CRANIAL ULTRASOUND SCANS ● 1/3

PURPOSE

- To detect:
  - brain injury in at-risk babies to provide appropriate medical management
  - lesions associated with long-term adverse neurodevelopmental outcome

PRETERM BABIES

Indications

- Gestation <33 weeks
- Birth weight <1500 g
- Ventilated
- Abnormal neurology
- Abnormal clotting
- Congenital abnormalities/significant dysmorphic features
- Cranial malformation suspected antenatally/family history of cranial malformations
- Maternal cocaine use in pregnancy and head circumference <10th centile and lower centile than weight
- Micro/macrocephaly

Minimal schedule for scans:

Gestation					
<30 weeks	0–3 days		6–10 days	14–16 days	36 weeks' CGA or at discharge
30–32 weeks		3–7 days			36 weeks' CGA or at discharge

Additional scans

- If routine scans show a significant abnormality, discuss serial scanning with consultant
- Perform additional scans as clinically indicated or following a significant clinical event:
  - necrotising enterocolitis
  - major collapse
  - repeated severe episodes of apnoea and bradycardia
  - unexplained sharp fall in Hb
  - change in neurological status
  - abnormal head growth
  - pre- and post-operatively

Follow-up

- If scan abnormal further follow-up as advised by consultant

TERM/NEAR TERM BABIES

Indications

- Neonatal encephalopathy/ischaemic brain injury
- Seizures
- Abnormal neurological signs (e.g. floppy child, large head)
- Congenital abnormalities (except trisomy 21) e.g. congenital cardiac abnormality, congenital diaphragmatic hernia
- Unexplained poor feeding at term
- Unexplained hypoglycaemia, looking for pituitary and midline structures
- Meningitis
- Congenital viral infection
- Metabolic disorders
- Suspected brain malformations
- Significant maternal alcohol intake during pregnancy
- Requiring ventilation – including all babies having surgery under general anaesthetic

Seizures

- In term babies with seizures, perform cranial ultrasound on admission and at 2 and 7 days while waiting for MRI scan (preferred imaging modality)

Neonatal encephalopathy

- Initial scan within 24 hr
  - 2nd scan 3–4 days

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- 3rd scan 7–14 days
- In encephalopathic babies with significant birth trauma and low haematocrit, request non-contrast CT scan to exclude extra-axial bleed
- For babies with moderate-to-severe encephalopathy, MRI scan recommended between 5–14 days of life

PROCEDURE

Operator must achieve acceptable level of competence before performing and reporting scans independently

- Record minimum set of coronal images (6+):
- anterior to frontal horns of lateral ventricles
- at anterior horns of lateral ventricles and Sylvian fissures
- at 3rd ventricle and thalamus
- at posterior horns of lateral ventricles (with choroids)
- posterior to choroids (posterior brain substance)
- if lateral ventricles are dilatated, measure ventricular index at the level of 3rd ventricle at the foramen of Munro (ventricular index) and plot on appropriate chart
- Record minimum set of sagittal images (5+):
- midline through 3rd ventricle, cavum septum pellucidum, cerebellum with 4th ventricle and foramen magnum
- through each lateral ventricle showing anterior and posterior horns, with caudothalamic notch imaged if possible
- through each hemisphere lateral to the ventricle for deep white matter
- Supplemental oblique, surface and axial images may be necessary to record pathology
- For detection of cerebellar lesions, scanning through posterior fontanelle (junction of lambdoid and sagittal sutures) and mastoid fontanelle (junction of posterior parietal, temporal and occipital bones) can be useful

SCAN REPORTING

- Must be done by appropriately trained staff
- Scans must be reported using categories/terminology in **Table** below
- Consider further imaging e.g. MRI scan or, if ultrasound abnormal, CT scan of brain

Intraventricular haemorrhage	• None • Localised IVH without dilatation (germinal matrix haemorrhage, subependymal haemorrhage) • IVH with ventricular dilatation • Large IVH with parenchymal infarction
Ventricular size	• Normal • Enlarged (measure and plot ventricular index)
Parenchymal lesions	• None • Periventricular flare • Cystic lesions ◦ single large porencephalic cyst ◦ multiple cysts (cystic periventricular leukomalacia)

COMMUNICATION

- Any member of neonatal team may communicate a normal result to parents but it is vital to give a consistent interpretation. N**ote** that a normal scan does not equate to normal development and follow-up is essential
- Discuss an abnormal result with neonatal consultant before discussion with parents – an abnormal scan does not equate to abnormal development, follow-up is essential

DOCUMENTATION

- Documentation is extremely important. Save copies as per unit policy for future review/reference/comparison – each image must contain patient identifiers
- Record following information on investigation chart:
- date scan requested

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- date scan carried out
- Record ultrasound result (or file a written report) in baby's notes (neonatal staff)
- Complete cranial ultrasound ad hoc form in **BadgerNet**
- Record plan for performing future scans
- Record in notes any discussion with parents, especially of abnormal scans
- Include results of all scans in discharge summary, even if normal
- If eligible baby transferred to another hospital before scanning, communicate need for scan in transfer summary