Neonatal convulsions

Often a manifestation of an underlying serious problem

Most neonatal seizures will not persist into infancy and there is no evidence that treatment of clinical seizures with anticonvulsants improves outcomes. However, there is consensus that neonatal clinical seizures should be treated, particularly if they are frequent, prolonged or have adverse effects on cardiorespiratory function.

Diagnosis

Neonatal convulsions may be overt and obvious, they may be subtle and look like “something else” (like apnoea), or they may be subclinical and detected only on EEG (where available!). The following table describes neonatal seizures.

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<tr>
<th>Seizure type</th>
<th>Incidence</th>
<th>Physical characteristics</th>
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| Subtle       | Most common i.e. 50 – 75% | **Orofacial:** mouthing, chewing, lip smacking, blinking, eye deviation, fixed open stare  
**Limb movements:** e.g. pedalling, boxing  
**Autonomic:** unstable blood pressure, tachycardia, central apnoea |
| Clonic       | 23 – 40% | Repetitive jerking that cannot be suppressed if limb is held  
Focal or generalised  
Differentiate from jittering |
| Tonic        | 2 – 23% | Stiffening, sustained posturing of the limbs or trunk or deviation of eyes  
Generalised or Focal (less common) |
| Myoclonic    | 8 – 18% | Tend to occur in flexor muscle groups, rapid isolated jerks  
Focal, multifocal or generalised  
Differentiate from benign sleep myoclonus |

Things that can look like convulsions

1) **Jitteriness** (usually a sign of ill health: e.g. hypoglycaemia, meningitis)
   - no associated eye movements or autonomic phenomena
   - induced by stimulus or spontaneous
   - suppressed by holding the limb

2) **Benign neonatal sleep myoclonus** (usually a sign of good health and contentment)
   - occurs during REM/active sleep
   - not stimulus sensitive

Causes of neonatal seizures

In our setting, the main causes are:

1) **Hypoxic-ischaemic encephalopathy** (HIE)
2) Intracranial haemorrhage (IVH/PVH)
3) Intracranial infection: meningitis > encephalitis
4) Electrolyte disturbances: hypoglycaemia, hypocalcaemia, hypomagnesaemia, hyper- and hypo-natraemia
5) Kernicteris

N.B. Babies with HIE are best managed in their district hospital. Neither babies with severe (grade III) HIE nor secondary apnoea are candidates for ventilation.
Management

1) Immediate
   - Evaluation of airway, ventilation and perfusion with resuscitation to commence immediately if needed
   - Hypoglycaemia should be looked for and treated promptly
   - History: pregnancy, labour, delivery, resuscitation and a detailed description of the seizure should be documented

2) Stop the convulsion...
   - Indication for treatment of clinical seizures
     - Prolonged > 3 min
     - Recurrent > 3 convulsions in 1 hour
     - Associated with cardiorespiratory compromise
   - LORAZEPAM 0.3mg/kg/dose IV works quickly and has enduring anticonvulsant activity. Refractory cases may need MIDAZOLAM load 0.1-0.3mg/kg + infusion 3mg/kg in 50ml D5W at 1-4 ml/hour. 1ml/hour = 1mcg/kg/min

3) Investigations
   - Blood glucose level
   - Electrolytes: Na+, Ca2+, Mg2+
   - Full blood count
   - Cranial ultrasound may be indicated to exclude gross CNS pathology, but is not effective at detecting subdural and epidural bleeds or identifying parenchymal injury
   - Further investigations will be dependent on underlying aetiology.
     - Acid-base status
     - Blood culture
     - Lumbar puncture: in our setting HIE and meningitis sometimes occur concurrently, because both are common

4) Treat the underlying cause when known
   - Refer to the relevant guidelines
   - Hypocalcaemia: CALCIUM GLUCONATE 10% (0.22 mmol calcium/ml). If symptomatic, give 0.5 - 1ml/kg (0.11-0.22mmol/kg) IV over 10 minutes stat. Then give 2 - 4 ml of 10% solution/kg/day (0.44 - 0.88 mmol/kg/day) as a continuous infusion IV (this can be added to the neonatalyte)
   - Hypomagnesaemia: MGSO4 50% solution (2 mmol/ml). Give 0,1-0,2ml/kg/dose (0.2-0.4 mmol/kg/dose) 12H IV or IM

5) Maintenance anticonvulsant
   - If baby is going to need ongoing anticonvulsant, use PHENOBARBITONE PO: load 20mg/kg, then 5mg/kg/dose 24H
   - In most cases, anticonvulsant can be stopped prior to discharge (do this a few days before discharge)

When to refer
Babies with seizures should be referred:
   - if not contra-indicated by generic exclusion criteria (especially severe HIE)
   - if the seizures are intractable
   - if a cause cannot be identified

Follow up
Follow up needs are determined by underlying cause and residual or anticipated neurological deficit