Visual Loss
Understanding the Patterns

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By the end of the presentation, participants should be able to:

1. Understand the anatomy of the visual pathway
2. Have a systematic approach to analyzing images in patients presenting with visual loss

Visual Pathways

• Vision is a complex choreographed sensation
• Retinotopic organization maintained from globe to visual cortex

Visual Pathways

Visual Pathways

Objectives

Disclosures

https://www.researchgate.net/figure/203026668_Fig_10a-NP-Rep-Cre-reporter-vision-Criboblau-fluorescence-microscopy-images-of-a-vertical-fixation-visual-axons Figure 10a-NP-Rep-Cre-reporter-vision-Criboblau-fluorescence-microscopy-images-of-a-vertical-fixation-visual-axons
Integration of visual information occurs at the blink of an eye.
Visual Deficits: Defining the Terms
Scotoma (Greek, darkness): Partial visual field alteration

All lesions are at the level of the globe
No indication for imaging

Visual Deficits: Localizing the Lesion
Monocular Vision Loss
Visual Deficits: Localizing the Lesion

Monocular Vision Loss

Visual Deficits: Localizing the Lesion

Differential Diagnosis
Optic Nerve

Children
- Congenital
- Infection
- ON Glioma
- Skull Base-mass effect
- Neuroblastoma
- Ewings Sarcoma
- EG
- Fibrous Dysplasia
- Trauma

Adults
- Optic Neuritis
- Ischemic Optic Neuropathy
- Meningioma
- Aneurysm
- Trauma

Protocol: MR Orbits and Brain

Imaging Protocols: MR Orbit

Pre contrast
T1
PD
T1
T2
T2 FIESTA/CISS
Prop DWI

Pre contrast
T1
PD
T1
T2
T2 FIESTA
T1 Post contrast

Imaging Protocols: MR Brain

Pre contrast
T1
T2
DWI

Post contrast
T1 +C
3D FLAIR + C
3D T1 +C Black Blood

55 yo with endometrial cancer

Consider doing 3D FLAIR post contrast
2 patients with Monocular Vision Loss

2 patients with Monocular Vision Loss

Key Point: Look at the brain for additional lesions

22 yo F with Decreased Right Monocular Vision

3D FLAIR + C

T2

T1+C

FESTA

T1+C

22 yo F with Decreased Right Monocular Vision

Fiesta

T2

T1+C

Diffusion

Multiple Sclerosis

Neurofibromatosis

30 yo

Acute onset, pain

2 yo

Painless, esotropia

Multiple Sclerosis

Neurofibromatosis
Optic Neuritis

- Visual recovery good
- 48-70% with isolated ON will have brain lesions consistent with demyelination
- 72% patients with 1 or more brain lesions developed MS
- Only 25% developed MS with a normal brain MR

Index Patient

Multiple Sclerosis

Sarcoid

Ulcerative Colitis

Index Patient

Multiple Sclerosis

Acute Myelogenous Leukemia (Granulocytic Sarcoma)

22 yo F with AML

Mixed Picture:
- Progressive enlargement of nerve
- But, the nerve no longer enhances

Postulated: Related to superimposed ischemic changes within the nerve and/or post steroid effect

20 yo F acute onset visual symptoms & neck pain r/o dissection

20 yo F acute onset visual symptoms & neck pain r/o dissection

Lumbar Puncture

Intracranial Hypertension

Drusen - mimic of papilledema

Lumbar Puncture
Progressive Right Unilateral Visual loss; + Optocilliary Shunting

2 year old with CN 6 palsy and progressive bilateral visual loss

Optic Nerve Sheath Meningioma

Non Contrast Head CT

2 year old with CN 6 palsy and progressive visual loss

T2 T1 + C

FIESTA

3D T2

ADC

2 year old with CN 6 palsy and progressive visual loss

T1 + C

FIESTA 3D T2

3D T2

FIESTA

Differential Diagnosis
Met Neuroblastoma
Rhabdomyosarcoma
Ewings Sarcoma
EG
Fibrous Dysplasia

Visual Deficits: Localizing the Lesion

Bitemporal Hemianopia
Bitemporal Hemianopia

DDx: Chiasm
- Children: ON Glioma, Pituitary-Sella, Hypothalamus, Third Ventricle
- Adults: Optic Neuritis, Pituitary-Sella, Meningioma, Aneurysm

Protocol: MR Pituitary

55 year old with decreased vision x 1 year, rapidly progressed over 2 days

Hemorrhagic Macroadenoma

Homonymous Hemianopia

Urgent Neurosurgical and Endocrine Evaluation
Homonymous Hemianopia

Differential Diagnosis
- Tract/Radiations
  - Stroke
  - Tumor
  - Abscess
  - Demyelinating Disease (MS/ADEM)
  - PRES
  - Trauma

Occipital Lobe Lesions
- PCA Infarct
- AVM
- Falcine Meningioma
- Astrocytoma

43 yo woman with left homonymous hemianopia

DTI shows lateral displacement of terminal Optic Radiations

Cortical Blindness

Prior R HH now Cortical blindness
Occipital Lobe Lesions

- Labile HTN
- Cardiac Valvular Disease

Occipital Lobe Anatomy

- Calcarine fissure
- Parieto-occipital sulcus
- Cuneus
- Lingual gyrus

69 yo M with acute onset visual disturbance and confusion

Summary