Oculomotor Workshop

Timothy C. Hain, MD

Video Frenzel Goggles

Dr. Hain's system - - RealEyes Monocular

- Expensive (about $2000)
- Good teaching tool
- Can do some things not easily done with optical system (i.e vibration test, hyperventilation, vertebral artery test, head prone test, cross-cover)

Optical Frenzel Goggles

Storz/German goggle

ICS goggle

- Inexpensive (about $500)
- Portable – take to hospital
- A little limited – can't do vibration, head-forward or cross-cover. Some are dim.
- Can get hot, bulbs burn out and break

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Frenzel variants that I don't like

- Any binocular goggle - -e.g. RealEyes xDVR, VOG-B100, VF-405 – heavy, fragile
- Any firewire goggle – good for computers, bad for bedside.
- Any "focus free" goggle - -e.g. InView – no focus means small and fuzzy.

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Video Eye Movement Tests

- Saccades (slow, omn palsy, dysmetric)
- Spontaneous nystagmus
- Gaze testing
- Tests for unilateral loss
  - Vibration
  - Head-shaking
- Valsalva
- Hyperventilation

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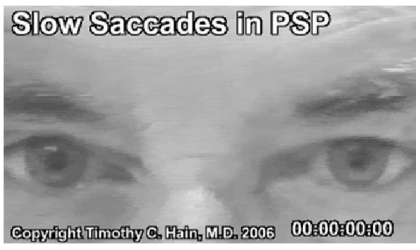
Slow saccades



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Case

Source: Leigh/Zee

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Case

Source: Leigh/Zee

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Case

Source: Leigh/Zee

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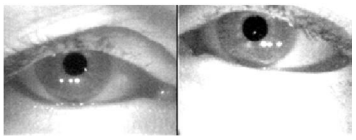
Case



Source of video: Preston Calvert, M.D.

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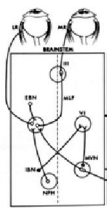
INO (Internuclear ophthalmoplegia)

- Brainstem lesion of MLF
- Most commonly seen in MS
- Slowing of adducting saccades
- Overshoot of abducting eye
- A system that can visualize both eyes is best for INO, but too few INO's to justify trouble.



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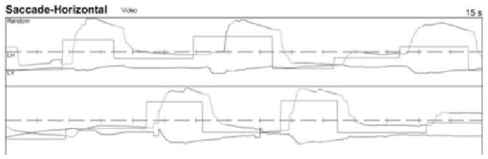
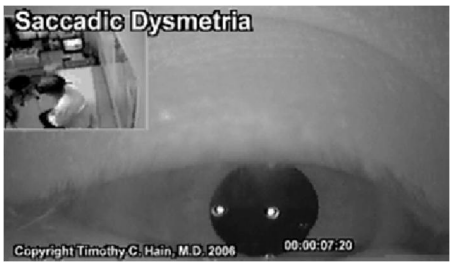
Oculomotor palsies

- Operators of ENG equipment may not think to do an oculomotor exam or check visual acuity. Useless output.
- Tests that displace viewing eye into paretic field eye may produce confusing results.



Case



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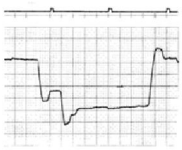
Overshoot dysmetria

- Usually cerebellar lesion
- Occasionally paretic eye fixation
- Never peripheral vestibular lesion



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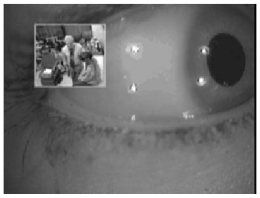
Case

- 14 year old girl
- Very unstable gait
- headaches
- Darting eyes



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Opsoclonus

- “dancing eyes-dancing feet” pediatric syndrome (Kinsbourne)
- Neuroblastoma
- Paraneoplastic syndrome
- West Nile

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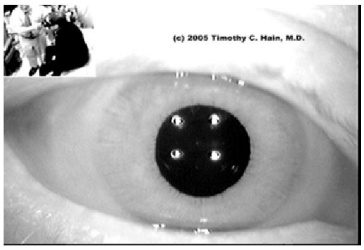
CASE



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Case

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Cases

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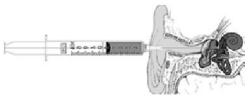
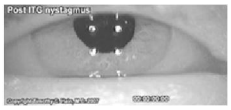
Case





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Spontaneous Nystagmus

- Acute vestibular disorders (V Neuritis, horizontal canal BPPV, Menieres, recent surgery) have strong horizontal "jerk" nystagmus.
- Normal people and chronic vestibular disorders have little or no nystagmus. Neural compensation for vestibular tone asymmetry is fast and effective.
- Most people can't "fake" nystagmus.
- Almost everything unusual is central.

