Respiratory Distress in the Newborn

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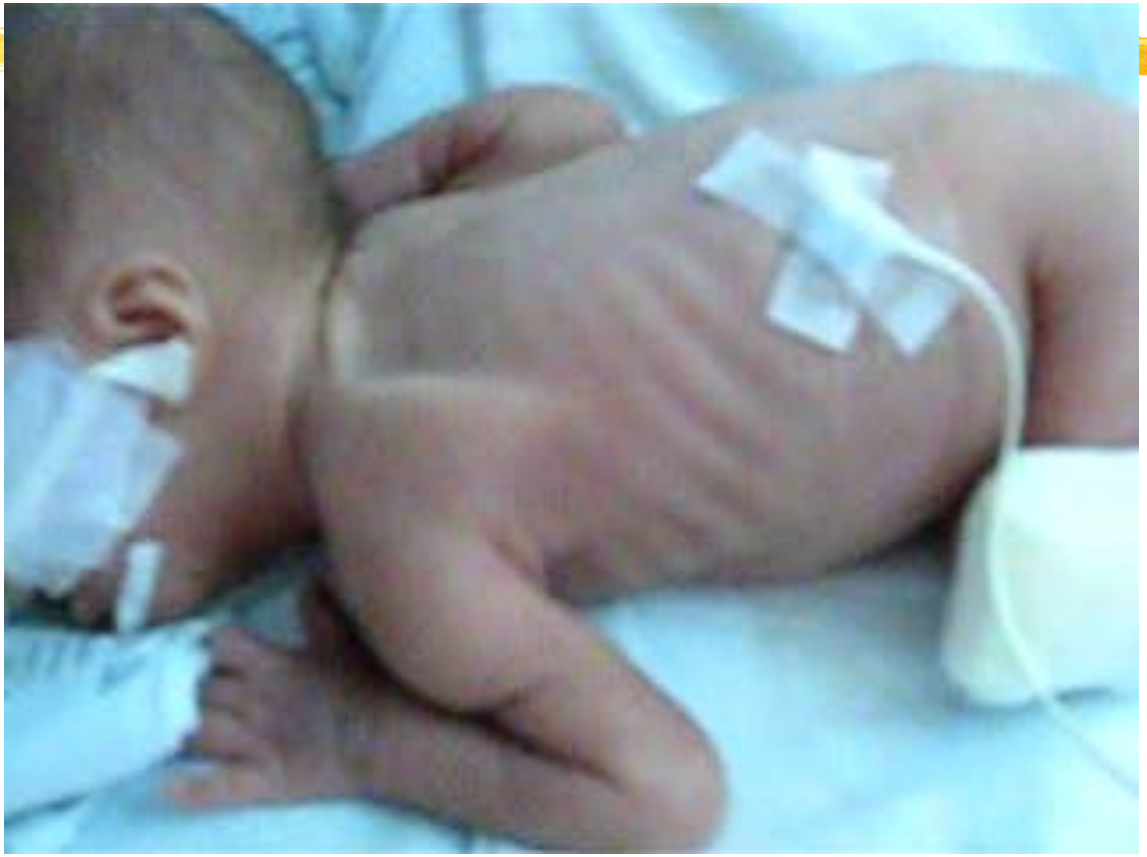
หน่วยทารกแรกเกิด ภาควิชากุมารเวชศาสตร์

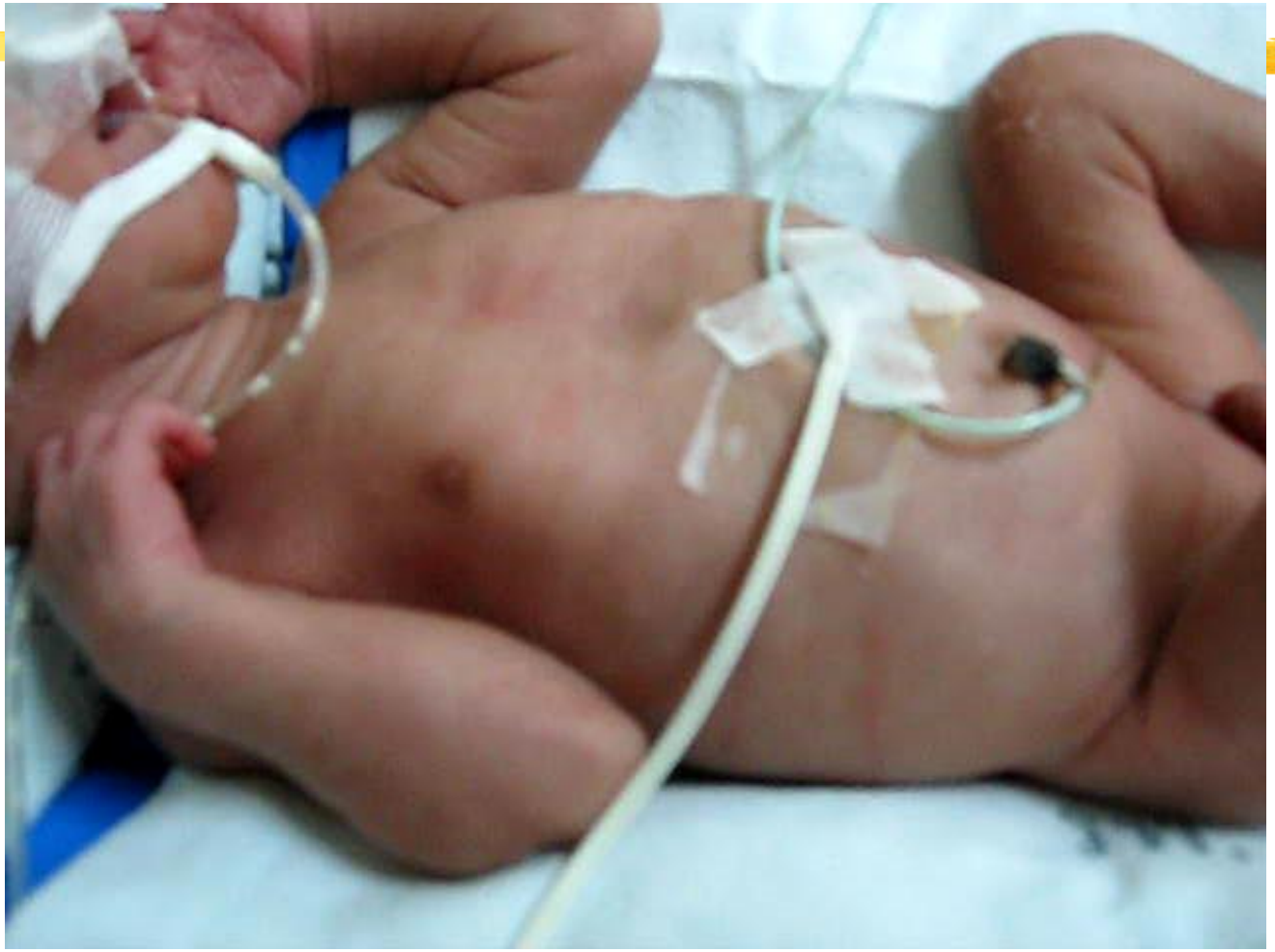
คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น

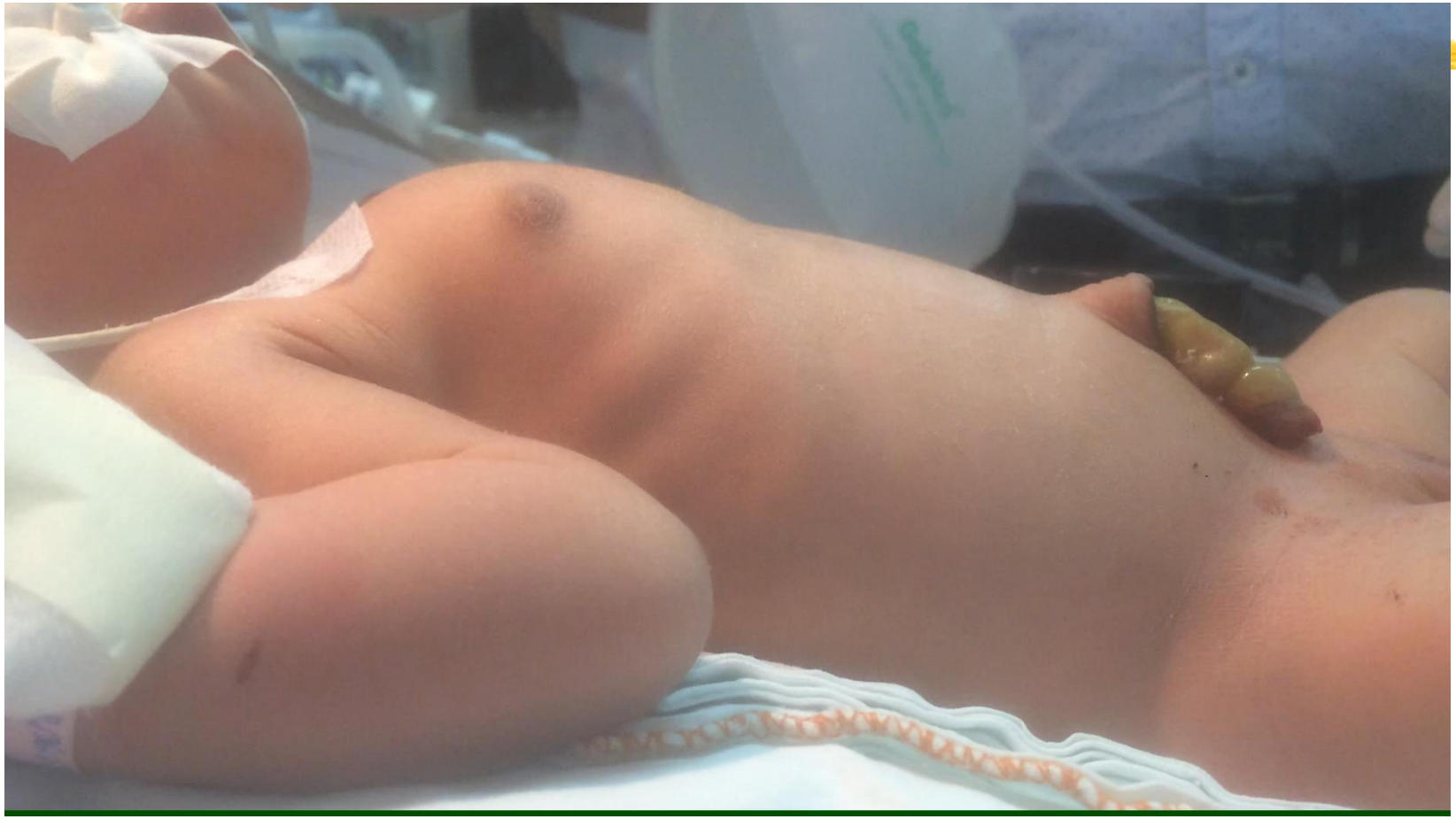
Respiratory Distress

Clinical Manifestations

- Tachypnea (RR> 60 /min)
- Grunting respirations
- Significant retractions
- Nasal flaring
- Cyanosis
- Apnea







