Basic Eye Examination

Goals
- Brief anatomy review
- Essential bedside visual examination
  - Vision, Inspection, Pupil (VIP)
- Localization in the visual afferent system
- Case examples.

Eye Examination: components
- Visual acuity
- Color
- Inspection (in order)
  - Adnexae, anterior segment
  - Alignment and eye movements
- Pupils: light reflex and APD
- Fundus
- Visual fields
- Tonometry when indicated.

Bedside Eye Examination
- Vision
- Inspection
  (Adnexae, Anterior segment, Alignment)
- Pupillary Defect (APD)

Structures

Aqueous Flow
Optical Coherence Tomography (OCT)

Central vs Peripheral vision

Peripheral Vision:
- Rods (95 million)
- 30% Ganglion cells
- Low resolution
- Scotopic
- P:G ratio 1000:1
- Visual fields

Central Vision:
- Cones (5 million)
- 70% Ganglion cells
- High resolution
- Photopic / color
- 1:1
- Visual acuity, color

OCT: retinal layers

Central vs Peripheral vision

Extraocular muscles

Horizontal
- Medial and lateral recti

Vertical
- Superior and inferior recti
- Superior and inferior obliques

History

- How the eye feels, sees, or looks
- e.g. . . . . Pain, Blur, Redness
- Location, quality, severity, chronology, timing, duration, association, modifies
- Common symptoms:
  - Vision loss
  - Photophobia
  - Night blindness
  - Color loss
  - Tearing
  - Redness
  - Irritation
  - Floaters
  - Discharge

History: Temporal course

- 20/20
- 20/200
- Visual Acuity
- min - hrs
- days - weeks - months
- Tumor, Cataract, Glaucoma, Diabetes, ARMD
- Uveitis
- Optic neuritis
- Uveitis
- Vitreous hemorrhage
- AION, CRAO, ARMD
- Retinal Detachment
Visual Acuity

- IMPORTANT
- Best corrected vision (with glasses or pinhole)
- Test at distance (20 ft) if possible
- At near, consider presbyopia (>45)
- Coax the patient!
  - Guessing is permitted and should be encouraged.

Pupil

Pupil Examination

- Light Reflex
  - Subject must fixate at distance
  - Symmetry, latency and velocity of constriction
- Near Response
  - Convergence, accomodation and miosis
- Consensual Response

Afferent Pupillary Defect

- IMPORTANT !!
- Paradoxical mydriasis to swinging flashlight
- Sign of assymetric optic nerve or retinal dysfunction
- Reliable and objective evidence of organic disease.

Inspection

Adnexa
Anterior Segment
Alignment
Eyelid

Anterior Segment

Conjunctiva
Cornea
Anterior chamber

Anterior Segment

Iris
Lens

Motility

• Ductions vs Versions (gaze)
• Alignment of both eyes in primary position
• Alignment in eccentric gaze

Corneal reflex can be used to assess both Alignment and Ductions

Assessment of Alignment (Hirschberg)

1 mm = 15 Δ
2 mm = 30 Δ
4 mm = 45 Δ
limbus = 60 Δ
Assessment of Ductions and Versions

DIPLOPIA

Monocular
- Diplopia that persists with monocular occlusion
- Resolves when either eye occluded.

Binocular
- Diplopia is only present with binocular vision
- Non paralytic strabismus
- CNS
- Cranial nerve: III, IV, VI
- Neuromuscular junction
- Extraocular muscle

Oculomotor nerve palsy

Abducens nerve palsy

Pupillary Dilation
- Document best corrected acuity
- Document pupil exam
- Obtain consent from the patient
- r/o allergies
- r/o impending neurological catastrophe (hemiation)
- Check for shallow chamber
- 2.5% neosynephrine

Fundus
Normal Fundus

Optic disc

C/D = < .1
Normal

C/D = .3
Normal

C/D = .8
Glaucoumatous optic atrophy

Optic atrophy

Hard and Soft Exudates

Optic disc edema v papilledema

Optic disc edema

Optic disc edema

Basic Eye Examination: Part B

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Eye Examination: components

- Visual acuity
- Color
- **Inspection** (in order)
  - adnexae, anterior segment.
  - alignment and eye movements
- Pupils: light reflex and APD
- Fundus
- Visual fields.
- Tonometry when indicated.

