

HEMIPLEGIA

An Overview

HEMIHELP CONFERENCE

CARDIFF 2013

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The Cerebral Palsies

A group of permanent disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occur in the development of the fetal or infant brain. The motor disorders of CP are often accompanied by disturbances of sensation, perception, cognition, communication and behaviour, by epilepsy and by secondary musculoskeletal problems.

Spastic Unilateral Cerebral Palsy (Hemiplegia)

- 25% all CP
- Milder physical disability
- Overall prevalence CP 1.7-3 cases/1000 live births
- Trend increase in CP overall in some papers
– relates to increased survival premature infants <1kg

Hemiplegia -Aetiology (cause)

- 25% infarction in distribution of middle cerebral artery
- Left more common – 70%
- Majority caused late in gestation
- Can be related to complicated labours (some intrapartum events arise from rather than are the direct cause of the lesion)
- Can be related to prematurity and intraventricular/ intracerebral haemorrhage and unilateral peri-ventricular leukomalacia
- Can be postnatal

Recent Developments

- Increased epidemiological awareness
- Better precision in the diagnosis of brain lesions
- Interest in CP as an outcome following neonatal intensive care
- Changes in treatment approaches –
Botulinum toxin, gait analysis, SEMLS

Neuro-imaging in Hemiplegia

- European CP study recommends MRI since since most children have underlying brain lesion
- However recent advances in brain imaging have led to an appreciation that very similar brain insults can leave very different sequelae in children

Terminology Used

- Tone
- Spasticity
- Dystonia
- Chorea

Spasticity

- State of increased muscle tone
- Results from a cerebral or spinal lesion
- Part of an upper motor neurone lesion
- Loss of UMN inhibitory control over local reflex arc
- Causes abnormal postures and impaired voluntary movement

Spasticity

- Greek “spastikos” - to tug or draw
- Velocity dependent - spastic catch (cf extrapyramidal rigidity)
- Antigravity distribution
- Muscles eventually shorten/contract
- Other soft tissue changes contribute to stiffness

Spasticity - consequences

- Interferes with function
- Pain
- Flexor and extensor spasms
- Dystonia
- Soft tissue and joint changes
- Cosmesis

Management

- Physiotherapy / Occupational Therapy (NICE 2012) alone or adjunct to other approaches. Bobath neurodevelopmental approach, Constraint induced movement therapy.
- Orthoses / lycra
- Medical
- Surgical

Medical treatment of spasticity

- Drugs - oral
- Botulinum toxin injections

Baclofen

- GABA beta receptor agonist
- Inhibits polysynaptic reflexes
- Impedes excitatory neurotransmission at spinal level
- Reduces muscle spasm and pain and improves mobility
- Side effects - sedation, increased weakness since penetrates BBB poorly

Botulinum Toxin

- BTX - A (Dysport or Botox) & BTX - B
- Intramuscular injection
- Adjunct to physiotherapy and other orthoses/serial casting
- Dynamic spasticity
- Careful clinical evaluation sometimes including video gait analysis
- Usually not more than 2 muscle groups injected at one setting

NICE (2012) – Botox use

- Where (spasticity/dystonia) impede function
- Where compromise of care and hygiene
- Where causes pain
- Where impedes tolerance of other treatments e.g orthoses
- Cosmetic concerns

Indication

- Persistent thumb in palm/adduction
- Wrist posture preventing effective hand use
- Tight elbow flexion

Indications

- Dynamic equinovarus throughout gait cycle
- Dynamic knee flexion angle >20 degrees during the gait cycle
- Significant scissoring
- Mor RCT trials ?multilevel use

Botox -Evidence

- UK Botulinum Toxin and Cerebral Palsy Working Party. Est 1995
- Position paper on the use of botulinum toxin in cerebral palsy
Carr Arch Dis Child Sep 1998
- Cochrane review database of systematic reviews 2010 (Hoare)
- NICE 2010

Action

- Starts within 2-3 days of injection
- Maximal at about 3 weeks
- Wears off at 3-4 months
- Functional improvement may persist beyond this - allows for stretching and growth of muscle
- Safe and effective in long term

