NEONATAL JAUNDICE

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Objectives

1. Define Jaundice and review the physiology of Jaundice.
2. To understand the classification and causes of Jaundice.
3. To review the clinical features, laboratory workup and management of the jaundiced neonate

Definition

- Jaundice is the yellow discoloration of the **sclera, conjunctivae, nail beds and the skin** as a result of accumulation of bilirubin in the body.
- Jaundice becomes apparent on the skin when serum bilirubin reaches more than **5 mg/dl.**

Incidence:

- Almost all neonates (**60% Term** and **80% Preterm**) will have bilirubin greater than 5 mg/ dl in the first week of life and about **6% of term babies will have levels exceeding 15 mg/ dl.**

Bilirubin Physiology

Source of Bilirubin:

- Bilirubin is derived from the breakdown of **heme proteins** which are present in **hemoglobin, myoglobin and certain heme containing enzymes.**
- **75%** of the bilirubin comes from hemoglobin catabolism.

Steps in metabolism of Bilirubin

- Heme → Biliverdin → Bilirubin
  - Heme oxidase
  - Biliverdin reductase
- Bilirubin is bound to **albumin** for transport in the blood to the hepatocytes
- Uptake of Bilirubin by hepatocytes
- Conjugation of bilirubin
- Excretion of bilirubin into the bile ducts

Cont…

***Conjugation* of Bilirubin:**

- In hepatocytes, bilirubin is conjugated with **glucuronic acid** to produce **mono- and diglucuronides** which are water soluble.

Bilirubin Metabolism in the Intestine

Conjugated bilirubin is acted upon by bacteria in the intestines to form **Urobilinogen**.

Urobilinogen has 2 fates:

-It is further converted into stercobilinogen which is then oxidised to form **Stercobilin** and excreted in stool and gives stool the brown color.

Cont..

Or

-In the sterile newborn gut, an enzyme called **beta- glucuronidase** converts **bilirubin diglucuronide** into **unconjugated bilirubin** which is reabsorbed into the circulation and later excreted through the kidney as **Urobilin** which gives urines a deep yellow color.

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- This is called **enterohepatic circulation** and is particularly important in babies who are infrequently fed from birth.
- With frequent feeding early colonization of the intestines occurs. These bacteria reduce bilirubin glucuronide into stercobilin which is excreted in stool, thus inhibiting the enterohepatic circulation.

Types of jaundice

- Direct Bilirubin or the conjugated bilirubin: is the water soluble type and does not cause CNS toxicity.
- Indirect Bilirubin or the unconjugated Bilirubin which is lipid soluble and crosses the blood brain barrier and causes CNS toxicity – ie deposited in the basal ganglia and leads to KERNICTERUS.

Classification of Jaundice:

A) **Physiologic Jaundice: causes**

- **Immaturity in bilirubin metabolism** at multiple steps results in the occurrence of hyperbilirubinemia in the first few days of life. These are:

· Increased bilirubin load on the hepatic cell

· Defective uptake from plasma into liver cell

· Defective conjugation

· Decreased excretion

· Increased entero-hepatic circulation

Characteristics of physiological jaundice

- First appears between **24-72** hours of age
- Maximum intensity seen on **4-5th** day in term and **7th day** in preterm neonates
- Does not exceed **15 mg/ dl**
- Clinically undetectable after **14 days**.
- No treatment is required but baby should be observed closely for signs of worsening jaundice.

Classification cont..

B) **Pathological Jaundice**: includes some causes of both indirect and direct jaundice.

Presence of any of the following signs denotes that the jaundice is pathological.

· Clinical jaundice detected before **24 hours of age**

· Rise in serum bilirubin by more than **5 mg/ dl/ day**

· Serum bilirubin more than **15 mg/ dl**

Cont..

- Clinical jaundice persisting beyond **14 days of life**

· **Clay/white colored stool and/or dark urine** staining the clothes yellow (features of obstructive jaundice.

· Direct bilirubin **>2 mg/ dl** at any time

NB: -Treatment is required in the form of phototherapy or exchange blood transfusion **for the indirect type**

-One should investigate to find the cause of pathological jaundice

CAUSES OF JAUNDICE

Hyperbilirubinemia in the first week of life is usually of the indirect variety. Causes are usually classified based on the time of onset of jaundice.

