

# Ultrasound

Last updated: September 5, 2017

**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.

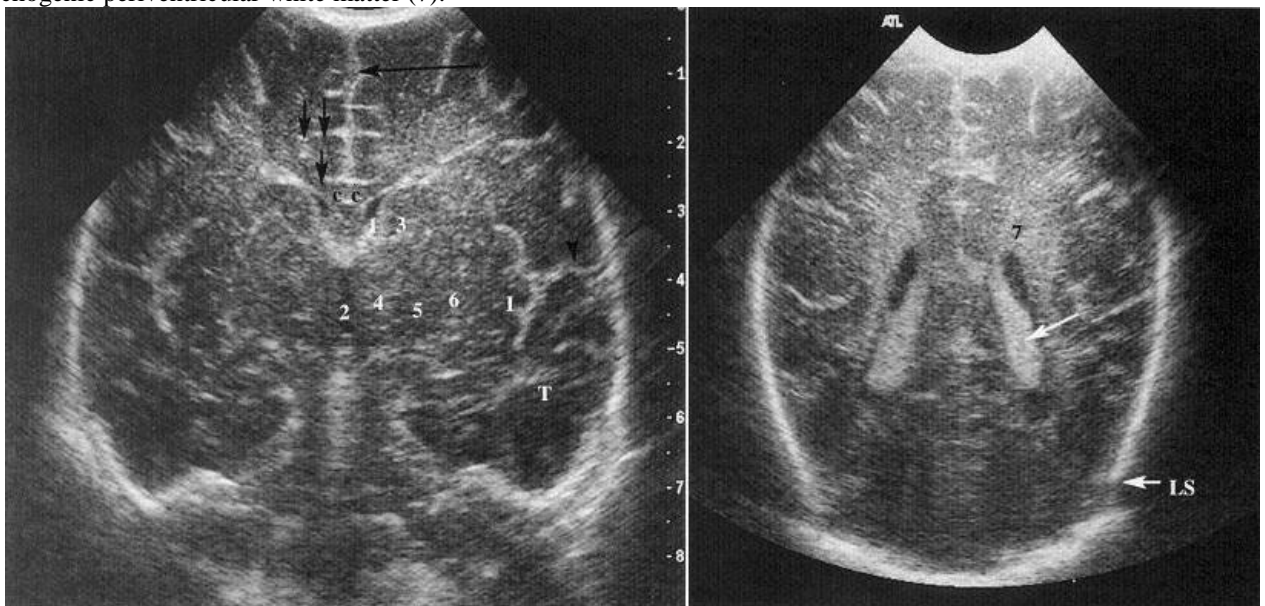
What can be detected:

- 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**

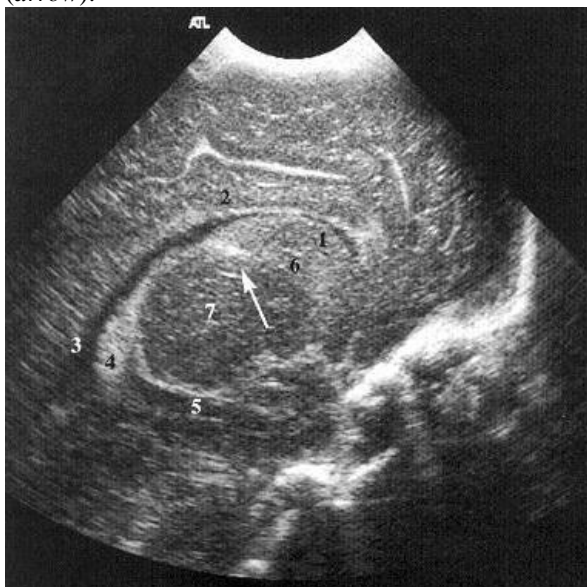
- 4) **cysts**
- 5) **periventricular hemorrhage** (subarachnoid / subdural blood that is nearer transducer are harder to identify - may be confirmed by CT).
- 6) **vascular malformations** (e.g. vein of Galen malformation).
- sensitivity for **hypoxic-ischemic lesions** is poor (normal sonogram does *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).