Respiratory Distress

- **Pulmonary Disorders**

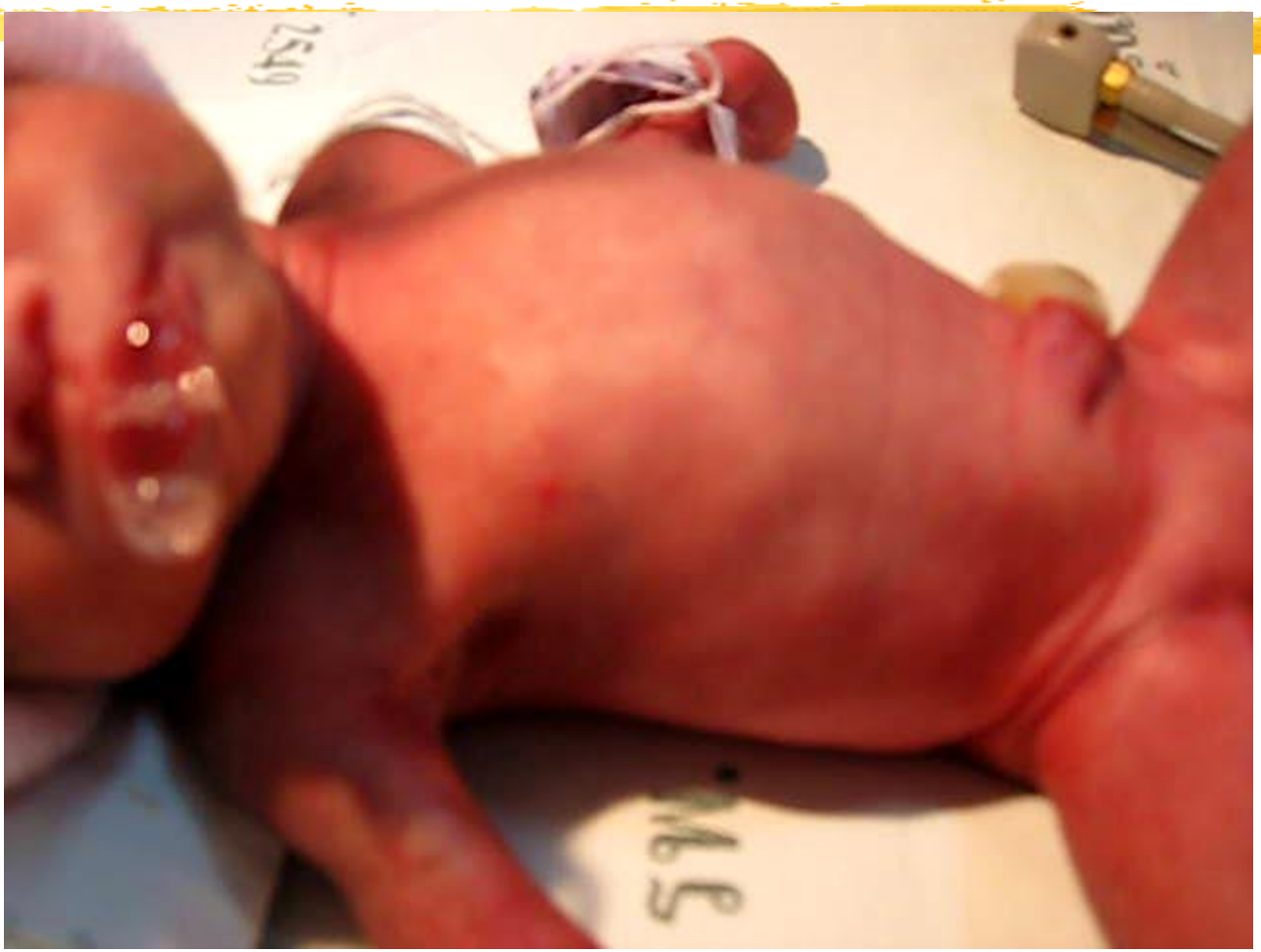
common	less common	uncommon
RDS	pulmonary hemorrhage	congenital lung cysts,tumors
TTNB	diaphragmatic hernia	congenital lobar emphysema
MAS	pulmonary hypoplasia/ agenesis	tracheoesophageal fistula
congenital pneumonia	upper airway obstruction	pulmonary lymphangiectasia
pneumothorax/air leak	tracheomalacia	tracheal lesions
	abdominal distention	rib cage anomalies
	pleural effusion/ chylothorax	extrinsic masses

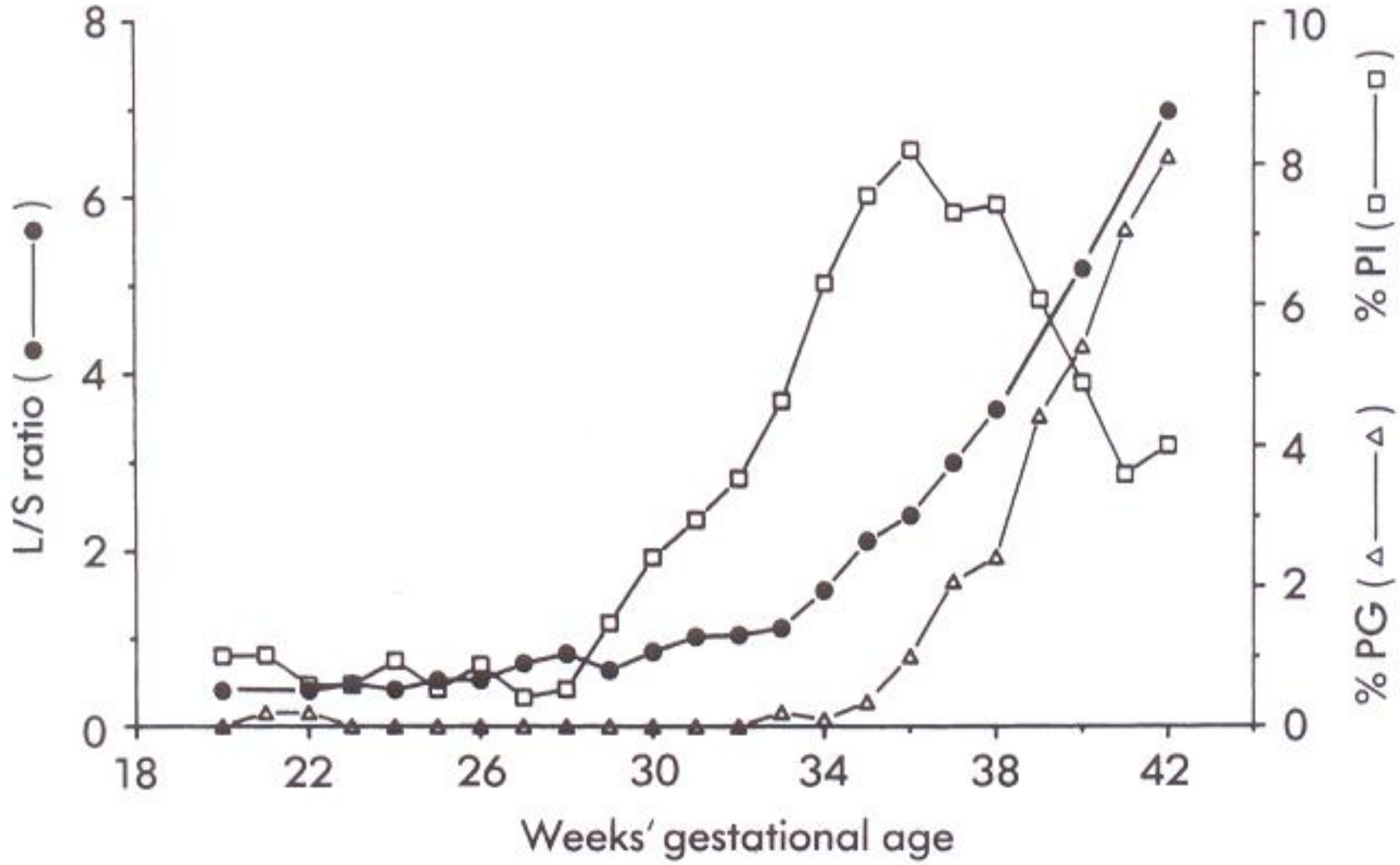
Respiratory Distress

- Extrapulmonary Disorders

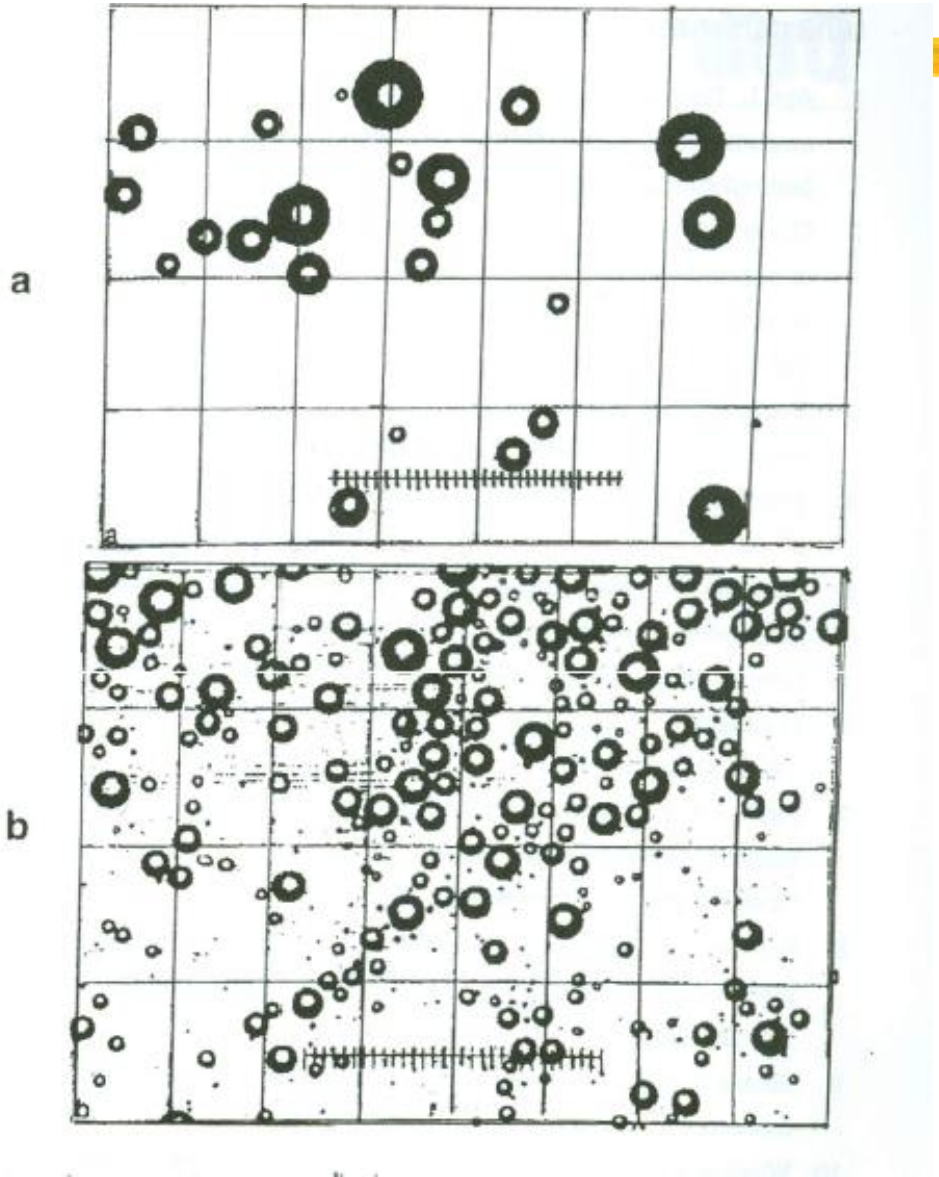
cardiovascular	metabolic	neurologic/muscular
hypovolemia	acidosis	cerebral edema
anemia	hypoglycemia	cerebral hemorrhage
polycythemia	hypothermia	drugs
PPHN	hyperthermia	muscle disorders
cyanotic heart disease		spinal cord diseases
congestive heart failure		phrenic nerve damage

Case




L/S ratio (●——●)
% PG (△——△)
% PI (□——□)
Weeks' gestational age
0
2
4
6
8
10
18
22
26
30
34
38
42

