SPR 2015 POSTGRADUATE COURSE

Fetal Imaging

Provided for further study

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What is the most likely diagnosis?

A. Meningomyelocele
B. Myeloschesis
C. Meningocele
D. Caudal Regression
E. The " lemon sign"

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What is the most likely diagnosis?

- Options A and B are **NOT** correct. This mass is skin covered. Neither a meningomyelocele nor myeloschesis is skin covered.
- Option C is **CORRECT.** Meningoceles are skin covered neural tube defects.
- Option D is **NOT** correct. Caudal regression is not associated with a soft tissue mass.
- Option E is **NOT** correct. The lemon sign is a sonographic sign of hindbrain herniation.

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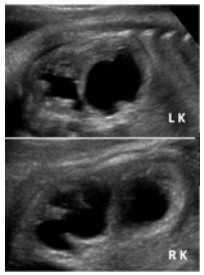
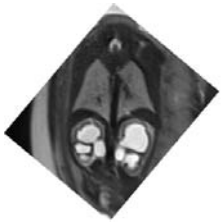
What is the most likely diagnosis?

- Tortori-Donati P, et al. Spinal dysraphism: a review of neuroradiological features with embryological correlations and proposal for a new classification. Neuroradiology 42:471–491, 2000.
- Sauerbrei EE. The fetal spine. In: Rumack CM, et al, editors. Diagnostic Ultrasound, 4th ed 4. Philadelphia: Elsevier Mosby; 2011.
- Barkovich A. Congenital Anomalies of the Spine. In: Barkovich A, editor. Pediatric Neuroimaging, 3rd ed. Philadelphia: Lippincott-Williams & Wilkins; 2000.
- Naidich TP, et al. Congenital anomalies of the spine and spinal cord: embryology and malformations. In: Atlas SW, editor. Magnetic Resonance Imaging of the Brain and Spine, 4th ed. Philadelphia: Lippincott-Raven; 2008.





The fetal MRI and US images:

A. Depict a low grade level in the UTD classification
B. Represent a high grade UTD
C. The fetal MRI and US do not correlate with each other
D. Findings are likely physiologic

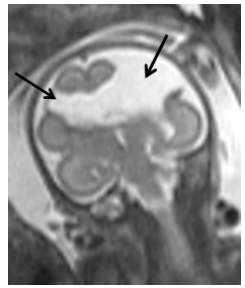
The fetal MRI and US images show which of the following findings?

- Option A is **NOT** correct since a low risk UTD would only include central urinary tract dilatation and not peripheral as in this case.
- Option B is **CORRECT**. The images show high grade UTD. Severe bilateral hydronephrosis with cortical thinning is noted in the coronal fetal MRI image. Similar findings of severe hydronephrosis are seen on the ultrasound images with not significant cortical thinning but minimally increased echogenicity. Despite the gestational age of this fetus, the degree of hydronephrosis and the abnormal cortex increases the risk for renal pathology from low risk to increased risk, UTD A2-3.
- Option C is **NOT** correct because the findings on MRI and ultrasound correlate with each other.
- Option D is **NOT** correct . The findings are not physiologic rather reflect severe bilateral hydronephrosis.

The fetal MRI and US images show which of the following findings?

- Nguyen HT, et al. Multidisciplinary consensus on the classification of prenatal and postnatal urinary tract dilation (UTD classification system). J Pediatr Urol. 2014; 10: 982-999.

Regarding the abnormalities denoted on this coronal T2-weighted MR image of a 26 week old fetus (See Figure 2 - Arrows), which one of the following is the TRUE concerning post-natal clinical outcomes?



A. Degree of impairment depends on the location of the cleft, whether it is unilateral or bilateral, and whether there are associated malformations.
B. Bilateral defects result in less severe neurologic impairment
C. Ultrasound is better than MRI in accurate prenatal detection and thus can be used to reliably counsel parents about the clinical manifestations
D. A variety of post-natal therapeutic options exist for dealing with these clefts

Which of the following best describes this patient's postnatal clinical outcomes?

The fetal MR image demonstrates bilateral open-lip schizencephalic defects, left larger than right, that are lined by gray matter.

