10 CARE OF NEONATE

10.5 COMPLICATIONS OF THE NEONATE

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10.5.2 NEONATAL JAUNDICE

10.5.2.1 PHOTOTHERAPY

AIM

- To lower the serum bilirubin (SBR) level avoiding the need for exchange transfusion or the development of kernicterus.
- To provide information to the mother about the treatment and management of the neonate receiving phototherapy.
- To encourage parental involvement with the management and care of the neonate receiving phototherapy.

BACKGROUND

Phototherapy converts fat soluble unconjugated bilirubin present in the superficial capillaries and interstitial spaces to a water soluble form that is excretable without further metabolism in the liver. The use of phototherapy curtails rising serum bilirubin levels and prevents its toxic accumulation in the brain which causes permanent neurological complications known as kernicterus.[1]

Approximately one third of all breastfed neonates will develop visible jaundice, and about two thirds will develop significant unconjugated hyperbilirubinenemia in the third week of life. Neonates with this jaundice will become jaundiced after their fifth day post birth and it can last for weeks or months.

The dose of phototherapy is determined by the spectral quality of the light source, the intensity of the light, the distance between the light and the neonatal skin, and also by the body surface area that is exposed.[1] The most effective light source for phototherapy is provided by blue fluorescent tubes.[2]

KEY POINTS

1. Encourage breastfeeding 8 – 12 times a day to maintain hydration during phototherapy, and to assist elimination.
2. The phototherapy unit should be switched off during collection of SBR levels.
3. Frequency of SBR measurements will depend on neonatal age and cause of hyperbilirubinemia.[3]
4. A SBR measurement 24 hours after completion of phototherapy will detect rebound hyperbilirubinemia.[1]
5. The neonate should be monitored with feeds for temperature, skin integrity, dehydration and urine and bowel elimination.
6. Measurement of glucose-6-phospate dehydrogenase (G6PD) level is recommended for a jaundiced neonate receiving phototherapy and whose family history, ethnic or geographic origin suggest risk, or whom the response to phototherapy is poor.[3]

PHOTOTHERAPY UNITS AND BILIRUBIN LEVELS

See Neonatology Clinical Guidelines Section 10 Phototherapy.

The birth weight based / gestation age graphs and guidelines of the American Association of Pediatrics shall be used as a guide.
In cases of infants with haemolysis,sepsis,dehydration or haemodymanic instability they must be discussed with the neonatal consultant or senior registrar.

AGE	Wt < 1500g	Wt 1500-2000g	Wt > 2000g
< 24 hours	> 70 bili level	> 70 Bili level	> 85 bili level
24-48 hours	> 85	>120	>140
49-72 hours	> 120	> 155	> 200
> 72 hours	> 140	> 170	> 240

PREPARATION FOR PHOTOTHERAPY

1. Obtain verbal consent from the mother prior to commencing phototherapy.
2. Prepare the incubator, set the temperature at 30 – 34^{0}C according to the infant's size. Ensure the phototherapy lights are functional and that all equipment is dust free.
3. Instruct the mother about the use and functioning of the incubator and equipment.
4. Perform a baseline neonatal temperature.
5. Remove all the neonate's clothing. Unfasten the nappy.
6. Cover the neonate's eyes with an appropriate size eye pad, securing in place with 'Fastnet'. Ensure there is not excessive pressure on the eyes,[1] and the nares are uncovered.
7. Place the neonate in the incubator.
8. Document the start time of and type of phototherapy unit used.
9. Position the phototherapy unit 40 cm away from the neonate.

MANAGEMENT OF THE NEONATE DURING PHOTOTHERAPY

VITAL SIGNS

Phototherapy units can give off some heat, as does the photochemical reactions occurring in the skin.[4]

- Assess the neonate's temperature with each feed to assess for hyperthermia or hypothermia.
- Provide instructions to the mother on assessment of the neonatal temperature, including advice to inform staff if abnormal.

HYDRATION

- Increased fluid intake has been shown to shorten the duration of phototherapy in full term neonates.[1]
- Encourage breastfeeding mothers to demand feed while the neonate is having phototherapy. Feeding 8 -12 times a day increases removal of bilirubin through the gut.[3] It is beneficial for the neonate to receive optimum exposure to phototherapy, therefore aim for each breastfeed to be completed within approximately 30 minutes.

- Supplementation with expressed breastmilk or formula may be appropriate if the neonate's intake appears inadequate, weight loss is excessive, or the neonate appears dehydrated.
- Monitor weight daily to ensure that loss is not excessive, and provide a guide to assess the need for additional fluid supplementation.
- If the neonate's SBR measurement is approaching the transfusion zone, phototherapy should be administered continuously.[3] Discuss with the paediatrician if the breastfeeding regime should be reviewed and the option of giving expressed breastmilk without the lights being turned off.

ELIMINATION

- Note and document all urine output. The neonate's urine may appear dark as bilirubin elimination increases.[1]
- Note and document all bowel activity. Watery stools and diarrhoea have been observed in neonates undergoing phototherapy. Dark green stools are due to increased excretion of unconjugated bilirubin from the gut.[1]
- Fluid replacement may be required if loose stools or signs of dehydration are present. Notify the paediatrician to assess.

EYE AND SKIN CARE

- Remove the eye pads when the phototherapy unit is switched off and when the neonate is removed from the incubator for breastfeeding.
- Assess the eyes at each feed for eye drainage, oedema or signs of infection. Removal of eye pads periodically for procedures and breastfeeding provides eye stimulation and parental interaction.[1]
- Change the eye pads as required or once per shift.

EQUIPMENT

- Clean incubator daily.
- Check temperature gauge setting each shift.

POSITION OF THE NEONATE

- Frequent turning has not been shown to improve the effectiveness of single phototherapy.[1]

PROMOTION OF PARENTAL INTERACTION

- Instruct the mother about the incubator and care of the neonate during phototherapy.
- Encourage mothercrafting including maintenance of skin integrity.
- Promote 'rooming in' with the neonate in the phototherapy unit and the mother.[5] The situation may need to be reassessed at night if the mother has difficulty sleeping from light exposure in her room.

MONITORING OF SERUM BILIRUBIN LEVELS

Ensure phototherapy lights are switched off prior to obtaining serum bilirubin levels. The lights will act upon the bilirubin pigments in the sample giving an inaccurate level.[1]

ASSESS FOR SIDE-EFFECTS

Observe for complications:

- Bronze infant syndrome – may occur with neonates who have cholestasis.[2, 3, 6]
- Dehydration[2, 6]
- Hyperthermia[7] or temperature instability[6]
- Skin changes[7]
- Diarrhoea[6, 7]

- Retinal effects – risk for effect if eyes are exposed[2, 6]

CEASING OF PHOTOTHERAPY

- Phototherapy may be ceased when[2]:
    - SBR levels are low enough to decrease risk for kernicterus
    - The infant is old enough to successfully eliminate the bilirubin load
- Document cessation of phototherapy.

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