Neonatal Head US: Useful Techniques to Improve Diagnosis
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1. Which of the following statements regarding neonatal brain ultrasound imaging is CORRECT:
   A. The mastoid fontanelle provides excellent visualization of the posterior fossa.
   B. The cerebellum is best imaged via the anterior fontanelle.
   C. The posterior fontanelle is of limited value in assessing the occipital horns of the lateral ventricles.
   D. The foramen magnum cannot be accessed sonographically.

   **Correct Answer: A**

   **Rationale**
   The posterior fossa, including the cerebellum, is optimally imaged via the mastoid fontanelle. Answer B is incorrect. Explanation: See above explanation for the correct answer. Answer C is incorrect. Explanation: The posterior fontanelle is particularly useful in imaging the occipital horns of the lateral ventricles in the setting of intraventricular hemorrhage. Answer D is incorrect. Explanation: The neonatal foramen magnum is easily accessible sonographically.

   **References**

2. Which of the following statements regarding Doppler US imaging of the brain is CORRECT:
   A. The middle cerebral artery is best imaged via the anterior fontanelle.
   B. Systolic and diastolic blood flow velocities decrease with increasing gestational age.
   C. Cerebral edema, hydrocephalus, hemorrhage and extra-axial fluid collections all result in an increase in vascular resistance.
   D. Most neonatal vascular strokes are hemorrhagic.

   **Correct Answer: C**

   **Rationale**
   Cerebral edema, hydrocephalus, hemorrhage and extra-axial fluid collections all result in an increase in vascular resistance. Answer A is incorrect. Explanation: The middle cerebral artery is best imaged with axial images obtained through the squamous portion of the temporal bone. Answer B is incorrect. Explanation: Systolic and diastolic blood flow velocities increase with increasing gestational age. Answer D is incorrect. Explanation: Most neonatal vascular strokes are ischemic and secondary to thrombosis.

   **References**
3. In recognizing suspicious patterns of thyroid nodules what is the most concerning feature for papillary thyroid cancer:
   A. Hypervascularity  
   B. Microcalcifications  
   C. Capsule with refractive shadow  
   D. “White knight”

   **Correct Answer: B**

   **Rationale**
   Answer A is incorrect. Explanation: While hypervascularity is a sign to look for it has low specificity to detect malignancy. Answer C is incorrect. Explanation: Follicular neoplasms (inclusive of adenoma or other neoplasm) have a hypoechoic capsule which demonstrates refractive edge shadowing. This is not typical of classical papillary thyroid carcinoma. Answer D is incorrect. Explanation: The white knight has a very low association with malignancy, less than 5%, and generally is considered a benign feature.

   **Reference**
   1. The American Thyroid Association Guidelines Task Force on Pediatric Thyroid Cancer, THYROID Volume 25, Number 7, 2015

4. In the evaluation of thyroid nodules in children:
   A. As in adults, size alone can be used to identify nodules that warrant FNA.  
   B. Pre-operative FNA of a hyperfunctioning nodule is always warranted.  
   C. All FNA in children should be performed under US-guidance.  
   D. In the setting of an adequate sample, repeat FNA in nodules with indeterminate cytology is recommended.

   **Correct Answer: C**

   **Rationale**
   Answer A is incorrect. Explanation: The 2009 adult guidelines indicate that FNA is not warranted for the evaluation of a nodule < 1 cm in size unless the patient is considered high-risk. However the gland size changes with the growth of the patient. Therefore, US characteristics and clinical context should be used more preferentially to identify nodules that warrant FNA. Answer B is incorrect. Explanation: Pre-operative FNA of a hyperfunctioning nodule in children is not warranted, based on the understanding that all hyperfunctioning nodules in children will be surgically removed. Answer D is incorrect. Explanation: Repeat FNA is not recommended in this setting, rather, lobectomy is recommended.

   **Reference**
   1. The American Thyroid Association Guidelines Task Force on Pediatric Thyroid Cancer, THYROID Volume 25, Number 7, 2015
5. A 14 year old boy presents with 4 days of fever and sore throat. What is the most likely diagnosis based on tonsil ultrasound?
   - A. Acute Tonsillitis
   - B. Peritonsillar Abscess
   - C. Peritonsillar Phlegmon
   - D. Intratonsillar Abscess

   **Correct Answer: D**

   **Rationale**
   The tonsil is enlarged and hyperemic with a sub centimeter size hypoechoic pocket within that most likely represents a small intratonsillar abscess. The patient was treated conservatively.

