



Promoting Excellence In Ultrasound

Policies and Statements

D13

Guidelines For Neurosonography In Infants

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1. EQUIPMENT

Cranial sonography in neonates and infants who have a patent anterior fontanelle should be performed with a curvey array transducer, using the fontanelle as an acoustic window. In addition high resolution linear or curved linear scanning through the anterior fontanelle is indicated for definition of near field anatomy and pathology located in the superficial cortex and extra-axial spaces. The highest frequency transducer, allowing adequate visualisation of the posterior fossa structures should be used. For premature babies and neonates, use of a 7.5MHz transducer is recommended. Frequencies lower than 5MHz are rarely necessary.

The equipment should be mobile with size small enough to go through ward doors and to fit between isolettes in the neonatal Intensive Care Unit. The transducers should be light weight and small enough to be introduced through the port-hole of the isolette and function adequately within the limited space available. Warming the gel is preferred.

2. DOCUMENTATION

A permanent hardcopy or digital record should be obtained in all cases, and a report of the findings issued. Recorded images should show patient identification and date of the examination and be annotated for orientation purposes (on coronal scans the baby's right side is viewed on the left of the screen and on sagittal scans, the baby's front is leftward on the screen (anatomic convention). Birth weight as well as gestational age should be documented. It is also important to note if the child is having therapeutic hypothermia. When performing serial studies, the same field of view should be used and similar sections recorded for each examination, to allow direct comparison of studies. Review of any previous study is therefore desirable before commencement of the current study.

3. PATIENT PREPARATION AND CARE

a) Neonatal Intensive Care Unit

I. Gowning for barrier area should be performed if needed.

II. The equipment should be plugged in, warmed up, and the identifying data of the patient typed in before the examination is undertaken.

III. There should be cleansing of the transducers and the operator's hands before opening the isolette.

IV. Neonatal intensive care unit nurses or doctors should be asked to assist with substituting any oxygen head box with a mask or resiting of chest or abdominal monitoring leads if warranted.

V. If adequate access through a porthole in the isolette is available, the study can be done without heat lamps. If the isolette is open, blankets or heat lamps are needed to keep a preterm infant warm.

VI. Infants are generally most settled after a feed. So performing the USS 10-20 minutes after a feed is often the best time. Non – nutritive sucking maybe helpful to settle an agitated infant.

b) Ambulant Infants from Outpatients

I. Sedation is not normally required.

II. An explanation of the procedure to the parents if they accompany the infant, is necessary.

III. If the patient is restless let the parent hold the infant during the study as this may make positioning and control easier.

IV. Withhold feeding for a limited time prior to the study if possible, so the baby will be quiet when fed. An alternative is to ask the parents to bring a bottle or the usual pacifier and then scan while the parent is holding the baby.

4. TECHNIQUE AND PLANES OF SECTION

A basic series of images from the modified coronal and sagittal planes should be recorded for each examination. Additional views and relevant findings should be recorded as necessary.

A minimum of 5 coronal images should be obtained at various angles ranging from as far anterior to as far posterior as possible while maintaining adequate contact with the transducer. In addition to the parenchymal tissue of the hemispheres, structures which should be identified in the coronal series include the anterior horns, bodies and atria of the lateral ventricles, third ventricle, corpus callosum, choroid plexuses, Sylvian fissures, interhemispherical fissure, tentorium and nodule of the vermis (identifying the position of the fourth ventricle and region of the corona radiata superior to the lateral ventricle).

The sagittal series should include a midline section showing the corpus callosum and third and fourth ventricles. Angled views should be taken in the plane of the lateral ventricle (showing the choroid plexus, the thalamus, head of the caudate nucleus and caudo-thalamic groove), and also through the lateral portions of the basal ganglia and periventricular white matter on each side. Sagittal views, obtained with greater angulation of the transducer, may be necessary to demonstrate laterally situated abnormalities identified in the coronal views. Detail of the sulcal pattern in the temporal lobe and Sylvian fissure is to be included to allow assessment of cerebral maturity in relation to gestational age.

Localised views (coronal and sagittal) of the superficial three or four centimetres of the brain tissue and the brain surface immediately subjacent to the fontanelle can be taken, using a high frequency linear array. These views allow better assessment of the brain parenchyma, meninges, subarachnoid space and extra-axial fluid collection.

In cases when posterior fossa pathology is suspected or detected and when supplementary views of occipital lobes and posterior lateral ventricles are needed, scans should be done using the posterior fontanelle as a window, if it is patent.

Axial views through the temporo-parietal bone may sometimes be of value to measure midline shift, the width of the third ventricle or to detect inferiorly situated extra-axial collections on the opposite side.

Head circumference should be taken into account in the interpretation of enlarged ventricles.

Colour and pulsed wave Doppler may be useful in circumstances of vascular lesions, evaluation of increased intracranial pressure, meningitis, superior sagittal sinus thrombosis and research protocols.