

Neuro-ophthalmology Curriculum Roadmap

Outline of lectures

- Neuro-op emergencies (1 hour)
 - To be presented in lecture style in the first two weeks of the academic year-BK
 - Learning objectives:

- Approach to anisocoria (2-hour)--BK
 - Anatomy presented by residents
 - Case-based discussion
 - Learning objectives:

- Approach to diplopia (2-hour)--SV
 - Anatomy presented by residents
 - Learning objectives:
 - Understand the pathophysiology, work up, treatment, and natural history of each of the conditions below.
 - Comitant
 - Decompensated phorias
 - Sagging eye/heavy eye syndrome
 - Congenital
 - CN palsies
 - Duane's
 - Brown's
 - Incomitant
 - Cranial nerve 3, 4 and 6 palsies
 - Anatomy and course of each CN
 - Functions of the CN3 subnuclei
 - Proper work up for CN3 palsy and alarm signs
 - Pupil-involving vs. pupil-sparing
 - Complete vs. partial/divisional
 - Aberrant regeneration- examples and significance
 - Acute vs. chronic CN4 palsy
 - Skew deviation vs. CN4 palsy
 - Differential for CN6 palsy in children vs. adults
 - Convergence spasm
 - Superior oblique myokymia
 - Internuclear ophthalmoplegia
 - Restrictive diplopia (trauma/TED/orbital myositis)
 - Variable
 - Ocular myasthenia gravis (Will also be covered in MAL topic)
 - Thyroid eye disease (Will also be covered in MAL topic)
 - Guillain Barre/Miller Fisher Syndrome
 - More than 1 CN involved
 - Cavernous sinus syndrome
 - Orbital syndrome

- How to distinguish between supranuclear versus nuclear/infranuclear palsies
 - How to distinguish between restrictive versus paretic diplopia
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- Approach to vision loss (2-hour)--AC
 - Anatomy presented by residents
 - Case-based discussion
 - Should include discussion of visual field testing and interpretation
 - Can VF testing be combined with Glaucoma division who also presents on VF's?
 - Learning objectives:
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- Neuro-radiology and Cranial nerve 7 (2-hour)--SV
 - Cranial nerve 7 anatomy presented by residents
 - Learning objectives:
 - CN7 (See anatomy handout and worksheet attached to be used as pre-work)
 - CN7 UMN and LMN pathways
 - Path of CN7 LMN from the genu around CN6 at facial colliculus → internal auditory meatus → geniculate ganglion →
 - External ear and ear canal, stapedius, lacrimal gland, salivary glands, tongue/taste, 5 nerve divisions that supply facial muscles
 - Dysfunction of CN7
 - Presentation of UMN vs. LMN lesion
 - LMN lesions: Dysfunction of stapedius, cerebellopontine angle tumor, Bell's palsy
 - Infectious/inflammatory lesions: Lyme, HSV, VZV, sarcoidosis, Melkersson-Rosenthal syndrome
 - Overactivity of CN7
 - Signs, symptoms, pathophysiology, and treatment of benign essential blepharospasm vs. hemifacial spasm vs. facial myokymia
 - Neuro-radiology
 - Utility and limitations of CT head/facial/sinus vs. MRI head/orbits
 - Utility and limitations of MRI orbits vs. MRI Brain
 - Utility and limitations of CTA head and neck vs. MRA head and neck vs. carotid duplex US
 - MRI sequences
 - Utility and limitations of each sequence
 - T2, T2 w/FS, T1, T1+C w/FS
 - MPRAGE, STIR, CISS
 - ADC, DWI
 - Anatomy:
 - Circle of Willis vessels
 - Origin and path of CN 3, 4, 5, 6, 7

- Foramina/other: optic canal, superior orbital fissure, inferior orbital fissure, foramen rotundum, foramen ovale, clivus, carotid canal, clinoid
 - Orbits: EOMs and optic nerves, optic nerve sheaths
 - Diagnostics: Know the images to order, typical findings, and sequences to review for the following lesions
 - Stroke
 - TED, orbital myositis
 - Sarcoidosis
 - Lymphoma
 - Multiple sclerosis, MOG, NMO
 - Meningioma
 - Optic pathway glioma
 - Craniopharyngioma, prolactinoma
 - C-C fistula
 - IIH
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- Papilledema and Optic neuropathies (2-hour)--AC
 - View lecture
 - Case-based discussion
 - Learning objectives:
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- Functional vision loss, headaches, eye pain & facial pain (2-hour)--BK
 - View KBD lecture online beforehand
 - Case-based discussion
 - Learning objectives:
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- OKAP review (1-hour) - guest lecturer

10 Core topics to be mastered during rotation

Mutually assured learning topics to present at morning meeting.