- Option A is **CORRECT**. The severity of motor and mental disability as well as severity of seizure activity is directly related to the extent of the anatomic abnormality and extent of the clefts, respectively.
- Option B is **NOT** correct. Bilateral defects result in worse intellectual and speech development compared with unilateral defects.
- Option C is **NOT** correct. MR imaging is more sensitive than ultrasound in identifying associated brain anomalies and distinguishing schizencephaly from other CSF-containing abnormalities of the fetal brain.
- Option D is **NOT** correct. Currently, no post-natal therapies exist for schizencephaly. Patient care is primarily targeted at seizure control.

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Which of the following best describes this patient's postnatal clinical outcomes?

- Barkovich AJ, et al. Schizencephaly: correlation of clinical findings with MR characteristics. AJNR Am J Neuroradiol. 1992;13:85-94.
- Oh KY, et al. Fetal schizencephaly: pre- and postnatal imaging with a review of the clinical manifestations. RadioGraphics. 2005;25:647-57.

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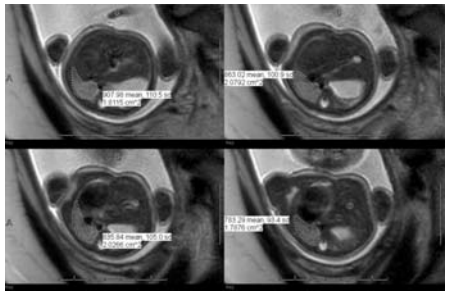

The images demonstrate measurement of which of the following fetal predictors of CDH severity?

A. Lung-head ratio (LHR)
B. Total fetal lung volume (TFLV)
C. Pulmonary vascularization index (PVI)
D. Modified McGoon index
E. Percent liver herniation

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The images demonstrate measurement of which of the following fetal predictors of CDH severity?

- Option A is **NOT** correct. The lung-head ratio is measured on ultrasound by obtaining the area of the contralateral lung at the level of the 4-chamber view of the heart and dividing by the head circumference
- Option B is **CORRECT**. The method demonstrated in the image is the one of the methods used for calculating the total fetal lung volume (TFLV)
- Option C is **NOT** correct. Pulmonary vascularization index is measured on ultrasound using 3-dimensional power Doppler acquisitions
- Option D is **NOT** correct. The modified McGoon index utilizes SSFSE T2-weighted MR images to measure the right and left pulmonary artery and aortic diameters to create a ratio of pulmonary-to-systemic blood flow
- Option E is **NOT** correct. Percent liver herniation also uses consecutive SSFSE T2-weighted MR images and the freehand ROI tool, but the volume of herniated liver is measured and compared to the total liver volume to determine the percentage of liver herniated into the chest

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The images demonstrate measurement of which of the following fetal predictors of CDH severity?

- Metkus AP, et al. Sonographic predictors of survival in fetal diaphragmatic hernia. J Pediatr Surg. 1996;31:148-151.
- Rypens F, et al. Fetal lung volume: estimation at MR imaging – initial results. Radiology. 2001;219:236-241.
- Ruano R, et al. Quantitative analysis of fetal pulmonary vasculature by 3-dimensional power Doppler ultrasonography in isolated congenital diaphragmatic hernia. Am J Obstet Gynecol 2006;195:1720-8.
- Valentin JF, et al. Prenatal pulmonary hypertension index: novel prenatal predictor of severe postnatal pulmonary artery hypertension in antenatally diagnosed congenital diaphragmatic hernia. J Pediatr Surg 2010;45:703-708.
- Cannie M, et al. Quantification of intrathoracic liver herniation by magnetic resonance imaging and prediction of postnatal survival in fetuses with congenital diaphragmatic hernia. Ultrasound Obstet Gynecol 2008;32:627-632.

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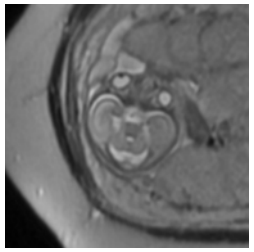

Select the CORRECT answer.
The findings on this axial image are:

A. Normal ocular globes
B. Persistent hyperplastic primary vitreous
C. Hypotelorism
D. Left microphthalmia and hypertelorism
E. Ventriculomegaly

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Select the CORRECT answer. The findings on this axial image are:

- Option A is **NOT** correct. The right globe is normal in configuration and size. The left globe is abnormally shaped and small with no lens.
- Option B is **NOT** correct. Persistent hyperplastic primary vitreous can be unilateral or bilateral. On fetal MRI image, the affected globe(s) is/are small, the lens(es) is/are thick and irregular and there is a dark T2 band attached to the posterior surface of the lens(es).
- Option C is **NOT** correct. The eyes are widely spaced, not too close together.
- Option D is **CORRECT**. The left globe is small (microphthalmia) and the fetal eyes are widely spaced (hypertelorism). Microphthalmia can affect one or both globes.
- Option E is **NOT** correct. The posterior fossa and 4th ventricle are included on this image and are normal in appearance.

