



PERINATAL HYPOXIA ("BIRTH ASPHYXIA") AND HYPOXIC ISCHAEMIC ENCEPHALOPATHY

The commonest avoidable cause of perinatal mortality and morbidity in term babies in South Africa

Definition

Hypoxic ischaemic encephalopathy is a clinical condition that presents with neurological signs in term infants, during the early neonatal period.

Although the focus is on the brain, it is a multi-organ disease, with all organs having been exposed to severe perinatal hypoxia

Cause

It is caused by severe perinatal hypoxia together with secondary cerebral ischaemia. A severe re-perfusion injury occurs maximally at about 72 hours.

Diagnosis

Do not jump to the diagnosis of HIE in any baby with encephalopathy. ALWAYS consider the three other COMMON causes – MENINGITIS, HYPOGLYCAEMIA AND ELECTROLYTE ABNORMALITIES – in babies with neonatal encephalopathy.

Take a good labour, delivery and resuscitation history and document the use of and findings on the PARTOGRAM. Also document time to spontaneous respiration.

Clinical signs and severity assessment

Lethargy with poor sucking, increased or decreased tone and poor Moro reflex, irritability, fisting, convulsions, full fontanelle and apnoea.

Severity score

Use the HIE score to measure the severity of the clinical signs on a daily basis. Anyone can do this.

HIE Scoring Chart

	0	1	2	3	Score
Level of consciousness	Normal	Hyper-alert	Lethargic	Comatose	
Tone	Normal	Hypertonia	Hypotonia	Flaccid	
Seizures	None	Infrequent	Frequent		
Posture	Normal	Fisting, cycling	Strong flexion	Decerebrate	
Moro	Normal	Partial	Absent		
Grasp	Normal	Poor	Absent		
Suck	Normal	Poor	Absent		
Respiration	Normal	Hyperventilating	Brief apnoea	Apnoea (IPPV)	
Fontanelle	Normal	Full	Tense		
				TOTAL SCORE	

Score babies daily using this chart. Use the HIE Scoring sheet ([Form Paed/05](#)). The score will usually increase a little up until the 4th day and then decrease.

Severity grading

A grading system is also used, but you need to have some experience in looking after neonates, and EEG parameters should be used.

Grade 1: mild encephalopathy with infant hyper-alert, irritable, and over-sensitive to stimulation. There is evidence of sympathetic over-stimulation with tachycardia, dilated pupils and jitteriness. The EEG is normal and there are no seizures

Grade 2: moderate encephalopathy with the infant displaying lethargy, truncal hypotonia, proximal weakness, and partially depressed primitive reflexes. There is parasympathetic over-stimulation with low resting heart rate, small pupils, and copious secretions. The EEG is abnormal and 70% of infants will have seizures.

Grade 3: severe encephalopathy with a stuporous, flaccid infant, absent reflexes, and drooling of saliva due to poor swallow and gag. The infant may have seizures and has an abnormal EEG with decreased background activity and/or voltage suppression.

Management

NO specific interventions have been shown to alter the outcome for babies with HIE. But you still have to get the basic principles of neonatal care right, to optimise the outcome of those babies who will not die

Prevention

- Reduce perinatal hypoxia with good antenatal and labour ward care

Resuscitation

- Do not over-oxygenate baby. If the lungs are normal, use air or 60% O₂ (leave the reservoir off the ambubag)
- Prevent postpartum hypoxia by competently resuscitating the baby. Give oxygen ONLY if needed to keep the O₂ saturation between 85-90%
- DO NOT give naloxone unless maternal opiates were given within 4 hours of delivery

Convulsions

- DO NOT USE "prophylactic phenobarbitone" (sedation masks neurological signs and has no benefits)
- LORAZEPAM 0.3mg/kg/dose IV works quickly and has enduring anticonvulsant activity. Refractory cases may need midazolam infusion (use MIDAZOLAM 3mg/kg in 50ml D₅W at 1-4 ml/hr: 1ml/hr = 1mcg/kg/min). Consider referral.

Intake

- Initiate IV fluids and keep nil per os for 24 hours (lessens risk of Necrotizing Enterocolitis) and then gradually commence nasogastric feeds and breastfeeding when the baby can suck and swallow
- Restrict fluid intake to $\frac{3}{4}$ maintenance requirements on days 1-3

Observation

- Monitor the HR, RR, temperature, saturation, BP, intake and output 3 hourly, and respond accordingly
- Prevent hyperthermia by making sure that the incubator temperature is not set too high
- Watch out for hypoxic injury to other organs
 - Lungs: ARDS
 - Heart: hypoxic myocardopathy
 - Liver: hypoglycaemia
 - Kidneys: ATN
 - Marrow: thrombocytopenia
 - GIT: necrotising enterocolitis

Follow up

- Follow up at 6 weeks and 4 months for neuro-developmental assessment and refer to physiotherapy if required.

Referral criteria

- Babies with HIE need to be managed in their district hospital. It is important to pay attention to supportive care so as to prevent further deterioration.
- A baby with a high HIE score is not a candidate for referral for ventilation, neither is a baby who fails to breathe spontaneously by 20 minutes post-delivery, despite full resuscitation.

Prognosis

- A baby who scores a maximum of 10 or less and is normal by day 7 will usually have a normal outcome. A baby whose score peaks higher than 15 or who remains abnormal after day 7 must have a guarded prognosis. This must be communicated to the family.
- Babies may be discharged once they are feeding well and stable.