Neonatal Jaundice

Definitions:

- **Neonatal jaundice:** Yellowish discoloration of the skin, sclera and mucus membrane (total bilirubin > 5mg/dl).
- **Hyperbilirubinemia:** Increase in the serum bilirubin above normal (>1.5-2 mg/dl) which is manifested as jaundice. Bilirubin measured at >95th percentile for age in hours using ***Bhutani normogram***.
- **Severe hyperbilirubinemia:** Total serum Bilirubin >25 mg/dL (428 micromole/L) in term newborns, it is associated with an increased risk for **bilirubin-induced neurologic dysfunction** (***BIND***).

BIND:

- **Acute Bilirubin Encephalopathy (ABE):** Poor feeding, lethargy, hypertonia, retrocollis, opisthotonos, shrill cry and irritability alternating with increasing lethargy. ***Advanced signs*** are cessation of feeding, bicycling movements, inconsolable irritability, crying, possible seizures, fever, and coma.

- **Kernicterus:** It is the chronic and permanent sequelae of BIND, collection of unconjugated bilirubin in the basal ganglia and brain stem nuclei and is manifested as Hypotonia, Seizures, Opisthotonos, Delayed motor skills, Choreoathetosis and Sensorineural hearing.

Physiological Jaundice:

- Appears in 2nd to 3rd day of life (term).
- Disappear by 5th day of life.
- Clinical jaundice resolved in term by 2 weeks, in preterm by 3-4 weeks.
- Peak bilirubin <12 mg/dl (in term), and <15 mg/dl (in preterm).
- Rate of bilirubin rise <5 mg/dl/day.
- Dose **not** appear after it has resolved.

- Clinically baby is well in general.
- May be higher in breast milk fed infants than formula fed.
- If > 2 weeks in term or 3 weeks in preterm then it's called **Prolonged jaundice**, 90% of them are not pathological, ***breast milk jaundice*** is most likely the cause, but always rule out pathological by work up.
- **Causes:**
  - Increased RBCs and ineffective erythropoiesis.
  - Shortened RBC lifespan.
  - Hepatic immaturity: Defective uptake from plasma, conjugation, excretion and increased enterohepatic circulation → decrease UGTA1.
  - Increased enterohepatic Circulation → Increase β-glucuronidase.
  - Other factors: antibiotics, bruises, cephalohematoma, hypoxia, asphyxia, hypothermia, hypoglycemia, dehydration, lipolysis.

Breast feeding Jaundice:

- The baby is not nursing well and so **not** getting many calories "low calorie intake".
- 3^{rd}-4^{th} day, frequent in first-time breast-feeding mothers, may become dehydrated
- **Managed** by counselling and rehydrating the baby, feed every 2-3 hours.

Breast milk Jaundice:

- The persistence of "physiologic jaundice" beyond the first week of age and can be prolonged to 2-3 months.
- Occurs due to B-glucuronidase present in some breast milk or genetic polymorphisms of the UGT gene "**Gilbert syndrome**" which is the most common inherited disorder of bilirubin glucuronidation.
- Stop breast feeding and give formula for 1-2 days, so when the bilirubin is checked again, it will have fallen significantly, then the baby may then be safely breast fed.

- Despite the increased risk, exclusive breast feeding is still the recommended feeding choice.
- Phototherapy is indicated if serum bilirubin > 20mg/dl.

Pathological Jaundice:

- It's a medical emergency, clinical jaundice appears in the first 24 hours of age, isn't resolved by 2 weeks in term, or by 3-4 weeks in preterm.
- Total bilirubin >12 mg/dl in term, >15 mg/dl in preterm.
- Total bilirubin rise >5 mg/dl/day.
- Direct bilirubin >1.5 mg/dl.
- Clinical jaundice appear after it has been resolved.
- Causes of **unconjugated** hyperbilirubinemia:
  - **Increased bilirubin production**
    1. Hemolysis (Rh/ABO incompatibility, Abnormal RBC morphology, Sepsis)
    2. Cephalhematoma
    3. Polycythemia
  - **Increased enterohepatic circulation**
    1. Pyloric stenosis
    2. Small/ large bowel obstruction
  - **Abnormal hepatic conjugation and secretion**
    1. Conjugation (Criglar-Najjar syndrome, Gilbert syndrome)
    2. Secretion (Hypothyroidism, Galactosemia)
- Causes of **conjugated** hyperbilirubinemia:
  - Cholestasis jaundice>>75% due to:
    1. Biliary atresia
    2. Neonatal hepatitis
    3. α-1-antitrypsin deficiency
- **Workup**:
  - CBC, retics, blood film
  - TSH, T4
  - G6PD enzyme
  - Urine Culture, Reducing substance (to rule out galactosemia)

- **Management:**
  - ✓ **Phototherapy**: Blue light is used. It converts bilirubin into soluble form that is secreted with urine. **Indicated** if Bile rise > 5 mg/dl/day, Persistent severe metabolic or respiratory acidosis, Sepsis and Sick very low birth weight. **Complications** may include loose stools, erythematous macular rash, Bronze baby syndrome, overheating leading to dehydration.
  - ✓ **Exchange Transfusion: Indicated** if bilirubin levels >25 mg/dL, those who are not responding to phototherapy and those with evidence of acute bilirubin encephalopathy.
  - ✓ **Intravenous immune globulin:** is recommended in infants with isoimmune hemolytic disease and if the TSB level is rising despite phototherapy or is within 2 or 3 mg/dL of the threshold for exchange transfusion.