Post -resuscitation management of an asphyxiated neonate
Perinatal asphyxia

Introduction

- Common neonatal problem
- Contributes significantly to neonatal morbidity & mortality
- Second most important cause of neonatal death
- Accounts for 25% of neonatal deaths
Perinatal asphyxia

- Insult to the fetus / newborn
  - Lack of oxygen - hypoxia
    &/or
  - Lack of perfusion – ischemia
- Effect of ischemia & hypoxia – inseparable
- Both contribute to tissue injury
Definition of perinatal asphyxia

- **WHO**: A failure to initiate and sustain breathing at birth.
- **NNF**:
  - Moderate asphyxia
    - Slow gasping breathing or an apgar score of 4-6 at 1 minute of age
  - Severe asphyxia
    - No breathing or an apgar score of 0-3 at 1 minute of age
Etiology

- Intrapartum or ante partum (90%)
  - Placental insufficiency
- Post partum (10%)
  - Pulmonary
  - Cardiac
Clinical consequences of perinatal asphyxia

Brain (Hypoxic Ischemic Encephalopathy, HIE)

- Altered sensorium
  Irritability, lethargy, deeply comatose
- Tone disturbances
  - Hypotonia of proximal girdle muscles
  (lack of head control & weakness of shoulder muscle in term infants)
Clinical consequences of perinatal asphyxia (contd.)

**Brain (Hypoxic Ischemic Encephalopathy, HIE)**

- Autonomic disturbances eg. hypotension, increase salivation, abnormal pupillary reflex
- Altered neonatal reflexes
  - Moro’s, sucking, swallowing
- Seizures
Clinical consequences of perinatal asphyxia

**Heart**

Myocardial dysfunction resulting in hypotension or congestive cardiac failure

**Kidney**

Tubular damage may cause acute renal failure
Principles of management

- **Maintain temperature, perfusion, oxygenation, ventilation & normal metabolic state**
  - **Temperature**: 36.5° C – 37.5° C
  - **Perfusion**:
    - **BP**: Mean 40-60 mm Hg (Term)
    - **CRT**: maintain < 3 sec
  - **Oxygen**
    - **PaO₂**: 60-80 mmHg
    - **saturation**: 90-93 %
  - **CO₂**: 35-45 mm of Hg
  - **Glucose**: 70-110 mg/dl
  - **Calcium**: 9-11 mg/dl
Initial management

- Admit in nursery, if
  - Apgar score ≤3 at 1 minute
  - Babies requiring intubation, chest compressions or medications

- Nurse in thermo-neutral temperature to maintain skin temperature at 36.5°C

- Secure IV line, fluids 2/3rd of maintenance

- Fluid bolus if CRT > 3 secs or blood pressure low

- Inj vit k

- Stomach wash
Clinical monitoring

- HR, RR, colour, CRT, O₂ saturation, BP & temperature
- Assessment of neurologic status
  - Tone, seizures, consciousness, pupillary size & reaction, sucking, swallowing
- Abdominal circumference
- Urine output
Biochemical monitoring

- Blood gases & pH
- Bedside blood sugar by Dextrostix
- Hematocrit
- S. electrolytes (Na, K)
- S. calcium
- BUN, creatinine
Other investigations

- Sepsis screen & blood culture to exclude in-utero or acquired infection during resuscitation
- X-ray chest to look for pneumothorax, malformations, cardiac enlargement
Other investigations contd..

**Neuroimaging**
- CT scan
  - brain edema as suggested by small compressed ventricles
  - hemorrhage
- Ultrasound
  - small compressed ventricles
  - intraventricular hemorrhage

**EEG**
Aims of specific management

- Prevent further organ damage
  - Maintain oxygenation, ventilation & perfusion
  - Correct & maintain normal metabolic & acid base milieu
  - Prompt management of complications
Specific management

**Maintain perfusion**

- Normal blood pressure
- CRT < 3 secs
- Normal urine output (>1ml/kg/hr)
- Absence of metabolic acidosis
Specific management

Maintain perfusion

- Maintain mean arterial pressure and CRT by giving slow bolus of crystalloid 10 ml/kg over 20 minutes. Repeat one more time, if still does not improve.

- Use vasopressors Dopamine and/or Dobutamine to increase BP.

- Sodium bicarbonate 1-2 ml/kg diluted in 5% dextrose can be used for babies with documented acidosis after establishing respiration.
Specific management

Treatment of seizures

- Correct hypoglycemia, hypocalcaemia
- Phenobarbitone
  - 20mg/kg loading dose slowly over 20 minutes; additional 10 mg/kg/ dose if required with max total dose of 40mg/kg. Follow with 5mg/kg/day maintenance after 12 hours.
- Phenytoin
  - 20mg/kg loading dose slowly over 20 minutes, if seizures not controlled with phenobarbitone. Follow with 5mg/kg/day maintenance.
Predictors of poor neuro-developmental outcome

1. Failure to establish resp. by 5 minutes
2. Apgar score of 3 or less at 5 minutes
3. Onset of seizures within 12 hours
4. Refractory seizures
5. Inability to establish oral feeds by 1 wk
6. Abnormal EEG, neuro-imaging
Preventing asphyxia

☐ Perinatal assessment
  ◼ Regular antenatal check ups
  ◼ High risk approach
  ◼ Anticipation of complications during labour
  ◼ Timely intervention (eg. LSCS)

☐ Perinatal management
  ◼ Timely referral
  ◼ Management of maternal complications