack of pigment in the iris).

Pattern: crypts on the iris (ups and downs -not smooth) appearance is normal ; smooth appearance of iris is abnormal (seen in chronic iridocyclitis due to chronic inflammatory process which makes tissue smooth, and in absolute glaucoma due to high rise of intraocular pressure for long time which makes the surface smooth).

Hole in the iris: central hole is pupil – normal

Peripheral iridectomy (hole in the periphery of iris near the upper limbus) -- seen in the trabeculectomy operation – surgical treatment for glaucoma, laser peripheral iridectomy – laser treatment for acute congestive glaucoma, intra capsular cataract extraction and anterior chamber intraocular lens implantation -- to prevent papillary block glaucoma.

Iridodialysis: a convex shaped hole in the periphery of iris, seen in blunt injury cases; the

pupil appears D shape with vertical line towards the iris hole.

White patches/atrophic patches: seen in absolute glaucoma and in chronic iridocyclitis.

Rubeosis iridis (neovascularization/new blood vessels on iris) : seen in proliferative diabetic retinopathy and neovascular glaucoma. Normally no blood vessels are seen on the iris surface.

10. PUPIL

Size : normal size is 3-4 mm (the variation is due to the environmental light and the sympathetic nervous system activity in the body); dilated (> 4 mm), mydriatic pupil seen after putting mydriatic drugs (tropicamide, phenylephrine, cyclopentolate, homatropine, atropine) – seen in acute congestive glaucoma, optic atrophy, optic neuritis, III rd cranial nerve palsy; constricted (< 3 mm), miotic pupil seen after putting miotic drugs (pilocarpine), acute iridocyclitis, horner syndrome.

Shape: circular – normal, irregular –seen in iridocyclitis due to posterior synechiae (adherence of pupil to the lens) or in blunt trauma due to rupture of sphincter pupillae muscle.

Reaction to light: briskly reacting to light (normal), sluggishly reacting to light (iridocyclitis, optic neuritis), not reacting to light (acute congestive glaucoma, atropine or homatropine drops put in the eye, III rd cranial nerve palsy).

Testing for relative afferent pupillary defect (RAPD) : when one pupil is dilated and sluggishly reacting to light, swinging flash light test is performed. Presence of RAPD indicates the optic nerve is affected (optic neuritis, retrobulbar neuritis, optic atrophy).

Swinging flashlight test: performed with penlight.

a) Ask the patient to keep fixating a letter or spotlight on the distance chart.
b) Shine a penlight or direct ophthalmoscope light into the right eye from below the patient's eyes from a distance of 5 to 10 cm. Pause for 2–3 seconds and then quickly switch the light to shine into the left eye across the nose below the lower eyelids, and not across the eyes.
c) Repeat alternately between the two eyes, pausing for 2–3 seconds on each eye, and look for any change in pupil size as the light is alternated.
d) A normal response is that both pupils will constrict as the penlight is shone in one eye. As the light is moved off the eye on its way to the fellow eye, both pupils will dilate. As the light reaches the fellow eye, both pupils constrict. After the light has been shone on a pupil for 1–2 seconds, the pupils may redilate slightly, so it is important to observe the pupils at the instant the light first falls on them.
e) An eye with a relative afferent pupillary defect (RAPD) will dilate as the light is first turned upon it, as the consensual dilation response due to the light moving off the good eye overpowers the poor constriction response from the affected eye.

11. LENS

The light is shone in different positions (temporal, nasal, superior, inferior) so that the lens abnormality is identified easily.

Transparency: clear – normal, cloudy/hazy -- cataract.

Cataract in newborns is dignosed as opacity in the lens with penlight; and more easily appreciated with direct ophthalmoscope (as a black spot in the red reflex in the eye, when the light is focused on the pupil from two feet distance) in a dark room where the pupils are slightly dialted. If not treated in-time (before the age of six months), this can cause strabismus in unilateral cases or nystagmus in bilateral cases. Therefore, the infants should be referred immediately to the eye specialist for further treatment.

Colour: normal lens in transparent and colourless. However, in the pupil it is seen as blackish appearance because the aqueous in front and vitreous behind are clear; greyish – early cataract, greyish white (immature cataract), pearly white (mature cataract).

Position of lens: normal -- in the pupil, margin/equator cannot be seen after dilating the pupil also.

Subluxation -- lens moved to any one direction (up/down/temporal/nasal), but still in papillary area; margin can be seen after dilating pupil due to rupture of zonules in that quadrant; signs include irregular anterior chamber, iridodonesis

(wabbling of iris with gentle movements of globe).

Posterior dislocation into the vitreous -- deep anterior chamber, iridodonesis. Jet black pupil, lens (clear or opaque) is seen in the vitreous with ophthalmoscope.

Intraocular lens: Anterior chamber intraocular lens after cataract operation is done when there is posterior capsule rupture and vitreous loss, and in previously operated intracapsular cataract extraction eyes (aphakia).

The shining surface of whole lens is visible in the anterior chamber in front of the pupil, with the circular edge of the lens and haptics (foot plates) going up and down towards the limbus area.

