# *Ultrasound*

Last updated: June 3, 2019

**SPINAL ULTRASOUND** (of infant spine) – see p. D70 >
**DOPPLER** – see p. D62 >>, p. Vas7 >>

| Higher beam frequency - better axial resolution, but less tissue penetration. |
|---|

A mode (amplification) - one of earliest and simplest forms of display: image is displayed as series of spikes; amplitude* is represented on *y* axis and depth on *x* axis.
- was used to identify *midline head structures* (*ECHOENCEPHALOGRAPHY*),

*stronger echo → higher spike.

Static B mode (brightness) - represents only current line of sight of transducer - each echo is displayed as dot (static 2D image); dot brightness is proportional to echo intensity.

TM mode (time-motion) - used primarily in *echocardiology*: image displays movements of various parts of heart.

Real-time ultrasound - rapid, sequential generation of 2D B-scan images - images change almost instantaneously on screen with shifts in transducer position.
- may be used in conjunction with Doppler (e.g. to diagnose carotid stenosis).

## BRAIN ULTRASOUND (of infants)

See also D45 p.!!!

Advantages - portable, safe, noninvasive, low cost and highly effective.

Disadvantages - findings may be relatively unspecific and difficult to interpret (even for experienced sonologists).
- grey and white matter cannot be differentiated.

Sonographic "window" (not blocked by intervening bone or air) - ANTERIOR FONTANELLE – allows ***coronal*** and ***sagittal*** images:
1) cerebral hemispheres
2) deep ganglionic structures
3) thalami
4) ventricles
5) posterior fossa.

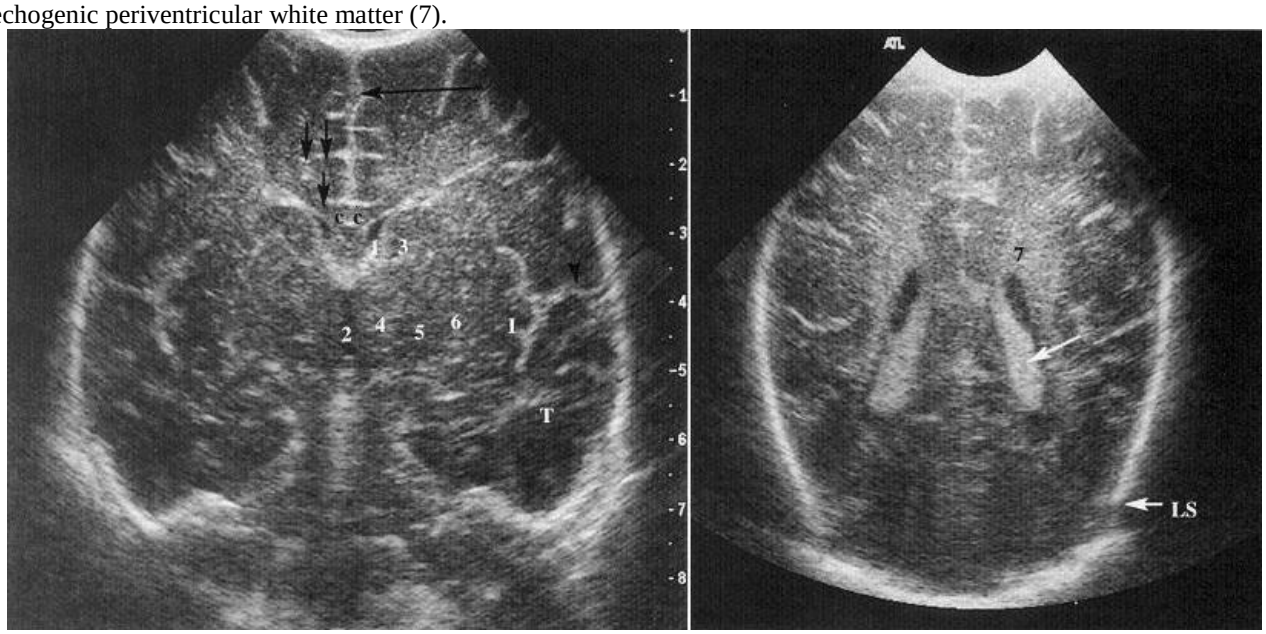
- POSTERIOR FONTANELLE - better views of posterior fossa.
- TEMPORAL FONTANELLES - ***axial*** views in very young.

