Liver Imaging
Body Imaging Postgraduate Course - May 15, 2018
SAM References

Liver Masses – Pretext Staging

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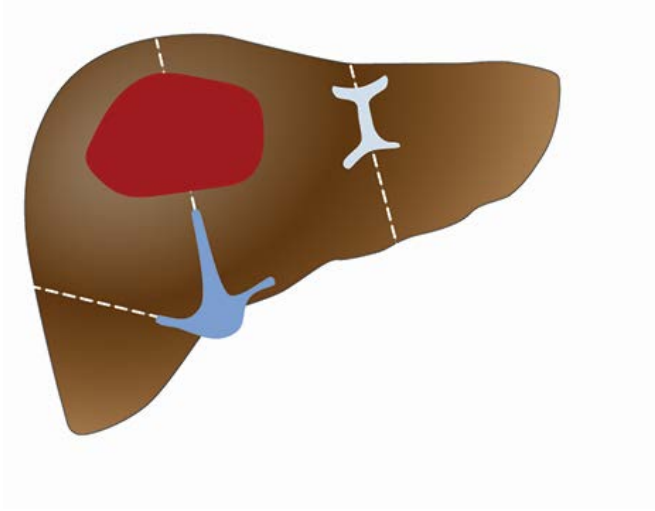
1. Which of the following choices represents the correct PRETEXT group for this tumor?



A. PRETEXT 1
B. PRETEXT 2
C. PRETEXT 3
D. PRETEXT 4

Correct Answer: C
Rationale: The tumor involves the right anterior and left medial sections of the liver. Three sections would have to be resected (either via an extended right hepatectomy or an extended left hepatectomy) in order to completely excise the tumor. Thus, this represents a PRETEXT 3 tumor, and answers A, B, and D are incorrect.
Reference:

- Towbin AJ, Meyers RL, Woodley H, Miyazaki O, Weldon CB, Morland B, Hiyama E, Czauderna P, Roebuck DJ, Tiao GM. 2017 PRETEXT: radiologic staging system for primary hepatic malignancies of childhood revised for the Paediatric Hepatic International Tumour Trial (PHITT). Pediatr Radiol. 2018 Apr;48(4):536-554.

2. Which of the following statements represents a venous positive (V+) annotation factor according to the 2017 PRETEXT staging system?

A. Tumor touching the right hepatic vein
B. Tumor encasing the right hepatic vein
C. Tumor encasing the right and the middle hepatic veins
D. Tumor thrombus in the left hepatic vein

Correct Answer: D
Rationale: According to the 2017 version of PRETEXT, a tumor is said to be V+ if it meets any of the following criteria: 1) The tumor obliterates all three first-order hepatic veins or the intrahepatic inferior vena cava; 2) The tumor encases (by more than 50% or 180°) all three first-order hepatic veins or the intrahepatic inferior vena cava; 3) There is tumor thrombus in any one (or more) first-order hepatic vein or the intrahepatic inferior vena cava.

Reference:

- Towbin AJ, Meyers RL, Woodley H, Miyazaki O, Weldon CB, Morland B, Hiyama E, Czauderna P, Roebuck DJ, Tiao GM. 2017 PRETEXT: radiologic staging system for primary hepatic malignancies of childhood revised for the Paediatric Hepatic International Tumour Trial (PHITT). Pediatr Radiol. 2018 Apr;48(4):536-554.

Budd-Chiari/Veno-Occlusive Disease

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3. The Best Sonographic indicator to diagnose VOD/SOS is?

A. Hepatomegaly
B. Gallbladder wall thickening less than 4 mm
C. Narrowing of Portal Vein
D. Ascites, gallbladder wall thickening, hepatomegaly, and slowed/reversed portal flow, but US findings alone are not diagnostic.

Correct Answer: D
Rationale: Ultrasound findings that can be see with VOD/SOS include hepatomegaly, ascites, marked gallbladder wall thickening, HA RI >0.75, and reversal of portal venous blood flow. However, ultrasound findings may be absent or nonspecific, and the diagnosis relies heavily on clinical diagnostic criteria.
Reference:

- McCarville MB, Hoffer FA, Howard SC, et al. Hepatic veno-occlusive disease in children undergoing bone-marrow transplantation: usefulness of sonographic findings. Pediatr Radiol 2001;31:102-105
- Mahgerefteh SY, Sosna J, Bogot N, et al. Radiologic Imaging and Intervention for Gastrointestinal and Hepatic Complications of Hematopoietic Stem Cell Transplantation. Radiology 2011;258 (3):660- 671.
- Chao N. How I treat sinusoidal obstruction syndrome. Blood 2014 123:4023-4026.

4. Budd-Chiari syndrome can be distinguished from VOD/SOS on US based on which of the following?

A. Thrombosis of the hepatic veins and/or inferior vena cava
B. Absent intrahepatic collateral pathways
C. Slow hepatofugal blood flow in the portal vein
D. Clinical triad of hepatomegaly, abdominal pain, and ascites

Correct Answer: A
Rationale: VOD/SOS resembles Budd-Chiari syndrome clinically but the obstruction in Budd-Chiari syndrome is due to thrombosis of the hepatic veins or IVC, while in VOD it is due to occlusion of the terminal hepatic venules and sinusoids.
Reference:

- McCarville MB, Hoffer FA, Howard SC, et al. Hepatic veno-occlusive disease in children undergoing bone-marrow transplantation: usefulness of sonographic findings. Pediatr Radiol 2001;31:102-105.
- Brancatelli G, Vilgrain V et al. Budd-Chiari Syndrome: Spectrum of Imaging Findings. AJR 2007;188: 168 – 176.
- Desser TS, Sze DY, Jeffrey RB. Perspective: Imaging and Intervention in the Hepatic Veins. AJR2003;180: 1583 -1591.

