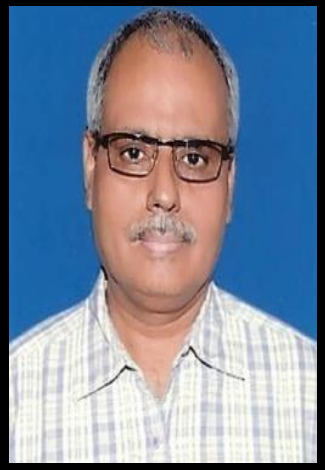
# RESPIRATORY DISTRESS SYNDROME

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**DEFINITION :** Liveborninfants delivered before 37 weeks ( 259 days) from the first day of the last menstrual period are termed as premature.

**CLASSIFICATION : ( by gestational age )**

a) preterm – less than 37 completed weeks

b) late preterm –$34^{0\ 7}$ to $36^{67}$ weeks ( 238 – 258 days )

**BIRTH WEIGHT CLASSIFICATION :**

**LBW** ( low birth weight ) – less than 2500 grams

**VLBW** ( very low birth weight ) – less than 1500 grams

**ELBW** ( extremely low birth weight ) – less than 1000 grams

## Causes of Prematurity :

→ multifactorial and involves complex interaction between fetal, placental, uterine, and maternal factors

FETAL :

→ fetal distress/ hypoxia
→ intrauterine growth restriction
→ multiple gestation
→ erythroblastosis
→ non-immune hydrops

PLACENTAL :

→ placental dysfunction
→ placenta previa
→ abruptio placenta

UTERINE :

→ bicornuate uterus
→ incompetent cervix ( premature dilation/ surgery )
→ congenital malformation
→ threatened abortion

MATERNAL :

→ women younger than 16 yrs and older than 35 yrs
→ low maternal weight
→ prior poor birth outcome
→ preeclampsia / eclampsia
→ chronic and acute medical illness ( DM )
→ genital colonization and infections

## CLINICAL FEATURES :

### Measurements :

→ small body size with relatively large head

→ crown – heel length < 47 cm

→ head circumference < 33 cm but exceeds chest circumference by more than 3 cm

### Activity and posture :

→ general ability is poor

→ Moro's reflex , suckling and swallowing are sluggish or incomplete

→ extended posture due to poor tone

## Face and head :

- → face appears small for disproportionately large head size
- → sutures are widely separated ; fontanels are large
- → small chin
- → protruding eyes due to shallow orbits and absent buccal pad of fats

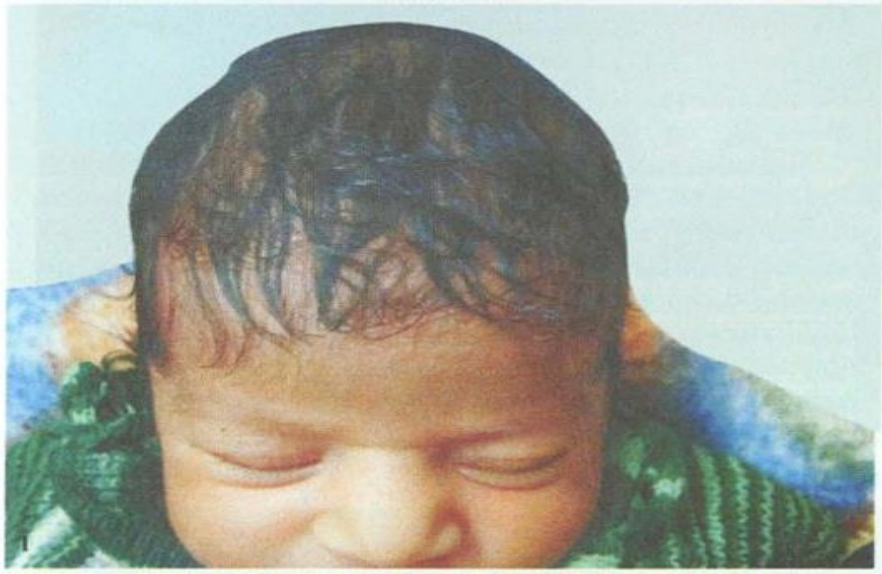
## Skin and subcutaneous tissues :

- → thin skin
- → shiny and gelatinous
- → excessive pink
- → abundant lanugo
- → very little vernix caseosa
- → subcutaneous fat is deficient