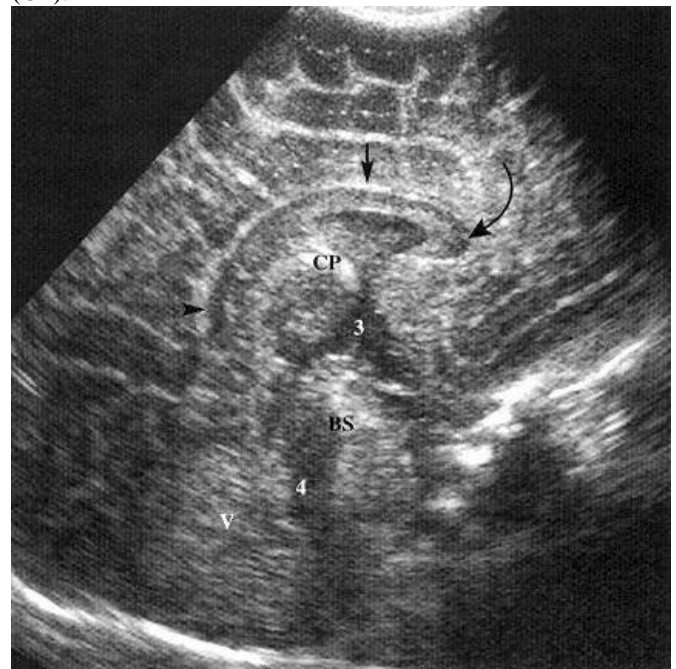


Normal brain US: **sagittal** section on lateral ventricle: frontal horn (1), body (2), atrium (3), glomus of choroid plexus (4), choroid plexus in temporal horn (5), caudate nucleus (6), thalamus (7), caudothalamic groove (*arrow*):

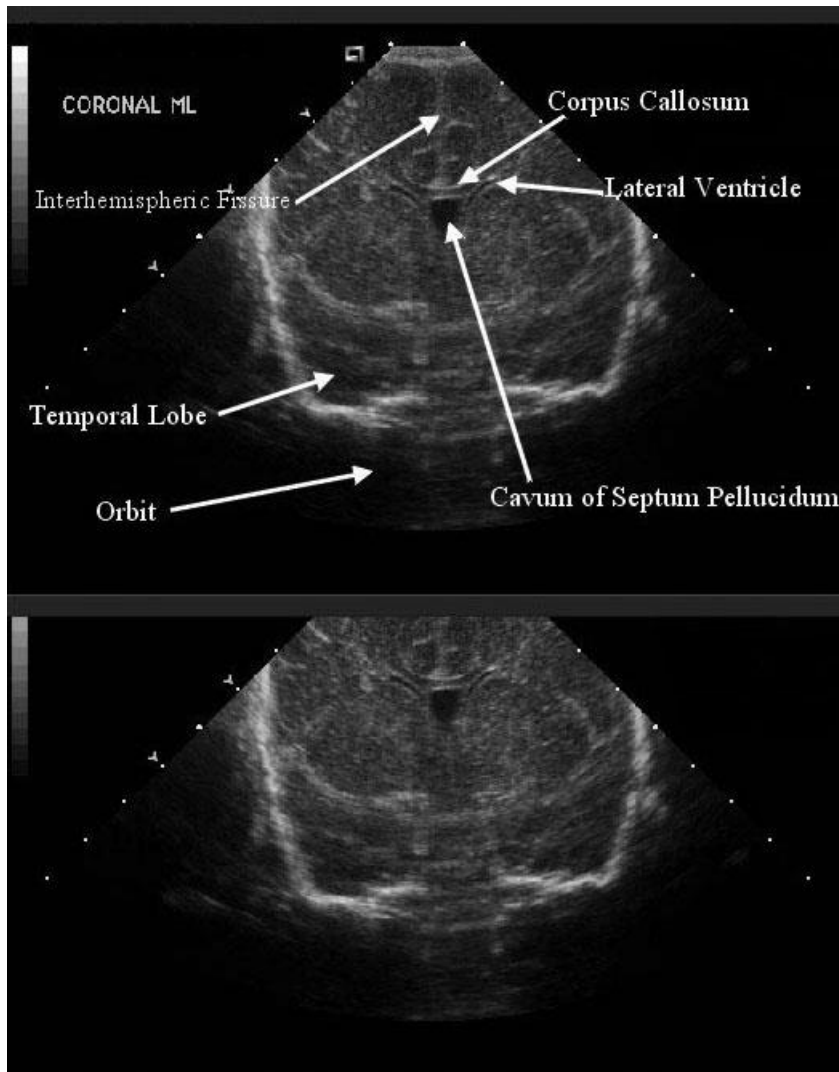


Normal brain US: **medial sagittal** section: Corpus callosum: genu (*curved arrow*), body (*straight arrow*), splenium (*arrowhead*), 3<sup>rd</sup> ventricle (3), 4<sup>th</sup> ventricle (4), cerebellar vermis (V), brainstem (BS) choroid plexus