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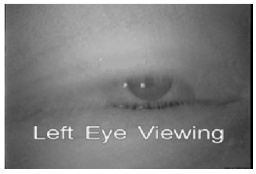
Case – cross-cover test



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Non-vestibular spontaneous nystagmus the common variants

<u>Latent Nystagmus</u>

- Found in persons with congenital esotropia
- changes direction according to viewing eye (Cross-cover test)
- Viewing eye beats laterally
- Intent to view controls direction (pseudoscope)
- Always have "lazy" eye

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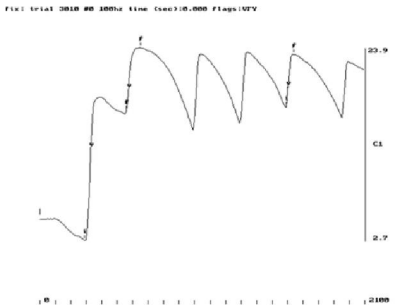
Latent Nystagmus



Note “bizzare” increasing velocity waveform typical of CN. Some malingerers use LN

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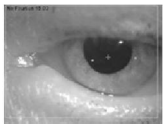
Case

In light



In dark

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Congenital Nystagmus

- One/1000 population
- Present from early age
- Usually worse in light
- PT is not useful
- Rehab significance is to avoid confusing it with central nystagmus or vestibular nystagmus.

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Non-vestibular spontaneous nystagmus: the common variants

- “Wrongly” directed primary position nystagmus
  - Downbeat
  - Upbeat
  - Torsional

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Case

- Chiari (MRI)
- Cerebellar (especially remote effect) – get a CXR
- Idiopathic/drug

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Case

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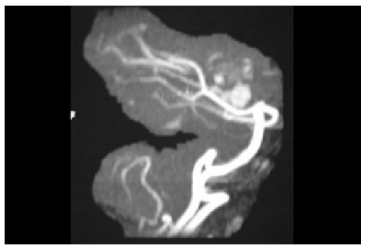
The cause



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Case

- Smoking (slight)
- Paxil (slight)
- Wernickes
- BPPV variants ?
- Vestibular neuritis variants
- Central vertigo – Migraine ?

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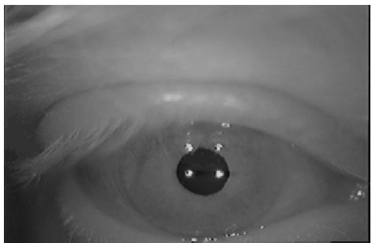
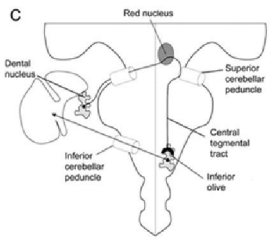
Direction ? Waveform



Something else was moving too

Oculo Palatal Myoclonus

- Fairly common disorder
- Pendular nystagmus
- Palatal myoclonus
- Triangle of Guillain Molleret



Gaze Testing

- Move finger to the limits of lateral gaze (bury sclera) – if can't bury, may have oculomotor palsy
- Move finger to limits of vertical gaze
- Do eyes reach end-gaze ?
- Is there end-gaze nystagmus ?
- Is there rebound nystagmus ?

