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Neonatal Jaundice

Standard Operating Procedure (SOP)



Union of Myanmar Special region - 1
Pediatric (SOP)

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Union of Myanmar Special region - 1
Pediatric (SOP)

Neonatal Jaundice

Physiological Jaundice

- *Appears after 24 hours*
- *Maximum intensity by 4th and 5th day in term and 7th day in preterm*
- *Total serum bilirubin level (TSB) usually less than 15 mg/dl (255 µmol/l)*
- *Clinically not detectable after 14 days*
- *Disappears without any treatment*

Note: Baby should, however, be watched for worsening jaundice

Pathological Jaundice

Characteristics

- *Appears within 24 hours of age*
- *TSB level more than 15 mg/dl*
- *Rate of rise of TSB more than 5 mg/dl/day (or) more than 0.5 mg/dl/hour*
- *Jaundice persisting after 14 days*
- *Direct bilirubin >2 mg/dl*
- *Stool-Clay coloured and urine-staining clothes yellow*

Pathological jaundice may be related to:

- *Serious bacterial infection*
- *Haemolytic disease of newborn*
 - *ABO, Rh or minor blood group incompatibility*
 - *G6PD deficiency*
- *Intrauterine infections*
- *Liver disease such as hepatitis or biliary atresia*
- *Hypothyroidism*

(I) Evaluation for Aetiology

- *Ascertain birth weight, gestation and postnatal age first*
- *Assess clinical condition (well or ill)*
- *Decide whether jaundice is physiological or pathological*
- *Find out factors, signs and symptoms that suggest the possibility of haemolytic disease*
 - *Family history of significant haemolytic disease*

- *Pallor, hepatosplenomegaly*
- *Onset of jaundice before 24 hours of age*
- *Rise in serum bilirubin levels of more than 0.5 mg/dL/hr or 8.5 μ mol/L/hr or more than 5 mg/dl/day*
- *Failure of phototherapy to lower the TSB*
- *Rapid rise in the TSB level after 24-48 hour (e.g. G6PD deficiency)*
- *Looking for factors, signs and symptoms suggesting the possibility of other disease such as sepsis or congenital infections e.g. lethargy, poor feeding, apnoea, petechiae, hepatosplenomegaly, etc.*
- *Observe whether there is risk of developing significant neonatal hyperbilirubinaemia such as:*
 - *Jaundice observed in the first 24 hours of life*
 - *Blood group incompatibility with positive direct Coomb's test, other known haemolytic disease (e.g. G6PD deficiency)*
 - *Gestational age 35-37 weeks (late preterm)*
 - *Previous sibling received phototherapy*
 - *Cephalohematoma or significant bruising*
 - *Exclusive breastfeeding, particularly nursing is not going well and weight loss greater than 7% within first 24 hours of age or weight loss greater than 10% after 48 hours of age*
 - *Infants of diabetic mother (DM)*
- *Assess risk factors which can cause severe hyperbilirubinaemia*
 - *Birth asphyxia (5 min Apgar of 3 or less) Temperature instability*
 - *CNS signs (e.g. lethargy)*
 - *Sepsis LBW: premature and SGA*

(II) Assessment of Severity of jaundice

- *Assess the level of jaundice clinically*
 - *Neonatal jaundice first becomes visible in the face and forehead. Blanching reveals the underlying color.*
 - *Jaundice then gradually becomes visible on the trunk and extremities*
 - *For visual staining of the skin and sclera, a level of at least 5 mg/dl is required*
 - *A simple and useful method of assessing the degree of jaundice is Kramer's rule*

Table 1.8 Kramer's rule

Area of body	Rate of bilirubin (mg/dl)	Average (mg/dl)
I. Face	4-8	6
II. Upper trunk	5-12	9
III. Lower trunk and thighs	8-16	12
IV. Arms and lower legs	11-18	15
V. Palms and soles	>15	>15

Note: Do not rely too much on level of jaundice on visual assessment alone. This is just a screening and before treating, always check for TSB

- Assess rate of rise of serum bilirubin >0.5 mg/dl/hr (or) 8.5 µmol/L/hr (or) >5 mg/dl/day
- Assess features of acute bilirubin encephalopathy

(III) Investigations

- Total Serum Bilirubin level (TSB)
 - Moderately jaundiced well baby on the 2nd or 3rd day of life and is otherwise well
 - Any unwell jaundice baby
 - Jaundice presenting in the 1st 24 hours
 - Prolonged jaundice

For evidence or exclusion of haemolysis

- Blood grouping and Rh status (both baby and mother)
- Complete blood picture
- Retic count
- G6PD assay
- Haemoglobin level and PCV
- Infection screen - infection must be excluded in any baby who is unwell or jaundice presents in the 24 hours or after day 3, or having risk factors for sepsis

(IV) Treatment

1. Treatment of the underlying cause
2. Treatment of jaundice
 - Phototherapy
 - Indication for phototherapy should be based not only on the level of serum bilirubin but also on the gestation of the baby, rate of rise of serum bilirubin, likely underlying cause and well-being of the baby
 - Start phototherapy immediately if a rapidly rising bilirubin is expected, e.g. haemolytic disease and with jaundice at less than 24 hours
 - Give phototherapy according to hour specific treatment threshold graph