Iron and Fat Deposition

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5. Which of the following are methods of quantifying liver steatosis?

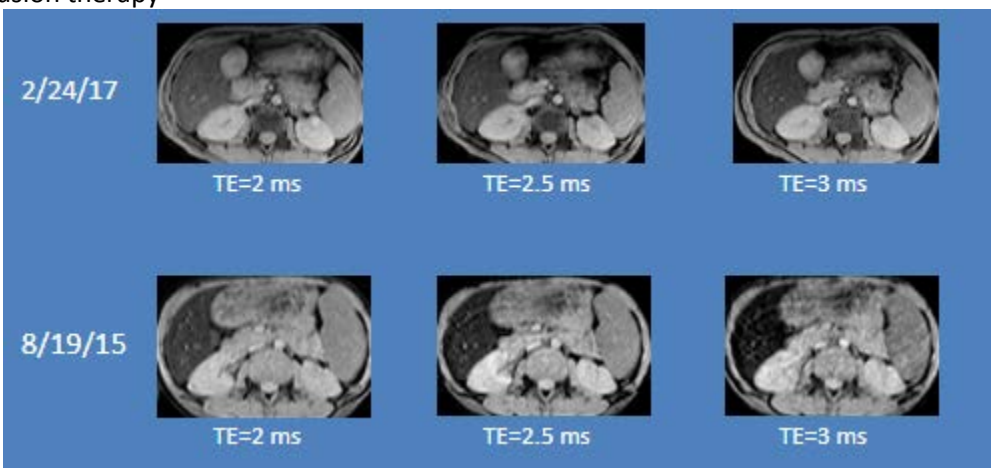
A. Single voxel spectroscopy
B. Proton density multi-echo gradient echo
C. Biopsy
D. All of the above

Correct Answer: D
Rationale: All listed methods can quantify hepatic fat.
Reference:

- Runge JH, Smits LP, Verheij J, Depla A, Kuiken SD, Baak BC, Nederveen AJ, Beuers U, Stoker J. MR Spectroscopy-derived Proton Density Fat Fraction Is Superior to Controlled Attenuation Parameter for Detecting and Grading Hepatic Steatosis. Radiology. 2018 Feb;286(2):547-556. doi: 10.1148/radiol.2017162931. Epub 2017 Sep 15.
- Middleton MS, Van Natta ML, Heba ER, Alazraki A, Trout AT, Masand P, Brunt EM, Kleiner DE, Doo E, Tonascia J, Lavine JE, Shen W, Hamilton G, Schwimmer JB, Sirlin CB.

6. The following gradient-echo images were obtained on the same 1.5T scanner. Which of the following best explains the change between 8/19/15 and 2/24/17?

A. Worsening liver disease
B. Therapeutic phlebotomy
C. Increased LIC
D. Transfusion therapy



Correct Answer: B
Rationale: Phlebotomy decreases total body iron and liver iron concentration explaining the increased signal intensity between the two exams.
Reference:

- Queiroz-Andrade M, Blasbalg R, Ortega CD, Rodstein MA, Baroni RH, Rocha MS, Cerri GG. "MR imaging findings of iron overload." Radiographics. 2009 Oct;29(6):1575-89.
- Hernando D, Levin YS, Sirlin CB, Reeder. "Quantification of liver iron with MRI: state of the art and remaining challenges." J Magn Reson Imaging. 2014 Nov;40(5):1003-21.

Transplant Complications – US/Doppler (Early and Late)

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7. Which of the following statements is true about blood flow in a pediatric liver transplant?

A. Flow within a pediatric liver transplant on post-operative day 1 is hyperdynamic compared to an adult liver transplant
B. An hepatic artery resistive index (RI) of 0.3 is a normal finding 1 year after transplant
C. Patients with portal vein stenosis will often show pre-stenotic dilation of the portal vein
D. Normal hepatic vein flow is monophasic

Correct Answer: A
Rationale: Compared to an adult liver transplant, blood flow within a pediatric liver transplant on post-operative day 1 is commonly hyperdynamic.
Reference:

- Ahmad, T, Chavhan, G, Avitzur, Y, Moineddin, R, Oudjhane, K. Doppler Parameters of the Hepatic Artery as Predictors of Graft Status in Pediatric Liver Transplantation. Am J Roentgenol. 2017 Sep;209(3):671-675.
- Jamieson, LH, Arys, B, Low, G, Bhargava, R, Kumbla, S, Jaremko, JL. Doppler ultrasound velocities and resistive indexes immediately after pediatric liver transplantation: normal ranges and predictors of failure. Am J Roentgenol. 2014 Jul;203(1):W110-6.

8. Which of the following is <u>TRUE</u> regarding liver transplant ultrasound in the immediate/early postoperative period?

A. Hepatic vein stenosis is the most common early postoperative vascular complication
B. Hepatic artery parvus tardus waveforms can be a normal finding
C. Pulsatile main portal vein with increased velocity is abnormal
D. Hepatic infarction and biliary dilatation can be seen in the early postoperative period most commonly due to decreased portal venous blood flow

Correct Answer: B
Rationale: Hepatic artery parvus tardus waveforms can be a normal finding in the early postoperative setting due to hepatic artery/anastomotic narrowing from post-surgical edema.
Reference:

- Horvat N et al. Pediatric Liver Transplant: Techniques and Complications. RadioGraphics 2017;37:1612-31.
- Berrocal T et al. Pediatric Liver Transplantation: A Pictorial Essay of Early and Late Complications. RadioGraphics 2006; 26:1187-1209.
- Sanyal R et al. Orthotopic Liver Transplantation: Reversible Doppler US findings in the Immediate Postoperative Period. RadioGraphics 2012; 32:199-211.