1. Appearing within 24 hours of age

- Hemolytic disease of newborn: Rh, ABO and minor group incompatibility
- Infections: intrauterine viral, bacterial; malaria
- G-6PD deficiency

Causes cont..

2. Appearing between 24-72 hours of life

- Physiological
- Neonatal Sepsis
- Polycythemia
- Concealed hemorrhages: cephallohematoma, subarachnoid bleed, IVH.
- Increased enterohepatic circulation

Causes cont

3. **Appearing after 72 hours**

- Neonatal Sepsis
- Neonatal hepatitis
- Extra hepatic biliary atresia
- Breast milk jaundice
- Metabolic disorders

4. Prolonged indirect jaundice: Causes:

- Crigler Najjar Syndrome
- Breast milk jaundice
- Hypothyroidism
- Pyloric stenosis
- Ongoing hemolysis, malaria

NB: jaundice beyond 10 days in the term baby and > 14 days in the preterm is termed as prolonged

Direct hyperbilirubinaemia

1. Malformations: (mostly due to obstructive causes)

-Biliary atresia (extra and intrahepatic)

-choledochal cyst

-bile duct stenosis

2. Idiopathic neonatal hepatitis
3. Infections -Hepatitis B, TORCH, Sepsis
4. Metabolic Disorders : Hypothyroididsm/ Galactosemia
5. Total Parenteral Nutrition

Clinical presentation/assessement

- Clinical criteria: Utilizes the principle that clinical jaundice first becomes obvious in the face followed by a downward progression as it increases in intensity.
- Assessment of jaundice should be done in natural light.
- The baby's skin is pressed preferably over a bony part, till it blanches. The underlying skin is noted for yellow color.

Approach to the Jaundiced Baby

The following four questions need to be answered

- What is the birth weight?
- What is the gestation?
- What is the postnatal age in hours?
- Is the jaundice physiological or pathological?
- If the jaundice is physiological and baby is well only observation is necessary.

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- In deeply jaundiced newborn one must also evaluate for presence or absence of bilirubin toxicity - **kernicterus**.
- Kernicterus is identified by **lethargy and poor feeding, poor or absent Moro's reflex, opisthotonus or convulsions**

History review for jaundiced baby

- Review maternal and perinatal history
- Family history of jaundice, liver disease
- Previous sibling with jaundice for blood group incompatibility
- Maternal illness during pregnancy
- Previous history of malaria

Cont..

- Traumatic delivery, delayed cord clamping, oxytocin use
- Birth asphyxia, delayed feeding, delay in meconium passage
- Breast feeding- initiation, frequency and adequacy

Physical exam

- Prematurity
- Small for gestation: polycythemia, hepato-splenomegaly, cataract, rash.
- Extravascular bleed: cephallohematoma
- Pallor: hemolysis, blood loss
- Petechiae: sepsis, TORCH infections
- Hepatosplenomegaly: Rh-isoimmunization, sepsis, TORCH infections

Lab tests * must in all

- Serum bilirubin total and direct*
- Blood group and Rh for mother and baby*
- Direct Coomb's test on infant
- Hemogram*
- Peripheral smear for RBC morphology, evidence of hemolysis and, reticulocyte count

Cont..

- Sepsis screen
- Liver and thyroid function tests in cases with prolonged jaundice
- TORCH titres

Management…

- Management of indirect jaundice is directed towards reducing the level of bilirubin and preventing CNS toxicity.

- Prevention of hyperbilirubinemia

i. Early and frequent feeding

ii. Adequate hydration

- Reduction of bilirubin: This is achieved by phototherapy or/and exchange transfusion.

Phototherapy - technique

- This involves exposure of the naked baby to blue, cool white or green light of wave length **420-470 nm**.
- Baby is placed naked **45 cm** away from the tube lights in a crib or incubator.
- Eyes are covered with eye-patches to prevent damage to the retina by the bright lights.

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- Phototherapy is switched on.
- Baby is turned every two hours or after each feed.
- Temperature is monitored every two to four hours.
- Weight is taken at least once a day.