What can be detected:
1) congenital anomalies in central (periventricular) position (Chiari malformations, Dandy-Walker syndrome, agenesis of corpus callosum, anencephaly, aqueductal stenosis, holoprosencephaly, encephaloceles)
2) hydrocephalus
3) neoplasms

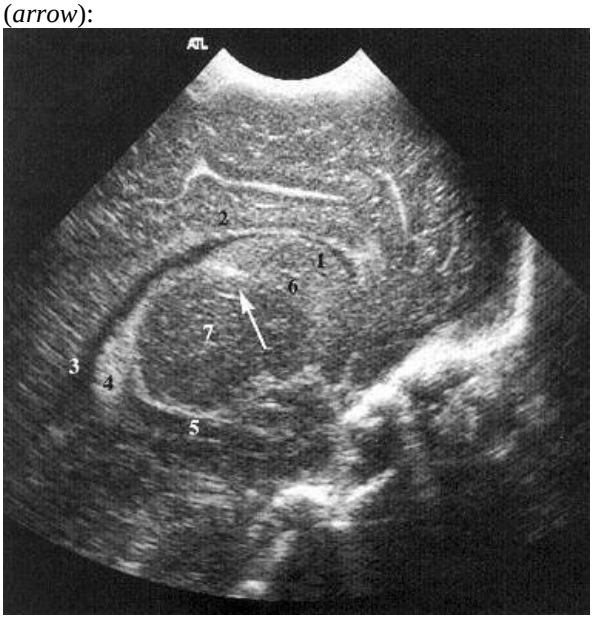
4) cysts
5) periventricular hemorrhage (subarachnoid / subdural blood that is nearer transducer are harder to identify - may be confirmed by CT).
6) vascular malformations (e.g. vein of Galen malformation).

- sensitivity for hypoxic–ischemic lesions is poor (normal sonogram does *not* exclude this pathology);
  - *cerebral edema* is **hyperechoic** - very difficult to diagnose since there is no adjacent parenchymal organ that can provide reference in echogenicity.
  - definite *infarction* is **hypoechoic** and well demarcated.

Normal brain US:
**A.** Coronal section at level of internal capsule: interhemispheric fissure (*long arrow*), cingulate sulcus (*two short arrows*); callosal sulcus (*short arrow*), sylvian fissure (*arrowhead*), corpus callosum (cc), frontal horn (1), 3rd ventricle (2), caudate nucleus (3), thalamus (4), internal capsule (5), putamen and globus pallidus (6), insula (I), temporal lobe (T).
**B.** Coronal section at level of ventricular atria: lambdoid suture (LS), glomus of choroid plexus (*white arrow*), slightly hyperechogenic periventricular white matter (7).

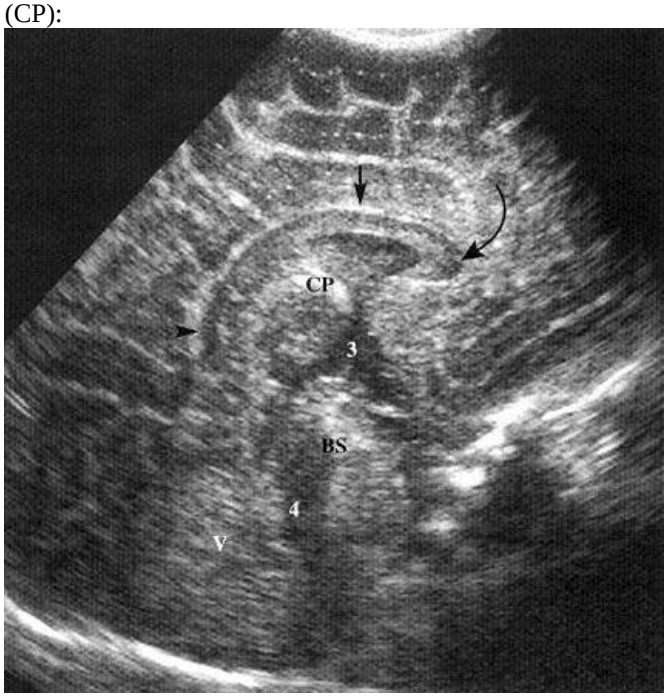



Normal brain US: sagittal section on lateral ventricle: frontal horn (1), body (2), atrium (3), glomus of choroid plexus (4), choroid plexus in temporal horn (5), caudate nucleus (6), thalamus (7), caudothalamic groove (*arrow*):