Stable Microbubble Test



Respiratory Distress Syndrome

Prenatal Prediction

A. Prenatal prediction of lung maturity by tests of amniotic fluid: Shake test, L/S ratio

B. Maternal glucocorticoid treatment

- **GA < 34 weeks or lung immaturity**
- **Lower incidence of RDS, IVH, PDA**

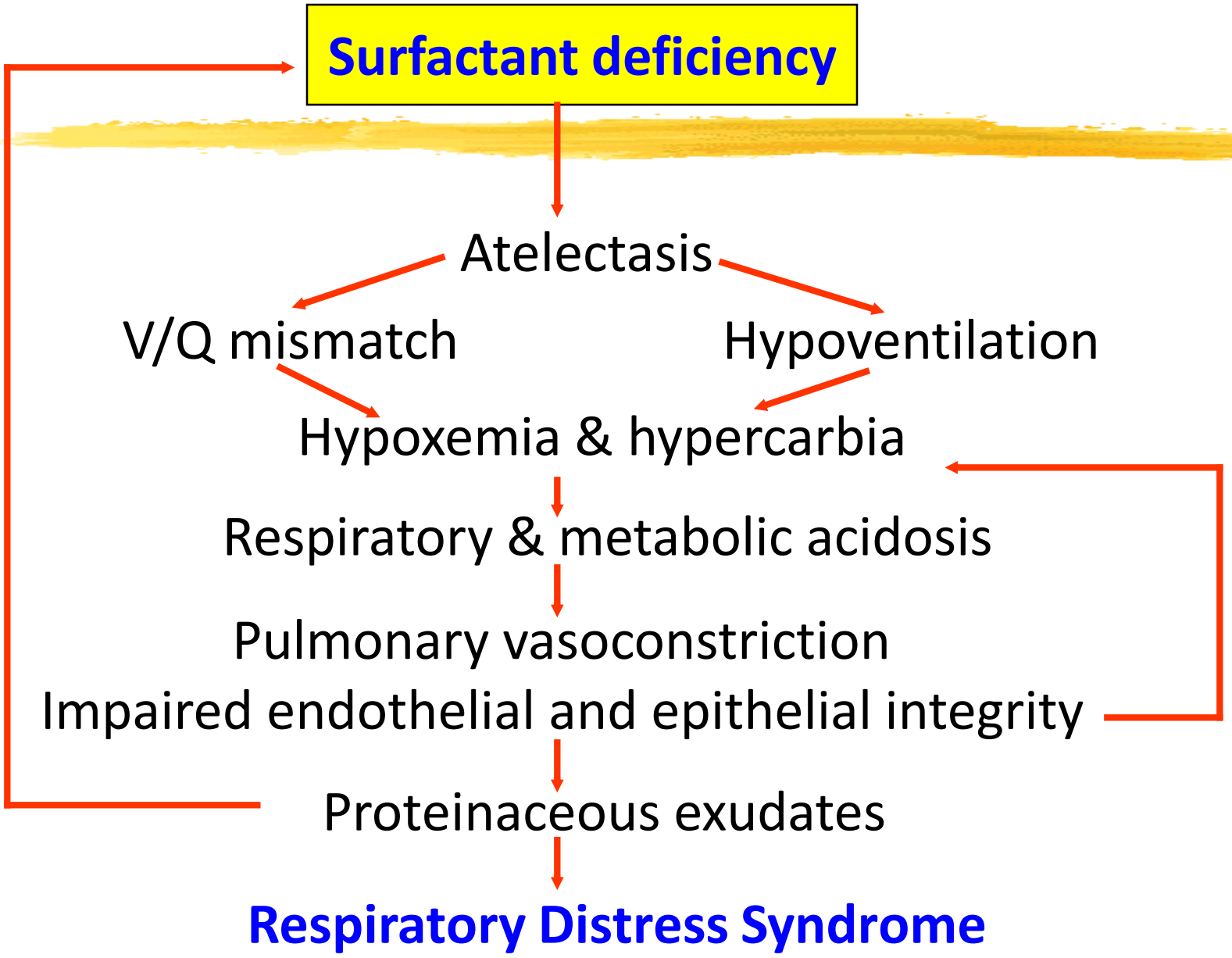
Respiratory Distress Syndrome

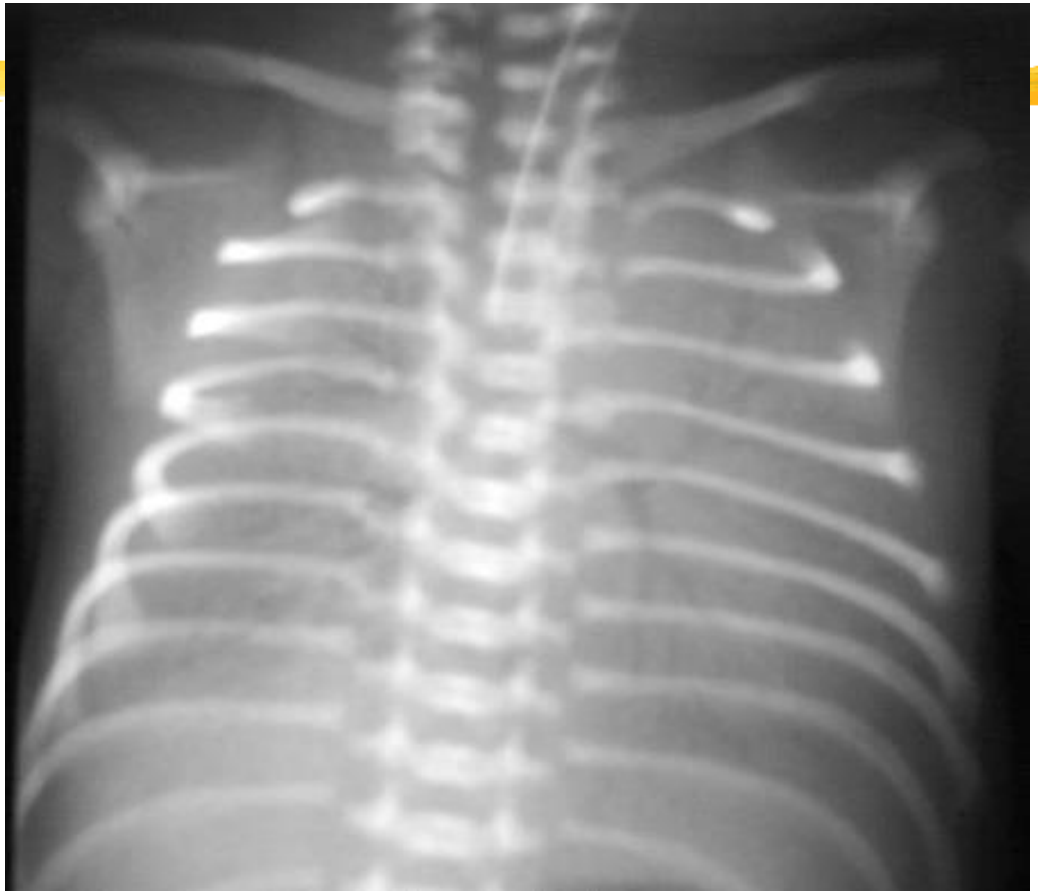
Postnatal Diagnosis

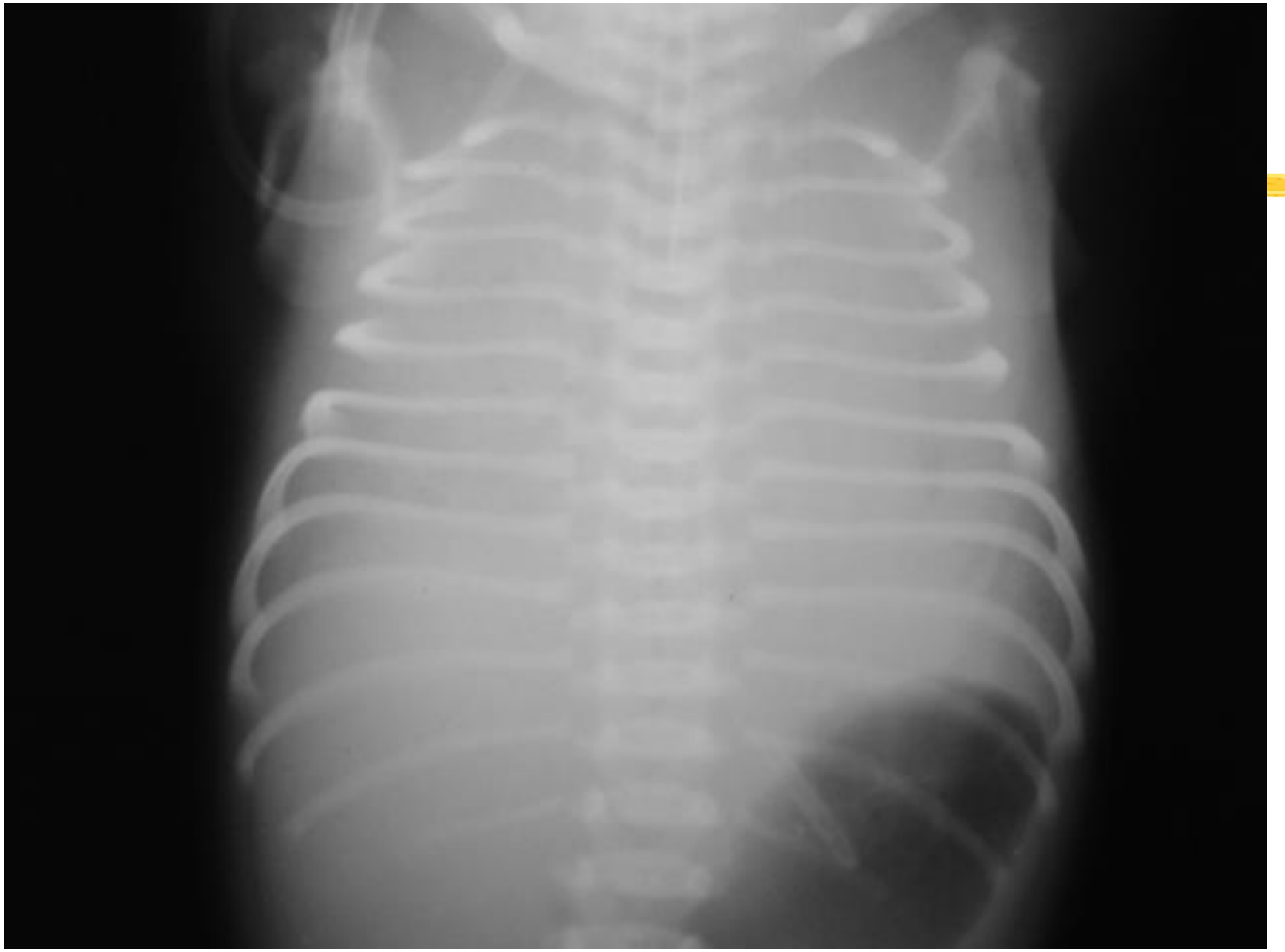
- Clinical signs shortly after birth
- Tachypnea,retractions,flaring of nasal alae

  grunting and cyanosis
- CXR - low volume lungs with a diffuse

  reticulogranular pattern and
  air bronchograms


Surfactant deficiency
Atelectasis
V/Q mismatch
Hypoventilation
Hypoxemia & hypercarbia
Respiratory & metabolic acidosis
Pulmonary vasoconstriction
Impaired endothelial and epithelial integrity
Proteinaceous exudates
Respiratory Distress Syndrome





Respiratory Distress Syndrome

Management

A. Oxygen

- Maintain PaO_2 50-80 mmHg

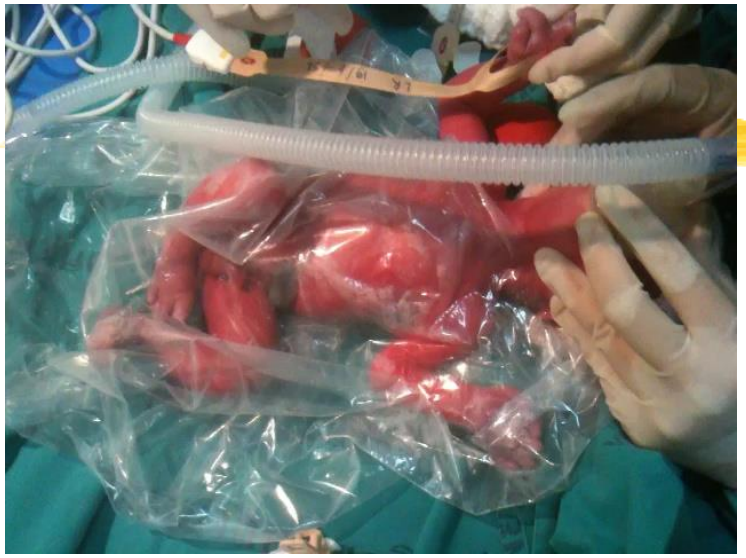
B. CPAP

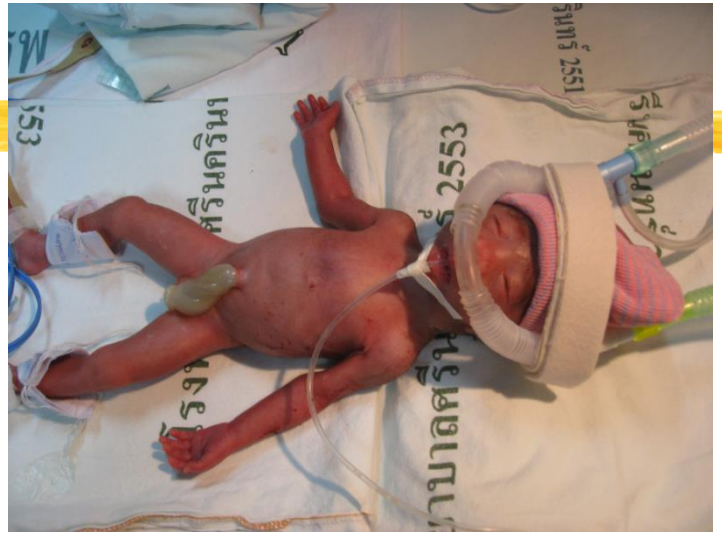
- Prevent atelectasis
- Decrease lung edema
- Preserve functional properties of surfactant

