Birth Depression Management

Regional Perinatal Outreach Program

2016

CROUSE HOSPITAL
Your care. In our hands.

Objectives

- Understand the terms and the clinical characteristics of birth depression.
- Be familiar with the evidence behind therapeutic hypothermia, aka “cooling”.
- Stabilize and manage the birth depressed infant until transport can occur.
- Introduce our new transport cooling blanket, Tecotherm Neo, and review our outcomes.

Birth Depression Terms

- “birth depression”, “respiratory depression at birth”, “perinatal asphyxia”, “hypoxic ischemic encephalopathy”, “neonatal encephalopathy”
- Do all these terms mean the same thing?

Prolonged Hypoxia

↓

Asphyxia

↓

Ischemia

↓

Lactic Acid Production

↓

Hypoxic Ischemic Encephalopathy

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

STATEMENT OF ENDORSEMENT

Neonatal Encephalopathy and Neurologic Outcome, Second Edition

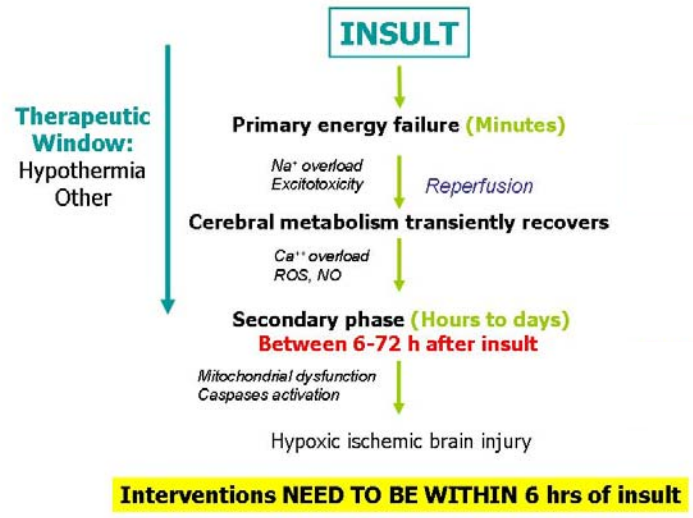
FREE

The American Academy of Pediatrics has endorsed the following publication: American College of Obstetricians and Gynecologists. Executive summary: neonatal encephalopathy and neurologic outcome. *Obstet Gynecol.* 2014;123:896–901 (executive summary follows on next page).

Hypoxic Ischemic Encephalopathy

- History of an intrapartum event
- Apgar score of <5 at 5 minutes, or
- Continued need for resuscitation, including ventilation, at ten minutes after birth, or
- Acidosis defined as either umbilical cord pH or any arterial or venous pH within 60 minutes of birth <7, or
- Base deficit ≥ 16 mmol/L in umbilical cord blood sample or any blood sample within 60 minutes of birth
- Evidence of moderate to severe encephalopathy
- Multiorgan dysfunction within 72 hours
- Exclusion of other identifiable etiologies

Why do we cool?



Interventions NEED TO BE WITHIN 6 hrs of insult

Therapeutic Hypothermia is the Standard of Care for HIE

Study	Number of babies	Cooling type	Mortality		Poor Outcomes	
			Hypothermic	Normothermic	Hypothermic	Normothermic
Cool Cap	235	Selective Head	33%	38%	55%	66%
TOBY Trial	325	Whole body	26%	27%	45%	53%
NICHD Trial	208	Whole body	24%	37%	49%	63%

All infants studied were >36 wks gestation, cooling initiated at 5.5-6hrs of life, and inclusion criteria of 1 out of 4: Apgars at 10 min<5, ph<7, base def>16, vented or resusc at 10 min of life; depressed consciousness and 1 of 3: hypotonia, abnormal reflexes, abnormal suck; clinical seizures or abnormal EEG (except for NICHD trial). Poor outcomes (severe disability) were based on 18-22 month Bayley II <70 and GMFCS 3-5 and/or severe visual or hearing loss. NICHD trial looked at moderate disability as well.

To cool or not to cool?

- ≥ 36 weeks gestation
- ≤ 6 hours of age at initiation of therapy
- Assess for evidence of hypoxia-ischemia by using discussed biochemical criteria AND
- Assess for moderate to severe encephalopathy
  - Must have one or more: hypotonia, abnormal reflexes, absent or weak suck, clinical seizures
- Amplitude EEG will be performed at the Regional Perinatal Center to evaluate brain activity background

What can you do to be prepared?

- Have equipment ready for the delivery room.
  - Intubation equipment
  - Umbilical venous line kit
  - Epinephrine and Volume expansion
- ABC's and Temperature!
- Request a cord pH!
- Call the RPC ASAP for transport and consider passive cooling.