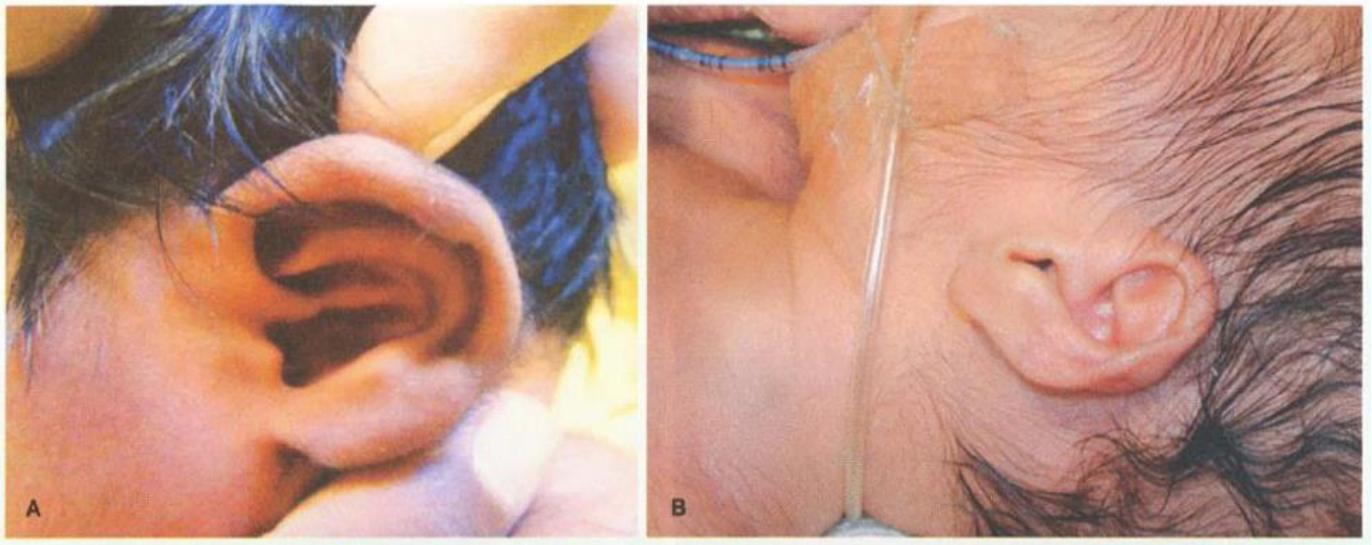
## ASSESSMENT OF GESTATIONAL AGE :

- The scoring system commonly used is the **Expanded New Ballard Scoring System ( ENBS )**
- ENBS system has an accuracy of one week
- It includes = Physical maturity
  Neuromuscular maturity

| PHYSICAL MATURITY MATURITY SCORE | NEUROMUSCULAR |
|---|---|
| skin | posture |
| lanugo | scarf sign |
| plantar surface | arm recoil |
| breast | square window |
| eye/ear | popliteal angle |
| genitals | heal to ear |

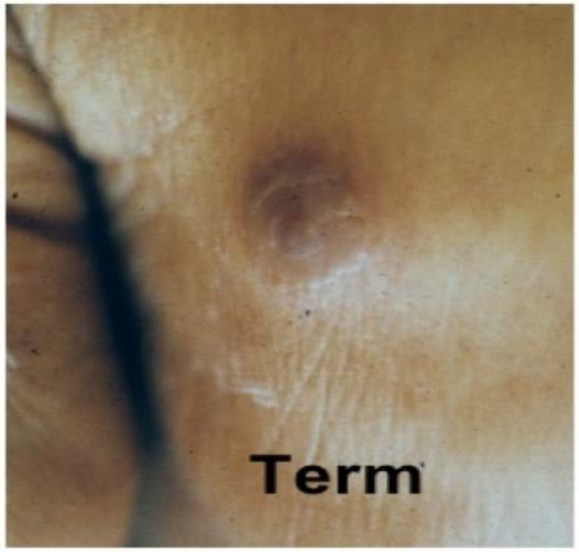


| TERM | PRETERM |
| --- | --- |
| silky hair | fuzzy hair |
| individual strands can be made out | |




| TERM | PRETERM |
| --- | --- |
| well curved pinna ; cartilage reaching upto periphery | flat and soft pinna ; cartilage not reaching upto periphery, |
| instant recoil | slow recoil |

# Breast nodule


| poorly developed breast bud | well formed breast bud ( > 5 mm) |
|---|---|
| Flat areola | Full and raised areola |



| TERM | PRETERM |
| --- | --- |
| Clitoris is not prominent | Clitoris is prominent |
| labia majora are fully developed and cover clitoris and labia minora | labia majora are poorly developed |

| TERM | PRETERM |
| --- | --- |
| Scrotum is well developed | scrotum is undeveloped |
| pendulous | not pendulous |
| Rugated | Minimal rugae |
| testes well down in scrotal sac | testes in inguinal canal or in abdominal cavity |

