Visual impairment in stroke survivors

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What are the consequences?

- Lots!
  - eye movement deficits
  - visual field impairment
  - perceptual and attention deficits
  - low vision
- Mild to severe
- Easily recognised or undiagnosed

- Impact
  - Mobility
  - Depth perception
  - Reading
  - Driving
  - Rehabilitation
  - Quality of life
Perceptual and visual impairments
Ocular motility

Types
- Prevalence of 15-68%

Cortical
- Saccadic
- Smooth pursuit
- Strabismus

Brainstem
- Cranial nerve palsy
- INO
- Parinauds
- Gaze palsy
- Skew
- Nystagmus

References:
Rowe FJ et al. Age and Ageing 2009; 38: 188-193
MacIntosh C. British Orthoptic Journal. 2003; 60: 10-14
Diplopia
16.5% acquired manifest strabismus
Diplopia as primary symptom
36%
Diplopia as combined symptom
16%
All with associated OM disorder
Ocular motility

- Nerve palsies
- Gaze palsies
- Saccadic deficit
- Pursuit deficit
- Nystagmus
Cranial nerve palsy
Gaze palsy
Nystagmus
Ocular motility

- 20% with manifest strabismus
- 12% with nystagmus
- 61.5% with abnormal eye movements
- 33% with reduced convergence
- 68.4%

Rowe et al. Age and Ageing 2009
Reading difficulties

Due to:

- Disturbed fast and/or slow eye movements
- Nystagmus
- Poor convergence
- Blurred vision
- Visual field loss
- Visual inattention
- Agnosia
- Alexia
Conservative treatment

- Prisms
- Occlusion
- Orthoptic exercises
- Compensatory head posture
Invasive treatment
Prognosis

**Symptoms**
- Primary diplopia • 16%
- Joined or alleviated • 14.3%
- Prisms or occlusion
- Primary nystagmus • 1.5%

**Signs**
- Full improvement • 3.1%
- Partial improvement • 14.2%
- Deterioration • Nil

VIS study 2009
Vision loss
Signs and symptoms

• Amaurosis fugax

• Transient visual obscurations

• Blurred vision
Visual field loss

Jones SA, Shinton RA. Age and Ageing. 2006; 35: 560-565

Riddoch phenomenon
Visual field loss

• Prevalence
  – 20-57%

• Approx two thirds are complete HH

Freeman CF, Rudge NB. British Orthoptic Journal. 1988; 45: 8-18
Treatment options

- Adaptation time
- Widening field of view
- Building blindsight
Treatment options: prisms

Effect of prism on Binocular Field

Unaided Left hemianopia Repeated with prism

70 yr old male: CVA 7/5/05: 2 months post stroke
Right haemorrhagic stroke, middle cerebral artery territory
Left hemiplegia & left hemianopia
Visual search strategies

Frequently combined with head movements
Neuro-Eye Therapy

www.abdn.ac.uk/sightscience
Typoscope
Prognosis

Expected recovery within 4-6 weeks

Approx 50% reported recovery

Freeman CF, Rudge NB. British Orthoptic Journal. 1988; 45: 8-18
What constitutes low form vision?

UK DVLA
• < 6/12 or 0.3 BCVA

WHO
• <6/18 or 0.5 BCVA
Visual impairment

- Low vision reported in 26%
- Visual impairment can pre-exist the stroke

Rowe FJ et al. Age and Ageing. 2009
Lotery A et al. Age and Ageing 2000
Treatment options

• Optical
  – Magnification
  – Minification
  – Anti-glare Optics

• Non optical
  – Eccentric viewing
  – Abnormal head posture
  – Tracking / scanning
  – Anti-glare strategies
Prognosis

Refractive error
  e.g. Un-corrected
  e.g. Under-corrected

Ocular pathology
  e.g. Cataract
  e.g. Glaucoma

Systemic pathology
  e.g. Diabetes
  e.g. Hypertension

Stroke related
  blurred vision (50%)
  71% improvement

Freeman CF, Rudge NB. British Orthoptic Journal. 1988; 45: 8-18
MacIntosh C. British Orthoptic Journal. 2003; 60: 10-14
Perception
Perception versus central vision
Colour vision
Contrast sensitivity
Implications...
Alexia / reading difficulties

- Impaired language interpretation
- Impaired word recognition
- Disconnection of occipital lobe from language processing areas
Metamorphopsia   Micropsia
Perception versus peripheral vision
Anton’s syndrome

Lacking insight of visual loss

Absent lid reflex to light or danger

Normal pupil function and fundus appearance

Blindsight

Aware of extent of visual loss

Reaction present to moving targets

Intact reflex pathway from retina to superior colliculus and pulvinar
Charles Bonnet syndrome
Perception versus eye movement
Motion perception

- Akinesthesia
- Impaired motion perception
- Retained static vision

Mishkin et al 1983
Palinopsia

- Persistence of images despite cessation of stimulus

Polyopia

- Visual perserverence
  - Similar to palinopsia but stimulus is still present
Depth perception

Detailed depth requires co-ordination and accurate pairing of both eyes
Cortical depth impairment

• Associated with motion deficits and forms of agnosia
Summary

- Co-existent impairments
- Perceptual impairment
- Vision impairment
- Eye movement impairment

Important to diagnose type
Determine impact to function
Provide accurate driving information
Onward referral

92% with confirmed visual impairment