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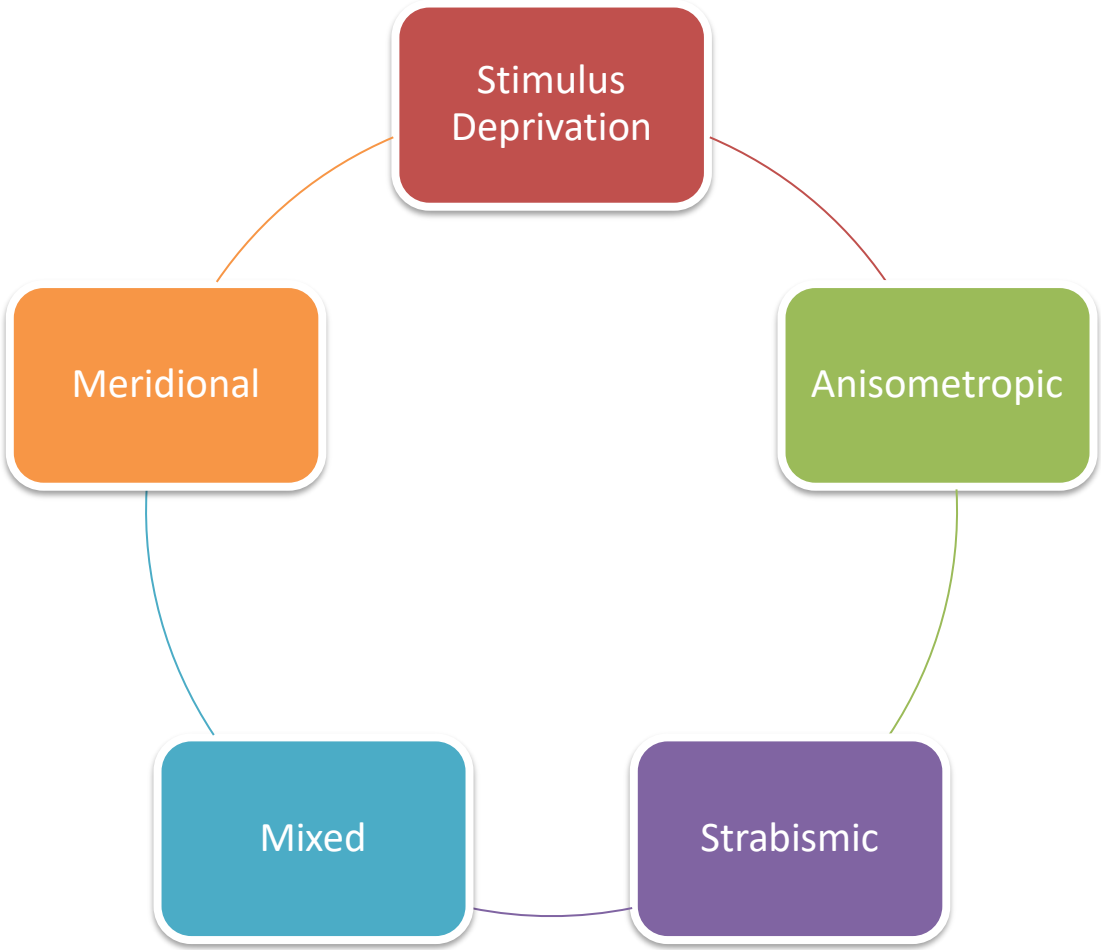
Amblyopia – Management and Risk of Recurrence Binocular Vision Anomalies – When is it Appropriate to Treat Them?

Faye Mather – Advanced Orthoptist

Amblyopia

Amblyopia



Treatment Options

- Conventional occlusion and atropine occlusion – both effective treatments (PEDIG, 2003; PEDIG, 2008a)
- Both offered as a first-line treatment at WHH, when appropriate
- Conventional occlusion tends to be the most common treatment method

Commencing Treatment

- Patient has had a refraction, fundus and media assessment
- Full-time glasses wear
- A minimum of 1-line IOD
- End of refractive adaptation – some exceptions

Ceasing Treatment

- Equal VA
- No improvement in the amblyopic eye for 3 or more consecutive visits
- Reduction of the VA in the non-amblyopic eye
- Low density of suppression on the sbisa bar – risk of intractable diplopia
- Reports of diplopia in the presence of manifest strabismus

Recurrence of Amblyopia

- Recurrence rate 24-27% (PEDIG, 2004; Bhola *et al.*, 2006; Walsh *et al.*, 2009) – defined as a reduction in the VA of 2 or more lines