What you can do before transport

- ABC's
- Establish IV access and check glucose frequently.
- Initiate passive cooling
- Treat for sepsis if appropriate
- Treat for seizures if present
- Discuss the diagnosis with the infant's family

Airway, Breathing, Circulation

- Intubate and ventilate as needed
- Document ETT position and lung volumes by CXR
- Obtain ABG or VBG to document any acidosis
- Goal of ventilation is a normal pCO2
- Use blended oxygen if available
- Monitor blood pressure and perfusion closely
  - Anticipate a lower heart rate
  - Treat hypotension with volume expansion
  - Normal Saline 10ml/kg bolus IV over 10 minutes, or consider O neg packed red blood cells in the case of acute hemorrhage

IV Access and Glucose

- Establish IV access quickly
- Low Umbilical Venous Catheters
  - 3.5 or 5 French catheter, inserted to 5 cm
  - Great because you can quickly place for access and draw labwork (VBG, CBC, Blood Culture)
- IV fluid: D10W at 60 ml/kg/day
- Monitor glucose frequently and maintain glucose per STABLE (50-110 mg/dL)
- Treat hypoglycemia: D10W 2ml/kg IV push

Monitor and Treat Seizures

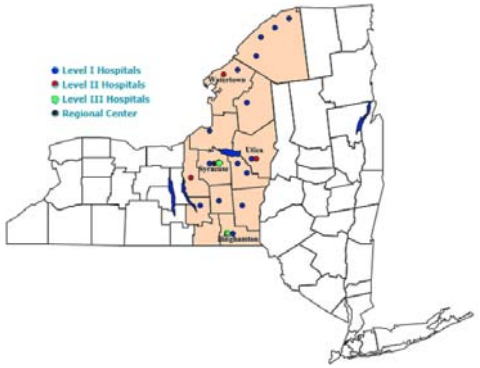
- Seizures may be subtle:
  - Rhythmic jerks: unifocal or multifocal
  - Bicycling/ swimming
  - Posturing
  - Nystagmus/blinking/fluttering
  - Sucking/ tongue protrusion
  - Apnea
- Treat with Phenobarbital 20 mg/kg IV

Initiation of passive cooling

- Do not apply hat
- Avoid hyperthermia but don't overcool either!
- Monitor and document temperatures q15 minutes.
- The radiant warmer may be used in manual mode and the skin probe can be inserted rectally 6 cm, or rectal temps may be checked.
  - If using the warmer you must shield the head with cloth diapers or foil
- Maintain passive cooling to target core temperatures of 34-35° C

Cooling on Transport

- To initiate and maintain therapy, we now have the latest equipment, the Tecotherm Neo, for therapeutic hypothermia on transport.



Cooling on Transport

Cooling Protocol at Crouse

- Whole body cooling blanket servo-controlled to an esophageal temperature of 33.5° for 72hrs with aEEG monitoring
- Intubated and sedated on morphine drip
- Monitored closely for complications:
  - Polycythemia
  - Coagulopathy
  - Fat necrosis
  - Hypotension
  - Bradycardia

After the cooling period

- MRI of the brain (usually around 7-10 days of life) and conventional EEG when off cooling blanket.
- Withdrawal of support remains an option for those who continue to manifest signs of a devastating insult.
- Neurodevelopmental follow-up at 6 and 24 months because of the vast developmental milestones that occur between 6-24 months.

Total Body Cooling Data 5/28/09 – 4/22/15

- Total Cooled 46
- Died 9 (19.6%)
- Survival 37 (80.4%)
- NICU followup clinic
  - 37 scheduled
  - 33 seen
  - 4 lost to follow-up

Total Body Cooling Characteristics
May 28, 2009 – April 22, 2015
N=37

Gender- Male	21 (57%)
Birth Weight	3.38kg ± 0.64 (1.87-5kg)
Apgar 1 min (n=36)	1.6 ± 1.5 (0-5)
Apgar 5 min (n=36)	3.1 ± 1.8 (0-7)
Apgar 10 min (n=34)	4.6 ± 1.9 (0-8)
Cord pH	6.9 ± 0.2 (6.5-7.3)
Inborn	15 (41%)
Seizures (yes)	25 (68%)

6 Month Follow-up
N=33 (4 lost to follow-up)
89% follow-up rate

	Scores with Mean, std dev, range	Normal	Mild-Moderate Delay	Severe Delay
Cognitive	93 ± 25 (55-120)	25 (76%)	3 (9%)	5 (15%)
Language	90 ± 16 (47-112)	26 (79%)	4 (12%)	3 (9%)
Motor	89 ± 22 (46-124)	22 (67%)	5 (15%)	6 (18%)
Cerebral Palsy in 3 (9%) and 2 possible (6%)				

24 Month Follow-up
Total to date N=27 (5 no show/1 moved out of state)
N=21 (data available) 78% follow-up rate

	Scores with Mean, std dev, range	Normal	Mild-Moderate Delay	Severe Delay
Cognitive	92 ± 23 (50-135)	15 (71%)	3 (14%)	3 (14%)
Language	89 ± 22 (50-144)	14 (67%)	4 (19%)	3 (14%)
Motor	90 ± 27 (50-115)	15 (71%)	4 (19%)	2 (10%)
Autism Spectrum: 1 child				
Cerebral Palsy: 2 (10%) with severe CP				

Questions?

References

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