Neonatal jaundice

Objectives

The student should know:

Significance of neonatal jaundice

Clinical evaluation of neonatal jaundice

Onset (causes), G.A, severity, rate, clinical condition

management

Neonatal jaundice

Over 60% of all newborn infants become visibly jaundiced. This is because:-The hemoglobin concentration falls rapidly in the first few days after birth from hemolysis 1 gm of Hb yields 35 gm of bilirubin

Bilirubin metabolism

Heme

↓ Heme oxygenase

Biliverdin

Biliverdin reductase↓

Bilirubin

↓

Bilirubin albumin complex

↓

Transported through the hepatocyte membrane by a carrier –mediated process

↓

↓ Glucoronyl transferase

Conjugated

Bilirubin metabolism

↓ Glucoronyl transferase

Conjugated

↓ → Intestine

Enterohepatic circulation

Note:-unconjugated is neurotoxic for infants

Conjugated is not

Excretion

↓

Bilirubin

↓

Urobilinogen

↓

Stercobilin

Why neonatal jaundice occur?

*The red cell life span of newborn infant > 70 days is markedly shorter than that of adult > 120 days.

*Hepatic –bilirubin metabolism is less efficient in the first few days of life

Importance of the neonatal jaundice:-

*It is a sign of another disease e.g. infection *Unconjugated bilirubin can be deposited in the brain particularly in the basal ganglia causing kernicterus

Kernicterus

This is bilirubin neurotoxicity which may occur when the level of unconjugated bilirubin exceeds the albumin-binding capacity of the blood ,as this free bilirubin is fat-soluble ,it can cross the blood brain barrier .The neurotoxic effects vary from transient disturbance to catastrophic changes and death.

Clinical manifestations

Early:-Lethargy, Poor feeding

Severe:- Irritability, ↑muscle tone (opisthotonus)

Sequalae : *Choreoathetoid cerebral palsy, *Learning difficulties , *Sensorineural deafness

Clinical evaluation of neonatal jaundice

Babies become clinically jaundiced when the bilirubin level reaches 80-120µmol (4.8-7.2 mg/dl)

Management: Varies according to:-

1-Gestational age

2-Age of onset

3-Bilirubin level

4-Rate of rise

5-Overall clinical condition

1-Age of onset

Is a useful guide to the likely cause of the jaundice

Jaundice < 24 hours of age:-

Usually results from hemolysis, unconjugated bilirubin Jaundice < 24 hours of age:- Rh incompatibility: is a condition that develops when a pregnant woman has Rh-negative blood and the baby has Rh-positive blood. Causes - During pregnancy, red blood cells from the unborn baby can cross into the mother's bloodstream through the placenta. If the mother is Rh-negative, her immune system treats Rh-positive fetal cells as if they were a foreign substance and makes antibodies against the fetal blood cells. These anti-Rh antibodies may cross back through the placenta into the developing baby and destroy the baby's circulating red blood cells.

Rhesus hemolytic disease

Identified antenatally and fetal therapy is available. Neonatal manifestations: anemia and hydrops, hepatosplenomegaly , Rh antibodies is most common antigens other Other antibodies (than D)belong to the kell and Duffy blood groups, can cause hemolysis

ABO incompatibility

More common than Rh disease most ABO antibodies are Igm and do not cross the placenta some group o women have IgG anti-A haemolysin IgG anti-B haemolysin hemolysis is less severe ,Hb is normal or slightly reduced . No hepatosplenomegaly, Coomb`s test is weakly +ve , can occur in first-born babies

does not become more severe in further pregnancies

G.6.P.D deficiency

Parents should be given a list of drugs to be avoided

Spherocytosis

Less common than G.6.P.D. Deficiency, +ve family history, Spherocytosis on the blood film

Congenital infection

Bilirubin is conjugated , Infants have another abnormal clinical signs

Jaundice at 2days -2weeks of age

Physiological jaundice

Jaundice attributable to physiological immaturity of neonates to handle increased bilirubin production usually appears between 24 to 72 hours of age. TSB level usually rises in term infants to a peak level of 12 to 15 mg/dL by 3 days of age and then falls. In preterm infants, the peak level occurs on the 3 to 7 days of age and TSB can rise over 15 mg/dL. It may take weeks before the TSB levels falls under 2 mg/dL in both term and preterm infants.