- Associated with better VA in the amblyopic when treatment stopped, level of improvement and previous recurrence

- Not associated with age, treatment duration, presence of strabismus or level of stereo

Stereopsis

Stereopsis

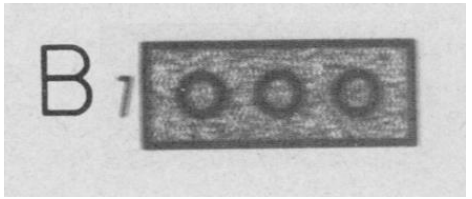
- First demonstrated at 3-4 months old
- Level varies with different tests

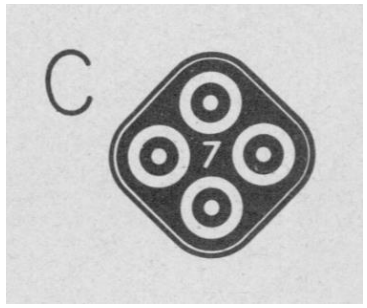
Test	Child (Seconds of Arc)	Adult (Seconds of Arc)
Randot Circles	64.1	21.3
TNO	109.9	40.5
Frisby	250.7	142.8

(Simons, 1981)

Stereopsis – Normative Values

Age	Frisby	Randot Circles	TNO	Titmus Circles
3 years	250”	70”	120”	200”
4 years	250”	70”	120”	140”
5 years	250”	70”	120”	100”
Adult	250”	20”	30”	40”





(Scott and Mash, 1974; Romano et al., 1975; Simons, 1981)

Reduced/Absent Stereopsis

- Reduced VA in one/both eyes
- Strabismus – including microtropia
- Anomaly of convergence/accommodation
- Lack of understanding – due to age/test used
- Non-organic cause

Reduced/Absent Stereopsis – Management

- Identification of underlying cause
- Glasses wear
- Amblyopia treatment i.e. conventional occlusion/atropine occlusion
- Exercises to treat anomalies of convergence/accommodation – exercises improve NPC/NPA and fusional reserves which may improve stereopsis

Convergence

Convergence

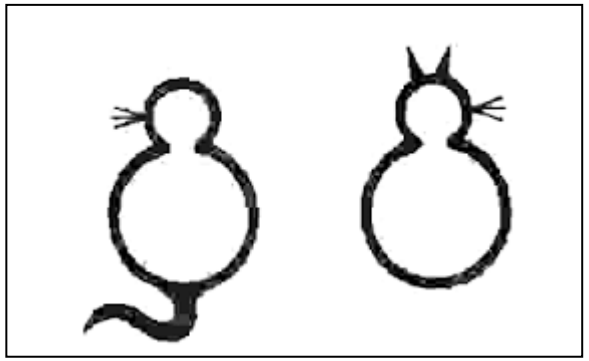
Normal NPC is ≤ 10cm

Symptoms of Convergence Insufficiency

- Diplopia
- Headaches – frontal
- Eye strain
- Difficulty reading
- Blurred vision

Convergence Insufficiency - Management

- Exercises
  - Effective if conducted properly under supervision
  - The patient must have sufficient cooperation and motivation
  - The patient should be in good general health
  - Various exercises used – smooth pen convergence, dot card, prism bar, stereograms



Convergence Insufficiency - Management

- Prisms
  - Indicated for patients who are not responding to exercises or are unable to conduct exercises effectively – Fresnel prisms should be trialed before incorporation
  - Fresnel prisms may also be used in conjunction with exercises initially if NPC is particularly reduced – aim to wean off prisms

Convergence Insufficiency - Management

- Surgery/Botulinum Toxin
  - Not indicated for primary convergence insufficiency – no evidence that surgery improves the convergence mechanism
  - May be indicated for convergence weakness exophoria when the patient has not responded to exercises
  - A prism trial may be indicated first – those who do not respond may have defective motor fusion and may be poor candidates for surgery (Ansons and Davis, 2014)

Convergence – Key Points

- Only treat patients who are symptomatic
- Refer to Orthoptist for differential diagnosis and management
- Refrain from prescribing prisms prior to patients seeing the Orthoptist

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Diplopia – Red Flags
Differential diagnosis of recent and longstanding strabismus

Sonia MacDiarmid – Head Orthoptist

Aims

- Highlight ‘red flags’ for patients presenting with diplopia
- Clues from the patient to aid diagnosis
- Urgency of referral