Injection

- Assessment - doctor + physio \pm orthotist
- Informed consent
- Sedation - oral midazolam, entonox
- Local EMLA/Ametop
- Sometimes EMG control

Adverse effects

- Excessive transient weakness in injected muscle or unwanted weakness in adjacent muscles
- Increased dysphagia
- Mild generalised fatigue
- Antibody formation - injections recommended >4-6 monthly intervals
- Less antibody formation and longer lasting effect with BTX-B

Outcome measures

- Ashworth scale
- GMFCS
- Wee FIM - functional independent measure for children
- Physician rated scale
- PEDI - Paediatric Evaluation of Disability Inventory
- PCI - physiological cost index
- QUEST
- Grip strength

Gait laboratory analysis

- Accurate and objective record of walking which is of significant value for research and often clarifies reason for deformities (possible from 3y)
- Measures joint movements (kinematics) by tracking markers on lower limbs and EMG over major muscles involved
- Generates computerised model of gait
- Physical examination, DVD, EMG, energy expenditure of gait
- Correlates well with GMFCS
- Allows detailed surgical planning

Single Event Multi-level Surgery

- Multiple one-stage procedure of soft tissue and bony surgery at hips, knees and feet
- Good option for hemiplegic or diplegic child where cognition and emotional maturation adequate to comply with post-op rehabilitation

Other surgery

- Hip dislocation
- Scoliosis surgery
- Tenotomies and tendon lengthening
- Tendon transfers (rectus femoris and split tibialis posterior transfer)

CP management

- Which child?
- Which treatment?
- Goal orientated

Management of Associated Impairments

- Feeding/dribbling
- Communication
- Bowel and bladder function
- Osteopenia
- Visual impairment/ visual field defect
- Hearing impairment
- Epilepsy (21% European group)

Cognitive Difficulties in Childhood Hemiplegia

- 2/3 children have IQ in **N** range
- As a group IQ shifted down
- Most in mainstream schools
- Those with acquired brain lesions between 1 and 60 months particularly susceptible to reduced IQ (peak period for synaptic creation and remodelling)

Specific Learning Difficulties in childhood hemiplegia

“Failure to achieve academic progress in reading, spelling or mathematics despite conventional instruction, adequate intelligence and socio-cultural opportunity (Snowling)”

Specific learning disability in hemiplegia

- 1/3 children met criteria for SpLD vs. expected 15% general population given method
- Half affected children met criteria for more than one SpLD group
- No significant differences on social or demographic features, sex, birth history, laterality of hemiplegia

Peer problems of 9-11 year old
children with hemiplegia in
mainstream primary schools.
Can these be predicted?

Carole Yude

Robert Goodman

Helen McConachie

Social/peer relationships and childhood hemiplegia

- Most children integrated into mainstream
- Problems not uncommon
- Increasing evidence for impairments in social understanding
- Emotional and social immaturity

Comments

- High risk sub-group may have benefited from early intervention and nurture of social skills
- Since social difficulties predict later psychopathology important to identify

Role of clinicians

- Put psychological issues on the agenda in our consultations
- Information for families
- Hemihelp - newsletters, meetings, advice
- Educational provision in part depends on health service provision
- Neuropsychological assessment
clinical/educational
- Re-assessment/refer

Armstrong – Canada 2001

- Literature focuses on the negatives
- Priorities of professionals and also parents those relating the child and family
- Priorities of the adolescents were those relating to peers and society

What do we learn from children and adolescents?

