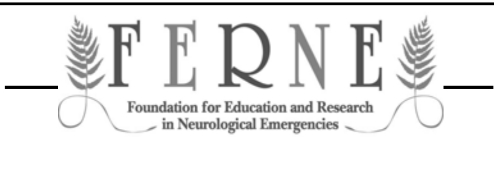
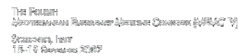
Evaluation of Patients with Diplopia and the Use of the Edrophonium Test



FERNE Brain Illness and Injury Course



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Disclosures

- ACEP Clinical Policies Committee
- Member, FERNE
  - FERNE support by Abbott, Eisai, Pfizer, UCB

Clinical Case

- 48 year-old woman with episodic diplopia for 1 month, worse and more frequent over the prior 4 days. She also noted intermittent bilateral ptosis.
- Physical exam showed normal vital signs and general exam. Neurological exam showed . . .

Key findings

- Normal pupils
- Right lid ptosis worse with prolonged upward gaze, better with rest
- Vertical diplopia is worse with prolonged upward, right-ward gaze
- Both lateral and medial rectus muscles tested normal

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Learning Objectives and Key Clinical Questions

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Session Objectives

- Discuss the differential diagnosis of non-traumatic binocular diplopia
- Review the anatomy and function of cranial nerves 3, 4 and 6
- Know how (and when) to perform the edrophonium test to help diagnose myasthenia gravis

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Key Clinical Questions

- Is the diplopia isolated (or are there other neurological findings)?
- Is there evidence of a cranial nerve palsy?
- When should I consider performing a edrophonium test?

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Key Learning Points

- Consider myasthenia gravis when

- Neurological findings that fluctuate
- Findings that are hard to localize
- Prominent cranial nerve symptoms

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Differential Diagnosis
(Binocular, non-traumatic) Diplopia

- Most commonly a cranial neuropathy (either peripheral or nuclear)
- Internuclear - INO
- Supranuclear cranial nerve problems
  - Wernicke’s, complex migraine, others
- Myasthenia gravis, thyroid disease
- Others
  - Botulism
  - Orbital pathology (tumor, infection or inflammation)

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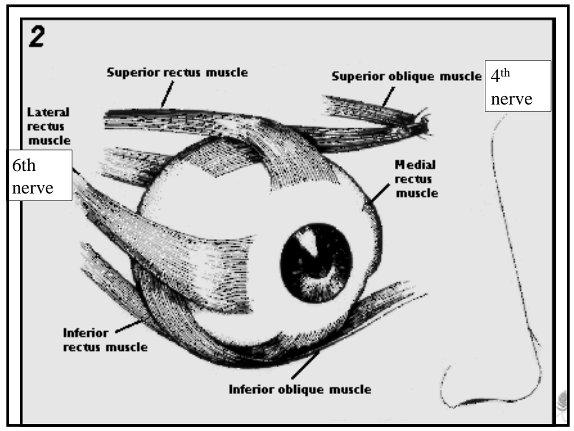
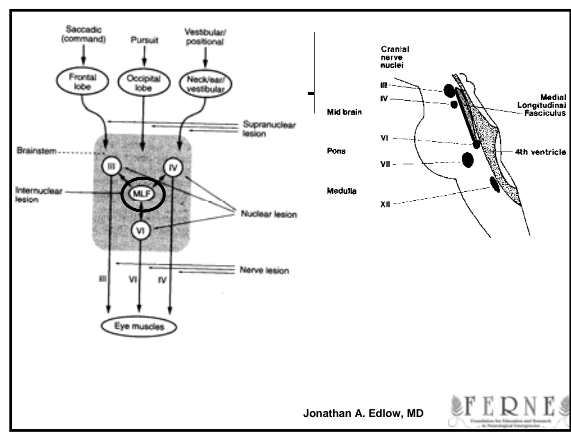
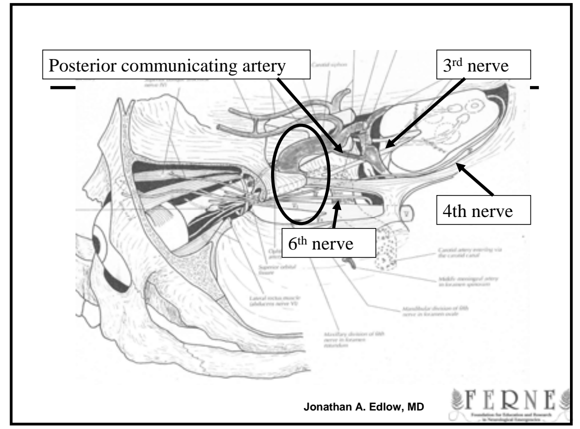
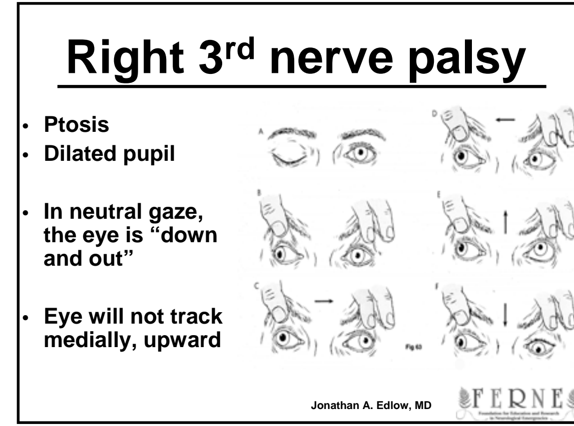