Visual Fields

Visual Field Basics

- Monocular testing
- Monitored fixation on central target.
- Subjective response to stimulus that varies in size, brightness and location
- Static Perimetry
- Kinetic Perimetry
- Confrontation visual fields

Visual Field Techniques

Static Perimetry

Kinetic Perimetry

Localization of the Visual Field

Visual Field Conventions

- Visual Fields test central and peripheral vision
- Anatomic vs Visual Field (as the patient sees)
- Upper VF projects onto inferior hemiretina; lower VF projects onto upper hemiretina
- Nasal VF projects onto temporal hemiretina; Temporal VF projects onto nasal hemiretina
Prechiasmal NFBL* Visual Field Defects

- Monocular
- Horizontal
- Papillomacular
- (abnl VA, Color)
- (abnl APD)
- (+ disc)

Arcuate scotoma  Central scotoma  Altitudinal defect  Step defect

* Nerve fiber bundle layers

Chiasmal Visual Fields

- Binocular
- Assymetric
- Respects the vertical
- Bitemporal defect

Bitemporal Hemianopsia

80% of chiasmal optic neuropathies are due to tumors

- Pituitary adenoma
- Meningioma
- Craniopharyngioma
- Glioma, aneurysms, inflammatory

Chiasmal Visual Fields

Chiasmal Visual Fields
Retrochiasmal Visual Fields

- Binocular
- Homonymous
- Respect for vertical meridian
- Optic tract; temporal, parietal or occipital lobes.

Homonymous Hemianopsias

- Complete
- Incongruent
- Congruent

Localization along the Visual Radiations

- Parietal Lobe
- Temporal Lobe
- Occipital Lobe

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CASES

Case EB.27yoWF

- History
  - Woke up with a “smudge” in her vision OD
  - Over the last 3 days, smudge has become more opaque; located dead center.
  - Colors seem washed out, vision seems darker in that eye
  - Painful, especially when she moves her eyes.

- PMH:
  - None
  - Last year: numbness and paresthesias, right thigh 3 weeks and then resolved. Evaluation by PMD was unrevealing.

- Meds: None
- Allergies: None

Case EB.27yoWF

- Examination.
  - Visual acuity: 20/60 OD; 20/20+ OS
  - Color: 2/8 OD, 8/8 OS
  - Pupils: APD OD
  - Anterior segment: normal
  - Eye movements: normal
  - Fundus: photo
  - Visual fields: photo.

Case EB.27yoWF

- Where is the lesion?
  - Acuity, APD, color, the absence of any retinal disturbance and the VF defect
- What is the lesion?
  - Consider age, mode of onset, associated symptoms and medical problems,
- Diagnosis?

Case EB.27yoWF

MRI
Case JK.32yoWF

History
- 6 m history of progressive decline in vision OD>OS.
- Headaches
- Recent onset of lactation (galactorrhea)

PMH:
- none
- Amenorrhea x 1yr

ROS:
- negative

Meds:
- none

Allergies:
- none

Examination.
- Visual acuity: 20/100 OD; 20/40 OS
- Color: 4/8 OD, 6/8 OS
- Pupils: Light reflex normal; APD OD
- Anterior segment: normal
- Eye movements: normal
- Fundus: photo
- Visual fields: photo.

Where is the lesion?
- Acuity, APD, color, binocularity, the absence of any retinal disturbance and the VF defect

What is the lesion?
- Consider age, mode of onset and progression, associated symptoms and medical problems,

Diagnosis?

Pituitary Adenoma:
Prolactinoma

Vision
Inspection
(Adnexae, Anterior segment, Alignment)
Pupillary Defect (APD)
[Extra: Versions, Fundus, VF]
Anisocoria

- Physiologic anisocoria
  - 20 – 40% of normals, < 2mm asymmetry
  - Both pupils react normally, no ptosis or diplopia
- Efferent lesion:
  - Parasympathetic (constrictor):
    - worse in light
  - Sympathetic (dilator):
    - worse in dark
- Afferent lesions do not cause anisocoria

Oculosympathetic Pathways

Horner’s Syndrome

- Light
- Dark
- Cocaine 10%