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Select the CORRECT answer. The findings on this axial image are:

- Robinson AJ, et al. MRI of the fetal eyes: morphologic and biometric assessment for abnormal development with ultrasonographic and clinicopathologic correlation. Pediatr Radiol. 2005;38: 971-981.
- Stanescu AL, et al. Three-Dimensional ultrasound of fetal orofacial anomalies. Ultrasound Clin. 2011;6: 25-38.
- Achiron R, et al. Axial growth of the fetal eye and evaluation of the hyaloid artery: in utero ultrasonographic study. Prenat Diagn. 2000;20:894-899.
- Ramji FG, et al. Orbital sonography in children. Pediatr Radiol. 1996;26: 245-258.
- Tortori-Donati P, et al. The orbit. In: Tortori-Donati P, et al, editors. Pediatric Neuroradiology. Berlin Heidelberg: Springer; 2005.

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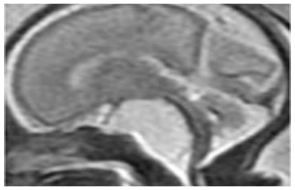


Sagittal T2WI from a fetal MR at 27 gestational weeks is shown (Figure 2). Which one of the following is the MOST likely diagnosis?

A. Blake pouch cyst
B. Brainstem hypoplasia
C. Dandy-Walker malformation
D. Arachnoid cyst
E. Joubert syndrome

Which one of the following is the MOST likely diagnosis based on this MRI performed at 27 weeks?

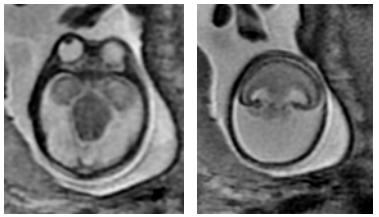
Fetal MRI shows a large prepontine and premesencephalic cyst causing compression and displacement of the brainstem, consistent with an arachnoid cyst.

- Option A is **NOT** correct. A Blake pouch cyst would be centered in the cisterna magna or the cerebellomedullary angle.
- Option B is **NOT** correct. There is compression and displacement of the brainstem related to an extra-axial cyst. Although underdevelopment of the brainstem may be present, mass effect accounts for the dysmorphology.
- Option C is **NOT** correct. The cerebellum is normal.
- Option D is **CORRECT**. A large midline cyst is compresses the brainstem and displaces it posteriorly. This is consistent with an arachnoid cyst, probably affiliated with the membrane of Liliequist.
- Option E is **NOT** correct. Joubert syndrome manifests with a malpositioned, hypoplastic vermis, apposed cerebellar hemispheres, and dysmorphic midbrain demonstrating a "molar tooth malformation".

Which one of the following is the MOST likely diagnosis based on this MRI performed at 27 weeks?

- Fushimi Y, et al. Liliequist membrane: three-dimensional constructive interference in steady state MR imaging. Radiology 2003; 229:360-5
- Miyajima M, et al. Possible origin of suprasellar arachnoid cysts: neuroimaging and neurosurgical observations in nine cases. J Neurosurg 2000; 93:62-7.
- Barkovich JA, et al. Congenital Malformations of the Brain and Skull. In: Barkovich AJ, et al, editors. Pediatric Neuroimaging, 5th edition. Philadelphia: Lippincott Williams & Wilkins; 2012.
- Tortori-Donati P, et al. Brain Malformations. In: Tortori-Donati P, Rossi A, eds. Pediatric neuroradiology: brain, head, neck and spine. Berlin: Springer; 2009.

Select the correct answer in reference to facial malformations.



A. Facial malformations are always isolated defects
B. Hypotelorism should not be concerning for underlying brain defects
C. Hypotelorism is frequently seen in the setting of holoprosencephaly
D. a and b are correct

Select the correct answer in reference to facial malformations.