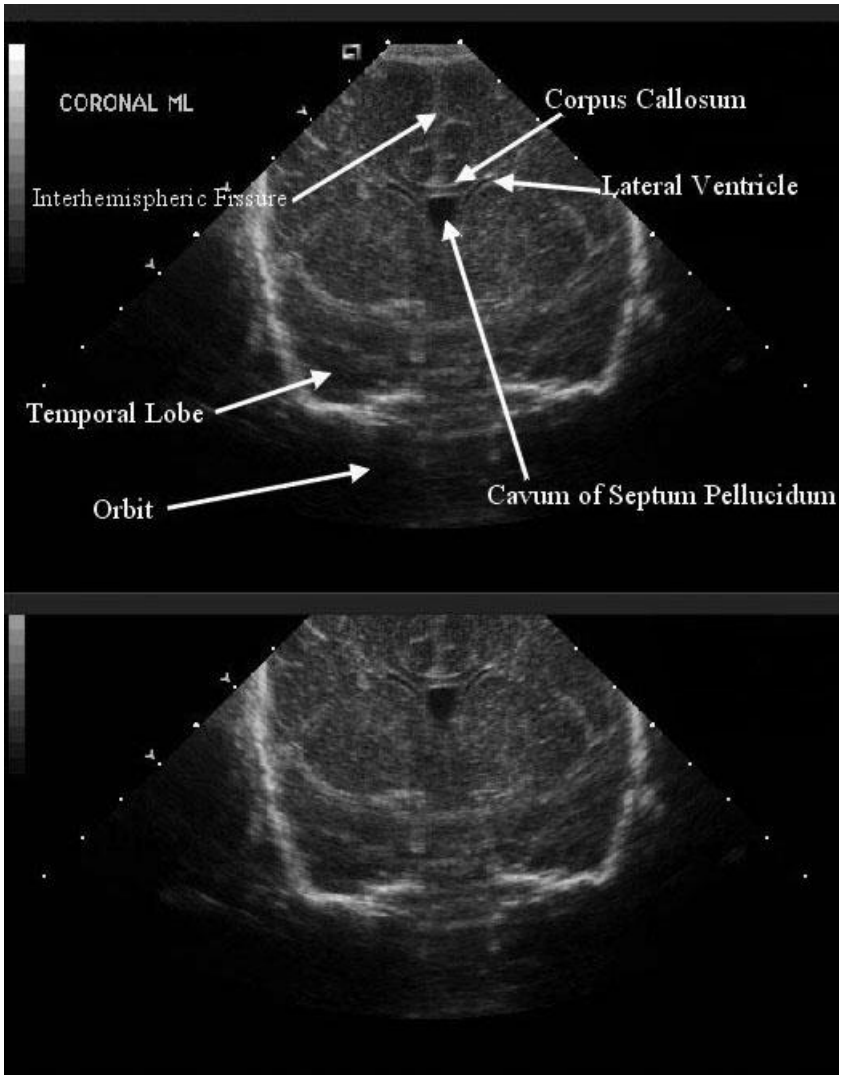



Normal brain US: medial sagittal section:
Corpus callosum: genu (*curved arrow*), body (*straight arrow*), splenium (*arrowhead*), 3rd ventricle (3), 4th ventricle (4), cerebellar vermis (V), brainstem (BS) choroid plexus