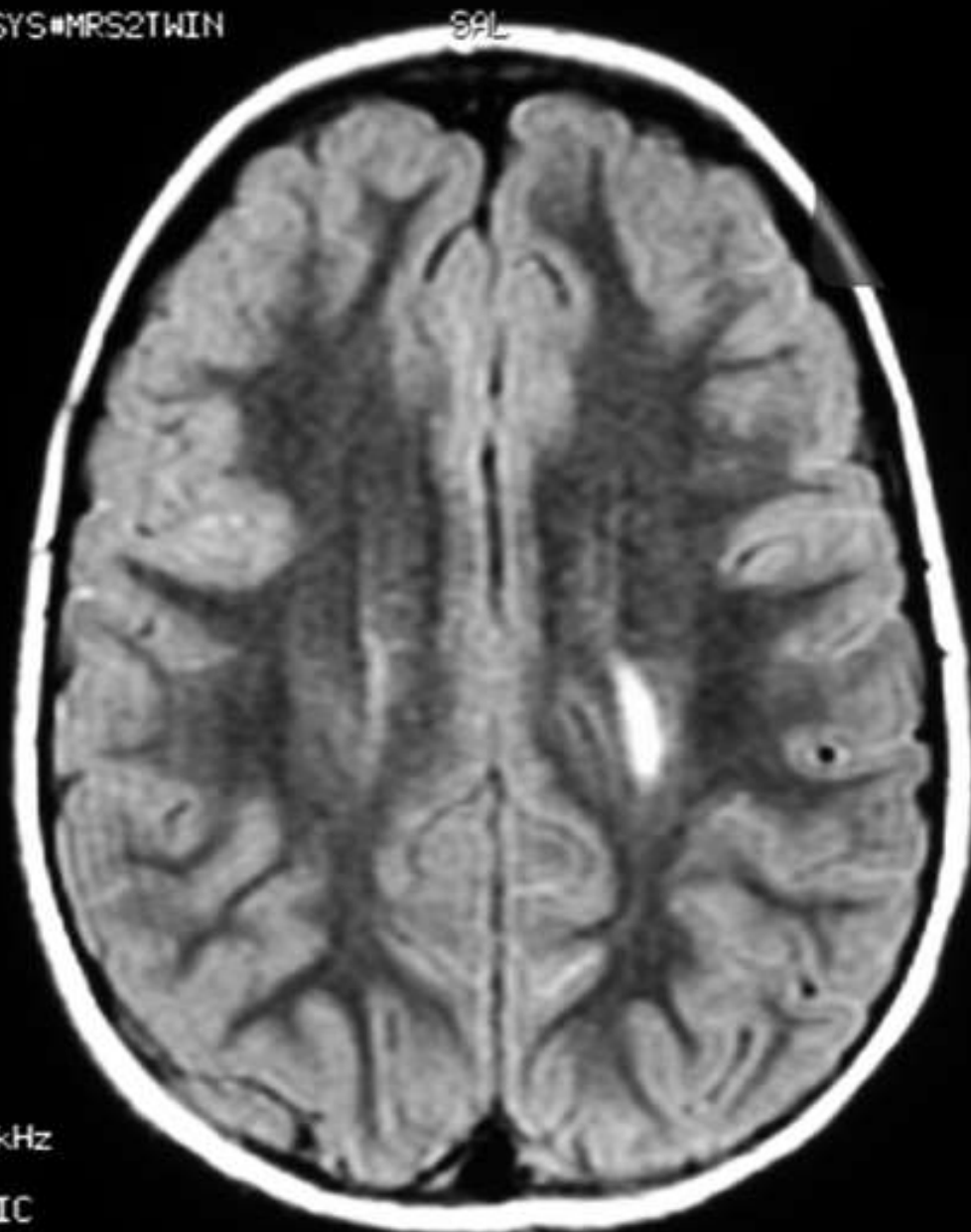
- We hate therapy
- Don't take us away from our friends
- We want to be treated normally
- Mostly understand their disability and are comfortable with themselves
- Sensitive to the way their friends interact with them
- Seek out shared experiences
- Recognise the importance of others with disability



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SAL

SAL



SAL

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TE:170/Ef
EC:1/1 15.6kHz
TI:2200
8HRBRAIN/SCIC
FOV:22x22/Z
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IPR