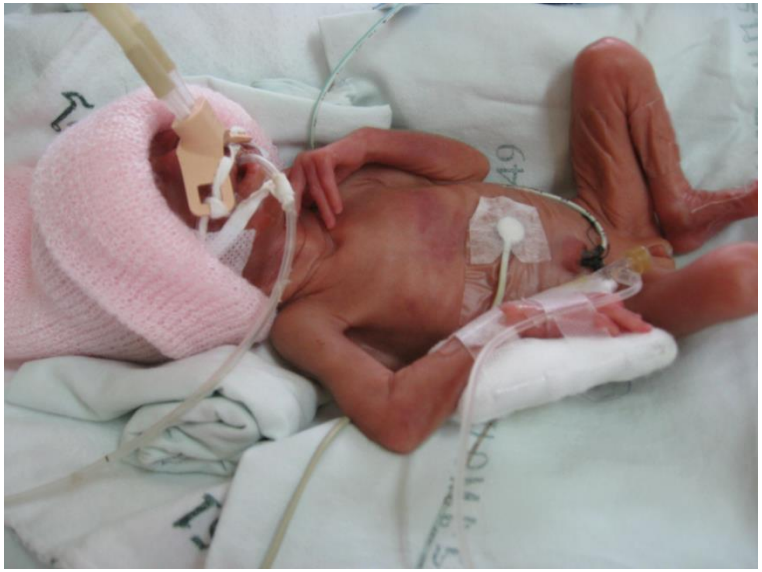
C. Mechanical ventilation

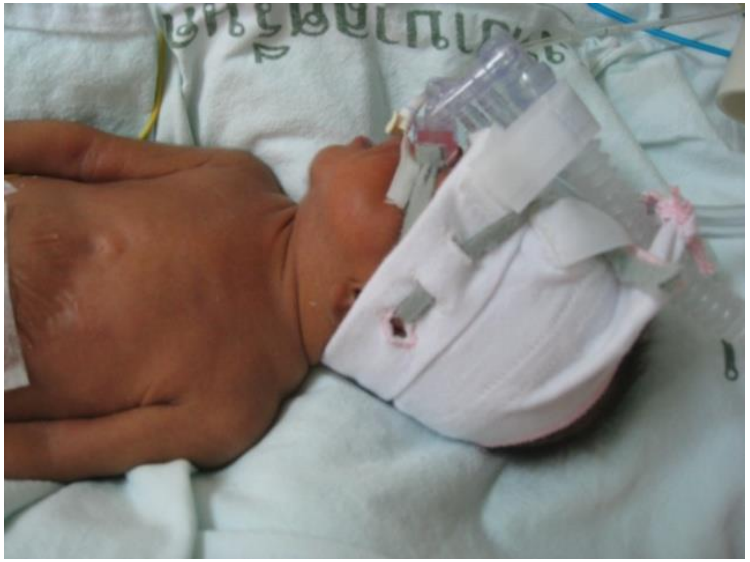
D. Surfactant replacement therapy

Non-invasive Ventilation









E.Supportive therapy

- Temperature
- Fluid and nutrition - monitoring of serum electrolytes and body weight
- Circulation
- Possible infection - broad spectrum antibiotics for at least 48 hours

Complications

Acute complications

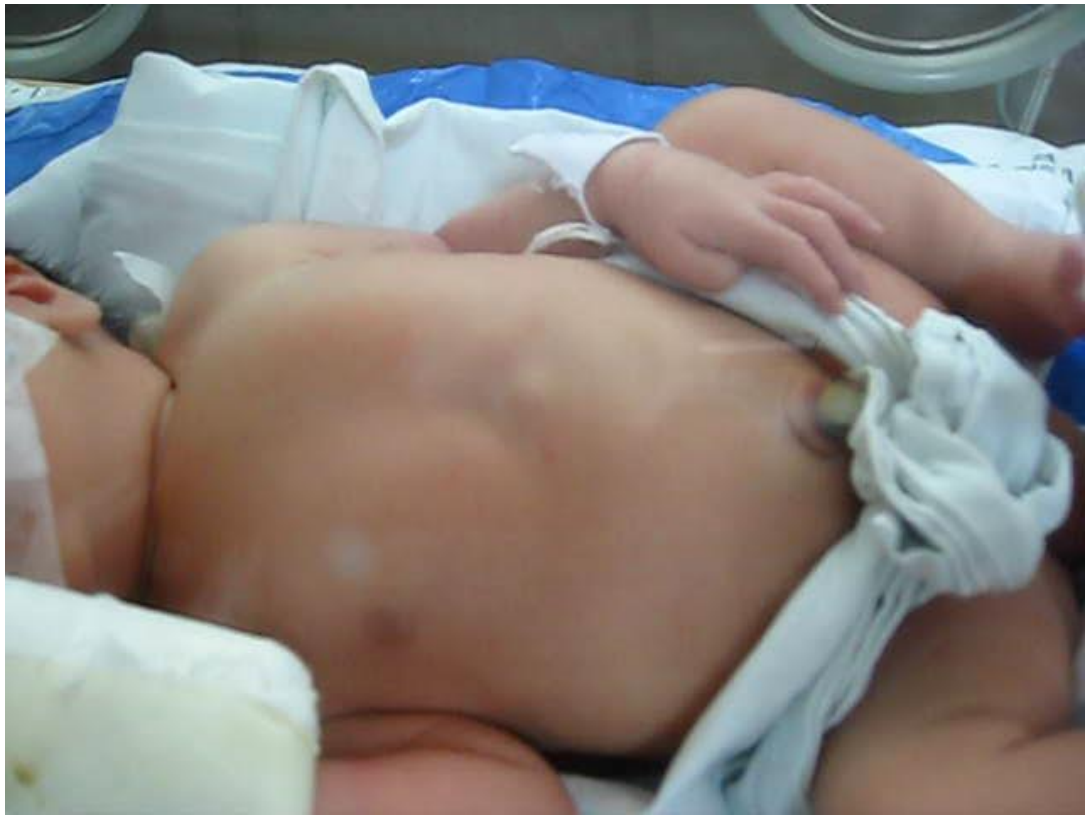
- Air leak
- Infection
- Intracranial hemorrhage
- PDA

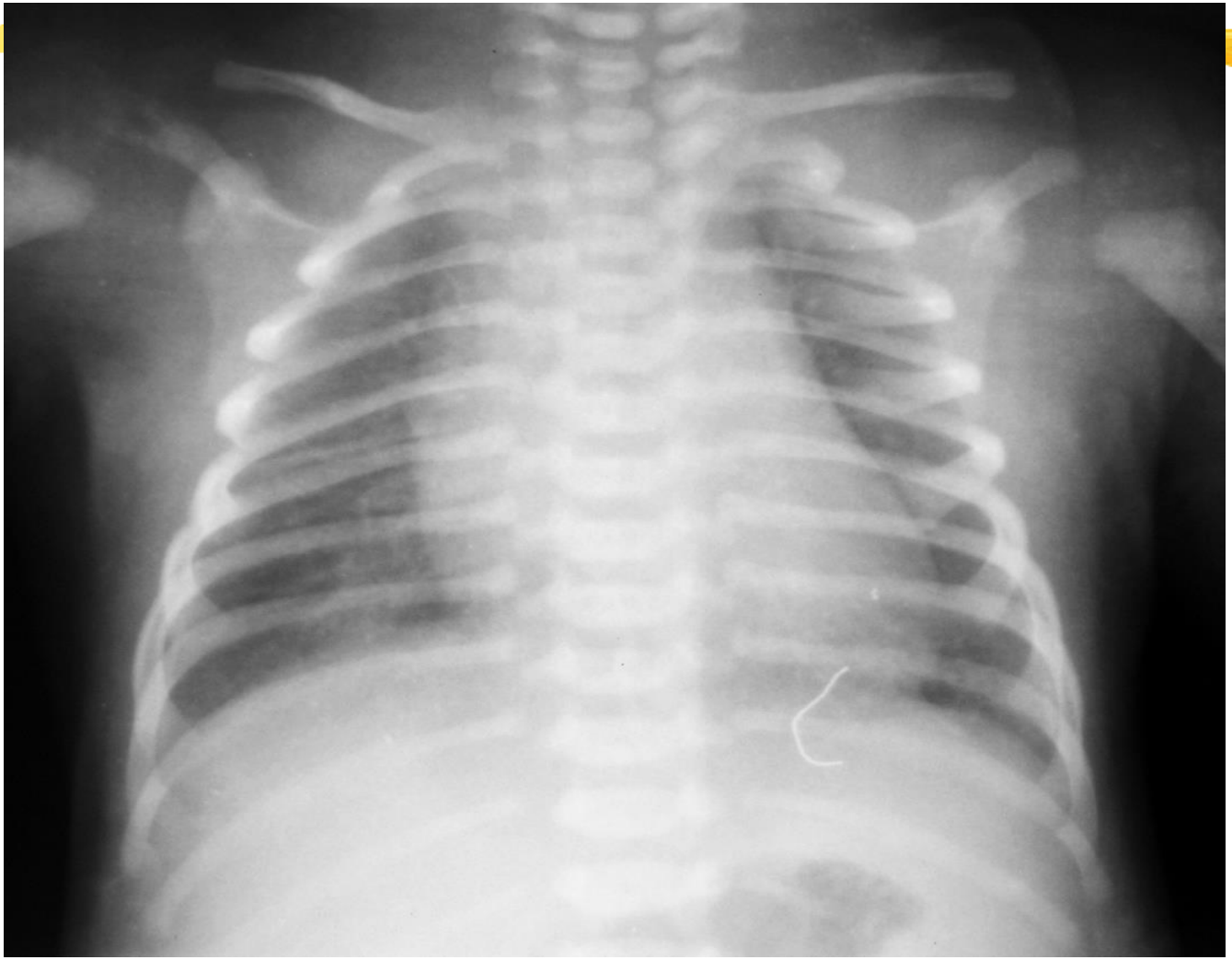
Long-term complications

- Cronic lung disease
- Retinopathy of prematurity
- Neurologic impairment

Case

ทารกเพศชาย อายุครรภ์ 37 สัปดาห์ น้ำหนักแรกเกิด 3,200 กรัม คลอดโดยวิธี C/S เนื่องจาก previous C/S, Apgar scores 8, 9 ที่ 1, 5 นาที





Process of Clearing Lung Fluid

- Begins 2 to 3 days prior to birth
- Decrease rate of secretion
- Clearance occurs during labor
- Changes from chloride - secreting to sodium absorbing membrane
- Lymphatics & pulmonary vessels drainage

Transient Tachypnea of the Newborn

- Progressive respiratory distress
- Excess lung fluid
- Intrauterine or intrapartum asphyxia
  - Cesarean section
  - Maternal over sedation, bleeding
  - Asphyxia
  - Maternal diabetes

Clinical Manifestations of TTNB

- Little or no difficulty at onset of breathing
- Shortly after birth
  - Expiratory grunting
  - Flaring of nares
  - Mild cyanosis noted in room air
  - Present by 6 hours of age
  - Respiratory rates as high as 100-140/min
  - Mild respiratory and metabolic acidosis