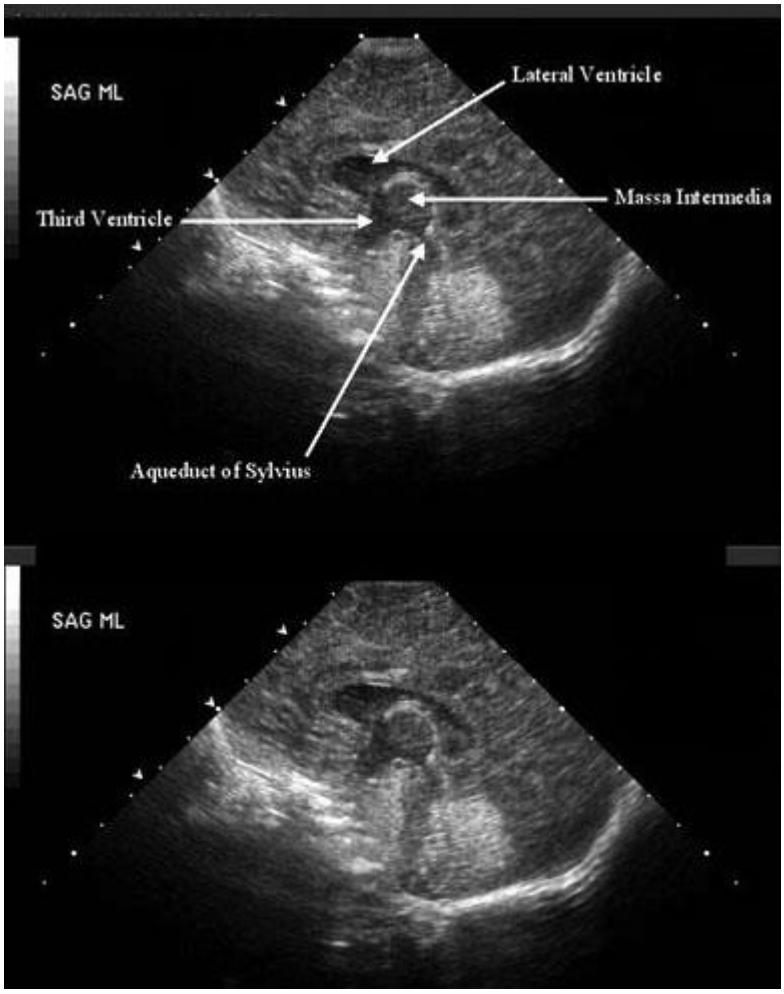
(CP):



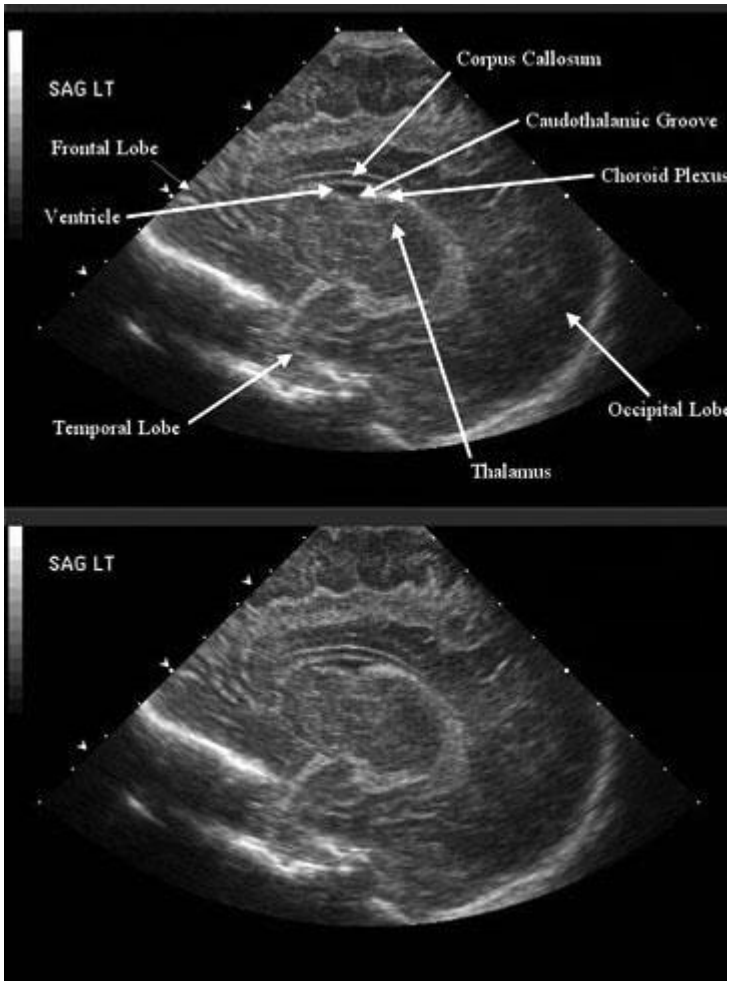

Normal neonatal brain - coronal midline scan:




Normal neonatal brain - coronal midline scan:




Normal neonatal brain – midline sagittal scan:




BIBLIOGRAPHY for ch. "Diagnostics" → follow this LINK >>