Breastfeeding jaundice

Inadequacy of breastfeeding , Breastfeeding problems such as improper positioning and attachment, cracked or sore nipple, engorgement, require support to the mothers to learn proper positioning and attachment, and adequate measures to address breastfeeding problems

Breast milk jaundice

Unconjugated may be prolonged,Unknown cause. Breast milk should be continued although the bilirubin level will fall if it I interrupted

Infection

unconjugated from:-poor fluid intake, Hemolysis, ↓hepatic function, ↑enterohepatic circulation, e.g. UTI

other causes

Bruising and polycythemia (venous haematocrit >65)

Crigler -Najjar syndrome-glucoronyl transferase is deficient or absent

Jaundice at >2 weeks of age

(Persistent neonatal jaundice) in prolonged unconjugated:- *breast milk jaundice 15% of breast-fed infants gradually fades by 3-4 weeks of age, *infection-UTI,*congenital hypothyroidism may present before other features (coarse facies, dry skin, hypotonia, constipation)

2-severity of jaundice

Observed most easily by blanching the skin with the fingers, Start on head and face, Spreads dawn the trunk and limbs. Level should be checked

3-Rateofchange

The rate of rise tends to be linear until a plateau is reached so serial measurements can be plotted on a chart. used to anticipate the need for treatment.

4-Gestation

Preterm infants are more susceptible to damage from raised bilirubin . So the intervention threshold is lower

5-clinical condition

Hypoxia, Hypothermia, Any serious illness. Those patients are more susceptible to damage from severe jaundice. Drugs-which may displace bilirubin from albumin e.g. sulphonamides and diazepam are rarely used in newborn

Management

increase Poor milk intake , Dehydration ↑jaundice. Feeding with water or dextrose will not↓ jaundice

Therapy

Phototherapy

Exchange transfusion for severe cases

Phototherapy

Light wavelength 450 nmo from the blue band of the visible spectrum converts unconjugated bilirubin by photo degradation into harmless water-soluble pigment . Eyes should be covered

Complications: Hypothermia, Hyperthermia,Dehydration, Macular rash,Diarrhea

More recently a fibreoptic blanket has been developed can be applied directly to the skin .Both an overhead light and blanket can be used simultaneously (intensive double phototherapy)

Intensive phototherapy,according to bilirubin Levels and Risk of Significant Hyperbilirubinemia

Exchange transfusion

Required if the bilirubin rises to levels which are considered dangerous particularly with anemia via umbilical venous catheter withdrawing 10-20 ml and replacing them with donor blood.

Twice the infant's blood volume (80 ml/kg) is exchanged . Donor blood should be:-Fresh,Warm

Screened for CMV, hepatitis B and C, HIV infection,.o bilirubin levels known to be safe or which will cause kernicterus.In hemolytic disease kernicterus could be prevented if TSB < 20 mg (340µmol/L)

Indications oh exchange transfusion

In the presence of hemolytic disease, severe anemia, or a rapid rise in the total serum bilirubin level (greater than 1 mg per dL per hour in less than six hours), newborn with non hemolytic jaundice if intensive phototherapy fails to lower the bilirubin level

Complications:-Acute-5-10%:Transient bradycardia. Apnea. Cyanosis. Transient vasospasm

Late:Infection-CMV, HIV, hepatitis, NEC. Anemia. Cholestasis. Mild graft versus host reaction-diarrhoea, rash, hepatitis, eosinophilia. Inspissated syndrome.Portal vein thrombosis

Manage thethe following cases of neonatal jaundice:-

1-8 hours old full term neonate with TSB of 200mm (12 mg/dl)

2-2 days old full term with TSB of 283 mm

(17 mg/dl).

3-3 days old with TSB of 200 mm (12 mg/dl).

Self assessment

4 hours old neonate is presented with TSB of 100 mm(6 mg/dl) could have the following problems …….

3 days old neonate was presented with jaundice since 1st day of life , managed with exchange transfusion . What's a possible positive finding in his family history?

What is your advice to mother with blood group O+ve mother who has delivered baby with blood group A+ve

How will you manage 3 days old neonate with TSB of 220mm (13.2mg) who is full term with normal examination