- A good guiding figure is-phototherapy is indicated when the bilirubin rises above a level given by the formula: Birth weight in kg x 100
- In term babies, phototherapy should be given only when the bilirubin rises above 300 $\mu\text{mol/l}$
- Visual observation as a mean of monitoring is unreliable once the baby is on phototherapy, Must do TSB level
- No standard TSB for discontinuing phototherapy, should stop once TSB level is below the phototherapy line on treatment threshold graph
- Failure of phototherapy-inability to observe a decline in bilirubin of 1-2mg/dl after 4-6 hours and/or to keep the bilirubin below the exchange trans fusion level
- Exchange blood transfusion
 - To consider exchange transfusion at a value of 5 mg/dl or 85 $\mu\text{mol/LG}$) higher than that for phototherapy (rough guide)

3. Promote and support successful breastfeeding

- Need to nurse the baby at least 8-12 times per day
- Discourage against routine supplementation of non-dehydrated breastfed infants with water or dextrose water

4. Prevention of dehydration

- Give extra fluid 10-20 ml/kg by means of more frequent breastfeeding to those babies under phototherapy

(V) Follow-Up

Babies with serum bilirubin 220 mg/dl and those who require exchange transfusion should be kept under follow-up in the high-risk clinic for neuro. developmental outcome up till the age of 2 years.

With prompt treatment, even very elevated serum bilirubin levels within the range of 25 to 29 mg/dl are not likely to result in long-term adverse effects on neurodevelopment.

Exchange Transfusion

- Preparation of infant
 - Informed consent from parents
 - Keep resuscitation equipment on standby
 - Maintain stable temperature, pulse and respiration
 - Place a peripheral line for maintenance intravenous fluid
 - Proper gentle restraint
 - Continue feeding the child and omit only the last feed before the procedure
- If <4 hours from last feed, empty gastric contents using a nasogastric tube aspiration prior to ET

Grouping of blood to be used

- For Rh isoimmunization: ABO compatible, Rh negative blood
- Other conditions: cross-match with baby and mother's blood
- Emergency (rarely): 'O' Rh negative blood may be used

Procedure

- Volume to be exchanged is twice blood volume (2 x 80 ml/kg)
- Use fresh whole blood preferably less than 5 days old
- Record baseline observations on the neonatal exchange blood transfusion sheet
- Heart rate, respiration and oxygen saturation are monitored and recorded every 15 minutes
- Strict aseptic technique with gown and mask
- Cannulate umbilical vein to depth not >5-7 cm (for push-pull technique through an umbilical venous catheter)
- Use 5-8 ml/kg aliquots of blood for removal and replacement (<10% of blood volume)
- Maximum volume per cycle - 20 ml for term infants
- The assisting nurse keeps a record of the amount of blood given or with drawn, and medication given

Isovolumetric or continuous technique

- When umbilical vein cannulation is not possible e.g. umbilical sepsis, or when failed cannulation - blood is replaced as a continuous infusion into a large peripheral vein while removing small amount of blood from an arterial catheter at regular intervals
- In smaller infants, e.g. 1.5 kg baby, total volume for exchange is 240 ml. Delivering 120 ml/hour, allowing 10 ml of blood to be removed every 5 minutes for 2 hours

Important points to note

- Blood volume to exchange 160 ml/kg body weight {2 x blood volume (80ml/kg)}
- Pre-warm blood (do not overheat blood)
- Rate of exchange is 4-5 minutes per cycle
1 min 'out, 1 min in, 1-2 min pause'; excludes time to discard blood and draw from blood bag
- Total exchange time should be about 90-120 minutes
- Start exchange with removal of blood, so that there is always a deficit to avoid cardiac overload
- Dilute and give 1 ml of 10% calcium gluconate for every 100 ml of blood exchanged {Use a peripheral vein and not the umbilical vein (UVC)}
- Shake blood bag gently and frequently to prevent settling of red blood cells

- *Remove UVC after procedure unless a second ET is anticipated and the UVC insertion was difficult*
- *Continue intensive phototherapy after the ET*
- *Repeat ET may be required in 12-24 hours for infants with high rebound of serum bilirubin*
- *Feed after 4-6 hours, baby is well and a repeat ET is not required*
- *if child is anemic (pre-exchange Hb <12 g/dL) give an extra aliquot volume of blood (10 ml/kg) at the end of exchange transfusion at a rate of 5 ml/kg/hr*

Investigations

- *Pre-exchange (1st volume of blood removed)*
 - *Serum bilirubin*
 - *Full blood count*
 - *Blood cultures as indicated (through peripheral venous blood)*
 - *Others as indicated if patient is unwell*
- *6-12 hours post-exchange*
 - *Serum bilirubin*

Follow-up after exchange transfusion

- *Long term follow-up to monitor hearing and neuro-developmental assessment at least up to the age of 2 years*