W =

172 L =

125

CHILD A

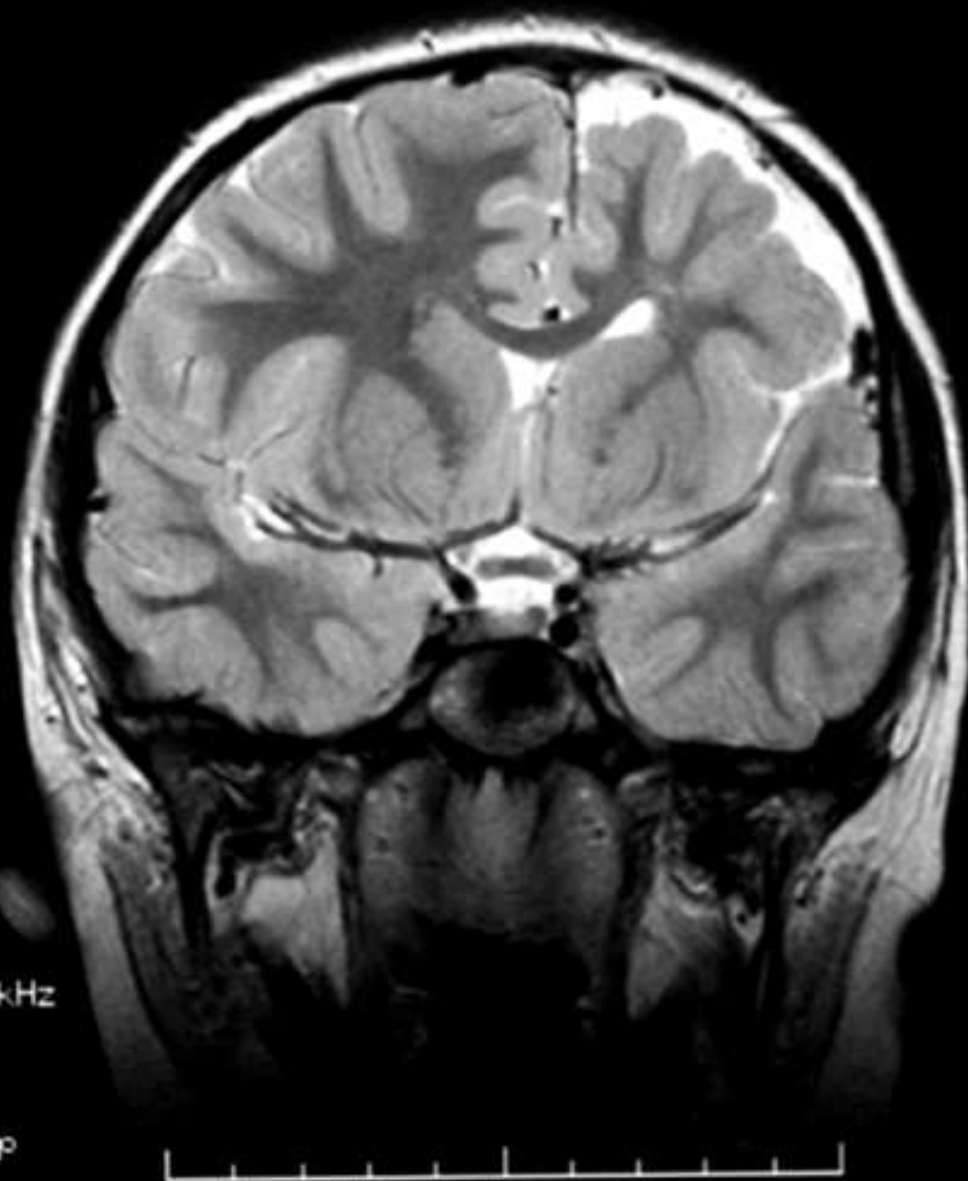
- Right hemiplegia/obligate left handedness
- Physiotherapy/orthotics/occupational therapy
- Mainstream school
- Some fine motor skill difficulties
- Leg length discrepancy
- Botox calf
- Distal femoral epiphysiodesis – helped foot clearance in swing

