Bedside examination using video-ENG

Timothy C. Hain, MD
Professor
Northwestern University
Chicago IL, USA

Dr Hain's bedside Video ENG system

- Large screen TV, 2nd camera
- DVR (I use Panasonic)
- PIP processor
- Amplifier to feed both DVR and TV

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http://www.dizziness-and-balance.com/practice/dvr.htm

Video Eye Movement Exam

- Spontaneous nystagmus
- Oculomotor testing
- Vibration
- Cervical testing
- Positional testing
- Valsalva, Tullio and Fistula testing
- Head-shaking
- Hyperventilation

3

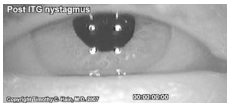
Acute vestibular imbalance

4

Subacute Vestibular Neuritis

5

Gentamicin treatment for Meniere's disease



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http://www.dizziness-and-balance.com/treatment/ttg.html

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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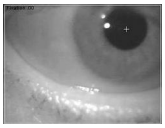
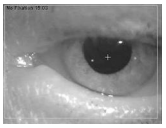
http://www.dizziness-and-balance.com/practice/nystagmus/nystagmus.html

Congenital Nystagmus



In light



In dark

8

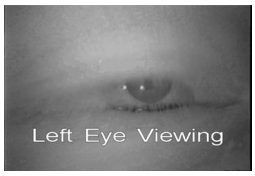
Congenital Nystagmus

- One/1000 population
- Present from early age
- Usually worse in light

9

http://www.dizziness-and-balance.com/practice/congenital%20nystagmus.htm

Congenital nystagmus
A sneaky one
cross-cover test



http://www.dizziness-and-balance.com/practice/congenital%20nystagmus.htm

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Latent Nystagmus
Common CN variant

- 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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Non-vestibular spontaneous nystagmus: the common variants

- "Wrongly" directed primary position nystagmus
  - Downbeat
  - Upbeat
  - Torsional

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DBN (jerk)

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

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Torsional (jerk)

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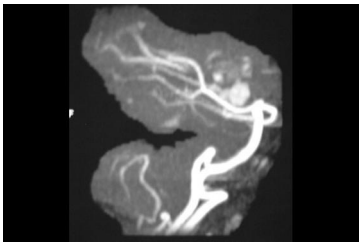
The cause



15

Upbeating (jerk)

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

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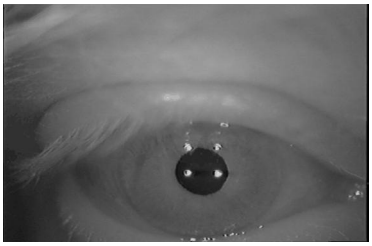
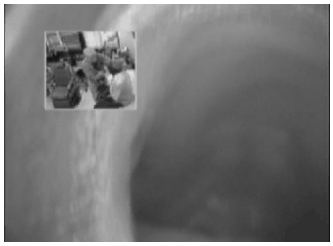
Pendular Vertical

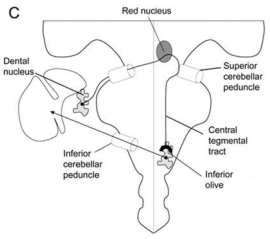


Something else was moving too



Oculo Palatal Myoclonus

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

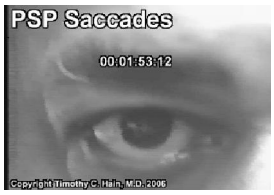


http://www.dizziness-and-balance.com/disorders/central/opm.html

Oculomotor Testing

- Saccades
- Pursuit
- OKN
- Gaze

Slow saccades



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PSP – progressive supranuclear palsy

- Very slow rapid eye movements
- Vertical affected first
- Present with falls
- Death in 5 years from diagnosis

http://www.dizziness-and-balance.com/disorders/central/movement/psp.htm

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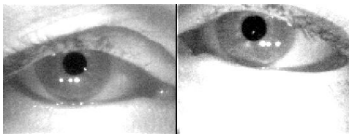
INO



Source of video: Preston Calvert, M.D.

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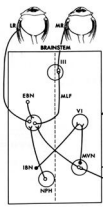
INO (Internuclear ophthalmoplegia)

- Brainstem lesion of MLF
- Rare but most commonly seen in MS
- Slowing of adducting saccades
- Overshoot of abducting eye
- A system that can visualize both eyes is best



http://www.dizziness-and-balance.com/practice/saccade.htm

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Dysmetria

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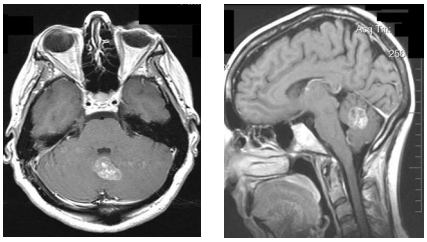
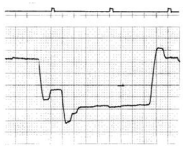
Vermal lesion due to breast ca metastasis



