JAUNDICE IN NEWBORN

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Jaundice is yellow discolouration of sclera and mucous membranes and skin.It is one of the commonest clinical signs observed in nurseries. Newborn jaundice is a condition marked by high levels of bilirubin in the blood. The increased bilirubin cause the infant's skin and whites of the eyes (sclera) to look yellow. Bilirubin is a yellow pigment that's created in the body during the normal recycling of old red blood cells. The liver processes bilirubin in the blood so that it can be removed from the body in the stool.

Before birth, the placenta -- the organ that nourishes the developing baby -- removes the bilirubin from the infant so that it can be processed by the mother's liver. Immediately after birth, the baby's own liver begins to take over the job, but this can take time. Therefore, bilirubin levels in an infant are normally a little higher after birth

In adults it becomes visible when serum bilirubin level is > 2mg/dl in newborns jaundice becomes visible only at a level of 4-6 mg/dl.

PHYSIOLOGICAL JAUNDICE OF NEW BORN

Jaundice is present to some degree in most newborns. Such "physiological jaundice" usually appears between day 2 and 3, peaks between days 2 and 4, and clears by 2 weeks. Physiological jaundice usually causes no problems.

In full term infants physiological jaundice is characterized by a gradual rise in serum unconjugated billirubin concentration to a level usually of around 6-8mg/dl between 72-90hr of age, followed by a gradual fall of1 mg/dl/day upto 10th day of life. The infant is otherwise well and behaves normal, physical examination is normal, no treatment is generally required.

Breast milk jaundice

is another common, usually non-harmful form of newborn jaundice. Breast milk may contain a substance that increases reuse of bilirubin in the intestines. Such jaundice appears in some healthy, breastfed babies after day 7 of life, and usually peaks during weeks 2 and 3. It may last at low levels for a month or more.

Breastfeeding

jaundice is a type of exagerated physiological jaundice seen in breastfed babies in the first week, especially in those that are not nursing often enough. It is different than breast milk jaundice in that it occurs later and is caused by the milk itself.

PATHOLOGICAL JAUNDICE OF NEW BORN

. The main symptom is a yellow color of the skin. The yellow color is best seen right after gently pressing a finger onto the skin. The color sometimes begins on the face and then moves down to the chest, belly area, legs, and soles of the feet.

Sometimes, infants with significant jaundice have extreme tiredness and poor feeding.

Useful distinguishing features are:

-Timing of presentation of jaundice.

-Whether bilirubin is conjugated or un-conjugated.

The natural history of most simple and insignificant causes also contributes to our ability to be able to diagnose the more serious causes in time, as most of the simpler causes lead to disappearance of jaundice early.

Persistance of jaundice beyond two weeks of age certainly demands a detailed workup. It becomes very important because the surgical causes need to be rectified early as a delay can lead to irreversible damage to the liver and adversely affects the prognosis

Sometimes jaundice can be a sign of a serious underlying problem. Higher levels of bilirubin can be due to:

An event or condition that increases the number of red blood cells that needs to be processed

Anything that interferes with the body's ability to process and remove bilirubin

The following increase the number of red blood cells that need to be processed:

Abnormal blood cell shapes
Congenital spherocytic anemia
Elliptocytosis
Blood type incompatibilities
ABO incompatibility (Mother has type O blood, baby does not)
Rh incompatibility (Mother is Rh negative, baby is not)
Cephalohematoma or other birth injury
Glucose-6-phosphate dehydrogenase deficiency
High levels of red blood cells (polycythemia)
More common in small for gestational age babies
More common in some twins
Infection
Prematurity
Pyruvate kinase deficiency
Transfusions

The following interfere with the body's ability to process and remove bilirubin:
Alpha-1 antitrypsin deficiency
Biliary atresia
Choledochal cyst
Inspissated bile syndrome.
Certain medications
Congenital cytomegalovirus (CMV) infection
Congenital herpes
Congenital hypothyroidism
Congenital rubella
Congenital syphilis
Congenital toxoplasmosis
Crigler-Najjar syndrome
Cystic fibrosis
Gaucher's disease
Gilbert syndrome
Hypoxia
Infections (such as sepsis)
Lucey-Driscol syndrome
Neonatal hepatitis
Niemann-Pick disease
Prematurity

