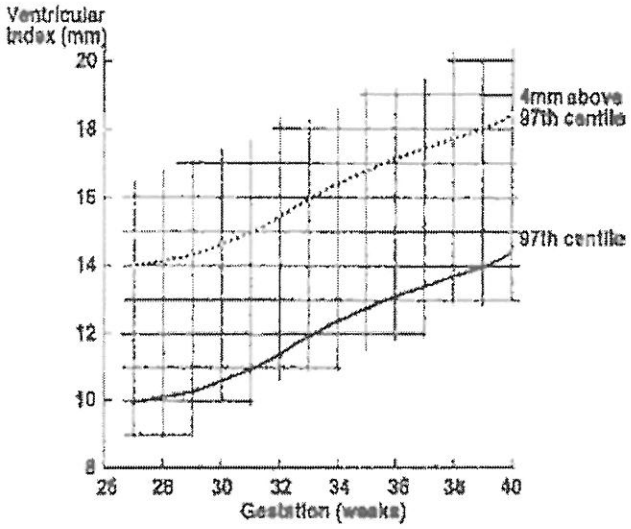

Figure 1 Reference values for ventricular width. The black line is 97th centile and the dotted line is 4 mm over the 97th centile (redrawn with permission from ref [10]).

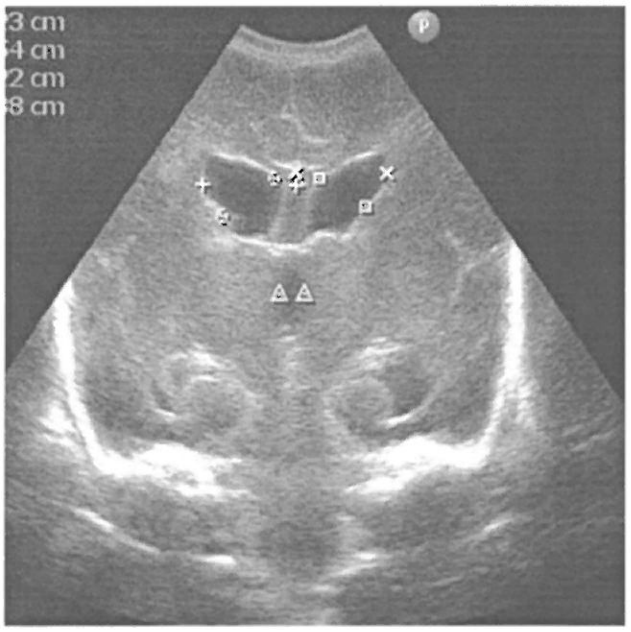

Figure 2 Cranial ultrasound scan showing moderate dilatation of the lateral ventricles. Coronal view with callipers showing anterior horn width (denoted by square calipers), third ventricular width (triangular calipers), and ventricular index ('X' and '+' calipers) measurements.

do not expand laterally, but become rounded or expand occipitally. Davies has produced reference ranges for anterior horn width (which is measured diagonally) and third ventricular width, measured in the coronal plane, as well as the thalamo-occipital dimension, measured in the sagittal plane, as shown in figures 2 and 3.[11] To recognise this we have arbitrarily used the combination of three measurements—anterior horn width >4 mm (>1 mm over the 97th centile), thalamo-occipital dimension >26 mm (>1 mm over the 97th centile) and third ventricular width >3 mm (>1 mm over the 97th centile)—as an alternative definition for PHVD. Measurements on both sides must exceed these limits.

Figure 3 Cranial ultrasound scan, sagittal view, showing considerable dilatation of the right lateral ventricles Callipers ('+') are showing the thalamo-occipital dimension.

DEFINITION OF EXCESSIVE HEAD ENLARGEMENT

Head circumference enlarges by approximately 1 mm per day between 26 weeks of gestation and 32 weeks, and about 0.7 mm per day between 32 and 40 weeks.[12] We regard a persistent increase of 2 mm per day as excessive. Measuring head circumference accurately, maximum fronto-occipital circumference, although low-tech, is not as easy as it sounds. Detecting a difference of 1 mm from day to day is difficult and we do not react to a difference of 2 mm from one day to the next unless there is other evidence of raised intracranial pressure. However, an increase of 4 mm over 2 days is more likely to be real and an increase of 14 mm over 7 days is definitely excessive.

RECOGNITION OF RAISED INTRACRANIAL PRESSURE

A change in the fontanelle from concave to bulging may be palpated but this is different from soft to tense which may be more ominous. The preterm skull is very compliant and can easily accommodate an increase in CSF by expanding with separation of the sutures. When CSF pressure was measured with an electronic transducer in infants expanding their ventricles after IVH, the mean CSF pressure was approximately 9 mm Hg, three times the mean in normal infants.[9] There was a considerable range with some infants expanding their ventricles and heads at a pressure of 5–6 mm Hg and a small number with CSF pressure around 15 mm Hg. A CSF pressure of 9 mm Hg does not necessarily produce clinical signs but may be associated with an increase in apnoea or vomiting, hypotonia, hypertonia or decreased alertness. A structured neurological examination of the newborn such as that published by Dubowitz is recommended.[13]

Serial Doppler Resistance Index (RI) on the anterior cerebral artery is a useful and practical way of detecting impairment of cerebral perfusion by raised intracranial pressure and can easily be done during ultrasound imaging. RI is systolic velocity-diastolic velocity/systolic velocity. This measurement is independent of the angle of insonation. If intracranial pressure rises and arterial pressure does not rise, end-diastolic velocity decreases. In the context of PHVD and absence of a patent ductus arteriosus, RI increasing above 0.85 is suggestive of increasing pressure and RI of 1.0 indicates impaired