Fetal activity, behaviour, and neurology: fact or fiction?

Behaviour is the interaction between environment and activity. In the newborn infant, behaviour has been categorised by Prechtl in a series of behavioural 'states'. Prechtl has defined them as 'distinct and mutually exclusive conditions, each having its specific properties and reflecting a particular mode of nervous function'. The newborn cycles between state epochs which are both stable and recurring. Neonatal behavioural state is determined by both direct observation of movement and activity patterns (table) and by polygraphic recordings of the electroencephalogram and other physiological variables.

It has been shown that the premature infant shows the consistent behavioural patterns defined by Prechtl from 36 weeks' postmenstrual age onwards, and it is reasonable to believe that the fetus of 36 weeks also shows these patterns of activity developing towards term. Nijhuis et al were the first to describe fetal 'behaviour' by using two real time ultrasound machines to assess simultaneously fetal body, face, and eye movements as well as fetal breathing patterns. They also recorded fetal heart rate variability and related changes in this variable to movement. It has subsequently been suggested that in order to record at least one complete activity cycle, the minimum observation period should be 1–2 hours. Using these methods of assessing fetal activity, four fetal 'behavioural' states have been described and are shown in the table. These have been adapted from Prechtl's neonatal behavioural states. Nijhuis states that the fetus cannot be considered to be awake in the uterus, but many describe fetal states as being either 'asleep' or 'awake'. The description of fetal state, and by implication

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overt brain abnormalities on ultrasound scans. They asked whether abnormal in utero behavioural patterns could be used as a test of neurological abnormality. Two of the 10 infants were found to be subsequently normal. This very interesting paper raises the question of whether fetal activity can be assessed and whether this can be related to neurological abnormality.

I believe that the term 'fetal behaviour' is misleading and has no scientific validity. Nevertheless, it is valid to ask whether assessment of fetal activity can recognise a group of fetuses who later show neurological abnormality. This will be a very difficult question to answer. We know that the infant can show abnormal neurological features which recover and the child is eventually functionally normal. Thus clinical assessment may not predict outcome and abnormal fetal activity will therefore be extremely difficult to measure against a gold standard. We require longitudinal studies of groups of fetuses who have careful assessment of activity and relate these abnormalities to eventual outcome at 1 to 2 years of age.

The assessment of fetal activity is a fascinating area for future research, but we must not overinterpret the preliminary findings. Activity is not the same as behaviour and fetal neurology is not the assessment of activity alone. Moore and Hanson in reviewing this theme have concluded that the 'absence of evidence is not in itself evidence of absence'.

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