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TE:86.3/Ef
EC:1/1 17.9kHz

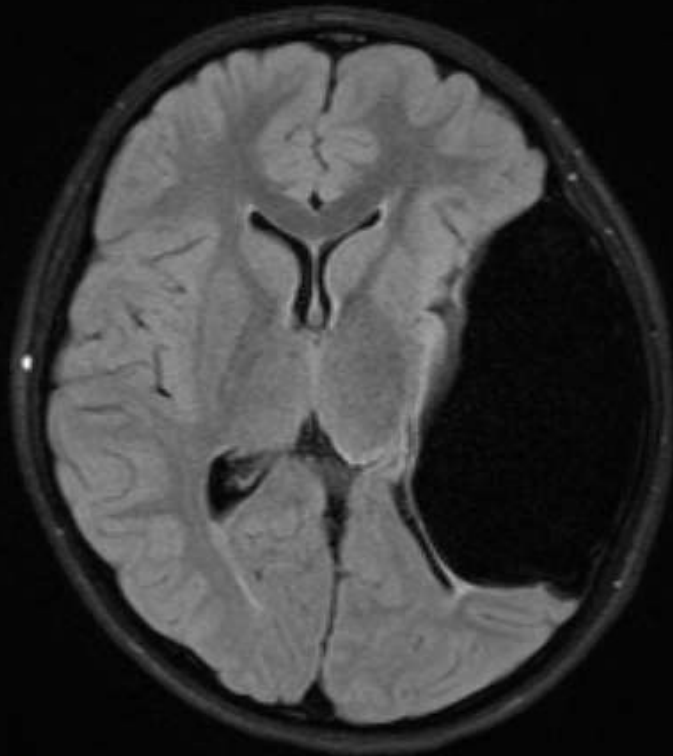
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21/02:42
384X256/2 NEX
EC:1/1 17.9kHz