- Option A is **NOT** correct. Hypotelorism may be seen in the setting of craniosynostosis, chromosomal defects such as trisomy 13 and with abnormal brain development, frequently in the spectrum of holoprosencephaly.
- Option B is **NOT** correct. Hypotelorism is frequently seen in the spectrum of holoprosencephaly.
- Option C is **CORRECT**. Hypotelorism is frequently seen in the spectrum of holoprosencephaly.
- Option D is **NOT** correct.

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Select the correct answer in reference to facial malformations.

- Babcook C. The fetal face and neck. In: Callen P, editor. Ultrasonography in obstetrics and gynecology. Philadelphia: Saunders; 2000.
- DeMeyer W, et al. The face predicts the brain: diagnostic significance of median facial anomalies for holoprosencephaly (arrhinencephaly). Pediatrics 1964; 34: 256.
- Benacerraf BR, et al. The face and neck. In: Nyberg DA, et al., editors. Diagnostic imaging of fetal anomalies. Lippincott Williams & Wilkins: Philadelphia; 2003.

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The SSFSE T2-weighted MR image shows which ONE of the following imaging features of a hernia sac in congenital diaphragmatic hernia?

A. Superior capping of the hernia by lung in the coronal plane.
B. Posterior capping of the hernia by lung in the axial plane.
C. Fluid contained within the hernia by a sac.
D. Pleural fluid separated from the hernia contents by a sac.
E. Free fluid contiguous between the pleural and hernia compartments.

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The SSFSE T2-weighted MR image shows which ONE of the following imaging features of a hernia sac in congenital diaphragmatic hernia?

- Option A is **CORRECT**. The coronal image shows lung superior to the hernia.
- Option B is **NOT** correct. The image is in the coronal plane. One would expect to see lung posterior to the hernia contents on an axial image, but no axial image is provided.
- Option C is **NOT** correct. Although having ascites within the hernia sac and separated from the pleural space is associated with the presence of a hernia sac, that finding is not shown in the image.
- Option D is **NOT** correct. Pleural fluid kept from mingling with the hernia contents would be a sign of a hernia sac if it was present, but pleural fluid is not shown on the provided image
- Option E is **NOT** correct. Having free fluid contiguous between the pleural space and the hernia contents would be evidence against a hernia sac

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The SSFSE T2-weighted MR image shows which ONE of the following imaging features of a hernia sac in congenital diaphragmatic hernia?

- Mehollin-Ray AR, et al. Fetal MR imaging of congenital diaphragmatic hernia. RadioGraphics 2012;32:1067-1084.
- Zamora IJ, et al. Predictive value of MR findings for the identification of a hernia sac in fetuses with congenital diaphragmatic hernia. AJR Am J Roentgenol. In press.

Which diagnosis is most likely to be seen prenatally?

A. Hirschspring disease
B. Meconium ileus
C. Anorectal malformation / cloaca
D. Ileal atresia
E. They are all reliably seen prenatally

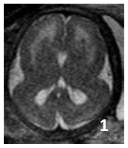
Which diagnosis is most likely to be seen prenatally?

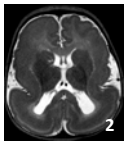
- Options A and B are **NOT** correct. Hirschsprung disease and meconium ileus are often a surprise diagnosis.
- Option C is **CORRECT**. ARM/cloaca have a connection to the GU tract and therefore there is more fluid in the intestines, an abnormally short meconium column on MRI, and mixing of urine and meconium creating calcifications.
- Option D is **NOT** correct. Ileal atresia often occurs late in gestation.
- Option E is **NOT** correct.

Which diagnosis is most likely to be seen prenatally?

- Rubesova E. Fetal bowel anomalies--US and MR assessment. Pediatr Radiol. 2012;42:S101-6.
- Calvo-Garcia MA, et al. Fetal MRI clues to diagnose cloacal malformations. Pediatr Radiol. 2011;41:1117-28.
- Belin B, et al. How accurate is prenatal sonography for the diagnosis of imperforate anus and Hirschsprung's disease? Ped Surg Internat. 1995;10:30-32.

Axial T2-weighted image from a fetal brain MRI at 28 weeks gestation (See Figure 1) and post-natal follow-up image from the same child (See Figure 2) are provided. What is the diagnosis in this patient?