Posterior chamber intraocular lens is identified by appreciating a shining appearance in the pupillary area when the light is put on the cornea; the edge of the lens and haptics are not visible because the intraocular lens surface is covered by the iris.

12. EXTRAOCULAR MUSCLE MOVEMENTS

These are tested to detect III, IV, VI cranial nerve palsies in the eye. The patient will present with squint and/or diplopia. It is better to test ocular movements with the torch light because one can see the globe landmarks (limbus, canthus, and conjunctiva/sclera) easily when you test different muscles of eye. Depending on the space between the limbus and the canthus, the movement of medial rectus and lateral rectus are assessed. The position of corneal light reflex and space between lower limbus and lower lid is looked while assessing the movement of superior rectus. The position of corneal light reflex is taken into account in assessing the movements of inferior rectus, superior oblique and inferior oblique muscles.

Testing for extraocular muscle movements will also decide whether the squint is concomitant (eye muscles movements are normal) or paralytic (one or more muscles show limitation or absent movement).

Orthophoria … both eyes are straight looking in primary position, no squint in either eye.

Heterotropia (strabismus/squint) … one eye is looking straight and other eye is looking in different direction, convergent squint -- eye is looking inside towards nose (eso tropia), divergent squint – eye is looking outside (exo tropia).

Assessment of squint: Corneal light reflex test -- when you shine light on the eyes, a small light spot is seen in the centre of cornea in the pupillary area; there is no squint in any eye. If light spot is seen on the temporal side of the pupillary area – convergent squint; if it is on the nasal side of the pupillary area – divergent squint. When the light spot is present on the pupil margin -- squint is 15^0, on the limbus – squint is 45^0, in between limbus and pupil margin – the degree of squint is to be determined approximately between 20^0 and 40^0.

Strabismus is not normal situation in infants (after 3-4 months age) and in young children. The child should be referred to the eye specialist so that the child's vision and binocular vision can be improved after appropriate treatment. If not, the child will develop lazy eye.

13. INTRAOCULAR PRESSURE (IOP)

Digital (fingers) tonometry: General practitioners usually do not have any type of tonometer (Schiotz tonometer, Applanation tonometer, Tonopen, Pneumo tonometer) which measures the intraocular pressure. These instruments are costly and the procedure requires training to perform them. Therefore, one has to remember the skill of the fluctuation test procedure learnt in the surgery department. The patient is asked to look downward and the index fingers of both hands are put on either side of the globe over the upper eyelids and the globe is felt for its texture by doing fluctuation test.

When the eyeball feels firm – Intraocular pressure (IOP) is normal; eyeball feels hard -- IOP is high, eyeball feels soft -- IOP is low. Normal IOP 10- 21 mm Hg. It is very important to know about this to suspect open angle glaucoma and also closed angle glaucoma and refer the patients to the eye specialist.

14. LACRIMAL SAC REGURGITATION TEST

This test is performed to know about the patency of nasolacrimal duct (drainage of tears). When the lacrimal sac area is pressed with the little finger, if fluid/ mucus/ purulent material comes out of the upper or lower punctum -- there is obstruction of nasolacrimal duct (test is positive).

If nothing comes out of the puncta -- nasolacrimal duct is patent (test is negative). If this test is missed, the risk of corneal infection in cases of corneal abrasions/ foreign body and endophthalmitis after cataract/intraocular operation is much higher.

15. VISUAL FIELDS TESTING BY CONFRONTATION TEST

Peripheral visual fields are tested in this procedure. The patients vision should be tested (counting finger test) before starting the procedure. Patient should be seated at 1 meter distance. Observer closes left eye and patient closes right eye, to test the visual field of right eye. The patient is asked to look into observer eye and observer looks into patients eye, in order to detect that patient is not moving the eye which is tested. Then, the finger is brought into view in the mid distance from periphery temporally and moved centrally till the patient sees the finger. The finger is moved inwards from nasal side till it is visible. Thus, the finger is shown 8 times (+ and X -- temporal, nasal, superior, inferior, diagonal in between these spaces) in each eye separately.

The field defects detected are: (i) Bitemporal hemianopia -- loss of visual field on the temporal side in both eyes (seen in central optic chiasmal lesions), (ii) Homonymous hemianopia -- loss of right half or left half of visual field of both eyes (seen in peripheral optic chiasma lesion), (iii) Quadrantanopia -- loss of one quadrant of visual field in one or both eyes (Upper quadrantanopia – temporal lobe lesion and Lower quadrantanopia – parietal lobe lesion). The main disadvantage of this procedure is that the extent of visual field loss cannot be documented, which is done by testing visual field on computerized auto perimeter.

16. FUNDUS EXAMINATION WITH OPHTHALMOSCOPE

Fundus examination is done with the direct ophthalmoscope in a semi dark room. Since you are examining the patient in a semi dark room, it is good to have a chaperon with the patient. It is better to dilate both pupils with phenylephrine eye drops 5% so that the retinal findings can be seen easily. There is no fear of raised intraocular pressure and occurrence of rare complication of angle closure glaucoma, if both pupils are constricted in the clinic with pilocarpine eye drops 2% and then only the patient is asked to go home. The estimated incidence of acute angle closure glaucoma following diagnostic mydriasis (use of dilating drops) has been reported to be 0.0003% (2 out of 6760 subjects) [6].