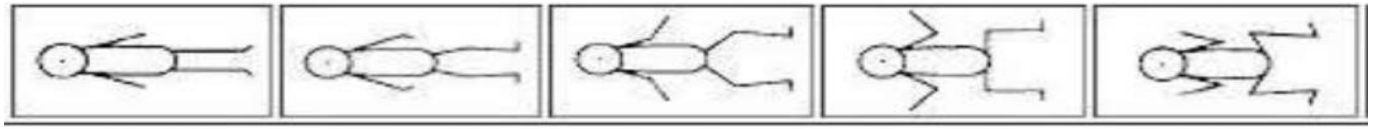


| TERM | PRETERM |
| --- | --- |
| Deep creases over entire plantar surface | Faint creases partially covering the sole |

## Posture :

→ passive tone increases in a caudo – cephalic direction ( beginning from lower limb )

→ preterms exhibit unopposed passive extensor tone

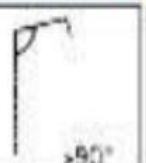


| SIGN | NEURO-MUSCULAR MATURITY SCORE | | | | | | | SIGN SCORE |
|---|---|---|---|---|---|---|---|---|
| | -1 | 0 | 1 | 2 | 3 | 4 | 5 | |
| Posture | | | | | | | | |

## Square window :

→ palm is flexed over the forearm ;

→ angle made with ulnar aspect of the forearm and the palms is observed from lateral side.

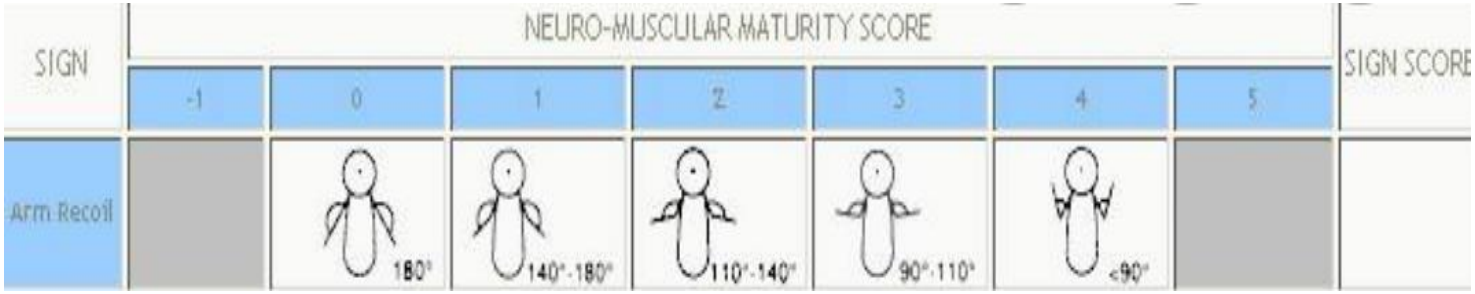
| SIGN | NEURO-MUSCULAR MATURITY SCORE | | | | | |
|---|---|---|---|---|---|---|
| | -1 | 0 | 1 | 2 | 3 | 4 |
| Square Window |   |   |   |   |   |   |

## Arm Recoil :

→ keep the arm flexed for 5 sec ;

→ fully extend the arm briefly and release.

Observe how quickly the arm returns to flexion

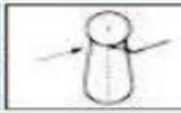



## Scarf sign :

→ Try to put hand around neck and as far as possible over the opposite shoulder.

→ in term baby the muscle tone resists the manoeuver

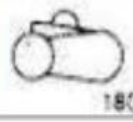
→ in preterm , hypotonicity allows the elbow to be moved to opposite side.

| SIGN | NEURO-MUSCULAR MATURITY SCORE | | | | | |
|---|---|---|---|---|---|---|
| | -1 | 0 | 1 | 2 | 3 | 4 |
| Scarf Sign |  |  |  |  |  |  |

# Popliteal angle :

→ maintain the pelvis flat on the table

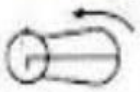
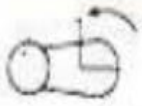
→ fix the knees on the abdomen, then lift the lower segment of leg and observe e angle between the leg and thigh.

| SIGN | NEURO-MUSCULAR MATURITY SCORE | | | | | | |
|---|---|---|---|---|---|---|---|
| | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| Popliteal Angle |  180° |  160° |  140° |  120° |  100° |  90° |  <90° |

# Heel to ear :

→ fix the pelvis

→ lift the legs as far as possible to reach the ear with feet

| SIGN | NEURO-MUSCULAR MATURITY SCORE | | | | | | |
|---|---|---|---|---|---|---|---|
| | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| Heel To Ear |  |  |  |  |  |  | |

# COMPLICATIONS OF PREMATURES:

**RESPIRATORY :**

a) Respiratory distress syndrome ( due to surfactant deficiency and pulmonay immaturity)

b) Apnea

c) Development of chronic lung disease / Bronchopulmonary dysplasia

**NEUROLOGIC :**

a) Perinatal depression

b) Intracranial Haemorrhage

c) Periventricular Leukomalacia

**CARDIOVASCULAR :**

a) Hypotension – (due to hypovolemia , sepsis induced vasodilation)

b) Patent Ductus Arteriosus.