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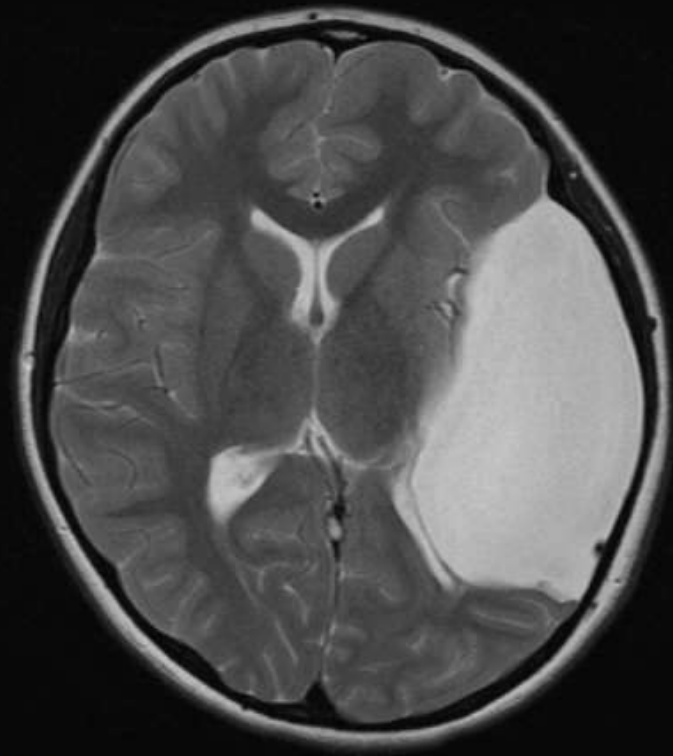
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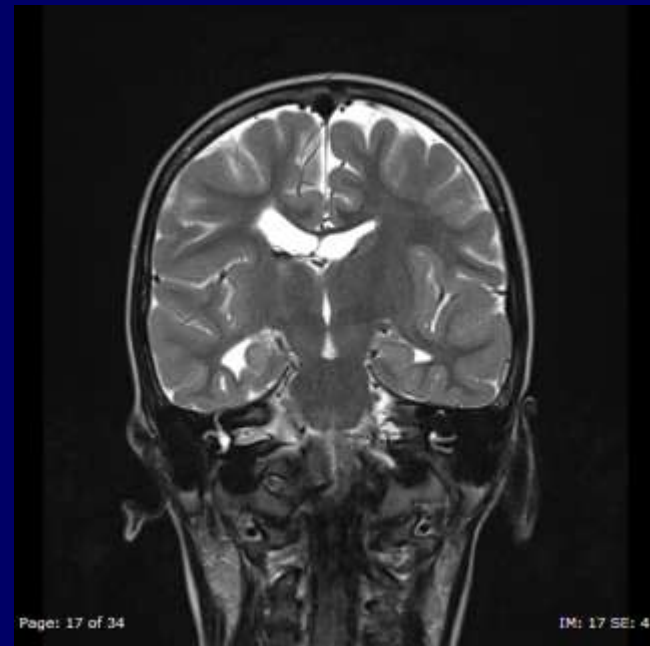
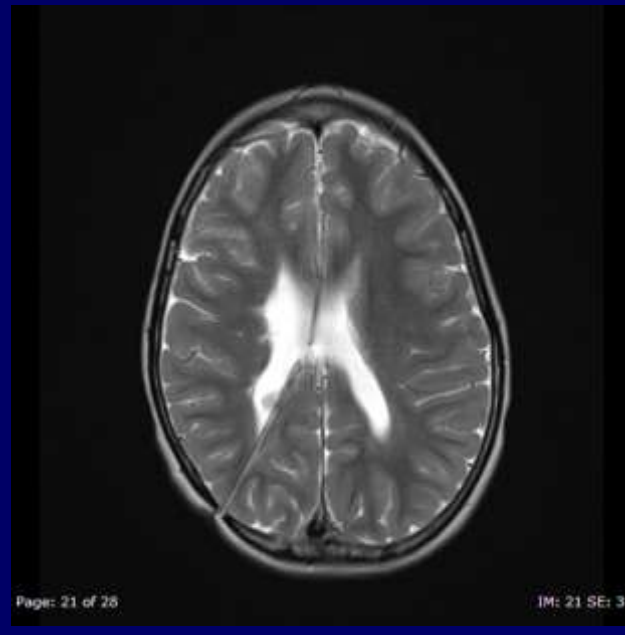
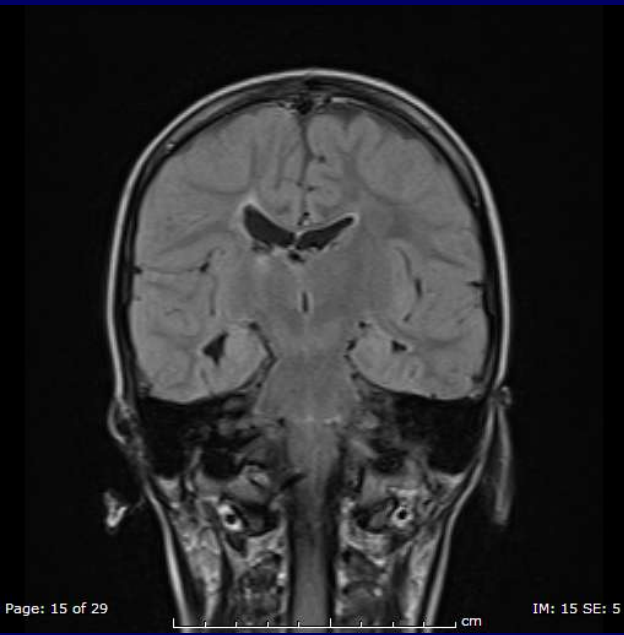
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Child C

There is a 9cm fluid filled cyst arising from the middle temporal fossa which causes mild mid line shift and compresses the left lateral ventricle and causes distortion of the temporal lobe which is poorly seen.

CHILD C

- Cerebral haemorrhage first few hours birth possibly secondary to AVM
- Focal epilepsy – controlled with medication
- Mainstream school, doing GCSE's
- Competitive horse-riding
- Minimal physical disability