In otherwise healthy babies born at 35 weeks gestation or greater, those most likely to eventually develop signs of newborn jaundice are those who have:
A brother or sister who needed phototherapy for jaundice
A high bilirubin level for their age, even if they are not yet jaundiced
Been exclusively breastfeed, especially if weight is excessive
Blood group incompatibility or other known red blood cell disease
Cephalohematoma or significant bruising
East Asian ancestry
Symptoms
Signs and tests
All newborns should be examined for jaundice at least every 8 to 12 hours for the first day of life.
Any infant who appears jaundiced in the first 24 hours should have bilirubin levels measured immediately. This can be done with a skin or blood test.
Babies should be assigned a risk for later developing jaundice before they leave the hospital. Doctors use hourly bilirubin levels to predict a baby's odds of later developing jaundice. Babies are classified as low risk , low intermediate risk, high intermediate risk, or high risk. Many hospitals do this by routinely checking total bilirubin levels on all babies at about 24 hours of age.
All babies should be seen by a health care provider in the first 5 days of life to check for jaundice.
Those who spend less than 24 hours in a hospital should be seen by age 72 hours.
Infants sent home between 24 and 48 hours should be seen again by age 96 hours.
Infants sent home between 48 and 72 hours should be seen again by age 120 hours.
Jaundice is an emergency if the baby has a fever, has become listless, or is not feeding well. Jaundice may be dangerous in high-risk newborns.
Jaundice is generally NOT dangerous in term, otherwise healthy newborns. Call the infant's health care provider if jaundice is severe (the skin is bright yellow), if jaundice continues to increase after the newborn visit, lasts longer than 2 weeks, or if other symptoms develop. Also call the doctor if the feet, particularly the soles, are yellow.

In newborns, some degree of jaundice is normal and probably not preventable. The risk of significant jaundice can often be reduced by feeding babies at least 8 to 12 times a day for the first several days and by carefully identifying infants at highest risk.
All pregnant women should be tested for blood type and unusual antibodies. If the mother is Rh negative, follow-up testing on the infant's cord is recommended. This may also be done if the mother blood type is O+, but it not necessarily required if careful monitoring takes place.
Careful monitoring of all babies during the first 5 days of life can prevent most complications of jaundice. Ideally, this includes:
Considering a baby's risk for jaundice
Checking bilirubin level in the first day or so
Scheduling at least one follow-up visit the first week of life for babies sent home from the hospital in 72 hours

Further testing varies on the infant's specific situation and test results. For example, the possible cause of the jaundice should be sought for babies who require treatment or whose total bilirubin levels are rising more rapidly than expected.
Tests that will likely be done include:
Complete blood count
Coomb's test
Measurement of levels of specific types of bilirubin
Reticulocyte count
Serum albumin levels may also be checked. Because bilirubin travels in the blood attached to albumin when possible, low albumin levels may increase the risk of damage from excessive jaundice.

Treatment
Treatment is usually not necessary. Keep the baby well-hydrated with breast milk or formula. Encourage frequent bowel movements by feeding frequently. This is because bilirubin is carried out of the body by the intestines in the stools. (Bilirubin is what gives stool their brown color).

Sometimes special blue lights are used on infants whose levels are very high. This is called phototherapy. These lights work by helping to break down bilirubin in the skin. The infant is placed naked under artificial light in a protected isolette to maintain constant temperature. The eyes are protected from the light. The American Academy of Pediatrics recommends that breastfeeding be continued through phototherapy, if possible.
In the most severe cases of jaundice, an exchange transfusion is required. In this procedure, the baby's blood is replaced with fresh blood. Recently, promising studies have shown that treating severely jaundiced babies with intravenous immunoglobulin is very effective at reducing the bilirubin levels to safe ranges.

Expectations (prognosis)
Usually newborn jaundice is not harmful. For most babies, jaundice usually resolves without treatment within 1 to 2 weeks. However, if significant jaundice is untreated, very high levels of bilirubin can damage the brain. For babies who require treatment, the treatment is usually quite effective.

Complications
Rare, but serious, complications from high bilirubin levels include:
Jaundice in the new born is an important symptom. More so because in a few cases it can lead to rather serious consequences like Kernicterus. With the prevailing level of education and the existing health care methods and options available to patients, the general practitioner has a pivotal role to play in early detection of diseases and timely referral

TOXIC EFFECT OF UNCONJUGATED HYPERBILIRUBINEMIA
Increased circulating levels of bilirubin are toxic to CNS specially to basal ganglia
Clinical Symptoms
Poor sucking, hypotonia, vomiting, seizures and brain damage.
Treatment. Phototheray Exchange Transfusion.