**HAEMATOLOGIC :** Anemia

Hyperbilirubinemia

**GASTROINTESTINAL :** Necrotising Enterocolitis

GI Bleeds

**METABOLIC :** Hypoglycemia

Hypocalcemia

**RENAL :** Low GFR

Inability to process water, solute & acid loads

…

**TEMPERATURE REGULATION** : Hypothermia

**IMMUNOLOGIC** : Both humoral and cellular immune deficiency

➔ infections

**EYE** : Retinopathy Of Prematurity

# RESPIRATORY DISTRESS SYNDROME :

. Formerly known as Hyaline Membrane Disease ( HMD )

.Typical of preterm infants

. Caused by insufficient pulmonary surfactant in alveoli

## RISK FACTORS :

1. Prematurity ( Usually < 34 weeks )
   a) alveolar type II cells do not develop until early in third trimester.
   b) Their number and capacity to produce surfactant increase throughout the third trimester.

2. Fetal Sex
   a) Male infants are at higher risk.
   b) Fetal androgens inhibit the production of surfactant phospholipids (lecithin)

3) Maternal Diabetes :

Fetal insulin inhibits the production of surfactant proteins

4) Lack Of Antenatal Steroids :

Maternal glucocorticoids enhance lung maturity.

5) Birth Asphyxia

6) Rh Isoimmunisation

7) Hypothermia

8) Multiple gestations

**Clinical Course :**

Onset at or soon after birth

Tachypnoea

Retractions

Flaring of alae nasi

Grunting

**Radiographic Features**

Low lung volumes

Fine reticulogranular pattern ( ground glass appearance )

Air bronchograms with surrounding microatelectasis

White-out lungs

This Newborn is GRUNTING

# Tachypnoea, intercostal & subcostal retractions

# ASSESSMENT OF SEVERITY OF RESPIRATORY DISTRESS IN PRETERM

## ( SILVERMAN SCORE )

| Feature | Score 0 | Score 1 | Score 2 |
|---|---|---|---|
| Upper Chest movement | Synchronous | Inspiratory lag | See-saw respiration |
| Lower chest retractions | None | Minimal | Marked |
| Xiphpoid retractions | None | Minimal | Marked |
| Nasal flaring | None | Minimal | Marked |
| Grunting | None | Audible with stethoscope | Audible without stethoscope |

**Score > 4 = Clinical respiratory distress**

**> 7 = Impending respiratory**

# Differential diagnosis :

## 1) Transient tachypnoea of newborn

Occurs in late preterm and term infants

Caesarean section

Maternal diabetes, asthma

Analgesic & anaesthesia used during labour

Radiographic findings :

Hyperinflated lungs

Perihilar streaking (**SUNBURST** pattern ) due to enlargement of lymphatics

Fluid in minor fissure

Pleural effusion

Mild cardiomegaly

## 2) Pneumonia :

→ Presents as Early Onset Neonatal Sepsis

→ Inflammatory Cytokines (GBS sepsis ) inactivate & downregulate surfactant constituents.

Radiographic findings are indistinguishable from RDS.

## 3) Meconium Aspiration Syndrome :

→ Meconium causes obstruction of air passages

→ Chemical pneumonitis causes activation of inflammatory mediators and inactivates surfactant

Radiographic findings :

Hyperinflated lungs

Coarse nodular opacities

Patchy atelectasis with areas of overinflation

# 4) Congenital Heart Disease :

→ Presents with cyanosis, hyperactive precordium, gallop rhythm, poor capillary refill, weak and delayed pulses in lower limbs, hepatomegaly

→ Cardiomegaly on chest radiography

→ CHD presents without marked respiratory distress.

**INVESTIGATIONS :**

History

Clinical Examination

Chest X-ray

Sepsis screen

Blood Culture ( if sepsis is suspected)

CT thorax ( suspected lung anomalies)

Echocardiography ( for PPHN or CHD )

# TREATMENT :

## 1) Supportive Care

→ Maintainance of thermo-neutral environment under radiant warmer

→ Ensuring normal blood glucose with iv fluids

→ Monitoring vitals (HR, RR, Oxygen Saturation)

## 2) Respiratory Support

→ To ensure adequate oxygenation & ventilation ; to decrease work of breathing

→ Supplemental Oxygen

→ Continuous Positive Airway Pressure

→ Mechanical ventillation for those who fail to maintain oxygenation in CPAP.

**3) Specific Therapy**

→ Surfactant replacement for RDS

→ antibiotics for associated EOS


THANKYOU
WELLS FARGO
JDRF 2005
We're on Track For a Cure