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

1. **Clinical** – detailed neurological and general examination8

* ***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
  + Skin bleeding, bruising, neurocutaneous lesions, birth marks.
* Cardiac to include auscultation for murmurs and possible bruits over fontanelle (AV malformation).
* Abdominal looking for intra-abdominal masses.

1. **1st line investigations2,8,9,10,11**

* Blood gas – pH, pCO2, 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.**

1. **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**

**REFERENCES**

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Part IV.