Overshoot dysmetria

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



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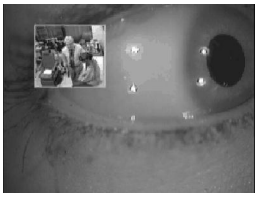
http://www.dizziness-and-balance.com/practice/saccade.htm

Opsoclonus

- 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 (lung cancer)
- West Nile virus

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http://www.dizziness-and-balance.com/practice/nystagmus/saccadic-nystagmus.htm

Pursuit and OKN

- Easily assessed with video goggles
- However, little utility

- Pursuit – track finger
- OKN – use hand-held OKN drum.

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Gaze Testing: method

- 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)

33

Rebound Nystagmus

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

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http://www.dizziness-and-balance.com/practice/rebound.htm

Vibration test

Vibration test: Method

- 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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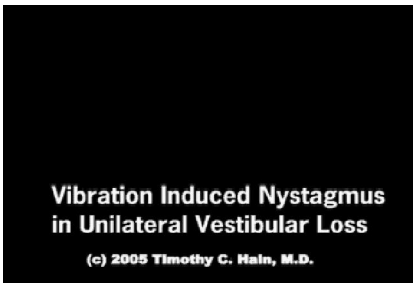
http://www.dizziness-and-balance.com/practice/nystagmus/vibration_test.htm

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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Positional Testing Strategies using Video

- Dix-Hallpike --- head 30 back/rotated
  - Posterior canal BPPV (UBN, ipsitorsion)
  - Anterior canal BPPV (DBN)
- Supine roll test – lateral canal BPPV
  - Geotrophic or ageotrophic
- Head upright or forward – cervical vertigo
  - Gravity coordinate vs. not

http://www.dizziness-and-balance.com/disorders/bppv/bppv.html

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"Vertebral artery test" for Neck nystagmus

- Method
  - Turn head to one side for 20 seconds
  - Observe for nystagmus
  - Do this BEFORE Dix-Hallpike to differentiate neck nystagmus from gravity nystagmus

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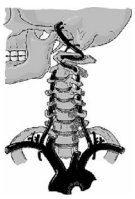
http://www.dizziness-and-balance.com/testing/ENG/VAT.html

Mechanisms for Neck nystagmus

- Vertebral Artery compression (rare). 2 patients in 30 years
- Cervical cord compression (?)



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Positional testing methodology

- Mat table is best
- Locate emesis basin before beginning

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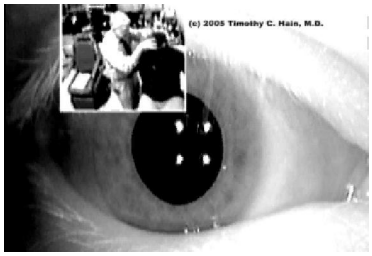
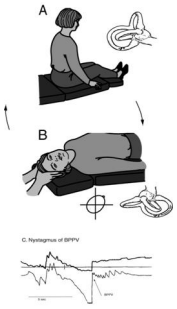
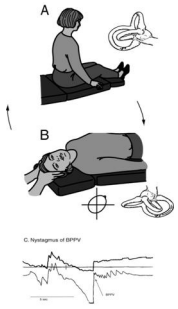
Posterior Canal BPPV from Dix-Hallpike





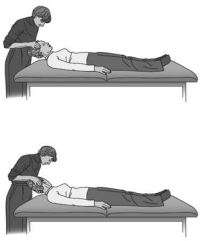
Posterior Canal BPPV

- Upbeating/Torsional nystagmus (or at least torsional, top of eye beats toward ground)
- Latency: 0 to 30 sec
- Burst: up to 1 min
- Unwinds when sit up
- Treat with CRP



Helminski, Zee, Janssen, Hain (2010). Effectiveness of particle repositioning maneuvers in the treatment of benign paroxysmal positional vertigo: a systematic review. Physical Therapy 90(5) 1-16

Direction Changing Positional Nystagmus from Supine Roll Test



45

DCPN – Lateral Canal BPPV ?