Management of TTNB

Supportive care

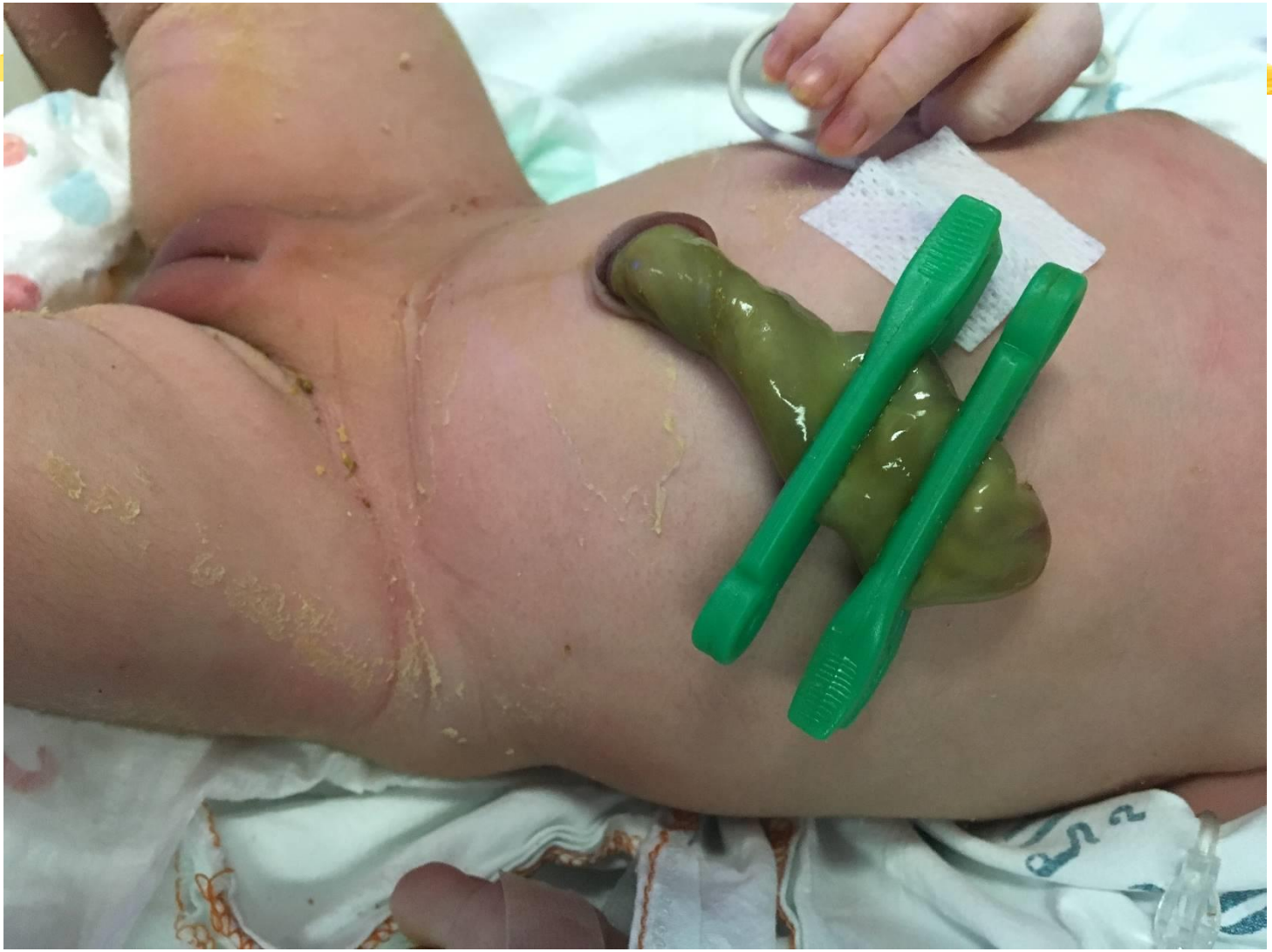
Adequate oxygenation

IV fluids for fluid and electrolyte balance

Improving by 24 hours

Clinical course ~ 72 hours

Case



Meconium Aspiration Syndrome (MAS)

Presence of meconium in amniotic fluid

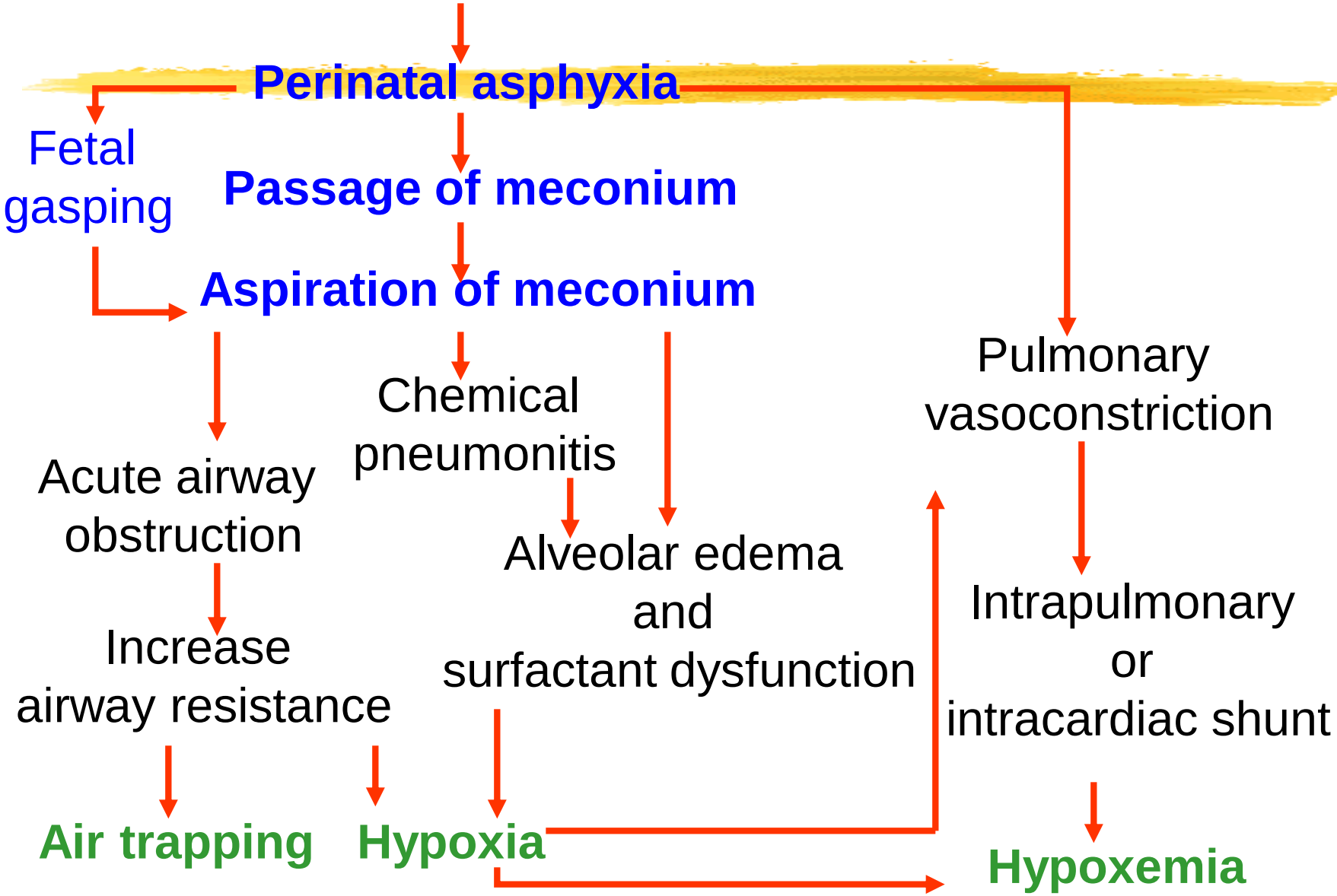
Asphyxial insult

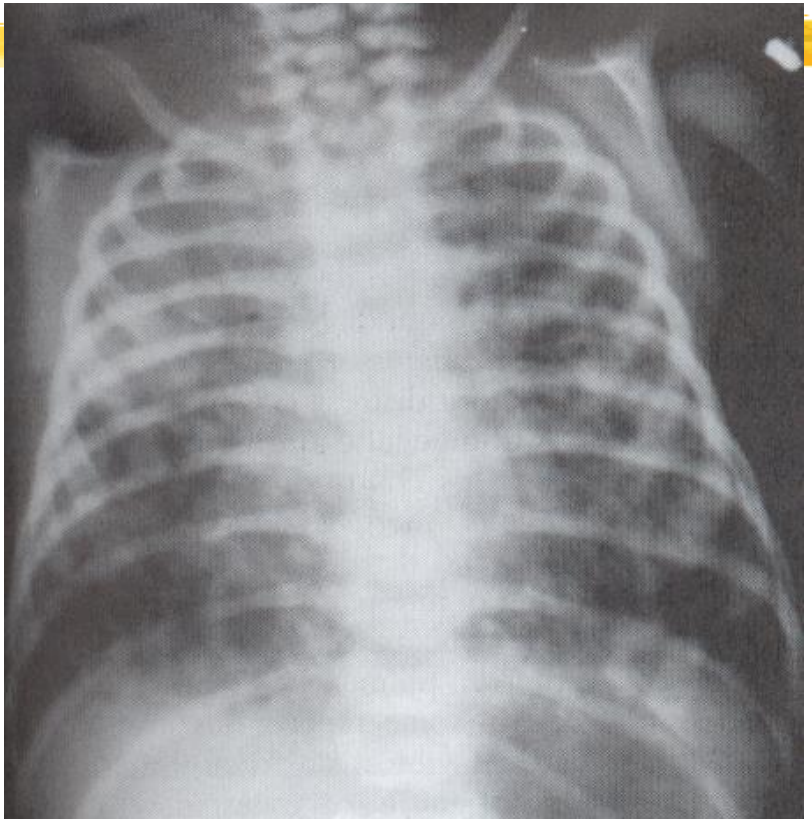
Fluid aspirated into tracheobronchial tree in utero or during the first few breaths