Observations

Abnormal head posture

Orbits/Lids

Limb weakness

Gait

Parkinsonian movements

Tremor

Navigational skills

Dystonia

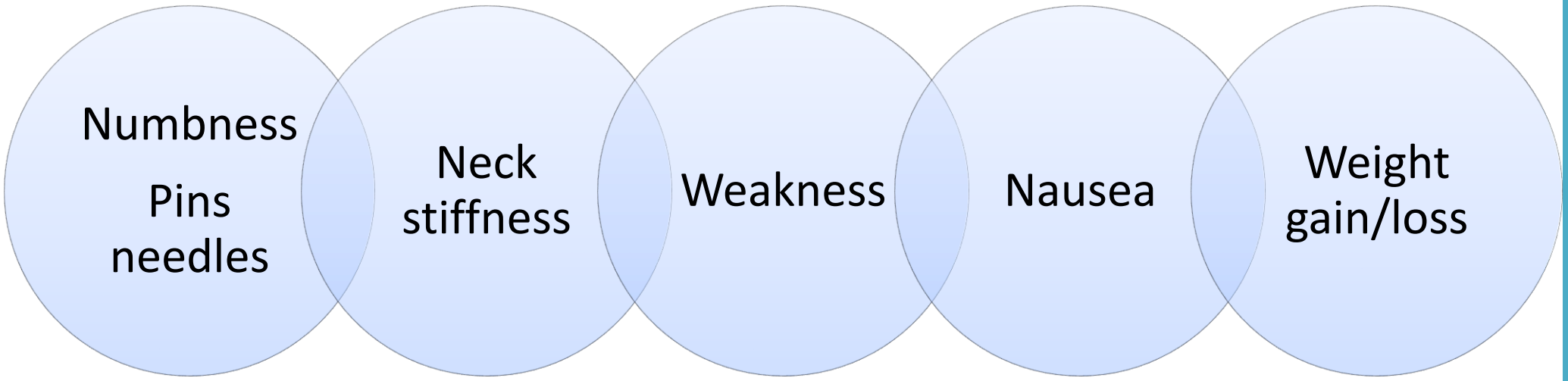
Facial asymmetry

Taking a Good Case History

Listen to the patient's description – let them talk

- Onset – gradual/sudden
- Direction of the diplopia
- Near/distance disparity
- When do they notice the diplopia – constant or intermittent? Does it vary? Uhthoff's phenomenon? Fatigue?
- Pain – location/nature of pain
- Headaches – waking up/bending down/coughing
- Monocular or binocular diplopia
- Associated signs/symptoms

Signs/Symptoms



Social history

Drinking/smoking/weight gain

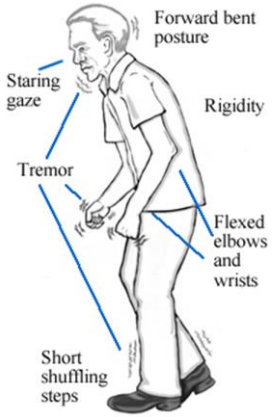
Medication/recreational drugs

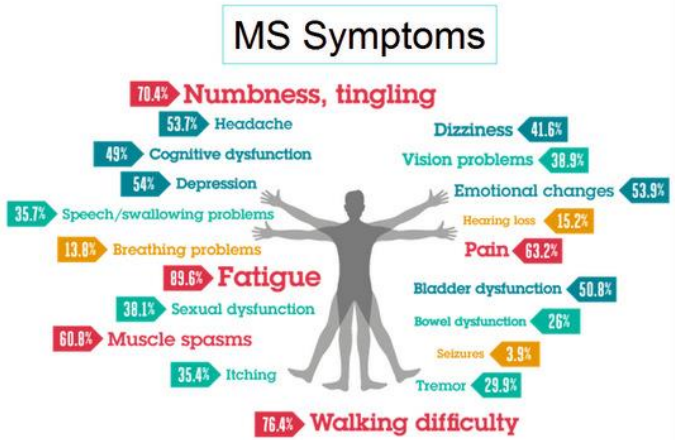
Family history

Stress/mental wellbeing

Medical History

- Diabetes
- HTN
- Hyperlipidaemia
- Parkinson's Disease
- MS
- Thyroid dysfunction
- Recent infection/illness
- Ocular trauma
- Other forms of trauma
- Previous ocular history…decompensating childhood squints/ suppression mask diplopia





Cover Test

Look for **Incomitance** – children can have incomitant squints

Esotropia larger for distance - VIth, decompensating distance esophoria, myopia with esotropia, accommodative/convergence spasm

