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缅甸联邦第一特区卫生部

The Union of Myanmar, SR(1) Department of Health

Post Asphyxiated Newborn Babies

Standard Operating Procedure (SOP)

Contents

Post Asphyxiated Newborn Babies

- *Clinical management is primarily supportive and is dependent on the extent of organ compromise*
- *Each baby's management should be individualized, with close monitoring of cardio-respiratory status and early identification and treatment of multi-organ system complications where appropriate*

Initial Management

- *Maintain temperature - i.e. between 33-34'C*
  - *Preferably placing the baby under radiant warmer with heater off*
  - *Nursing them in thermo-neutral environment Go*
  - *Avoid hyperthermia*
- *Immediate clinical assessment - Check vital signs*
  - *Respiration, blood pressure (MAP), heart rate, capillary refill time, temperature, oxygen saturation, and urine output*
- *Check Hct, Glucose, U&E8 Blood gases* (*If facilities are available)*
- *Start intravenous fluid*
  - *IV fluid 5% to 10% D/W depending on initial glucose level*
  - *Fluid volume~60 ml/kg/24 hours*
    (If peripheral venous cannulation is difficult initially, umbilical vein maybe used temporarily under aseptic condition. Once the baby is stable. try again IV line)
- *Consider volume expander*
  - *Slow bolus infusion of Normal saline or Ringer lactate 10-20 ml/kg over 05-10 minutes if poorly perfused (i.e. CFT >3 sec, low MAP)*
  - *Repeat volume bolus as required and consider to give packed red blood*
  - *cells if there has been significant blood loss*
  - *Start Dopamine continuous infusion at 2-5 ug/kg/min to keep MAP above normal*
  - *If response inadequate, may advance at 20 minutes intervals by 5 ug/kg, min to maximum 20 ug/kg/min*
  - *If cardiac dysfunction is suspected, start/add dobutamine, at 5 ug/kg/min: if response inadequate, increase in 5 ug/kg/min increments to 20ug/kg/min*
  - *If still ineffective, consider to give epinephrine infusion 0.05-0.1 ug/kg, min and titrate to the desired effect (0.1-1 ug/kg/min)*

Dopamine *Dobutamine*	*6x Weight (kg) x desired ug/kg/min = mg in 100 ml 5 %DW*	*1 ml/hr delivers l ug/kg/min*

MAP = Diastolic +1/3 (Systolic - Diastolic)

Term-MAP above 35-40 mmHg
Preterm-Normal MAP = Gestational age in weeks (lower limit)
G gestational age in weeks+ 20 (upper limit)

- *Miscellaneous: Vitamin K (1 mg) IM/IV*

Subsequent Management

- *Mainly supportive and is dependent on the extent of organ compromise*

Close monitoring of both clinical and biochemical parameters
Respiratory status

- *Respiratory rate, bilateral adequate chest expansion and air entry*
- *Need to monitor for hypoxia, hypercarbia and acidosis (*If facilities are available)*

CVS status: Heart rate, skin color, CRT (<3 sec), MAP and SpO_2
Temperature: Axillary skin temperature 36.5-37.5'C manually or automatic reading from servo-control radiant warmer 4-6 hourly
CNS status: Grade HIE staging after initial stabilization

- *Assessment of anterior fontanel, tone, seizures, autonomic disturbances pupillary sizes and reactions about 4-6 hourly*

Renal status: Monitor urine output (>1 ml/kg/hr)

- *Direct indicator of state of peripheral perfusion*
- *Daily weight check*
- *End organ perfusion is mainly assessed by CRT (<3 seconds) and UOP (>1 ml/kg/hr)*

Haematological status: Check clotting profile and platelets

- *Treatment given as required by FFP, Platelet concentrate or Vitamin K*

Biochemical monitoring: Glucose, Hct, electrolytes, calcium, urea, creatinine, blood gases and pH as appropriate*

Table 1.2 Neurological investigations

Cranial Ultrasound	*To exclude hemorrhage and other intracerebral abnormalities*
Brain CT scan	*To exclude haemorrhage, cerebral edema and other intracerebral abnormalities. May assist with prognosis Extensive areas of low attenuation with apparent brightness of basal ganglia are associated with very poor prognosis (done after 1s week of life)*
Brain MRI	*MRI may provide prognostic information. Abnormalities of the thalami and basal ganglia are associated with increased risk of subsequent abnormal development! outcome. Superior to CT scans*
Electroencephalogram (EEG)	*Severe abnormalities include burst suppression, low voltage or isoelectric EEG, Moderate abnormalities include slow activity*

Treatment

1. *Temperature control*
   - *Ensure thermoneutral environment*
   - *Avoid high environmental temperature and hyperthermia*
   - *Therapeutic hypothermia*
     Criteria for therapeutic hypothermia
     (Active or Passive Cooling)
     All of the followings: 5 criteria must be met.
     1. *Greater than or equal to 36 weeks of gestation*
     2. *≥1800 g 2*
     3. *Less than 6 hour after delivery*
     4. *Physiological criteria for Intrapartum Hypoxia*
        Either of the following criteria:
        - *Acidosis within 60 minutes of birth (umbilical cord, arterial or capillary blood sample - pH <7.00)*
        - *Base deficit 216 mmol/L or more on umbilical cord or any blood sample (arterial or venous or capillary) within 60 minutes of birth If blood gas is not available or*

pH is between (7.01 and 7.15) or base deficit is between (10 and 15.9 mmol/L) on blood sample obtained within the first hour of birth:

Two additional criteria are needed:

- *History of an acute perinatal event (i.e. abruption placenta cord prolapse, fetal heart rate decelerations, uterine rupture, maternal trauma/ haemorrhage/ cardio-respiratory arrest etc.)*
- *The need for assisted ventilation initiated at birth and continued for 10 minutes or an APGAR score S5 at 10 minutes after birth.*

5. *Neurologic criteria for intrapartum hypoxia*
   Either of the following criteria:
   - *Seizures (any medically witnessed reports, written or verbal)*
   - *Moderate to Severe encephalopathy on at least 3 of 6 categories (See Table 2: below)*

Note: (Moderately or severely abnormal background activity of at least 30 minutes duration or seizure activity on amplitude integrated EEG) may be added to one of the neurological criteria.