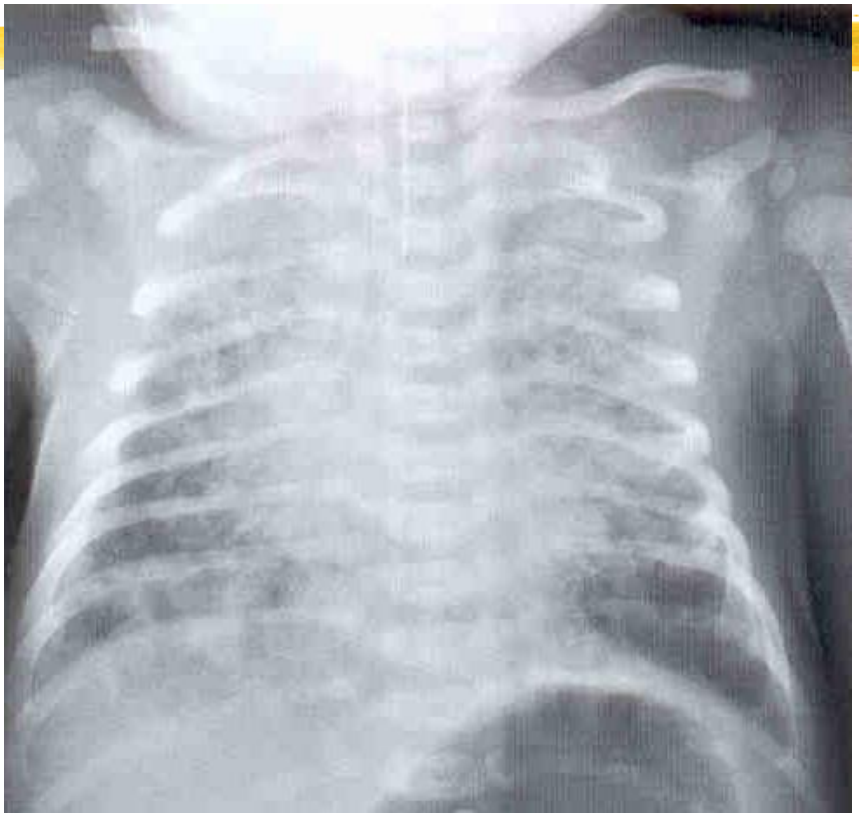
Clinical Manifestations of MAS

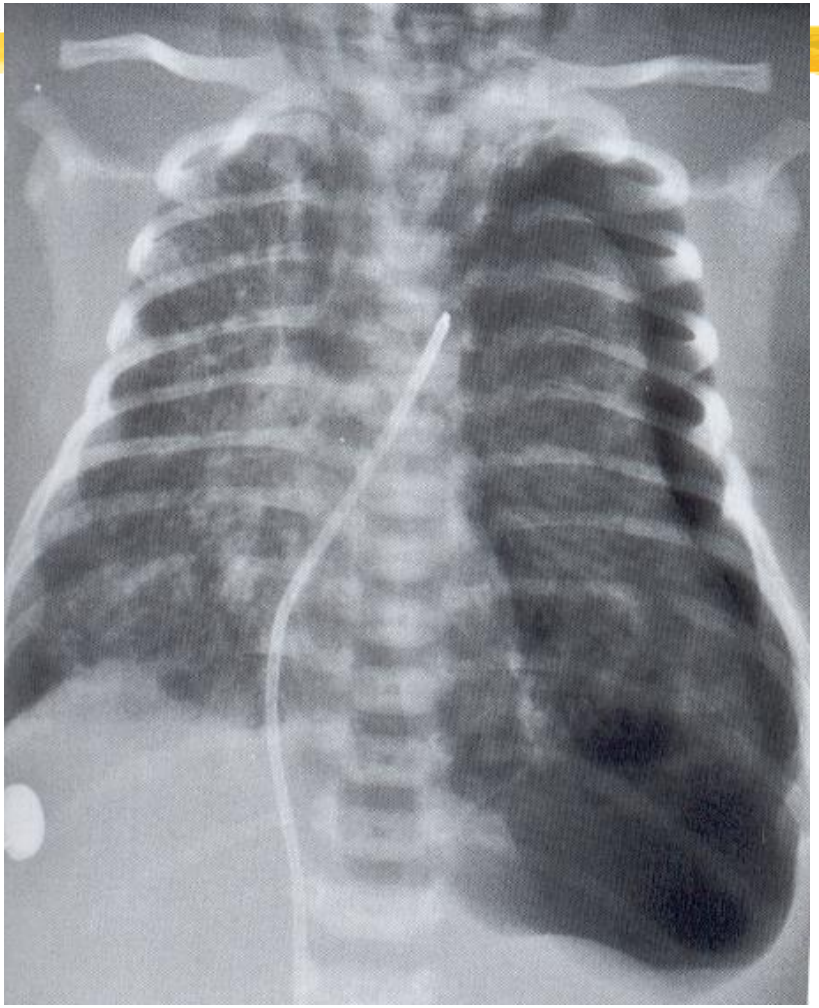
- Fetal hypoxia in utero
  - slowing of FHR or weak and irregular
  - loss of variability
  - meconium staining of amniotic fluid
- Meconium in trachea
- Signs of distress at birth
  - pallor, cyanosis, apnea, low heart rate, low Apgar
- CXR