Exotropia – IIIrd, (pupil and non pupil sparing) Parkinson's disease, INO (MS)

Vertical squint - IVth, skew (supine test) or mechanical, decompensating congenital IVth

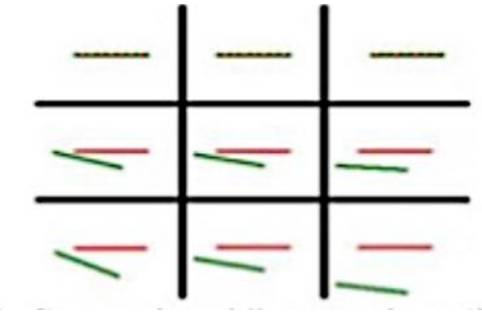
Mechanical and supranuclear - small deviations compared with deficit

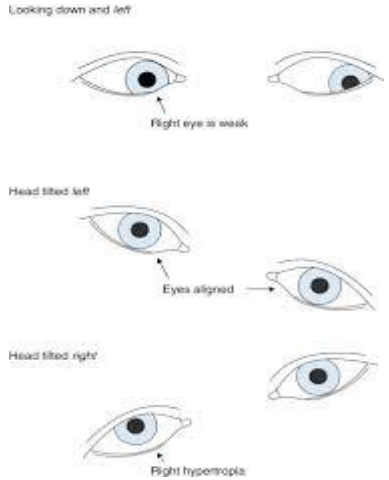
Variability – Myasthenia gravis

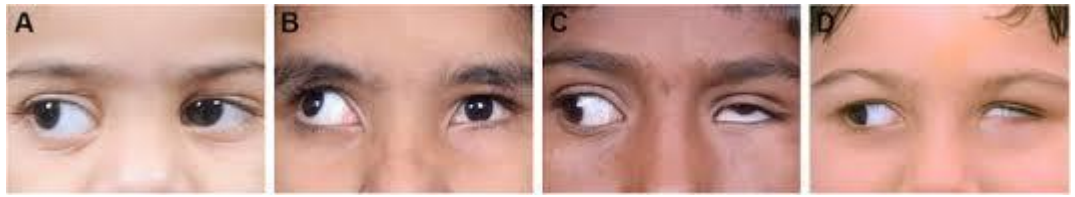
Assessing Eye Movements

Look for

- Description of the diplopia
- Greatest restrictions/limitations
- Ductions and versions
- Lid changes
- Globe retraction
- Variability
- Nystagmus
- Torsion
- Head tilt test







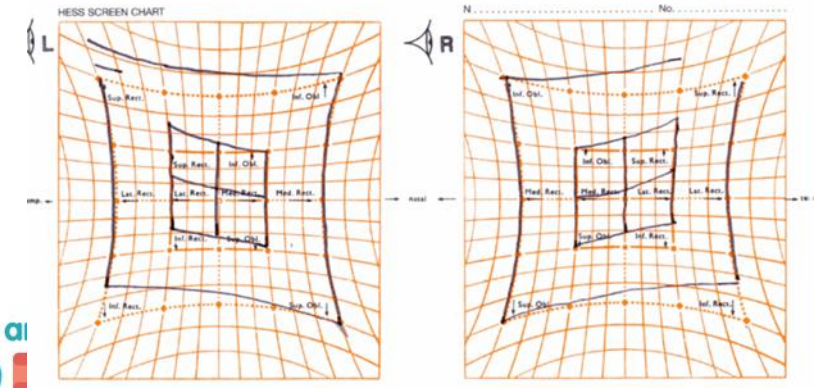
Binocular vision

- Convergence deficit – Parkinson's
- Reduced/absent stereopsis – childhood microtropia decompensated
- Suppression – mask diplopia or nystagmus
- Extended vertical motor fusion
- Important – guide our treatment options