A. Normal for gestational age
B. Polymicrogyria
C. Lissencephaly
D. Schizencephaly
E. Holoprosencephaly

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What is the diagnosis in this child imaged at 28 weeks gestation (A) and postnatally (B)?

- Option A is **NOT** correct. The normal brain is still smooth in the early 2nd trimester though, by 28 weeks gestation, normal convexity sulci should be seen.
- Option B is **NOT** correct. Polymicrogyria is characterized by excessively small gyri and prominent convolutions with altered sulcation pattern.
- Option C is **CORRECT**. Lissencephaly is a malformation of cortical development caused by arrested neuronal migration resulting in a smooth brain. On imaging, 3 layers are seen: a thin outer cortical layer of neurons, a "cell-sparse" zone, and a thick deep cortical layer of neurons.
- Option D is **NOT** correct. Schizencephaly is a trans-mantle cleft of the brain lined by gray matter.
- Option E is **NOT** correct. Holoprosencephaly is a complex malformation characterized by abnormal cleavage of the forebrain (prosencephalon).

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What is the diagnosis in this child imaged at 28 weeks gestation (A) and postnatally (B)?

- Barkovich AJ, et al. Classification system for malformations of cortical development: update 2001. Neurology. 2001;57:2168-78.
- Ghai S, et al. Prenatal US and MR imaging findings of lissencephaly: review of fetal cerebral sulcal development. RadioGraphics. 2006;26:389-405.
- Prayer D, et al. MRI of normal fetal brain development. Eur J Radiol. 2006;57:199-216.

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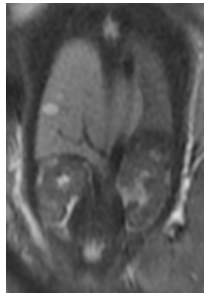
You are shown an image from a prenatal MR (coronal T2 SSFSE) of a 22 week old fetus. What is the MOST LIKELY diagnosis?



A. CPAM
B. Bronchogenic Cyst
C. Congenital lobar overinflation
D. Bronchopulmonary sequestration
E. Hybrid Lesion

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What is the MOST LIKELY diagnosis on this prenatal MR of a 22 week old fetus?

- Option A is **NOT** correct. CPAM is not the best answer. Although cysts are present in the mass, a feeding vessel is not characteristic of a CPAM.
- Option B is **NOT** correct. Bronchogenic cyst is not correct. These typically appear as T2 hyperintense structures on MR and are classically located in a subcarinal region. No feeding vessel or solid tissue is evident in these.
- Option C is **NOT** correct.
- Option D is **NOT** correct. Although a bronchopulmonary sequestration would demonstrate a feeding vessel, cysts would not be expected in these masses.
- Option E is **CORRECT**. A hybrid lesion is the best answer. This lesion has components of both a CPAM and a bronchopulmonary sequestration compatible with a hybrid lesion.

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What is the MOST LIKELY diagnosis on this prenatal MR of a 22 week old fetus?

- Barth RA. Imaging of fetal chest masses. Pediatr Radiol. 2012;42: S62-S73.
- Alamo L, et al. Prenatal diagnosis of congenital lung malformations. Pediatr Radiol. 2012;42:273-283.
- Pacharn P, et. al. Congenital lung lesions: prenatal MRI and postnatal findings. Pediatr Radiol. 2013;43:1136-1143.
- Rodriguez MR, et al. MR Imaging of thoracic abnormalities in the fetus. RadioGraphics. 2012; 32:E305-E321.
- Biyyam DR et al. Congenital lung abnormalities: embryologic features, prenatal diagnosis, and postnatal radiologic-pathologic correlation. RadioGraphics. 2010; 30:1721-1738.
- Daltro P, et al. Congenital chest malformations: a multimodality approach with emphasis on fetal MR imaging. RadioGraphics. 2010; 30:385-395.

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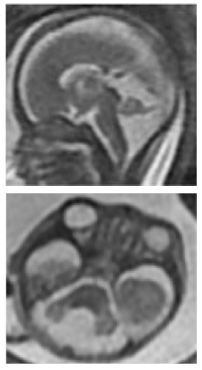
Sagittal (Figure 1a) and axial (Figure 1b) T2-weighted-images from a fetal MR at 22 gestational weeks are shown. Which one of the following is the MOST likely diagnosis?

