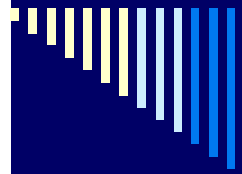


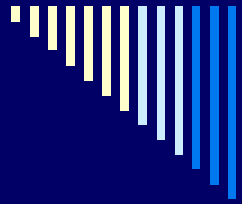
# Post -resuscitation management of an asphyxiated neonate



# 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



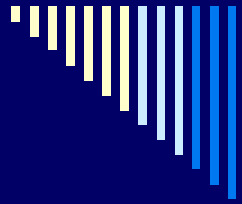
# Definition of perinatal asphyxia

## □ WHO :

- A failure to initiate and sustain breathing at birth.

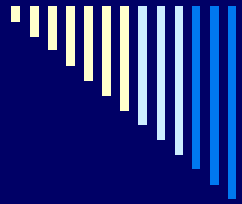
## □ NNF :

- 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

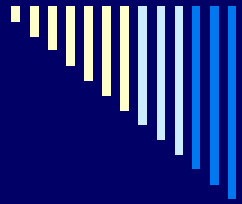
*(lack of head control & weakness of shoulder muscle in term infants )*



# 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

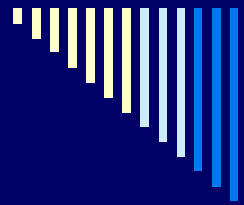
## Heart

Myocardial dysfunction resulting in hypotension or congestive cardiac failure

## Kidney

Tubular damage may cause acute renal failure

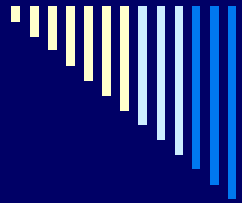




# Principles of management

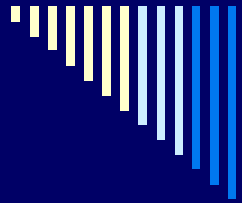
## □ **Maintain temperature, perfusion, oxygenation, ventilation & normal metabolic state**

- Temperature 36.5° C – 37.5° C
- Perfusion:
  - BP Mean 40-60 mm Hg ( Term)
  - CRT maintain < 3 sec
- Oxygen
  - PaO<sub>2</sub> 60-80mmHg
  - saturation 90-93 %
- CO<sub>2</sub> 35-45 mm of Hg
- Glucose 70-110 mg/dl
- Calcium 9-11 mg/dl



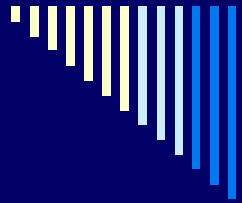
# Initial management

- Admit in nursery, if
  - Apgar score  $\leq 3$  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 2/3 rd of maintenance
- Fluid bolus if CRT > 3 secs or blood pressure low
- Inj vit k
- Stomach wash



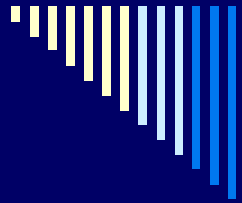
# Clinical monitoring

- HR, RR, colour, CRT, O<sub>2</sub> saturation, BP & temperature
- Assessment of neurologic status
  - *Tone, seizures, consciousness, pupillary size & reaction, sucking, swallowing*
- Abdominal circumference
- Urine output



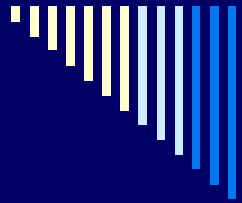
# Biochemical monitoring

- 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



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## Aims of specific management

### **Prevent further organ damage**

- Maintain oxygenation, ventilation & perfusion
- Correct & maintain normal metabolic & acid base milieu
- Prompt management of complications



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# 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

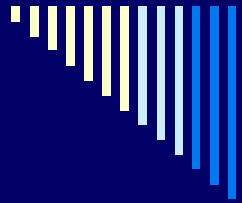
- Correct hypoglycemia, hypocalcaemia
- Phenobarbitone
  - 20mg/kg loading dose slowly over 20 minutes; additional 10 mg/kg/ dose if required with max total dose of 40mg/kg. Follow with 5mg/kg/day maintenance after 12 hours.
- Phenytoin
  - 20mg/kg loading dose slowly over 20 minutes , if seizures not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



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## 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