With undilated pupil fundus examination, the retinopathy signs in diabetes and hypertension patients are likely to be missed. If the above eye drops are not available with the doctor, it is better not to do fundus examination; and all patients of diabetes and hypertension should be referred to the eye specialist for screening of retinopathy.

Red reflex: when you focus the ophthalmoscope light on the pupil from a distance of two feet from the eye, you will see a uniformly bright red glow in the pupil. This is normal due to reflection of light from the choroidal vessels. If there is some haziness in this red reflex, it means there is opacity in the media (cornea, lens, vitreous). Corneal opacity and lens opacity can be seen with torch light. Ophthalmoscopy can detect whether the lens is opaque partially (immature cataract) or totally (mature cataract).

Immature cataract -- black spot will be seen in the red background, depending on its shape and location, surrounded by red reflex. Mature cataract – red reflex is not seen and cataract appears as white with ophthalmoscope examination.

17. VITREOUS

Vitreous is focused with ophthalmoscope by using a +10 D lens. Floaters -- black spots in front of the eyes which move with movement of eyes. These are seen as black particles in the vitreous which move with the movement of eye.

Hemorrhage -- red colour fluid is seen in the vitreous with an ophthalmoscope. If the whole vitreous is filled with blood, the patient cannot see and the vision is very poor; the red reflex is not seen with the direct ophthalmoscope.

18. RETINA

Optic disc: colour -- pink is normal, hyperemia -- optic neuritis, papilloedema, pale -- optic atrophy.

Blood vessels: arteries are bright and thin, veins are dull and thick, artery: vein ratio is 2:3.

Look for arterio- venous crossing signs due to hardening of the arterioles (Salus sign – change in the course of the vein giving saucer shaped

appearance, and Gunn/Bonnet sign – tapering/nicking of the vein on either side) --- seen in hypertensive retinopathy.

Exudates: hard exudates -- yellow, small, circular spots, lipid deposits; cotton wool spots (soft exudates) – greyish white patches with irregular margins --- seen in diabetic retinopathy, hypertensive retinopathy, papilloedema.

Haemorrhages: superficial/flame shaped -- red spots with irregular margins, deep/dot and blot --red spots with circular shape --- seen in diabetic retinopathy, hypertensive retinopathy, papilloedema, leukemia, retinal vein occlusion.

Microaneurisms: tiny, dot like red spots --- seen in diabetic retinopathy, hypertensive retinopathy.

Drusen: discrete, yellow, lesions larger than hard exudates --- seen in age related macular degeneration.

*Neovascularizatio*n: new blood vessels, in the shape of fishing net or grapes bunch like,

NVD – new vessels on/around the optic disc, NVE – new vessels elsewhere in the retina --- seen in diabetic retinopathy.

Macula: is more darker than retina colour, seen two disc diameter temporal to optic disc, yellowish bright spot seen in its centre (fovea). When the patient looks into small light of ophthalmoscope, only macula is seen and no other areas of the retina is visible.

Hard exudates, microaneurysms, haemorrhages in macula --- seen in diabetic maculopathy.

Cherry red spot in macula --- seen in central retinal artery occlusion.

19. DISCUSSION

Undergraduate ophthalmology training is currently suboptimal in many countries and clinical placements are not compulsory. The average length of attachments are few days to two weeks; and ophthalmology teaching varies in content and depth between institutions [7-10]. Moreover, there is no posting of ophthalmology during internship/house officer period after graduation in majority of the countries in the world.

Only 3.7% of general practitioners undergo postgraduate ophthalmology training. The majority of them rely on their undergraduate knowledge of eye conditions when faced with an ocular presentation. Studies have demonstrated that accurate diagnosis of eye conditions is achieved between 16% and 36% of the time; and up to 12% of those misdiagnosed experience adverse outcomes as a result [11].

Eye diseases such as keratitis/corneal ulcer, foreign body cornea, perforating eye injury, chemical burns of eye, scleritis, anterior uveitis, acute congestive glaucoma, orbital cellulitis, retinal detachment, central retinal artery occlusion, optic neuritis, orbital cellulitis should be referred immediately to the eye specialist after suspicion or diagnosis in order to save vision of the patients. If they are treated late, the visual morbidity remains permanently or patient may become blind due to complications. Therefore, they are considered as “red flags” in general practice [12,13].

20. CONCLUSION

It is not difficult to diagnose common eye diseases by the family medicine physicians or general practitioners. They have to remember the common symptoms and the eye conditions in which they are seen; and correlate the eye signs which are specific to a particular eye disease. Being the solo general practitioner available in suburban/rural areas of the country, he/she should be able to treat common eye diseases and refer the sight threatening eye diseases to the ophthalmologist (after explaining the urgent need of treatment to save vision) for further management. Thus, they will be contributing a lot in reducing the prevalence of blindness in the community.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history/25030