In neonates with HIE, is MRI, EEG, or cranial ultrasonography the most useful technique in predicting outcome?

Cranial ultrasonography may be unreliable for predicting outcome in infants with HIE, despite good reports from studies in 9 infants (Pressler, 2001) and 58 infants (Siegel, 1984). In a study of 34 infants (Eken, 1995), no abnormalities were noted in 20 cases, but only 9 of these had a good outcome; the other 11 had severe encephalopathy and died.

Another study in 46 infants (Rutherford, 1994) found that, although ultrasonography adequately identified those with a poor prognosis, MRI was better at detecting the precise site and extent of the lesion. A resistive index $\leq 0.55$ had a PPV of 71% in predicting adverse outcome in a case-control study in 212 patients (Jongeling, 2002).

In a study comparing 47 neonates undergoing CT (n=26), MRI (n=24) or both (n=3) with ultrasonography (Blankenberg, 2000), CT and MRI revealed 25 instances of hypoxic-ischaemic injury compared to 13 identified by ultrasonography. Intraparenchymal haemorrhage was also identified twice as often (10 instances vs 5) by CT and MRI compared to ultrasonography.

A small study in 16 infants (Malik, 2002) found that MR spectroscopy was more sensitive than MRI in detecting the insult due to HIE.

A study of combined standard EEG with MRI in 25 infants (Biagioni, 2001) found that the presence of any EEG background abnormality early in the course of the illness predicted 94% of cases that resulted in an abnormal outcome (mild to severely abnormal). This compared with 85% for MRI. The authors advocate early EEG to distinguish those infants likely to have an abnormal outcome, followed by MRI to provide further information on the nature of the outcome. However, an accompanying editorial (Baumgart, 2001) suggests that focusing on the moderate-to-severely abnormal outcomes results in 100% accuracy for MRI, with little extra benefit from EEG.

Standard EEG may be difficult to obtain in the first hours following birth, but amplitude integrated EEG (aEEG) has been developed to monitor cerebral electrical background activity in the intensive care unit. A study of the technique in 47 infants (Hellstrom-Westas, 1995) found that it predicted outcome correctly in 43 (91.5%). Similar results were obtained from a study of 73 infants (Toet, 1999).

Baumgart S, Graziani LJ. Predicting the future for term infants experiencing an acute neonatal encephalopathy: electroencephalogram, magnetic resonance imaging, or crystal ball? Pediatrics 2001;107:588-90


Normal body temperature (36.5 – 37.2°) should be maintained?
A systematic review (Shah, 2007) found that hypothermia, in 4 studies including 497 infants, resulted in a reduced combined outcome of death or neurodevelopmental disability compared with normothermia (RR 0.76, 95% CI 0.65-0.88, NNT 6, 95% CI 4-14). Opinion in the US is currently divided on whether or not the strength of the existing evidence warrants a change in practice (Perlman, 2008; Kirpalani, 2007).

Evidence Level: IV


Evidence Level: I

Last amended June 2008