Bradford Teaching Hospitals NHS
NHS Foundation Trust

Seizures - Investigations

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Investigations for neonatal seizures

Seizures occur most commonly in the neonatal period than in any other period of life and suggest a serious neurological abnormality. Furthermore, they are more likely to occur in the preterm than the term infant and the list of aetiologies are vast.[1,2] An incidence of 0.15 – 3.5 per 1000 births has been reported with higher rates in preterm infants.[3,4,5] The majority of seizures are reactive, secondary to an underlying condition.[2] The commonest cause of seizures in the term infant is Hypoxic Ischaemic Encephalopathy while in preterm infants it is intracranial haemorrhage. Other aetiologies include:[1,6,7]

- Infection
- Intracranial pathology
- Electrolyte imbalance
- Hypoglycaemia
- Inborn errors of metabolism
- Drug withdrawal
- Familial
- Idiopathic

When considering the underlying aetiology of seizures and appropriate investigations it is important that we are guided by the individual case. A structured approach should be taken as shown below.

1. **History** – antenatal, perinatal, family (including family tree with demographics and consanguinity) and feeding history. Consider risk factors including:[2,8]
    - Maternal — Advancing maternal age; Nulliparity; Pre existing/gestational diabetes; Illicit drug use
    - Intrapartum — Fetal distress; Placental abruption, cord prolapse, prolonged second stage; Maternal pyrexia/chorioamnionitis
    - Neonatal — Lower gestational age; Post term (>42 weeks); Low birth weight; Male

2. **Clinical** – detailed neurological and general examination[8]
    - ***Neurological*** – level of consciousness, tone, gaze, posture, cranial nerves (pupillary reaction, facial movements, suck, gag reflex) and reflexes. Documentation and description of seizures should be charted.
    - ***General*** - looking for underlying disease
        - <u>Skin</u> bleeding, bruising, neurocutaneous lesions, birth marks.
        - <u>Cardiac</u> to include auscultation for murmurs and possible bruits over fontanelle (AV malformation).
        - <u>Abdominal</u> looking for intra-abdominal masses.

3. **1st line investigations**[2,8,9,10,11]
   - Blood gas – pH, pCO_2, BE, lactate, glucose, ionised calcium
   - FBC
   - U&E – renal function, Na, K, Mg, Ca
   - LFT's
   - Ammonia
   - Septic screen – Blood culture, CRP, LP (consider viral PCR's if appropriate), urine culture

   Neuroimaging
   - Cranial USS – to identify intraventricular haemorrhage, arterial stroke, malformations and infections. Should be carried out as early as possible.
   - MRI – to identify changes of HIE, arterial and venous stroke, meningitis/encephalitis, inborn errors of metabolism and congenital malformations. Can be carried out later into investigations.

   Electrophysiology
   - aEEG – all babies being investigated for seizures require EEG monitoring.
   - Multichannel EEG – contact Neurophysiology Department (SLH)

If abnormalities are found in first line investigations, further investigations may be required to determine the underlying cause for the abnormal result. **Discussion with Neurology, Genetics and the Metabolic Team would be appropriate for advice on further management and investigations.**

4. **2nd line investigations**
   - Metabolic screen – serum amino acids, acylcarnitine, TORCH, urine organic and amino acids, urine reducing substances
   - Genetic testing
   - LP – neurotransmitters, paired glucose/lactate/amino acids

The National Metabolic Biochemistry Website has some useful guidelines -
http://www.metbio.net/metbioGuidelines.asp
including presentation and investigations for suspected metabolic disorders.

SEIZURE INVESTIGATIONS LIST

Name
Hospital number
Date of birth

INVESTIGATION	DATE SENT	DATE EXPECTED	RESULT
Blood gas			
FBC			
U&E's			
LFT's			
Ammonia			
Septic screen • Blood cultures • Urine culture • LP • CRP			
Metabolic screen • Acylcarnitine • Serum AA's • Urine OA's • Urine AA's • Urine reducing substances			
Genetic testing (discuss with genetics)			
TORCH			
CSF			
Cr USS			
MRI			
EEG			

INVESTIGATION SHEET TO BE FILED BEHIND DAILY BLOOD TESTS

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Part IV.