A. Classical Dandy-Walker Malformation
B. Dandy-Walker continuum (Hypoplasia of the vermis with rotation)
C. Arachnoid Cyst
D. Mega cisterna magna
E. Joubert syndrome



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Which of the following entities is the MOST likely diagnosis in this fetus of 22 weeks gestational age?

- Fetal MRI shows 4th ventriculomegaly, marked counter-clockwise rotation of a hypoplastic vermis with an increased tegmento-vermian angle, and splaying of the cerebellar hemispheres. The torcular herophili is normal in position.
- Option A is **NOT** correct. Classical Dandy-Walker Malformation is defined by the following criteria: counter-clockwise rotation of a hypoplastic vermis; marked 4th ventriculomegaly; and enlargement of the posterior fossa and torcular elevation.
- Option B is **CORRECT**. Imaging findings meet all criteria for classical Dandy-Walker Malformation *except* elevation of the torcular herophili. Therefore, this represents a Dandy-Walker continuum.
- Option C is **NOT** correct. An arachnoid cyst can cause mass effect and distortion of the regional brain parenchyma, but is not typically associated with cerebellar hypoplasia.
- Option D is **NOT** correct. A mega cisterna magna does not splay the cerebellar hemispheres, malrotate the vermis, or cause vermian hypoplasia.
- Option E is **NOT** correct. Although Joubert syndrome may manifest with a malpositioned, hypoplastic vermis, the cerebellar hemispheres are typically apposed and the midbrain is dysmorphic, with thinning of the lower tegmentum and thickened superior cerebellar peduncles ("molar tooth malformation").

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Which of the following entities is the MOST likely diagnosis in this fetus of 22 weeks gestational age?

- Patel S, et al. Analysis and classification of cerebellar malformations. AJNR Am J Neuroradiol. 2002;23:1074-1087
- Barkovich JA, et al. Congenital malformations of the brain and skull. In: Barkovich AJ, et al., editors. Pediatric Neuroimaging, 5th edition. Philadelphia: Lippincott Williams & Wilkins; 2012.
- Osborn AG, et al. Diagnostic Imaging: Brain, 1st edition. Altona: Friesens; 2004.
- Tortori-Donati P, et al. Brain Malformations. In: Tortori-Donati P, et al., editors. Pediatric neuroradiology: brain, head, neck and spine. Berlin: Springer; 2009.

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Which of the following is an exclusion criteria for fetal meningomyelocele surgery?

A. Meningomyelocele at L3
B. Normal karyotype
C. Presence of hindbrain herniation
D. Presence of club feet
E. Scoliotic curvature of > 30°

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Which of the following is an exclusion criteria for fetal meningomyelocele surgery?

- Options A , B, and C are **NOT** correct. They are inclusion criteria for surgery
- Option D is **NOT** correct. Club feet do not exclude a patient from undergoing fetal surgery
- Option E is **correct**. Severe scoliosis has been used as an exclusion criteria for fetal surgery

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Which of the following is an exclusion criteria for fetal meningomyelocele surgery?

- Adzick NS, et al. A randomized trial of prenatal versus postnatal repair of myelomeningocele. N Engl J Med. 2011;365:993–1004.
- Danzer E, et al. Fetal surgery for myelomeningocele: progress and perspectives. Dev Med Child Neurol. 2011;54:8–14.
- Gupta N, et al. Open fetal surgery for myelomeningocele. J Neurosurg Pediatr. 2012;9:265–273.

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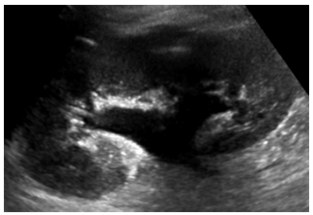
What was one of the purposes of the new UTD classification?

A. Create more confusion amongst the pediatricians
B. Create more confusion amongst the pediatric radiologists
C. Unify the language used by MFMs and pediatric radiologists only
D. Standardize terminology of UTD that could be applied both prenatally and postnatally
E. All of the above



What was one of the purposes of the new urinary tract dilatation classification?