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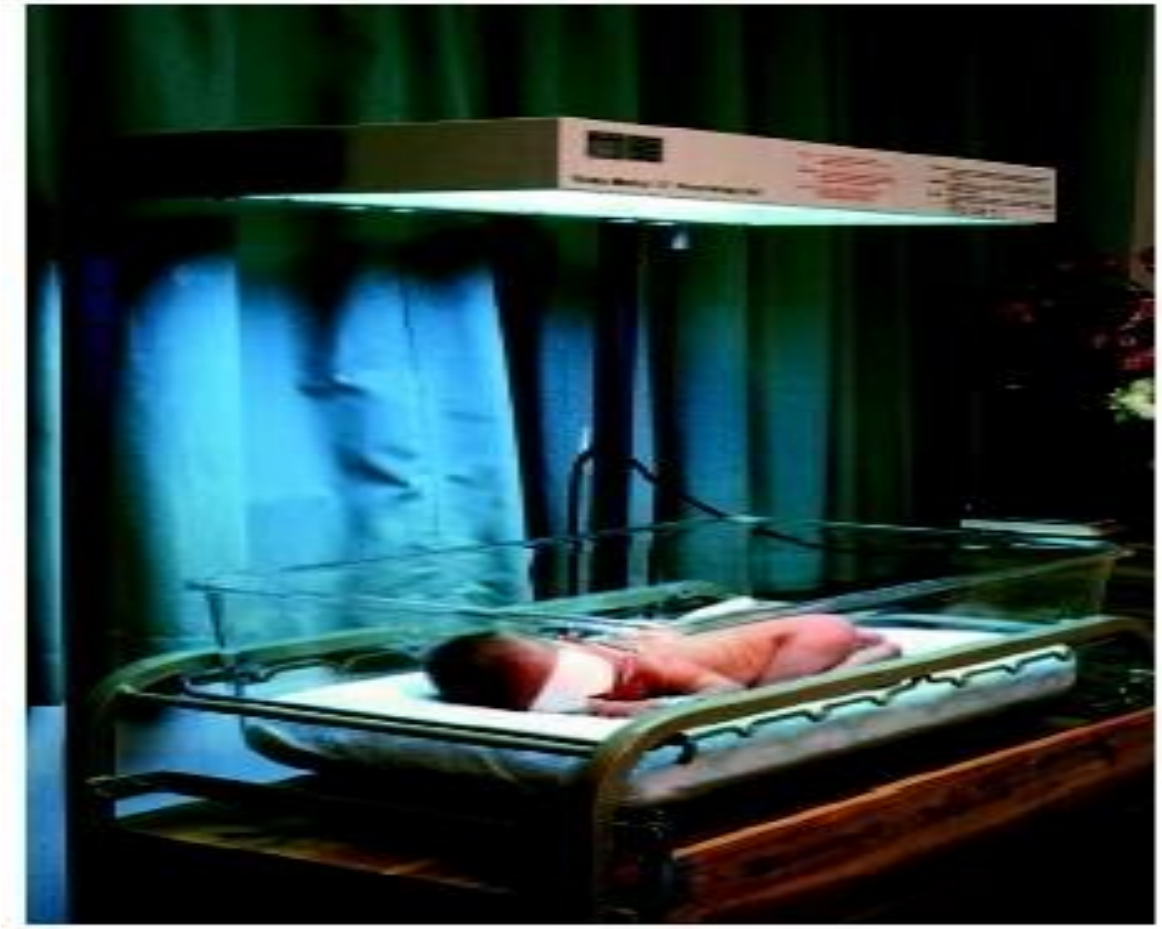
- More frequent breastfeeding or 10-20% extra fluid is provided.
- Urine frequency is monitored daily.
- Serum bilirubin is monitored at least every 12 hours.
- Phototherapy is discontinued if two serum bilirubin values are < 10 mg/dl.

Side effects of Phototherapy

- Increased insensible water loss: extra breast feeding.
- Loose green stools: weigh often and compensate with breast milk.
- Skin rashes: Harmless, no need to discontinue phototherapy
- Bronze baby syndrome: occurs if baby has conjugated hyperbilirubinemia. If so, discontinue phototherapy;
- Hypo or hyperthermia: monitor temperature frequently.

Picture



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Questions

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