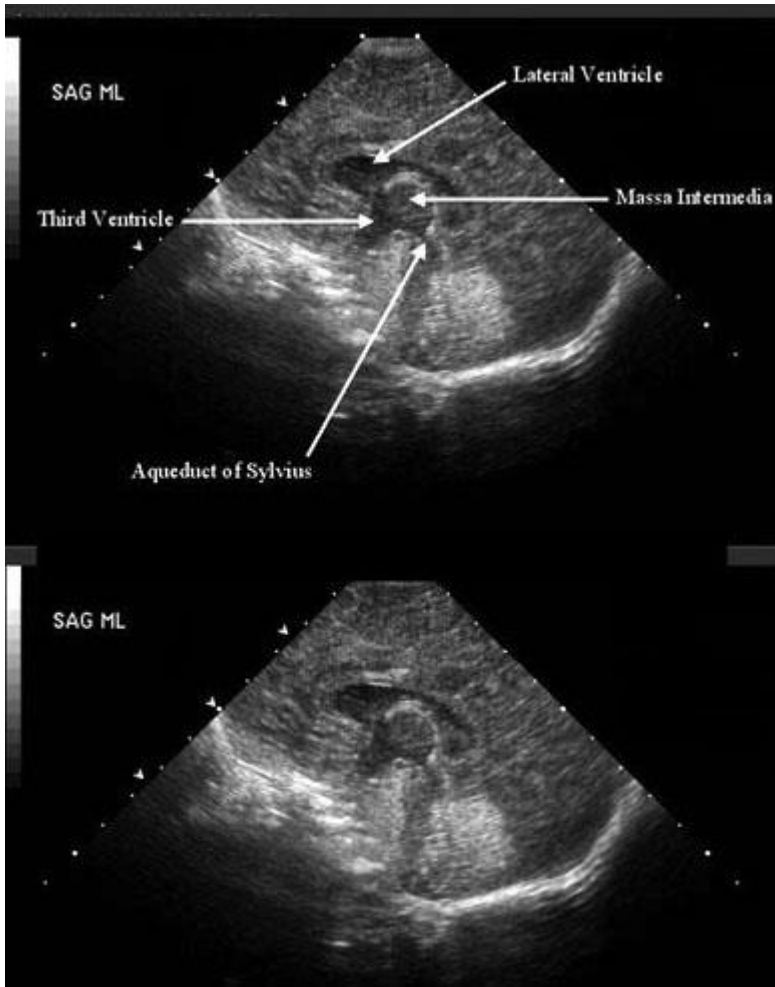
(CP):



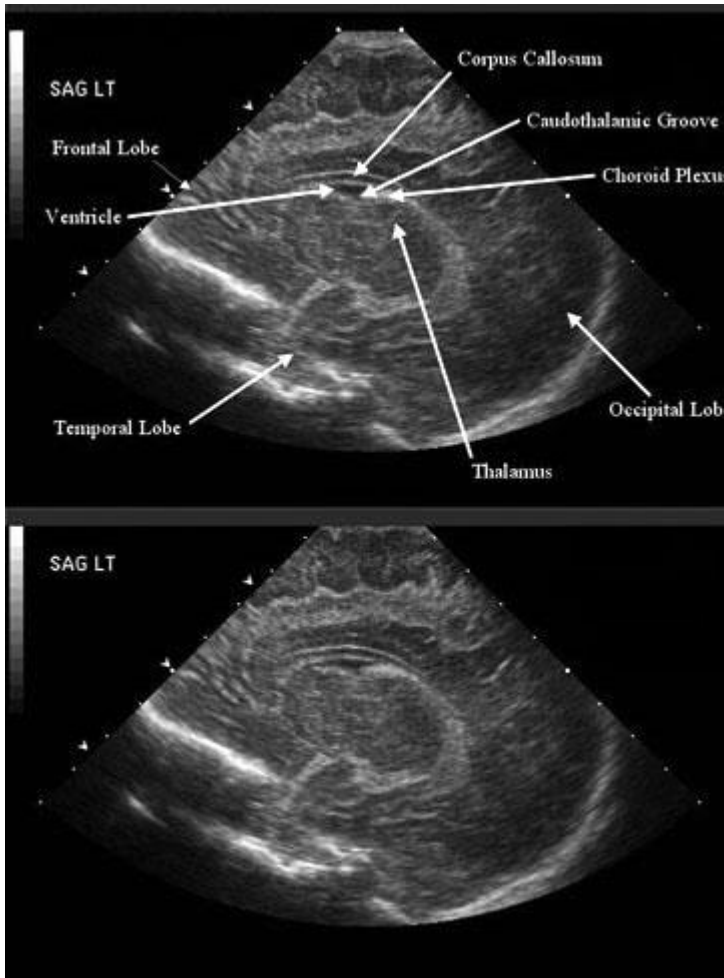
Normal neonatal brain - coronal midline scan:



Normal neonatal brain - coronal midline scan:



Normal neonatal brain – midline sagittal scan:



BIBLIOGRAPHY for ch. "Diagnostics" → follow this [LINK >>](#)