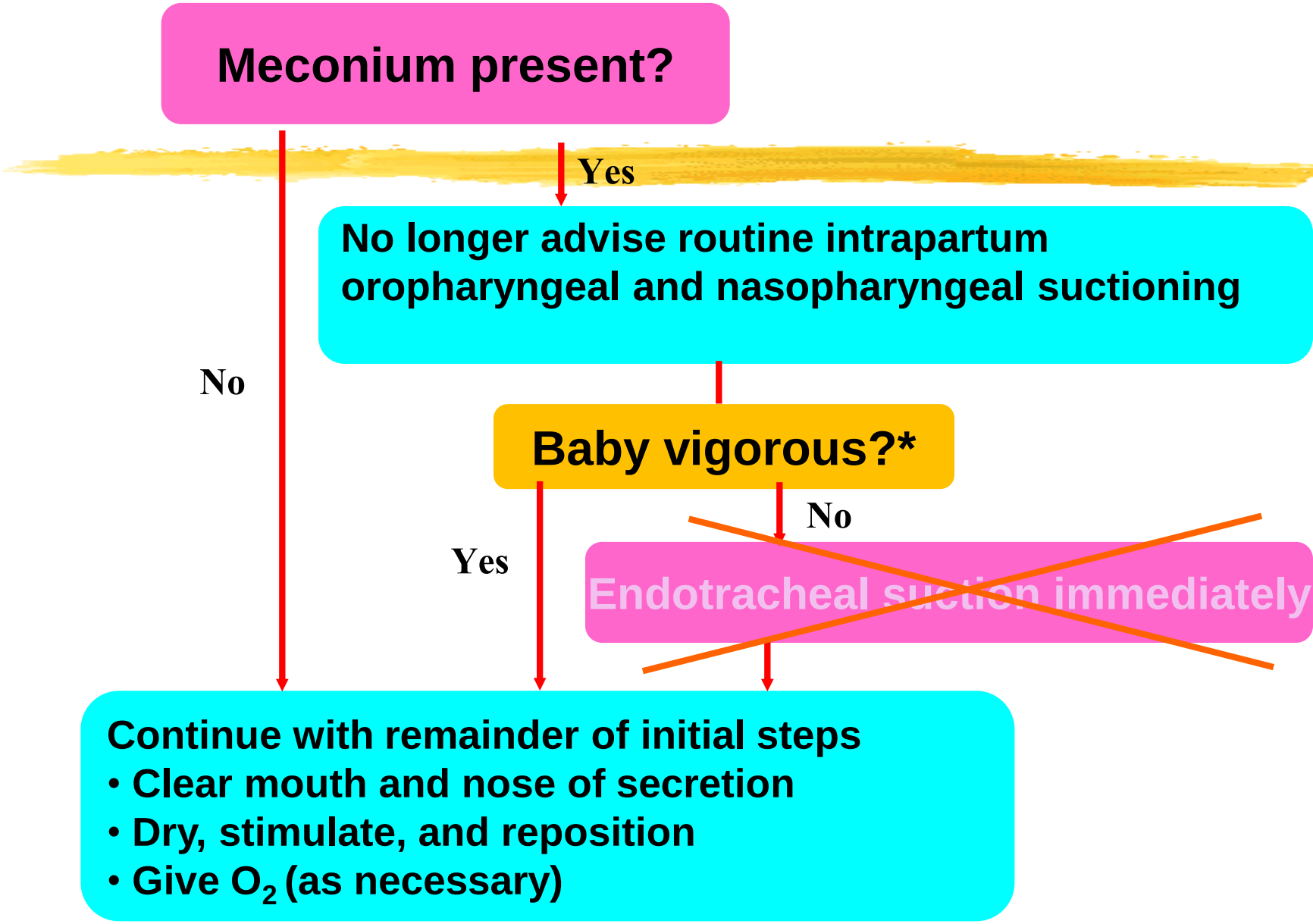
Maternal-fetal compromise



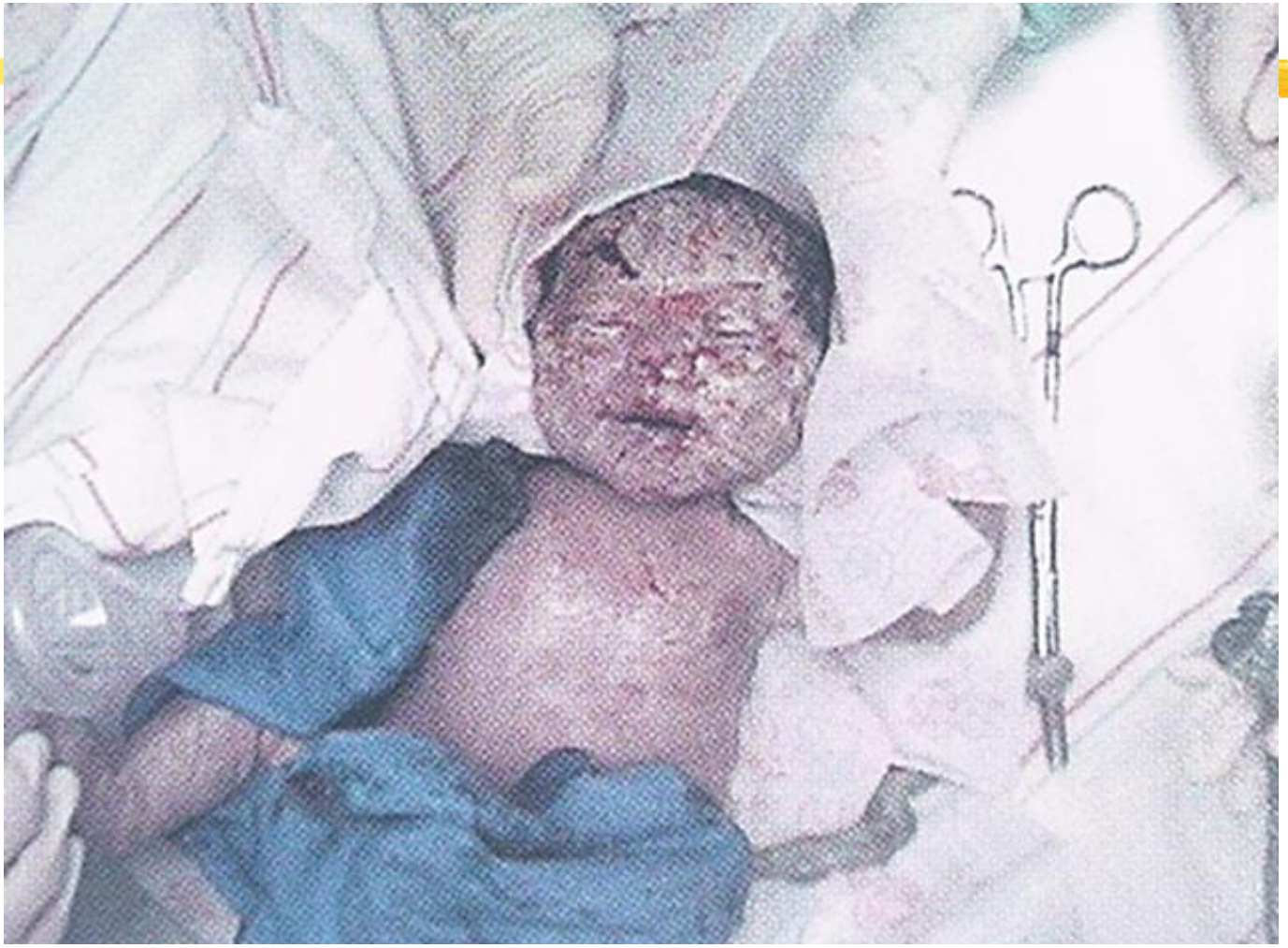


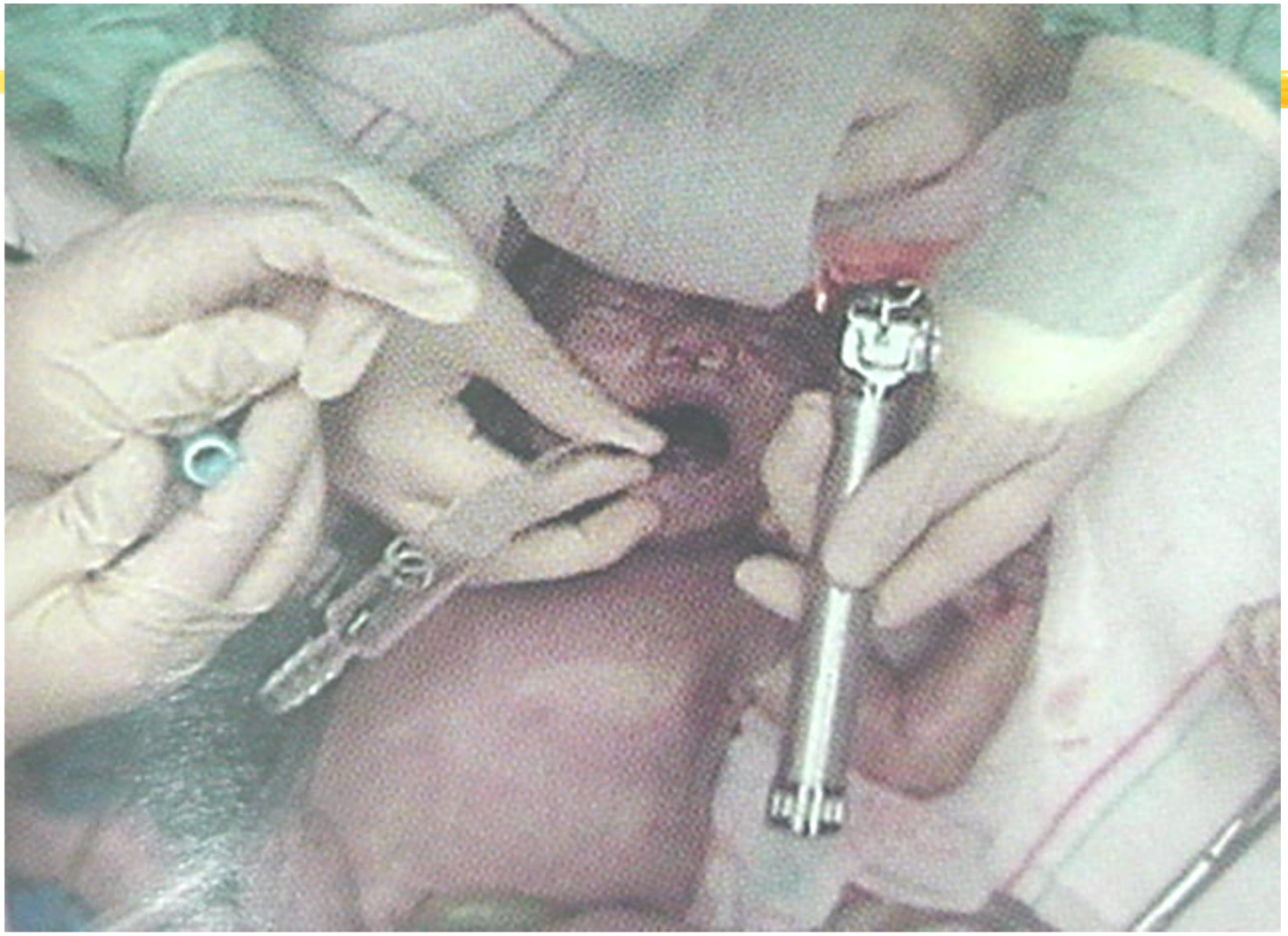






*strong respiratory effort, good muscle tone, and HR>100 bpm





Management of MAS

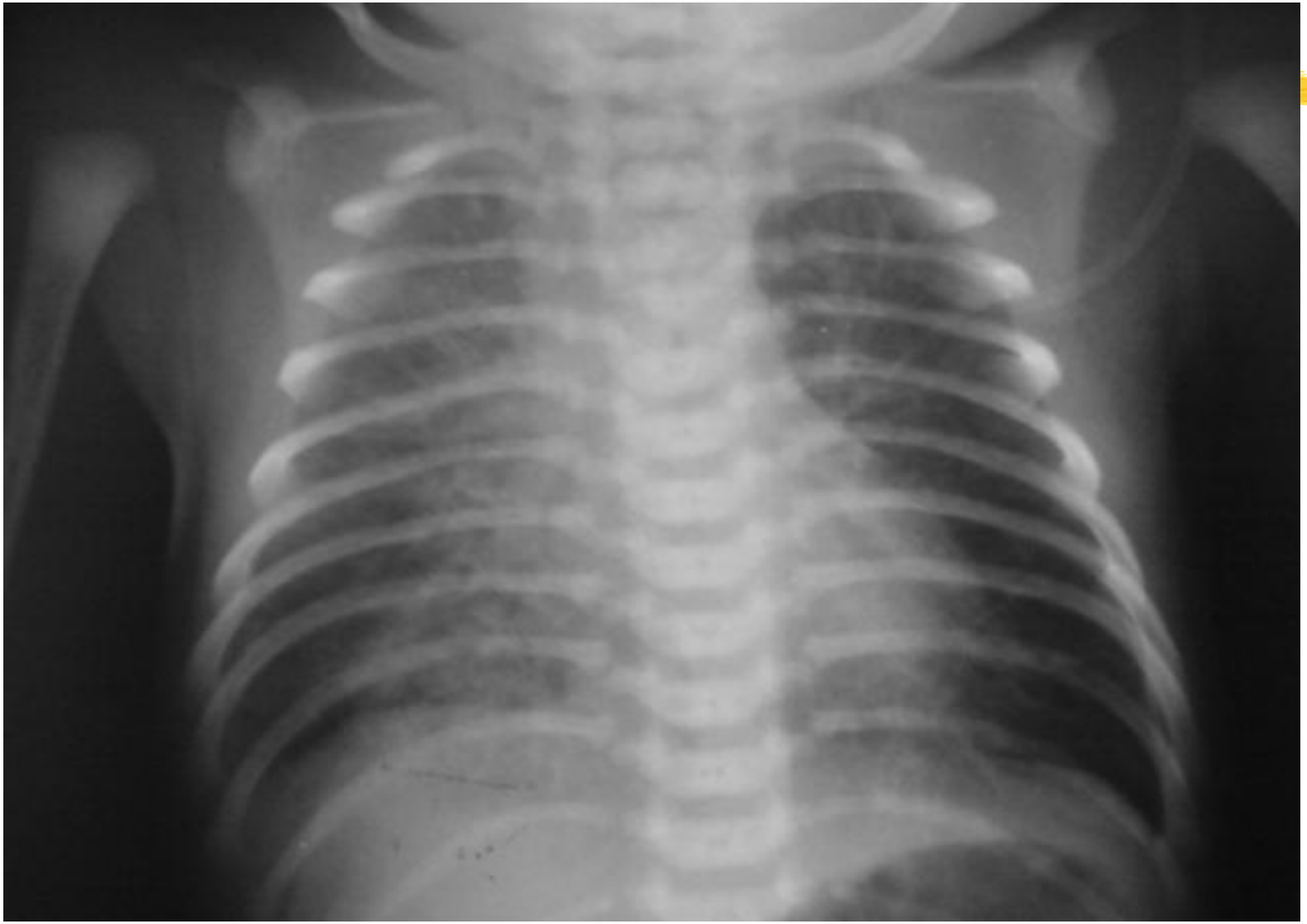
- Drug therapy : broad-spectrum antibiotics
- Routine care : thermal environment, BS
- Obstruction, Chemical pneumonitis
- Oxygen therapy, CPAP
- Mechanical ventilation if respiratory failure

  $PaCO_2$> 60 mmHg, PaO_2 < 50 mmHg

Complications

- Air leak
- Pneumothorax
- Pneumomediastinum
- Pulmonary hypertension
- PPHN

Case 4



Neonatal Pneumonia

- **Intra-amniotic infection**
- **Hematogenous or transplacental spread**
- **Common pathogens -GBS, E.coli, Klebsiella**

Risk Factors

- **Rupture of membranes > 18 hours**
- **Maternal intrapartum fever > 38^{o}C**
- **Chorioamnionitis**
- **Preterm**

