Overview with general points on presentation of acquired motor cranial neuropathies - oculomotor (III), trochlear (IV) and abducens (VI) nerve. Investigations should always be guided by an informed assessment of the likely problem. This talk will include general clinical points supported by neuro-imaging illustrations.

Common symptoms may include visual confusion and oscillopsia, as well as diplopia. Initial assessment needs to include distinction between comitant and non-comitant (paralytic) deviations, the difference between supranuclear and infranuclear ophthalmoplegia, between neurogenic and myogenic causes and the possibility of unsuspected restrictive problems.

Non-visual symptoms are important including questions about dizziness, periocular pain, headache and other neurological symptoms in addition to general medical and drug history. Ask about a history of childhood strabismus and amblyopia treated and untreated.

In addition to examining the eye movements, the clinical examination needs to include visual acuity and fields (at least to confrontation), an appreciation of field of binocular vision and binocular function, assessment of the eyelids and pupils, a search for orbital signs including congestion and proptosis as well as tonometry and fundoscopy.

Points for special attention in 3rd nerve palsy (in adults approximately 30% due to aneurysms, 50% microvascular, 20% all other causes)

- Pupil sparing 3rd nerve palsies only safely assumed ischaemic if complete, and:
  - pt > 40 years old,
  - arteriosclerotic medical risk factors
  - sudden onset – complete ptosis within 24hrs
  - no aberrant regeneration
  - no history vasculitis, cancer or autoimmune disease
  - no persistent pain
  - remaining exam is all normal including finding preserved intorsion

- Aneurysmal 3rd nerve palsies may be pupil sparing early in evolution and affect any combination of extraocular muscles either singly or in combination can cause horizontal, oblique or vertical diplopia.

Points for special attention in 4th nerve palsy (commonly ischaemic or decompensated congenital)

- Do not diagnose unilateral ischaemic 4th nerve palsy unless:
  - age >40 years
  - vasculopathic risk factors +ve
  - no history cancer, vasculitis, autoimmune disease
  - sudden onset with subjective torsion < 10 degrees
  - no other abnormality
• Do not diagnose congenital 4th nerve palsy unless:
  historic evidence of head tilt
  hypertropic eye has inferior oblique overaction and/or superior oblique underaction
  hypotropic eye has normal ocular ductions
  vertical fusion range is > 5 prism dioptres
  subjective torsion - absent

Points for special attention in 6th nerve palsy (commonly due to ischaemia, tumours or inflammatory disease)

• Do not diagnose microvascular, ischaemic 6th palsy unless:
  pt >40 years
  vasculopathic risk factors
  no history of cancer, vasculitis or autoimmune disease
  sudden onset
  unilateral abduction deficit with no other abnormality
  recovery starting at 3 months

• Suspect tumours if:
  gradual or intermittent onset
  progression
  persistent pain
  other cranial neuropathies (afferent and efferent visual system)

• Remember mimics which also cause unilateral abduction deficits:
  myasthenia
  Duanes syndrome
  restrictive myopathies

2 Management: Gill Adams, John Sloper, Jo Hancox

3rd nerve palsy

If the 3rd nerve palsy has been acquired traumatically whatever intervention is undertaken the patient may have intractable diplopia due to loss of fusion. Surgery may be taken to improve the alignment, which may help the use of an occlusive contact lens, but will not abolish diplopia.

For a divergent squint in a partial 3rd nerve palsy without vertical misalignment and good horizontal movement, a recession of the lateral rectus and resection of the medial rectus can be undertaken and traction stitches may be useful.

For a divergent squint with hypotropia but good adduction, a recession of the lateral rectus and resection of the medial rectus with elevation of the insertions can be undertaken.

For hypotropia consider a Knapp procedure, and an inverse Knapp procedure for a inferior division palsy with hypertropia.

For residual diplopia from incomitance secondary to medial rectus underaction a Scott procedure to the contralateral lateral rectus can be valuable.
Eyes with essentially no adduction in a total 3rd nerve palsy present a particular surgical challenge. Superior oblique transposition has been suggested but appears to have a short time efficacy. The use of periosteal fixation of the medial rectus insertion, combined with disinserting the lateral rectus from the globe to the lateral orbital wall soft tissue and the use of temporary traction sutures has proved successful in these challenging cases.

4th nerve palsy

The commonest first intervention is usually ipsilateral inferior oblique weakening. Superior oblique tendon tuck can be helpful in congenital cases if superior oblique underaction exceeds inferior oblique overaction. Ipsilateral superior rectus recession can be a very helpful intervention, and has less risk of over correction than performing contra lateral inferior rectus recession.

In the presence of torsion Harado Ito procedures are extremely helpful. For patients with bilateral asymmetrical superior oblique weakness a superior oblique tuck to the more affected eye with a unilateral Harada-Ito procedure to the other eye is a useful procedure.

For patients with residual downgaze diplopia and no height in primary position an inferior rectus faden procedure (posterior fixation suture) can be valuable as a second procedure.

For patients with height in primary position and all downgaze positions an inverse Knapp procedure is useful provided the ipsilateral superior rectus is not tight.

6th nerve palsy

Management decisions in 6th nerve palsy depend on the abduction status, and the use of botulinum toxin is extremely helpful in differentiating between partial and complete lateral rectus palsy.

If the palsy is incomplete medial rectus recession and lateral rectus resection is indicated. If the palsy is complete transposition of the vertical recti to the lateral rectus border is required with preoperative botulinum toxin to the ipsilateral medial rectus. Bilateral palsies are highly likely to require 2nd stage surgery, most commonly medial rectus recession or Faden procedure or a contra lateral Scott procedure on lateral rectus.

In a small number of cases a functional cure is achieved following botulinum toxin.

References
2. Kouri A, Bessant D, Adams GGW, Sloper JJ. Quantitative changes in the field of binocular single vision following a Fadenoperation to a vertical rectus muscle JAAPOS 2002 (5) 294-9