Differential diagnosis Acquired v Longstanding

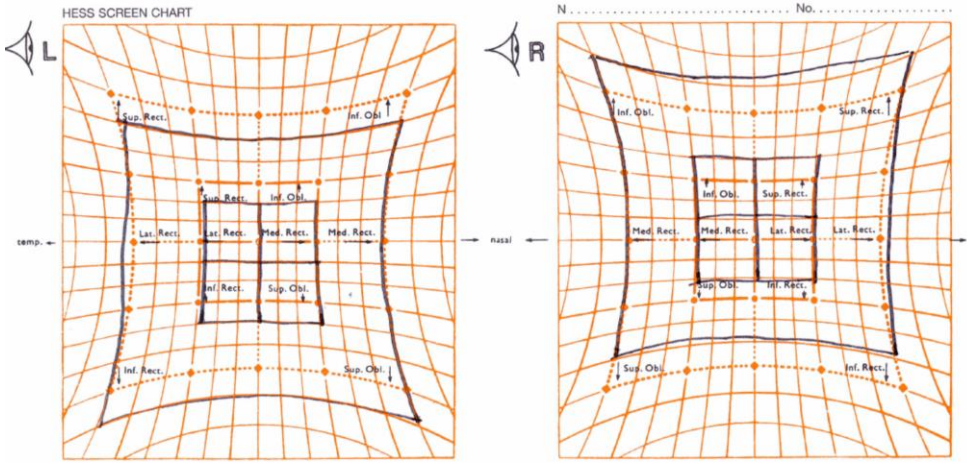
Acquired

- History
- Awareness of abnormal head posture
- Incomitance



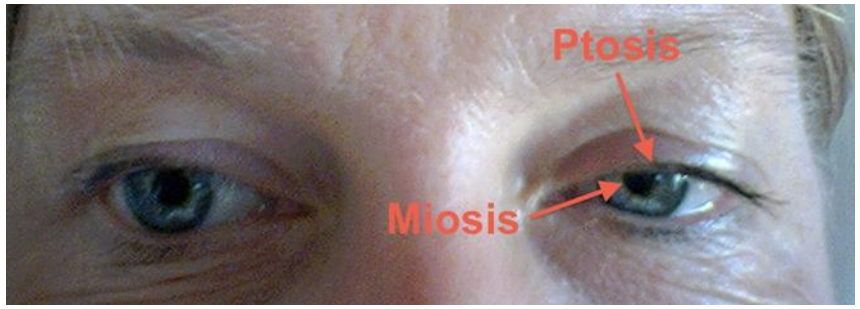
Longstanding/Congenital

- History
- Unaware of AHP
- Presence of amblyopia/microtropia
- Extended vertical fusion range
- Concomitance



Pupil involvement

- Horners – red flag



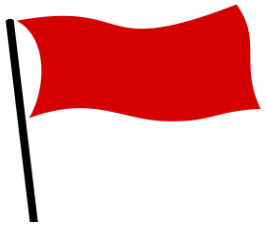
- IIIrd nerve
  - No pupil involvement – diabetic
  - Slow progressing pupil involvement

Lid assessment

- Blink rate – reduced in PSP and Parkinson’s
- Evidence of blephrospasm – Parkinson’s, benign, PSP
- Apraxia of lid opening - PSP
- VIIth nerve function
- Ptosis- Horner’s

Red Flags

- Pupil-involvement – Horner's
- Incomplete III palsy – pupil may be affected later
- Pain (IIIrd)
- No recovery or improvement within 12-weeks – importance of serial Hess charts, measurements in 9 positions to monitor improvement or progression
- Multiple cranial nerve palsies
- Variability
- Papilloedema
- Neurological signs/symptoms…



Urgent radiological Investigation

- IIIrd N with pupil involvement and/or pain
- Consider for those under 60 years of age
- Patients without any appropriate history or trauma for diagnosis
- Multiple CNP
- Patients without known microvascular risk factors
- Recurrent CNP
- CNP that is not recovering after 12 weeks

Referral pathways to Ophthalmology

- Routine – Standard referral route to Ophthalmology primary care (current wait – 5 Weeks)
- Urgent referrals
- Warrington ED
- WEEP (Warrington emergency eye provision)
  - Min 6 sessions per week Mon-Friday
  - On call rota shared with STHK
  - GP urgent referrals via ICE system
  - Emergency eyes email
  - All referrals triaged
  - Aim to see urgent diplopic patients within 24 hours (orthoptist + Ophthalmologist

Treatment options

- Fresnel prisms – acute phase (refrain from incorporation in the acute phase)
- Aim to incorporate once stable at least >12 weeks
- Torsion (IVth) – barrier to prism, occlusion
- Sector occlusion
- Acute VIth nerve – botox injection to MR urgently

- Botox (horizontal squints only)
- Strabismus surgery – Mr. Bregu
- Monitor for improvement/progression
- Advice – MECC, driving, eye health, support

Recap

- Overview of binocular vision
- Normative values
- Amblyopia treatment overview
- Ocular motility
- Red flags
- Referral process

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Thank you

- Sonia.macdiarmid@nhs.net
- Faye.mather@nhs.net

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