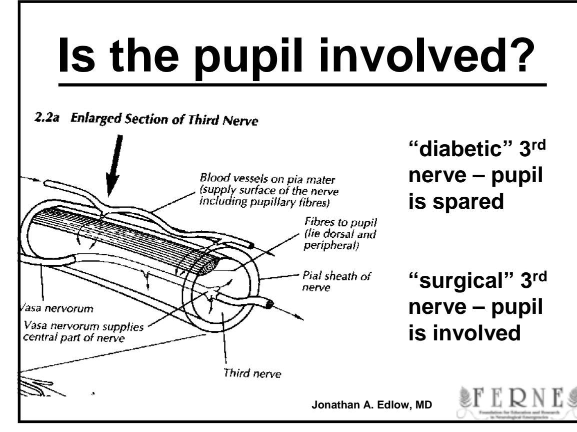


Right 3rd nerve palsy

- Ptosis
- Dilated pupil
- In neutral gaze, the eye is "down and out"
- Eye will not track medially, upward



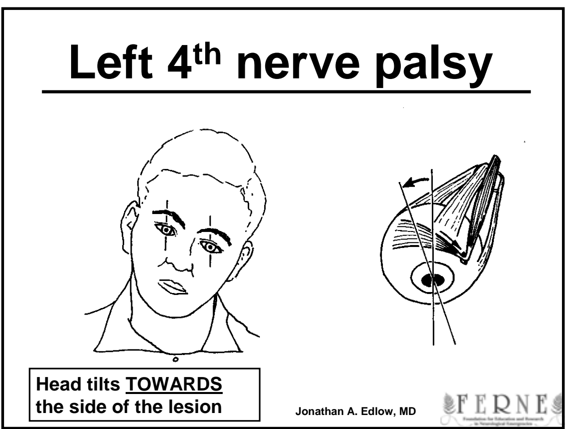
Is the pupil involved?



"diabetic" 3rd nerve – pupil is spared

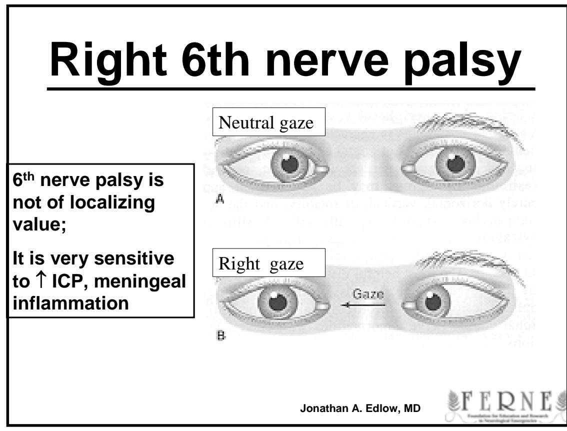
"surgical" 3rd nerve – pupil is involved

Left 4th nerve palsy



Head tilts TOWARDS the side of the lesion

Right 6th nerve palsy



6th nerve palsy is not of localizing value;

It is very sensitive to ↑ ICP, meningeal inflammation

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Key clinical findings

- Fluctuating diplopia
- Bilateral ptosis
- Normal 3rd, 4th and 6th nerve function
  - Normal pupils
  - Normal horizontal & vertical gaze
- No other neurological findings

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Edrophonium Test

- Need a “testable” muscle
- Ideally have a blinded observer & use saline to “double-blind” the test
- Have atropine available in case of adverse reaction
  - bradycardia
  - respiratory distress
  - syncope

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Edrophonium Test

- Prepare 2 syringes
  - 10 mg of edrophonium
  - Saline (equal volume)
- Inject 2 mg of drug over 15”
- Inject the other 8mg (if no response)
- Results visible ~ 45” (and last ~ 5’)

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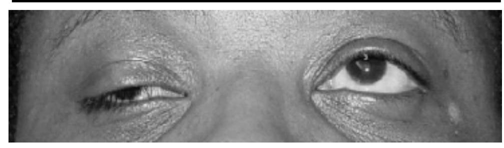
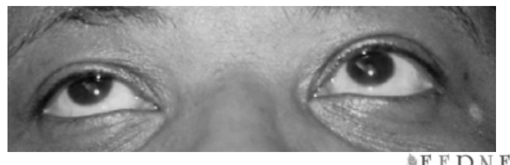
Edrophonium test





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What does it mean?

- Edrophonium test *
  - Positive test – LR 15 (7.5-31)
  - Negative test – LR 0.11 (0.06-0.21)

- Ice test *
  - Positive test – LR 24 (8.5-67)
  - Negative test – LR 0.16 (0.09-0.27)

* Sherer K; JAMA; 2005

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Medication triggers for myasthenia

- **Antiarrhythmic agents**
  - Quinidine
  - Procainamide
- **Antibiotics**
  - Aminoglycosides
  - **Quinolones**
- **Antihypertensive agents**
  - Beta blockers
  - Calcium channel blockers
- **Magnesium-containing compounds**
  - Magnesium sulfate and citrate
- **Neuromuscular blocking agents**
  - **Succinylcholine**
  - Curare derivatives

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Conclusions

- **Myasthenia gravis often presents**
  - **with odd assortments of neurological symptoms, often cranial neuropathy**
  - **but that often don't localize into a neat neuro-anatomic territory**
  - **and which fluctuate over time**
- **Hardest part of diagnosing myasthenia is thinking of it (only ~ 60% patients diagnosed <1 year of onset)**

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Recommendations

- **Look for cranial nerve 3, 4 or 6 palsy**
- **Think of myasthenia gravis in patients with fluctuating or non-localizing symptoms**
- **Consider doing an edrophonium test (or ice test) to increase diagnostic accuracy**

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Case resolution

- **Myasthenia gravis is diagnosed**
- **Chest CT negative for thymoma**
- **Started on oral pyrodostigmine**
- **Excellent response and has remained asymptomatic for 2 years**

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Questions?

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