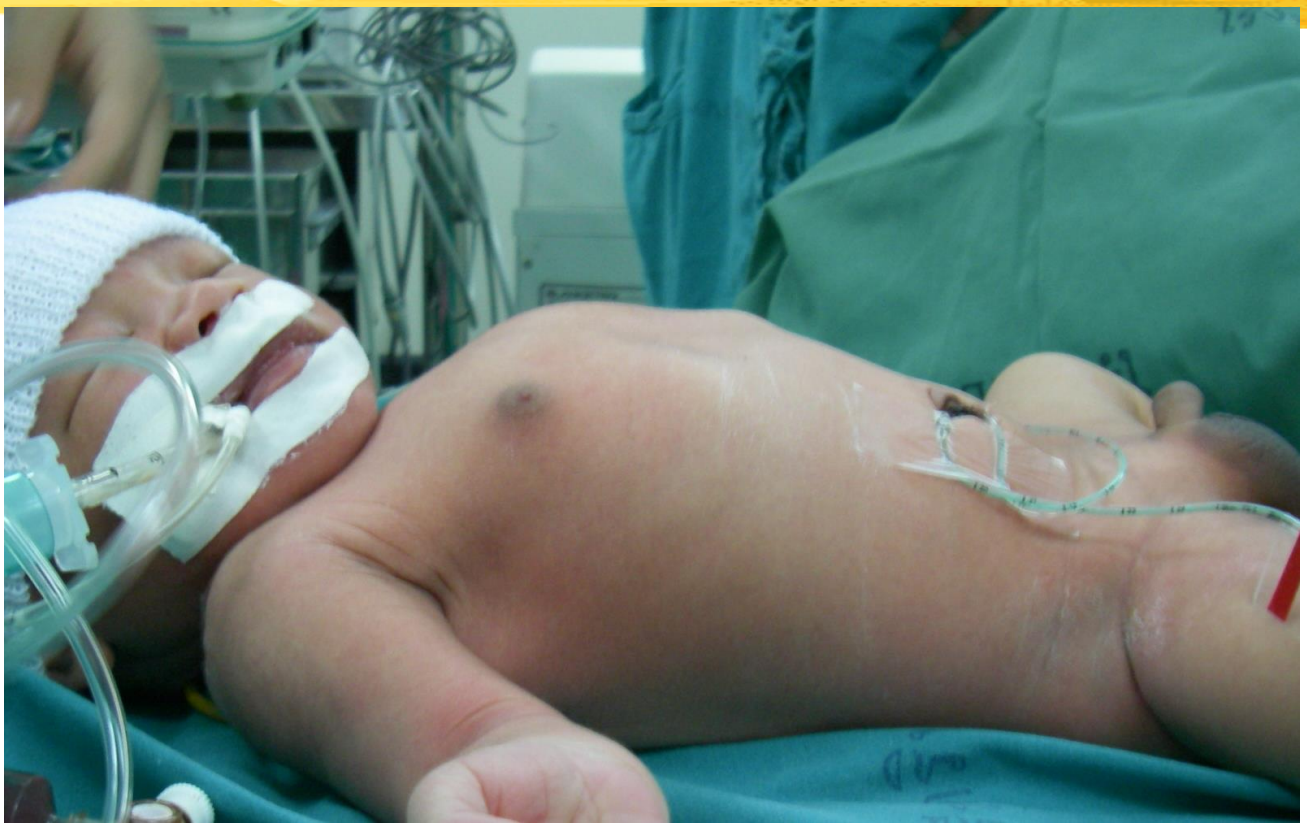
Neonatal Pneumonia

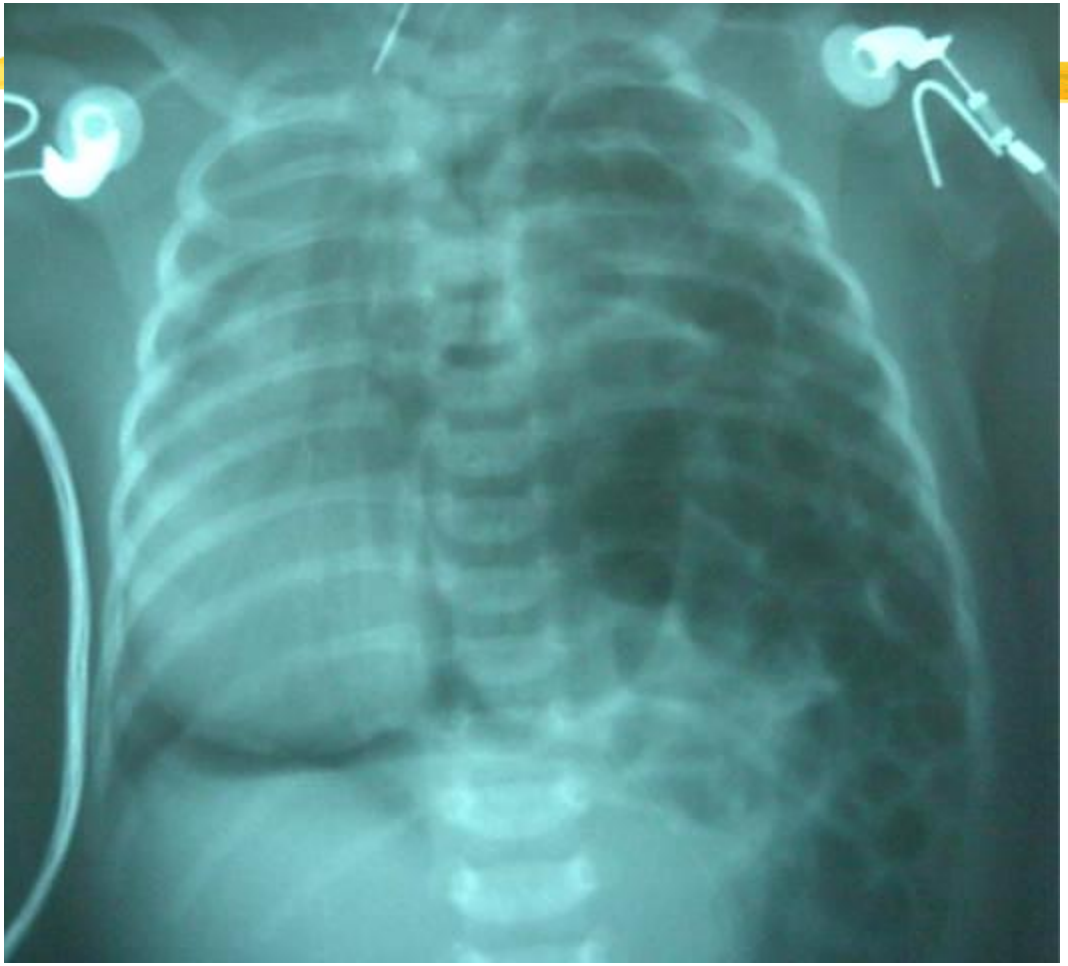
Management

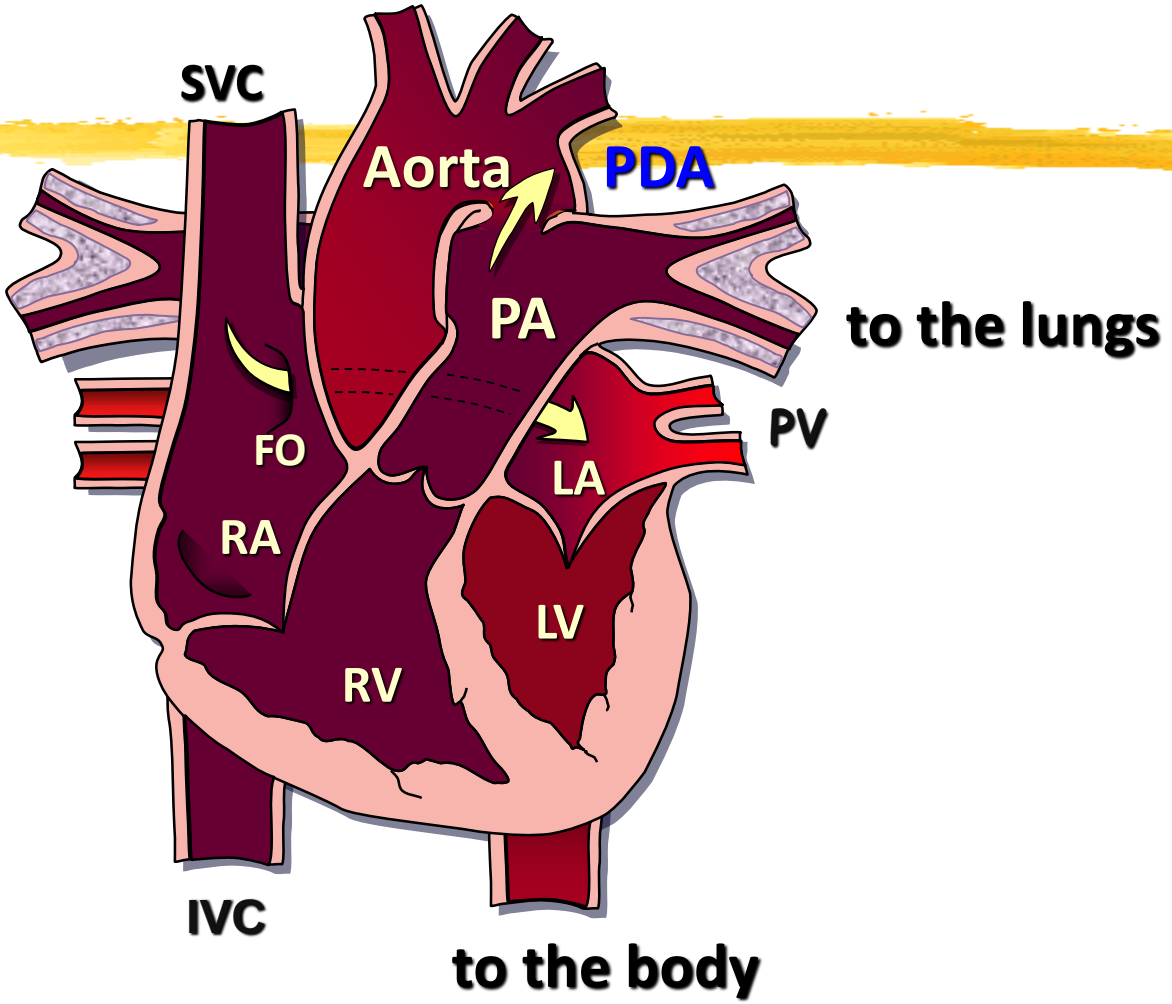
- **Empirical antibiotic therapy**

parenteral ampicillin and gentamicin 10 days

Case

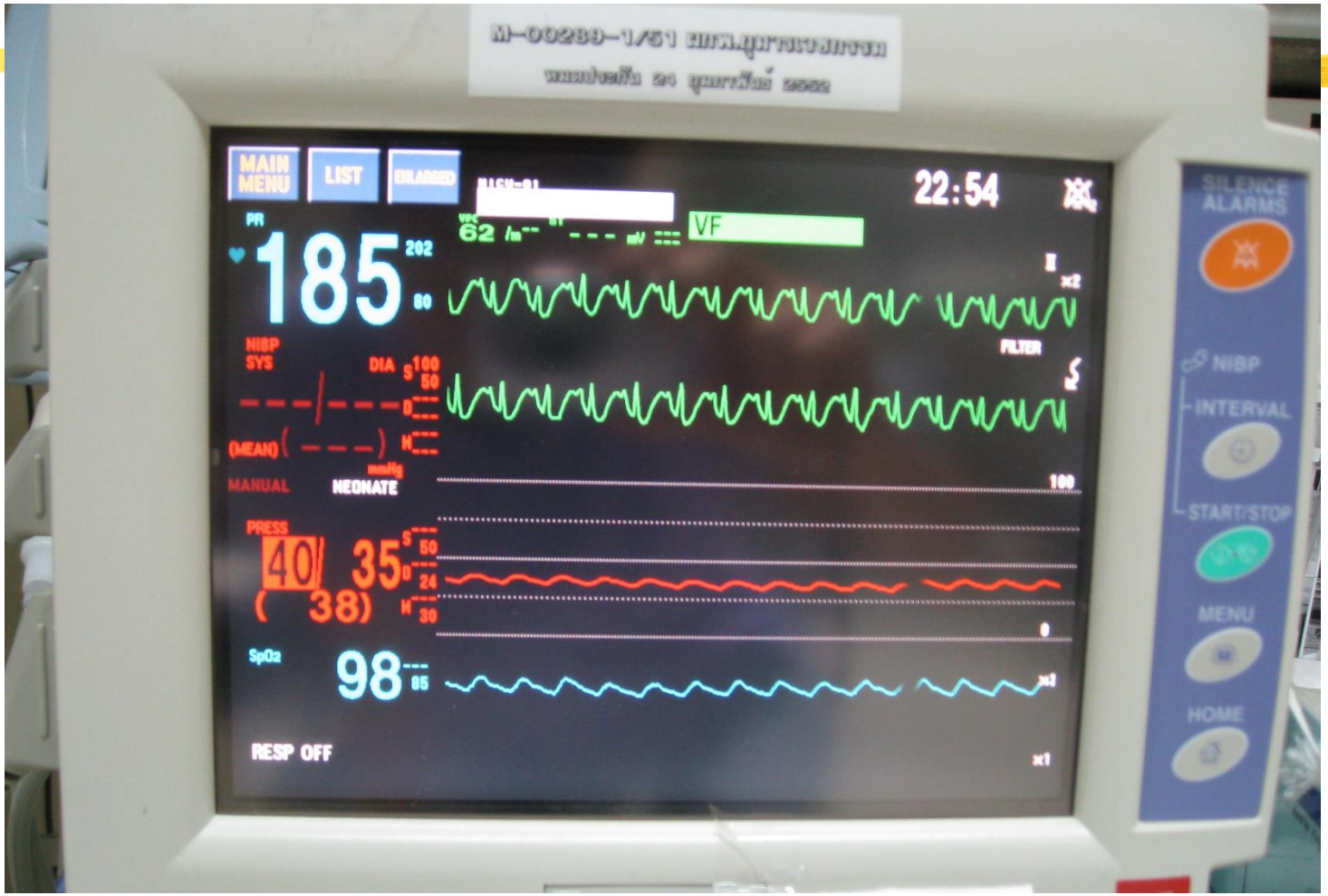






Right-to-Left Shunt

Pre-ductal SpO_2



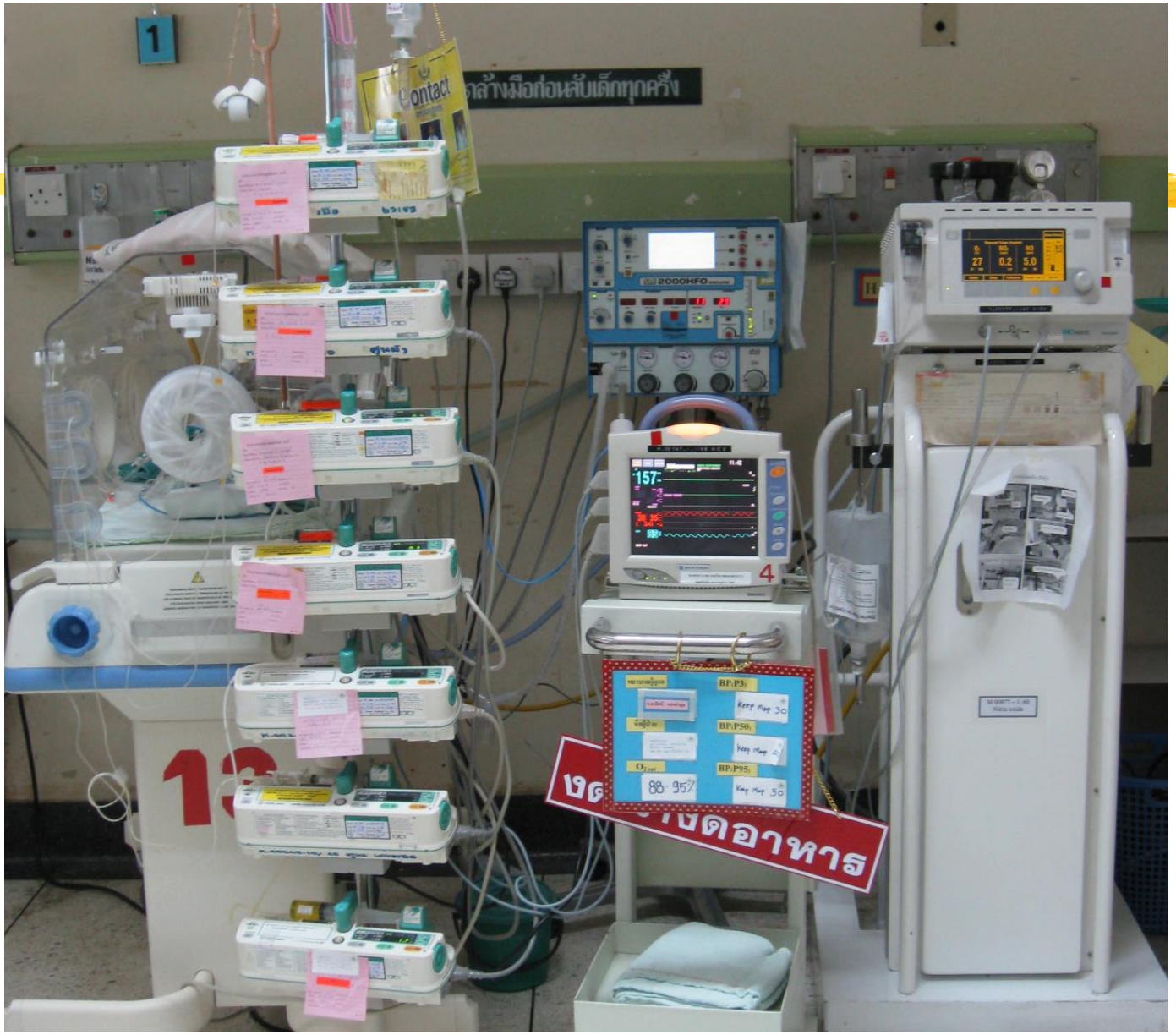
Post-ductal SpO_2

Therapy

- Lower pulmonary vascular resistance
- Maintain systemic blood pressure
- Reverse right-to-left shunts
- Improve arterial SpO_2, O_2delivery

Management

- Correction of acidosis, cold stress
- Minimization of stimuli, sedation
- Inotropic drugs to increase SVR
- Gentle ventilation
- High frequency ventilation
- Nitric oxide


1
2000HFO
4
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History

Physical examination

Investigations

Diagnosis

Management