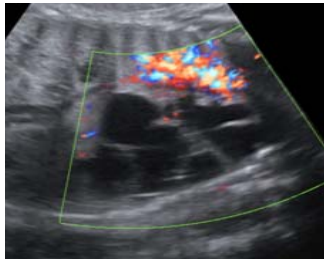
- Options A and B are **NOT** correct. The panel believed there the terminology was already confusing caregivers.
- Option C is **NOT** correct. The goal was to unify the language used by MFMs and pediatric radiologists as well as pediatric urologists, pediatricians, OB/GYNs and pediatric surgeons.
- Option D is **CORRECT**. The principal goals for the Consensus Panel were:
  - To propose a unified description of UT dilation that can be applied both prenatally and postnatally with consistent terminology.
  - To propose a standardized scheme for the perinatal evaluation of these patients based on sonographic criteria.
- Option E is **NOT** correct for all the above reasons.

What was one of the purposes of the new urinary tract dilatation classification?

- Nguyen HT, et al. Multidisciplinary consensus on the classification of prenatal and postnatal urinary tract dilation (UTD classification system). J Pediatr Urol. 2014;10:982-999.

You are shown a prenatal ultrasound of a fetus at 32 weeks gestation. Regarding the imaged abnormality,

A. The most rapid growth of this mass typically occurs after 30 weeks.
B. There is no communication with the tracheobronchial tree
C. The presence of fetal hydrops is an indicator of poor prognosis
D. There is systemic arterial supply
E. Immediate postnatal surgical resection is indicated in asymptomatic children



Which of the following is true regarding the abnormality shown on this ultrasound of the chest in a fetus imaged at 32 weeks of gestation?

- Option A is **NOT** correct. CPAMs grow most rapidly during the 20-26 weeks of gestation after which growth peaks and plateaus.
- Option B is **NOT** correct. CPAMs typically have abnormal communication with the tracheobronchial tree.
- Option C is **CORRECT**. Fetal hydrops is an indicator of poor prognosis in patients with congenital pulmonary airway malformation.
- Option D is **NOT** correct. CPAMs have pulmonary arterial supply.
- Option E is **NOT** correct. Immediate postsurgical resection is not indicated in asymptomatic, infants. Surgical resection may be performed in symptomatic neonates.

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Which of the following is true regarding the abnormality shown on this ultrasound of the chest in a fetus imaged at 32 weeks of gestation?

- Barth RA. Imaging of fetal chest masses. Pediatr Radiol. 2012;42: S62-S73.
- Alamo L, et al. Prenatal diagnosis of congenital lung malformations. Pediatr Radiol. 2012;42:273-283.
- Pacharn P, et. al. Congenital lung lesions: prenatal MRI and postnatal findings. Pediatr Radiol. 2013;43:1136-1143.
- Rodriguez MR, et al. MR Imaging of thoracic abnormalities in the fetus. RadioGraphics. 2012; 32:E305-E321.
- Biyyam DR et al. Congenital lung abnormalities: embryologic features, prenatal diagnosis, and postnatal radiologic-pathologic correlation. RadioGraphics. 2010; 30:1721-1738.
- Daltro P, et al. Congenital chest malformations: a multimodality approach with emphasis on fetal MR imaging. RadioGraphics. 2010; 30:385-395.

Visualize the Future

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Which is true about distal intestinal obstruction?

A. Echogenic bowel is very common
B. There is often polyhydramnios
C. It is often undetected prenatally
D. Calcifications are usually seen in the bowel
E. All of the above are true

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Which is true about distal intestinal obstruction?

- Option A is **NOT** correct. Echogenic bowel occurs in 1.8% of all second trimester fetuses
- Option B is **NOT** correct. Because the fluid is absorbed in patients with a distal intestinal obstruction, polyhydramnios is not expected.
- Option C is **CORRECT**. Distal bowel obstructions are not well detected prenatally – this is because they either occur late in gestation and/or there is a normal amount of amniotic fluid.
- Option D is **NOT** correct. Calcifications are only be seen in the intestines in patients with an anorectal malformation or cloaca.
- Option E is **NOT** correct.

Visualize the Future

Which is true about distal intestinal obstruction?

- Rubesova E. Fetal bowel anomalies--US and MR assessment. Pediatr Radiol. 2012;42:S101-6.
- Calvo-Garcia MA, et al. Fetal MRI clues to diagnose cloacal malformations. Pediatr Radiol. 2011;41:1117-28.
- Belin B, et al. How accurate is prenatal sonography for the diagnosis of imperforate anus and Hirschsprung's disease? Ped Surg Internat. 1995;10:30-32.