Ashford and St. Peter’s NHS Trust

Therapeutic Hypothermia (Cooling) for Neonatal Encephalopathy
In Infants > 36 weeks gestation

Background:
Neonatal encephalopathy due to HIE contributes significantly to neonatal mortality and morbidity including long-term neurodevelopmental sequelae in up to 25%-60% of survivors. Cooling has multiple effects on brain metabolism including reduction of excitotoxic neurotransmitter release, stabilisation of calcium metabolism, preservation of intracellular energy resources and inhibition of cellular apoptosis. Evidence from trials (see references) indicates that cooling of neonates with moderate to severe HIE is safe and reduces the risk of death or disability.

Eligibility
A. Infants >36 weeks gestation admitted to the NICU with at least one of
   • Apgar score of ≤5 at 10 minutes after birth.
   • Continued need for resuscitation at 10 minutes after birth.
   • Acidosis within 60 minutes of birth (cord, art or venous blood pH <7.00)
   • Base Deficit > 16 mmol/L within 60 minutes of birth (cord, art or venous blood pH <7.00)

B. Moderate to severe encephalopathy
   • Altered consciousness (reduced or absent response to stimulation) AND
   • Abnormal tone (focal or general hypotonia, flaccidity or hypertonia) AND
   • Abnormal reflexes (weak or absent suck or Moro or gag)

Consider infants eligible for cooling who meet A and B

Management
1. In order to be effective, cooling should commence as soon as possible and definitely within 6 hrs of birth. The decision to cool a neonate with HIE is made by the attending or on-call neonatal consultant.
2. Aim is to achieve target temperature range within 1 hour of initiation.
3. The total period of cooling and re-warming is for at least 84 hrs consisting of 2 phases:
   Active cooling – for 72 hours from the initiation of cooling.
   Rewarming - 12 hours of gradual re-warming time after completion of 72 hours of cooling.
   However in view of the potential hazards of re-warming, this should be delayed until the morning ward round has taken place
4. Setting up the Tecotherm Unit – see guideline on machine
5. Cooling the baby – see TOBY clinicians guideline Section 9 and see below
6. An individual PIN is required for each baby cooled; phone 01865 289735 (office hrs)
7. Ongoing management - Watch out for side effects and toxic drug levels even with normal doses. In particular, the use of phenytoin requires consultant discussion, and first line treatment is phenobarbitone. Refer to the Encephalopathy and Seizure Guidelines.
8. Use the TOBY register clinicians handbook
9. Babies can be fed 10-20 ml/kg/day during cooling
10. Parenteral nutrition is not currently recommended for cooled babies due to their reduced metabolic demands
11. Active sedation (morphine and/or chloral hydrate) is important for ventilated babies. About 20% of babies being cooled may end up being extubated during cooling and should be kept calm with judicious use of chloral hydrate
12. aEEG (Cerebral Function Monitoring) is to be recorded in all infants treated with cooling but cooling should not be delayed until the CFM is started.
13. Cooling may be discontinued early if the aEEG is normal within 6 hours (see Section 2, Clinicians Handbook).
14. Ongoing cooling is not appropriate if the baby is likely to require surgery during the first 3 days after birth or if he/she is moribund or has persisting extremely severe encephalopathy e.g. with isoelectric aEEG beyond 12-24 hours after birth.
Babies born at other hospitals

In addition to cooling, the rest of the management is routine and in accordance with the transport protocol. Once a call has been received from the peripheral hospital, the attending/on-call consultant will discuss with the referring Paediatrician regarding the eligibility and feasibility of cooling the neonate. Once a decision is made to cool and transfer the infant, the referring Paediatrician will commence passive cooling. Even if there is no bed at St. Peter’s, we will assist the local hospital by finding a cot for cooling elsewhere (via EBS) and the transport team can then facilitate this transfer.

Management

In order to be effective, cooling should commence as soon as possible and definitely within 6 hrs of birth. Passive cooling can be achieved by:

- Turn off all external heat sources except for humidification of inhaled gases
- Remove the baby’s clothes except the nappy
- Keep the incubator door open
- Turn down air conditioning in the ambulance
- In hot weather turn on fans
- In hot weather, if cold gel packs are available from a fridge, the baby’s head can be rested on one
- Aim to reach the hospital as quickly as possible to commence active cooling

Full monitoring is required. A surface temperature probe applied to the baby’s back will give a good approximation of core temperature (unpublished data), so overcooling can be avoided. The aim is a temperature between 33 and 34 degrees.

Support for referring hospitals

In addition to cooling, the rest of medical management is the same as any Neonate with Encephalopathy. We encourage discussion with the attending/on-call neonatal consultant at St. Peter’s Hospital for overall management of these cases as ongoing intensive care may be required and multisystem involvement may be present.

Selected References

4. www.npeu.ox.ac.uk/tobyregister

Guideline written by
Dr. Peter Reynolds, Consultant Neonatal Paediatrician
Neonatal Clinical Management group
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