1. TED and OMG
2. AION vs. ON
3. Hallucinations and higher order cortical function
4. IIH
5. Pituitary tumors
6. MS and mimickers
7. N-O of malignancy
8. Migraine and vertigo-when to image
9. Reading images during rotation (during morning report and in clinic)

Required clinical skills to be turned in

1. List of exam skills to be checked off by N-O faculty--below
2. List of "N-O conditions seen and diagnosed by resident"--below
3. Visual fields worksheet
4. Nystagmus worksheet
 - a. Watch Bob Daroff videos on NOVEL

Directed reading/landmark trials

Several excellent review articles are listed in the ophthalmology residents' Box.

Additional landmark trials to consider including

1. IIH treatment trial
2. Optic neuritis treatment trial (and follow up studies)
3. International optic nerve trauma study
4. Ischemic optic neuropathy decompression trial

Other resources available to residents to review on their own

Moran Core lectures

Novel.utah.edu

J. Lawton Smith podcasts

Review of N-O by Banderas

9. Skill list that must be checked off by neuro-ophthalmology faculty by the end of residency:
put in portfolio

SKILL	PERFORMED
Visual acuity testing	
Perform contrast sensitivity testing	
Confrontation visual fields and recording field	
Swinging flashlight test to determine if there is a relative afferent pupillary defect	
Measure RAPD correctly	
Perform and interpret 3 Goldmann Visual Fields	
Using cover/uncover testing document:	
III N Palsy	
IV N Palsy	
VI N Palsy	
Skew deviation	
Document convergence/divergence insufficiency	
Perform and interpret 1 Humphrey Visual Field	
Temporal artery biopsy	
Tensilon/Ice Test	
Eye movement examination (pursuit, saccades, VOR, VOR Suppression, nystagmus)	
Fundusoscopic examination of the optic disc: cup to disc ratio	
Grade papilledema correctly	
Recognize optic disc coloboma	
Recognize optic disc hypoplasia	
Perform and interpret OCT	
Watch Focal ERG performed	
Interpret full-field ERG	
Interpret Visual evoked potential (VEP)	
Cocaine test and interpretation	
Hydroxyamphetamine testing and interpretation	
Pilocarpine testing and interpretation	

CHECK LIST OF NEURO-OPHTHALMIC CONDITIONS SEEN AND DIAGNOSED BY RESIDENT

PUPIL CONDITIONS

Adie's tonic pupil
Horner's pupil
Argyll Robertson pupil
Diabetic tonic pupil

VERTIGO

Benign positional vertigo

HALLUCINATIONS

Charles Bonnet

VISUAL FIELDS

Bitemporal visual field
Homonymous hemianopia
Homonymous quadrantanopia
Arcuate defect
Central scotoma
Non-physiologic field loss

OPTIC NERVE CONDITIONS

Optic neuritis
AION—non-arteritic
AION arteritic
Optic perineuritis
Optic nerve tumor:
 Meningioma
 Glioma
Optic nerve drusen
Coloboma
Morning Glory disc
Optic nerve hypoplasia

EYE MOVEMENT DISORDERS

Nystagmus
Down beat nystagmus
Upbeat nystagmus
Convergence retraction nystagmus
III Nerve Palsy
IV Nerve Palsy
VI nerve palsy
Skew deviation
Comitant deviation
Convergence/Divergence insufficiency
INO
BINO
One-and one-half syndrome
Saccadic pursuit
Hypometric Saccades
Hypermetric Saccades
Ocular flutter
Opsoclonus

HEADACHE

Migraine with aura
Migraine without aura
Cluster headache
Paroxysmal Hemicrania