Table 1.3 Modified Sarnat and Sarnat Staging System

Category	*Moderate Encephalopathy*	*Severe Encephanlopathy*
Level of consciousness	*Lethargy*	*Stupor/coma*
Spontaneous activity	*Decreased activity*	*No activity*
Posture	*Arms flexed, legs extended (Decorticate)*	*Arms and legs extended (Decerebrate)*
Tone	*Hypotonia*	*Flaccid*
Primitive reflexes • *Suck* • *Moro*	 *Weak sucking* *Incomplete Moro's*	 *Absent sucking* *Absent Moro's*
Autonomic system (Any one) • *Pupils* • *Heart rate* • *Respirations*	 *Constricted* *Bradycardia* *Periodic breathing*	 *Dilated/non-reactive/ deviated* *Variable heart rate* *Apnoea*

(infants should be examined even in the presence of the seizures since the level of encephalopathy needs to be determined)

Infants not eligible for cooling

1. *Gestational age less than 36 weeks*
2. *Birth weight less than 1800 g*
3. *Inability to initiate cooling by 6 hours of age*

4. *Suspected coagulopathy (Low platelet count or clinical evidence of abnormal clotting and/or clotting studies which has not responded to appropriate therapy)*
5. *Life threatening abnormalities of the cardiovascular or respiratory systems*
6. *Major congenital malformations*
7. *Death appears inevitable*
8. *Oxygen requirement greater than 80% (FiO_2.)*

2. Maintain oxygenation and ventilation (Refer Table 1.5)

- *Monitor oxygenation by pulse oximetry or neonatal vital sign monitor*
- *To maintain SpO_2, between 88-93 % ($Pa0_2$,50-80 mmHg)*
  - *Supplemental oxygen by head box or nasal cannula*
  - *CPAP (if the baby has spontaneous breathing)*
  - *Assisted ventilation as required。*
  - *Frequent oropharyngeal suction as needed*

3. Maintain adequate perfusion

- *Volume expansion and use of vasopressors as appropriate*
- *Maintenance fluid therapy- 10%DW in the first 24 hours as usual (no need for fluid restriction)*
- *Monitor serum sodium level trends to gauge whether more or less fluids are needed (Refer Fluid and electrolytes in neonate)*
- *Assess fluid balance regularly*

4. Infection

- *Perinatal infection may co-exist with HIE*
- *All babies should have*
  - *FBC and Blood culture, full septic screen*
  - *Start giving Injection Ampicillin and Gentamicin*

5. Maintain normal blood glucose

- *BGL above >2.6 mmol/L (>47 mg/dl)*

6. Maintain normal calcium level

- *Maintenance dose of 4 ml/kg/day of 10% calcium gluconate for 1-2 days*
- *May be given as a continuous infusion or as 1:1 diluted bolus slowly, under cardiac monitoring*

7. Maintain normal haematocrit

- *Keep above >40% in neonates requiring assisted ventilation or supplemental*
- *Consider partial exchange transfusion if PCV is >65 %*

8. Treat seizures (Refer Algorithm)

9. Impaired synthetic liver function/ consumptive coagulopathy

- *Need to monitor Liver function tests (LFTs) regularly*
- *Perform platelet level and coagulation profile if there is evidence of bleeding or petechiae*
- *Consider*
  - *Fresh frozen plasma (FFP) and*
  - *A second dose of Vitamin K*

(DIC is a significant risk after hypoxic injury to the liver)

10. Gastrointestinal

- *Start orogastric feeding slowly once the baby has been stabilized without evidence of any system compromise such as respiratory distress, encephalopathy, hypotension, renal impairment, etc.*
- *Do not feed during the therapeutic hypothermia and only recommence feed safter rewarming*
- *Feed intolerance is common as gut circulation may have been compromised, this may increase the risk for necrotizing enterocolitis (NEC)*
- *Start the trophic feeding with fresh EBM slowly (i.e. 10-20 ml/kg/day)*
- *Individualize increments in feeding volume and composition*
- *Monitor abdominal girth and the composition of stool and for signs of gastric retention*

11. Treat the complications that arise

12. Cerebral protective measures

- *Maintain the MAP >40 mmHg for term infants*
- *Treatment of seizures*
- *Treat intracranial hypertension*
  - *IV Mannitol (0.25 g/kg over 20 minutes) may be used if there is evidence of raised ICP Maximum 2-3 doses 6 hourly*
  - *Steroids are of no benefit*

Prognosis

Good prognostic features

- *Stage l encephalopathy*
- *Absence of fits in first 24 hours*
- *Resolution of fits by 7 days*
- *Ability to suck and feed by 7 days*

Poor prognostic features

- *Stage II/III encephalopathy*
- *Encephalopathy >5 days*
- *Unreactive or discontinuous EEG*
- *USG evidence of thalamic or extensive parenchymal involvement*

Follow Up

- *All infants with HIE should be followed up for at least up to the age of 2 years for development and neurological problems*
- *Full term infants who suffer from Grade 2 or 3 encephalopathy are known to have a high incidence of neurologic damage*
- *Manage epilepsy and developmental delay as appropriate*
- *Remember to evaluate hearing and vision on follow-up and manage appropriately*