   **Reference**

6. After an equivocal clinical exam, what is the most appropriate next step in the management of suspected peritonsillar abscess?
   - A. Aspiration based on clinical impression
   - B. Contrast enhanced CT neck
   - C. Tonsil Ultrasound
   - D. Neck MRI

   **Correct Answer: C**

   **Reference**

Skin Sonography: What Can I Say?
*Cristian J. Garcia, MD*

7. 5-year-old girl with a preauricular nodule first noted six months ago. What is your diagnosis?
   - A. Epidermal cyst
   - B. Foreign body
   - C. Pylomatrixicoma
   - D. Dermoid cyst

   **Correct Answer: C**
Rationale
The lesion has punctate calcifications, is surrounded by an hypoechoic rim and involves the hypodermis and the deep dermis. Answer A is incorrect. Explanation: Epidermal cysts do not calcify nor have a hypoechoic rim. Answer B is incorrect. Explanation: Foreign bodies are mostly hyperechogenic and can determine acoustic shadowing. Answer D is incorrect. Explanation: Dermoid cysts are in most cases congenital and preauricular region is not a common location.

References
1. https://radiopaedia.org/articles/pilomatricoma

8. Regarding skin nodules in children, please indicate the correct alternative:
A. Inflammatory changes are uncommon in epidermal cysts
B. Metastatic skin nodules are commonly calcified.
C. Dermoid cysts are commonly located in the extremities.
D. Clinical – sonographic correlation is important in the diagnosis.

Correct Answer: D

Rationale
Clinical history and clinical findings are very important in the interpretation of sonographic findings. Answer A is incorrect. Explanation: Epidermal cysts get frequently infected. Answer B is incorrect. Explanation: Metastatic skin nodules are mostly hypoechoic and noncalcified. Answer C is incorrect. Explanation: Dermoid cysts are commonly located in the face or the scalp.

References

Appendicitis Debate - US, CT and MR
Andrew T. Trout, MD (US), Michael J. Callahan, MD (CT) and Ethan A. Smith, MD (MR)

9. What is the most appropriate initial imaging for suspected appendicitis in children?
A. Ultrasound
B. Limited CT
C. Limited MRI
D. Radiographs

Correct Answer: A
Rationale
ACR appropriateness criteria recommend ultrasound as most appropriate examination.

Reference

10. Which MRI sequence may be helpful for evaluation of intraappendiceal pus or postoperative abscess?
   A. CISS
   B. FIESTA
   C. DWI
   D. TWIST

**Correct Answer: C**

Rationale
Diffusion Weighted Imaging is excellent for detection of abscess. Answers A, B, and D are incorrect. CISS and FIESTA are heavily T2 weighted steady state sequences. TWIST is a time resolved angiographic sequence.

Reference

Secrets of the Experts: 5 Things I Learned the Hard Way in US
Henrietta K. Rosenberg, MD, FACR

11. 2 month old male with bluish mass upper left chest. What is the most likely diagnosis?
   A. Neuroblastoma
   B. Hemangioma
   C. Pilomatricoma
   D. Dermoid

**Correct Answer: C**

Rationale
Pilomatricoma is an uncommon benign subcutaneous tumor that arises from hair matrix cells, most commonly seen in children and adolescents. They are most frequently seen in the head, neck, and upper extremity and tend to be small in size, generally less than 2 cm in diameter. The mass is typically a non-tender, freely mobile, hard nodule with an irregular surface, sometimes with bluish/purplish discoloration of the overlying skin. Two ultrasound patterns have been described: well-defined heterogeneously hyperechoic lesion with a hypoechoic rim and echogenic calcified foci and an irregular, homogeneously hyperechoic mass with posterior acoustic shadowing caused by complete calcification. Color Doppler is mainly peripheral but is occasionally central.
12. Which is the most characteristic US finding in an aneurysmal bone cyst?

A. Simple cyst
B. Multisepetated cystic mass
C. Multiple solid components
D. Cortical thickening

**Correct Answer: B**

**Rationale**

Aneurysmal bone cysts (ABC) are expansile lesions consisting of numerous blood filled channels separated by fibrous septa that may contain osteoclast-like giant cells. ABC can exist either as a primary bone lesion (70%) or as a secondary lesion arising from another bone disorder (30%) such as chondroblastoma, fibrous dysplasia, or giant cell tumor. Pain and swelling are the most common clinical presentations.

**References**