1 **NEURAL AXIS**

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2 **ALPHAFETOPROTEIN (AFP)**

- Protein formed by:
  - Yolk sac
  - Fetal liver
- Excreted in fetal urine into amniotic fluid
- Crosses placenta to enter maternal serum
- Maternal serum AFP (MSAFP)
  - Reported in multiples of the median (MoM)
- In the setting of >MSAFP and normal US
  - Associated with IUGR

3 **ANENCEPHALY**

- Acrania
  - Fetal cranial bones not formed
- Exencephaly
  - Brain tissue outside the skull
- Anencephaly
  - Fetal skull ends above the orbits
  - Brain tissue has eroded away by 2nd trimester
    - Frogs Eyes image noted sonographically

4 **Cephalocele/Encephalocele**

2

- Bony defect in the cranial vault
  - Sac composed of dura mater protrudes
    - Sac may only contain CSF-occipital meningocele
      - Has better prognosis
  - Typically occiput
  - Poor prognosis
- Usually isolated
  -

5 **AGENESIS OF CORPUS CALLOSUM**

- Corpus callosum-bundle of nerve fibers connecting two cerebral hemispheres
- Identified in midline coronal and midline sagittal sections
  - Immediately anterior to body of lateral ventricles
  - Lateral ventricles take on a "Tear Drop" shape

6 **HYDRANCEPHALY**

- Absence of cerebral hemispheres

- Due to bilateral carotid occlusion
- Sonographically
  - Cranial vault filled with fluid
  - Lateral aspect locate Sylvian fissure
    - Cerebral artery still intact
  - Brain tissue only seen in the occipital region

7 **HOLOPROSENCEPHALY**

- Incomplete division of forebrain
  - Alobar
    - Most severe
    - Single ventricle
    - Fused thalami
  - Semilobar
    - Partial division of the forebrain
    - Partial fusion of the thalami
  - Lobar
    - Least severe
    - Absent cavum septum pellucidum
    - Normal ventricles and thalami
    - Tough to detect prenatally
    -

8 ***Hydrocephaly and Ventriculomegaly***

1

- Ventriculomegaly
  - Posterior horn >10mm
  - Head normal in size
- Hydrocephaly
  - Dilated ventricular system
  - Head larger than expected for dates
  - Noncommunicating
    - Obstruction from within
  - Communicating
    - Obstruction from outside ventricular system

9 **Aquaductal Stenosis**

- Obstruction, atresia, or stenosis of the aqueduct of Sylvius
  - Causing ventriculomegaly or hydrocephaly
- Connects third and fourth ventricles, located in the midbrain

10 **Choroid Plexus Cyst**

- Cystic structure(s) within the choroid plexus

- Can be:
  - Unilateral or bilateral
  - Small or large
  - Solitary or multiple
  - Unilocular or multilocular
  -

11 **MICROCEPHALY**

- Small brain enclosed within a small head
- Most infants with severe microcephaly die shortly after birth
- Cause
  - Viral infections
  - Drugs/alcohol
  - Autosomal recessive mode of inheritance
  - Idiopathic
- Must do serial measurements
  - May be difficult to diagnose-depending on severity

12 **PORENCEPHALIC CYST**

- Cyst in the cerebral hemisphere
- Results from liquefaction of an intracranial hemorrhage
- Cause
  - Hypoxic rupture of small vessels of germinal matrix
- Typically single and unilateral

13 **SCHIZENCEPHALY**

- Cleft in the cerebral cortex
- Can be:
  - Unilateral or bilateral
  - Open
    - Extend through to the calvarium
  - Closed
    - A lip of gray matter is noted proximal to the skull

14 **Vein of Galen Aneurysm**

- Rare arterial venous malformation
- Midline, intracranial lesion
  - Anechoic
  - High volume of flow with Doppler

15 **ABNORMALITIES OF POSTERIOR FOSSA**

- Dandy-Walker Malformation
  - Posterior fossa cyst

- Hypoplastic or absent cerebellar vermis
- Look for cerebellar splaying of the lobes

⦿Dandy-Walker Variant

- Anterior displacement of the vermis by posterior fossa cyst
- Absence of cerebellar abnormalities

⦿Both can have ventriculomegaly

16 **SPINA BIFIDA**

⦿Failure of neural tube closure

⦿Open

- Absence of skin covering the defect

⦿Closed

- Skin covering defect, but outpouching still occurring
- Often have tuft of hair or dimple
- Spina bifida occulta
-

17 **SPINA BIFIDA-LEMON AND BANANA SIGN**

1 ⦿Associated with open spina bifida

⦿Lemon sign

- Abnormal scalloping of the frontal bones
- More angular appearance to the front of the skull

⦿Banana sign

- Crescent shaped cerebellum
- Small transcerebellar diameter
- Small cisterna magna

18 **Arnold Chiari Malformation**

⦿Cerebellar tonsils located below the foramen magnum

⦿Various forms of malformation

- Type I
  - Most simple
  - Just tonsils herniate
- Type II
  - Parts of brain deformed
  - Cerebellum and brain stem displaced
- Type II
  - Most complex
  - Hindbrain displaced
  - Often see encephaloceles

⦿

⦿

19 **ABNORMALITIES IN THE SHAPE OF THE FETAL SKULL**

- Dolicocephaly
  - Long narrow head
- Craniostenosis
  - Skull sutures fuse prematurely
  - Can get:
    - "Strawberry Sign"
    - "Clover leaf Sign"
- Don't forget to include the cephalic index with the normal head biometric measurements

20 **SACRAL AGENESIS-CAUDAL REGRESSION SYNDROME**

- Ranges in severity from absence of the sacrum with short femurs to complete fusion of the lower limbs
  - Sirenomelia or mermaid syndrome
- Seen almost exclusively in infants born to diabetic mothers

21 **Conclusion**

- Anencephaly/Acrania
- Cephalocele/Encephalocele
- Spina Bifida/ Arnold Chiari malformation
- Dandy-Walker Malformation/Variant
- Holoprosencephaly- its types
- Agenesis of the Corpus Callosum
- Hydranencephaly
- Schizencephaly
- Ventriculomegaly/Hydrocephaly
  - Aqueductal Stenosis
  - Choroid Plexus Cyst
- Porencephalic Cyst
- Vein of Galen Aneurysm
- Microcephaly
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