Conjugated Hyperbilirubineamia
Definition: Conjugated hyperbilirubinemia is an elevation of direct reacting bilirubin to more than 2mg/dl or >15% of total serum bilirubin level.
Causes of Conjugated Hyperbilirubinemia
1.Biliary atresia: the lumen of enterohepatic bile duct is defective
2. perforation of common bile duct usually spontaneous
3.Choledochal cyst-cystic dilatation of segment of bile ducts
4.Biliary hypoplasia
5.Total parenteral nutrition
6.Inspissated bile syndrome: A plug of inspissated bile obstructive the bile ducts
7.Neonatal hepatitis

Biliary Atresia:
Biliary atresia is developmental anomaly in which the extrahepatic bile ducts are not patent.
Patient has jaundice since birth with H/o clay coloured stools
Clinically :
these children present with
Progressively increasing jaundice, usually noticeable in 2nd week of life.
Clay coloured stools
Hepatosplcenomegaly
Later on features of hepatic failure
Diagnosis:
It is mostly confirmed on Tc99 labelled HIDA scan showing excretion of contrast into small gut
Other investigation include
LFTs,
Serum Gama GT level,
lipoprotein-X level,
USG abdomen,
PT,APTT,
Liver Biopsy
Occasionally in cases of suspected biliary hypoplasia per operative cholangiogram may be needed.
TREATMENT
Treatment of Biliary atresia is surgical intervention before two months of age, prognosis is poor in patients >2months and patient with cirrhotic liver changes.
It is very important to diagnose and refer these patients timely for surgical intervention.
Liver transplant is required in case where surgery fails.
BILIARY HYPOPLASIA
Interlobular biliary hyperplasia is characterized by paucity of intrahepatic bile ducts and exceptionally small but grossly visible and radiographically patent extrahepatic biliary ductal system
Clinical features are Jaundice, pruritis, hepatomegaly , and may be associated with Alagille syndrome
Treatment
Medical: Vit A,D,E,K Phenobarbitone and cholestyramine
Surgical:Liver transplant.

Choledochal Cyst:
Mostly presents is early infancy around 3 months of age can be treated by excision of choledochal cyst and roux & Y hepaticojejnostomy.
Inspissated bile syndrome:
A plug of inspissated bile obstructs the bile duct and results in jaundice in this condition.the bile duct and liver are usually normal.it may be difficult to differentiate at times before per operative cholangiogram. At the time of operative cholangiogram, initially pressure and suddenly give up feeling with free flow is noted.

NEONATAL HEPATITIS
Etiology
Viruses: HepB virus ,Herpes Simplex, rubella,cytomegalovirus,protozoa,toxoplasmosis
Bacteria: Gram negative bacilli,staphylocous,syphilis
Metabolic Defects: alpha1antitrypsin deficiency,

Clinical Features:
Jaundice appears in first week and increases slowly, weight gain is slow, lethargy, vomiting, and sometimes fever is present. The liver or spleen may enlarge, urine is dark and stools are pale. Herpetic infection may accompany skin lesions, infants with congenital rubella may have cataract, microcephaly, mental retardation etc.
Diagnosis: LFTs,PT,APTT ,tests for specific infections.

Liver function test
-Bilirubin -Enzymes -Proteins
Coagulation profile
-PT, APTT
Further investigations include primarily some sort of imaging tools.
Radiology
Ultrasonography
HIDA Scan
In addition the histology of the Liver gives a lot of further information about the diagnosis.
Histology
Liver Biopsy

Differentiation between Biliary atresia and Neonatal hepatitis

Parameters	Billiary Atresia	Neonatal hepatitis
Colour of stool	Clay	Pale yellow
Hyperbilirubinaemia	Mostly direct	Mostly indirect
Alk. Phosphatase/Gamma GT	Markedly raised	Mildly increased
ALT/AST	Mild increase	Markedly increased
Bile ducts on USG abdomen	Absent	Present
Hida scan/Isotope excretion into duodenum	Absent	Present
Liver biopsy	Portal fibrosis Proliferation of bile ductules Bile pigment plugs	Degenerative changes Giant cell transformation
Extra-hepatic billiary ducts on per-operative cholangiogram	Absent	Present
Response to phenobarbitone therapy	No response	Jaundice decreases