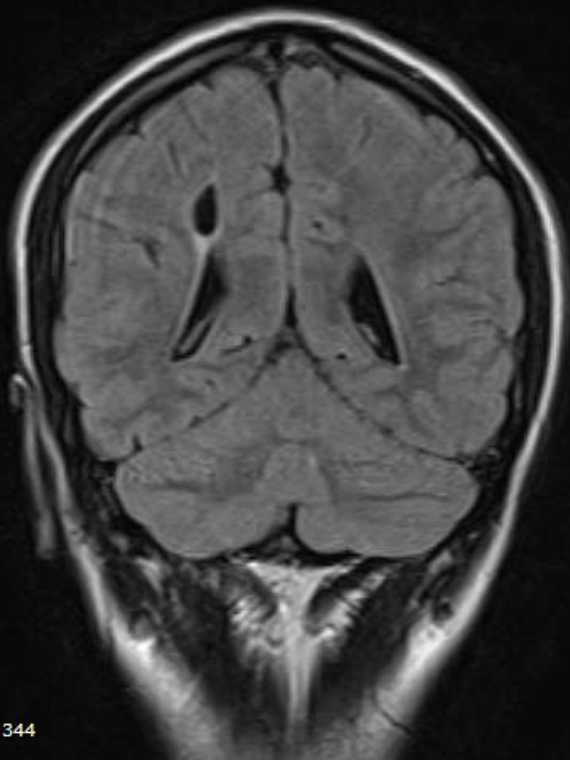


D

Right posterior VP shunt in situ. The tip of the the shunt lies within the body of the right lateral ventricle. There is irregularity of the outline of both lateral ventricles, more marked on the right. On the right side, there is periventricular hyperintensity and a decrease in the white matter bulk. The appearance is likely to be as a result of the previous choroid plexus bleed.

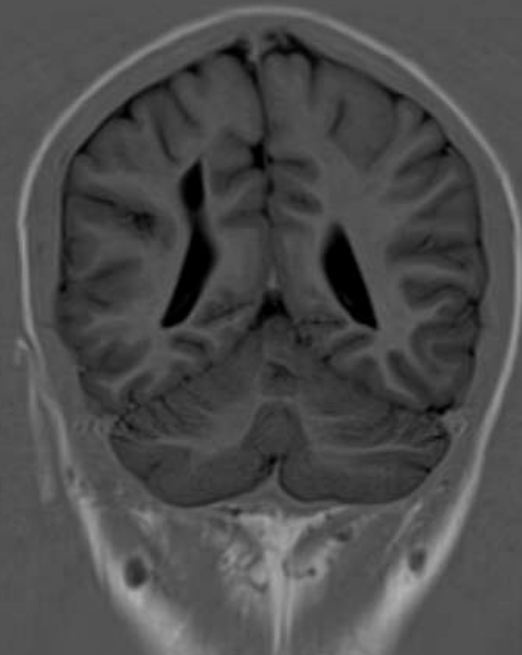
CHILD D

- Intracerebral bleed neonatal period
- Left hemiplegia
- Hydrocephalus
- Epilepsy
- Non-convulsive status epilepticus
- Learning difficulties – SEN
- Referred for consideration for epilepsy surgery (hemispherotomy)
- In remission with treatment with steroids for epilepsy



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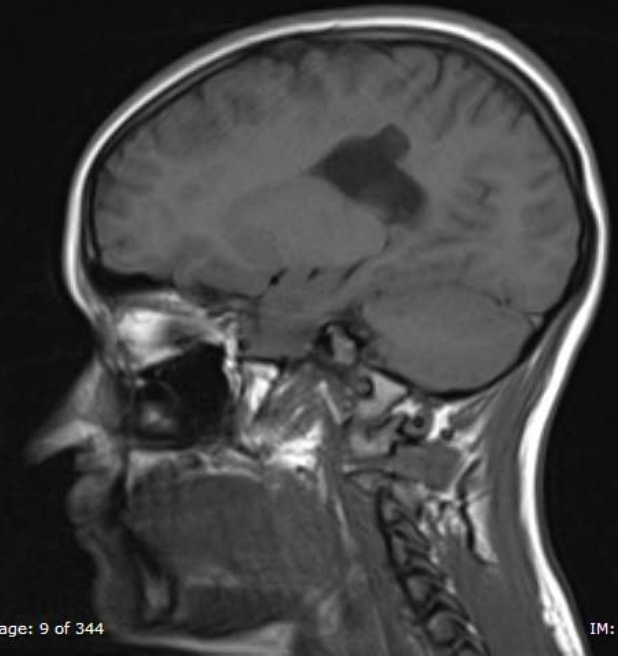
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CHILD E