- Geotrophic or Ageotrophic
- Usually strong, nauseating and prolonged
- Reverses sense with <u>head forward (cervical vertigo doesn't reverse)</u>
- Treat with log-roll

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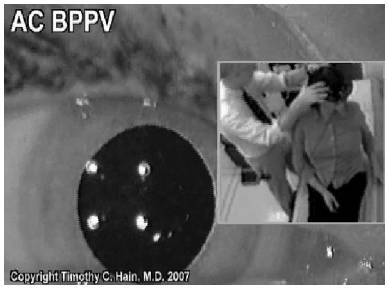
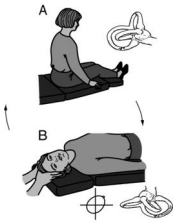
AC BPPV on Dix-Hallpike





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AC BPPV

- Downbeating nystagmus greater on one side than the other, sometimes with torsion
- Burst
- DDX – is very wide
  - Central (cerebellar)
  - SCD
  - Mystery DBN is very common (1/3)
- Be quick to get MRI
- Treat with deep DH or reverse CRP

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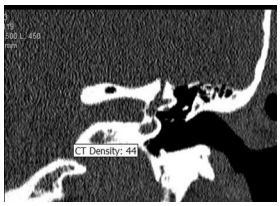
http://www.dizziness-and-balance.com/disorders/bppv/acbppv/anteriorbppv.htm

Tests for pressure sensitivity Dx: SCD, PLF, Slipped stapes prosthesis, Fenestration

- Valsalva
- Tullio
- Fistula test



49

http://www.dizziness-and-balance.com/disorders/symptoms/pressure.htm

Valsalva

- Method: Strain for 5 seconds
- Frenzel goggles to monitor nystagmus prior to and following straining
- Positive – substantial change in nystagmus
- Found mainly in Superior canal dehiscence. Also post fenestration (see http://www.dizziness-and-balance.com/disorders/symptoms/pressure.htm for movie)
- Positives are rare (i.e. prevalence of SCD is small)

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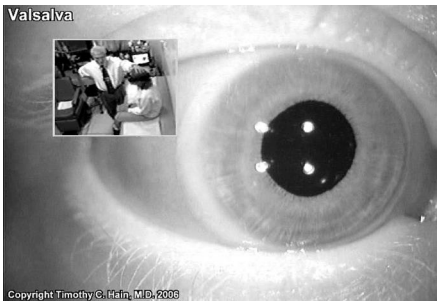
Valsalva in SCD



http://www.dizziness-and-balance.com/disorders/unilat/scd.htm

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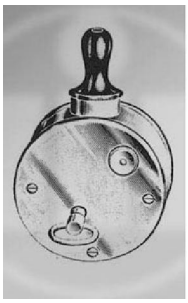
Tullio method

- Loud noise next to ear (Barany noise box, or massager)
- Look for nystagmus (usually subtle)
- Positive in SCD and PLF



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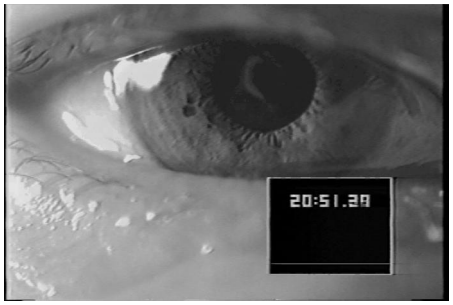
Tullio in SCD



http://www.dizziness-and-balance.com/disorders/unilat/scd.htm

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Fistula Test Method

- Positive and negative pressure. Use bulb/tymp or Brunnings Otoscope
- Look for nystagmus (usually subtle)
- Positive in SCD and PLF (very weak)

http://www.dizziness-and-balance.com/testing/fistula.html

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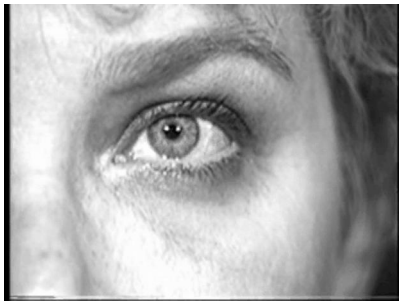
Positive Fistula test



http://www.dizziness-and-balance.com/disorders/unilat/fistula.html

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Hyperventilation test Method

- 30 seconds of brisk HVT
- Exam for change in nystagmus
  - Irritable vestibular nerve (tumor, v. neuritis, Gamma Knife)
  - Seizure (very rare)
  - Anxiety (dizzy, no nystagmus)
- Usually beats towards lesion (opposite of other tests that beat away).

http://www.dizziness-and-balance.com/practice/nystagmus/hyperventilation.htm

HVT in Gamma Knife

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http://www.dizziness-and-balance.com/practice/nystagmus/hyperventilation.htm

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.

http://www.dizziness-and-balance.com/research/hsn/Head%20Shaking%20Nystagmus.htm

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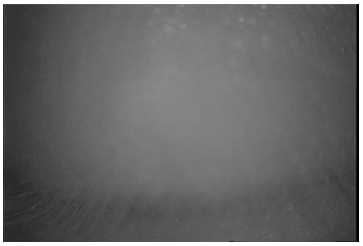
Head-shaking in person with left sided vestibulopathy



http://www.dizziness-and-balance.com/research/hsn/Head%20Shaking%20Nystagmus.htm

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HSN and unilateral loss

- 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.

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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.

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, irritable VN

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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

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.

More movies

www.dizziness-and-balance.com