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Gaze Test: normal

- Minimal or no horizontal and upgaze nystagmus
- No down-gaze nystagmus in normal people
- No rebound nystagmus

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Case (Cerebellar patient)

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Rebound Nystagmus

- Nearly always cerebellar lesion
- Rarely congenital
- Method of separating out cerebellar GEN from sedative effect or congenital nystagmus

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Vibration test

Vibration test

- Method: Apply 60-120 hz vibration to SCM, first one side, then the other. Shower massagers work well for this and are inexpensive. This is a Sunbeam/Oster shower massager
- Video Frenzel goggles – optical Frenzels don't work very well
- Compare nystagmus before and during

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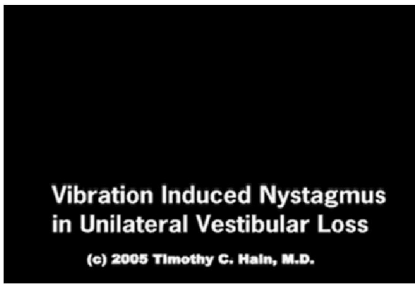
Vibration Induced Nystagmus



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Vibration Induced Nystagmus

- Unidirectional horizontal nystagmus strongly suggests contralateral vestibular lesion.
- Permanent nystagmus – never goes away
- Direction changing nystagmus is a normal variant.
- Vertical or torsional nystagmus is of uncertain meaning. Seems more common in BPPV.

Cherchi, M. and T. Hain (2010). Provocative Maneuvers for Vestibular Disorders. Vertigo and Imbalance: Clinical Neurophysiology of the Vestibular System. S. Eggers and D. S. Zee (Editors) , Elsevier.

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Head-shaking test

- Method: 20 cycles of horizontal head rotation
- Frenzel goggles to monitor nystagmus prior to and following head-shaking.
- Positive – substantial change in nystagmus following head-shaking. Usually beats away from bad ear.

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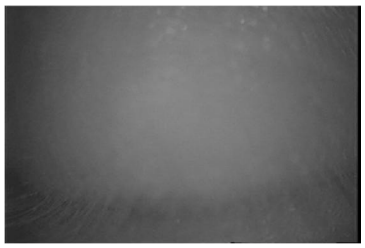
Head-shaking in person with left sided vestibulopathy



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HSN – unilat comments

- SN, HSN and Vibration are all useful in detecting unilateral vestibular loss
- SN is seen acutely but vanishes over time.
- HSN is more sensitive to moderate loss than VN. However, it may appear and then vanish, or even go in wrong direction.
- Vibration is more dependable than HSN – never goes away.

Cherchi, M. and T. Hain (2010). Provocative Maneuvers for Vestibular Disorders. Vertigo and Imbalance: Clinical Neurophysiology of the Vestibular System. S. Eggers and D. S. Zee (Editors) , Elsevier.

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Head Shaking

- Moderately useful test –.
- About 75% localizing
- Absent in about 25%
- Small VOR nystagmus – good for bilaterals

Hain TC, Spindler J. Head-Shaking Nystagmus. in The Vestibulo-Ocular Reflex and Vertigo (Ed. Sharpe JA, Barber HO), Raven, 1993

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Valsalva test

- Method: deep breath and strain
- Frenzel goggles to monitor nystagmus prior to and following HVT
- Positives suggest pressure sensitivity
  - Torsion - -SCD
  - Strong horizontal – horizontal canal fistula
  - Small amounts – not sure what this means

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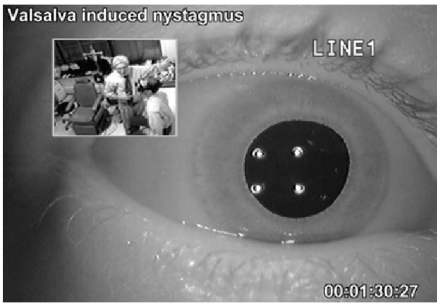

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Hyperventilation test

- Method: 30 cycles of deep breathing
- Frenzel goggles to monitor nystagmus prior to and following HVT
- Positive – substantial change in nystagmus (other than DBN) following HVT.

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Conclusion
Video Frenzel Goggles are the key to diagnosis of dizzy patients

- Oculomotor exam – far more sensitive with goggles
- Nystagmus à documents vertigo and localizes lesion
- Provocative testing à unilateral loss, SCD, VN nerve irritability

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More details

Hain, T.C. Approach to the patient with Dizziness and Vertigo. Practical Neurology (Ed. Biller), 2002, 2007. Lippincott-Raven

More movies

www.dizziness-and-balance.com