There is focal enlargement of right lateral ventricle in the parietal lobe with corresponding reduction in white matter. The appearances are consistent with a right porencephalic cyst

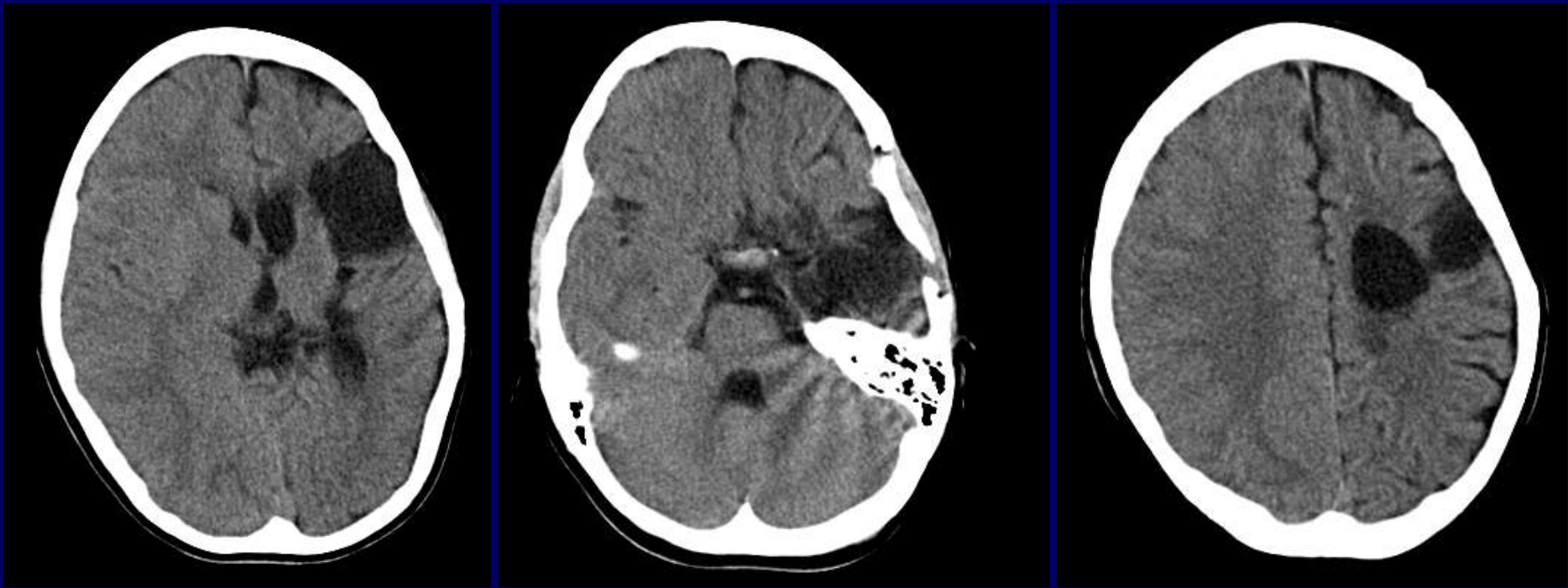


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CHILD E

- Left hemiplegia
- Pre-term 25 weeks
- Reduced vision right eye
- Mild scoliosis
- Behavioural issues – mainstream secondary SEN
- Surgery to growth plate right knee
- Investigated for focal epilepsy 16y



CHILD F

The left cerebral hemisphere is smaller than the right. Old infarction of the left frontal and temporal lobes with ex-vacuo dilatation of the left lateral ventricle noted.

CHILD F

- Intra-uterine transfusions
- Born prematurely at 33/40 EMSC
- Grade 1 IVH left
- Febrile convulsion within first year
- By 2y diagnosis epilepsy
- By 4y seizures problematic, EEG continuous epileptic activity left hemisphere
- Physio, OT, SALT, SEN
- Referred for work-up for consideration epilepsy surgery
- Hemispherotomy aged 7y
- Rehabilitation
- Seizure free off medication
- Mainstream school until secondary age