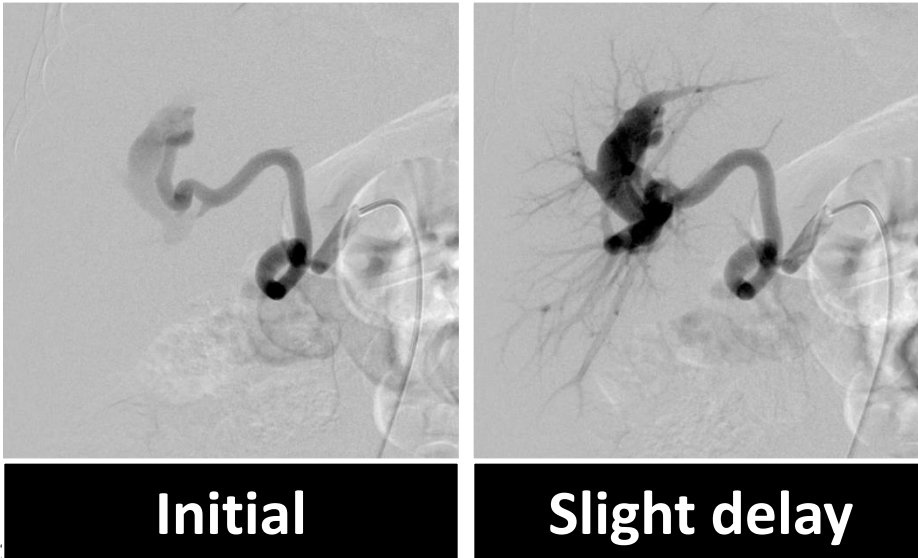


Transplant Interventions

Jared R. Green, MD

1. What is the finding of this pediatric liver transplant hepatic arteriogram?



- A. Hepatic artery extravasation.
- B. Hepatic artery to portal vein fistula.
- C. Hepatic artery to hepatic vein fistula.
- D. Hepatic artery occlusion.

Correct Answer: B

Rationale: Initial hepatic arteriogram image shows early opacification of a circumscribed area of contrast extrinsic to the hepatic artery. Subsequent image shows continued filling of the intrahepatic portal vein, via the hepatic artery, consistent with arterioportal fistula.

Reference:

- Tanimoto A, Rajeswaran S, et. al. (2018) Radiological Investigation and Intervention in Pediatric Solid Organ Transplantation. In: Dunn S, Horslen S (eds) Solid Organ Transplantation in Infants and Children. Organ and Tissue Transplantation. Springer, Cham

2. What determines eligibility for liver transplant in a patient with hepatoblastoma and pulmonary metastatic disease? (LEVEL 1-B evidence):

- A. Initial diagnosis of pulmonary mets precludes transplant.
- B. Liver masses regress post chemo.
- C. Reduced pulmonary metastases on CT chest post chemo.
- D. Clear margins on pulmonary met wedge resection.

Correct Answer: C

Rationale: Level 1-B evidence states that patients with hepatoblastoma and pulmonary metastases can be considered for liver transplant if: 1. post chemo chest CT shows no pulmonary metastases OR 2. wedge mastectomy shows clear margins.

Reference:

- Squires RH, Ng V et. al. Evaluation of the pediatric patient for liver transplantation: 2014 practice guideline by the American Association for the Study of Liver Diseases, American Society of Transplantation and the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition. *Hepatology* 2014 60:362-398.

3. What sonographic parameter is predictive of a hemodynamically significant (>50%) portal vein stenosis in pediatric patients post segmental liver transplant?

- A. Anastomotic stenosis diameter
- B. Change in velocity across the stenosis
- C. PV diameter post stenosis
- D. Peak anastomotic velocity

Correct Answer: D

Rationale: Peak anastomotic velocity is the only duplex US parameter that correlated with > 50% portal vein stenosis on percutaneous transhepatic portal venography.

Reference:

- Hawkins CM, Shaw DW et. al. Pediatric liver transplant portal vein anastomotic stenosis: correlation between ultrasound and transhepatic portal venography. *Liver Transplantation* 2015 21:547-553.

GI Interventions

Anne Gill, MD

4. Post pyloric delivery of feeds is associated with:

- A. Reduced gastroesophageal reflux with no improvement in the degree of pulmonary microaspiration
- B. Reduced gastroesophageal reflux and less pulmonary microaspiration
- C. Unchanged gastroesophageal reflux with less pulmonary microaspiration
- D. No evidence to suggest improvement in either the degree of gastroesophageal reflux or pulmonary microaspiration

Correct Answer: B

Reference:

- *Crit Care Med* 2001 Vol. 29, No. 8

5. Bowel perforation is known but rare complication of GJ tube placement. The most common risk factor found in the largest cohort published suggests it may be due to;

- A. Type of GJ tube
- B. Type of wire used to gain access into the small bowel
- C. Tube modified by operator (cut to length)
- D. GJ tube tip located beyond the ligament of Treitz

Correct Answer: D

Reference:

- *J Parenter Enteral Nutr.* 2016; 40: 1177-1182

6. **Feeding initiation can begin after de novo gastrojejunostomy tube within;**
- A. 4 - 6 hours
 - B. 12 hours
 - C. 24 hours
 - D. > 24 hours

Correct Answer: A

Reference:

- J Pediatr Gastroenterol Nutr 2012; 54:820-821.

Program Growth and Leadership

C. Matthew Hawkins, MD and Nghia "Jack" Vo, MD

7. **According to Kwan and Valji's study, IRs that provided higher number of E&M services had:**
- A. Higher overall procedural charges.
 - B. Higher number of procedural services.
 - C. Higher charges per unit of procedural service.
 - D. All of the above

Correct Answer: D

Reference:

- Kwan SW, Valji K. Interentional Radiologists' Involvement in Evaluation and Management Services and Association with Practice Characteristics. JVIR 2012; 23:887-892.

8. **According to White et al, a concerted effort to document inpatient E&M encounters resulted in:**
- A. Nearly 1400 annual RVUs from inpatient E&M services.
 - B. Nearly 700 annual inpatient encounters.
 - C. More time to do procedures.
 - D. A & B

Correct Answer: D

Reference:

- White SB, Sybul SL, Patel PJ, et al. A single-center experience in capturing inpatient evaluation and management for an IR practice. JVIR 2015; 26:958-962.

9. **Question: Which of the following are characteristics of high functioning teams?**
- A. Members have shared goals and common vision
 - B. There is mutual trust and understanding between team members
 - C. Ability to adapt to unforeseen circumstances quickly
 - D. All of the above

Correct Answer: D

Reference:

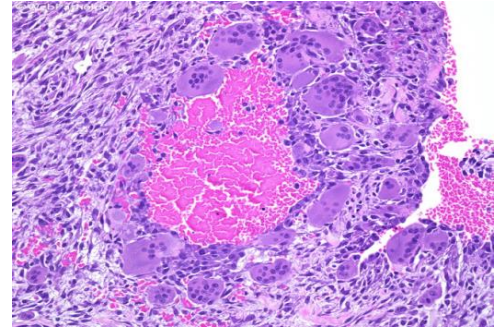
- <http://www.diagnosticimaging.com/practice-management/physician-burnout-and-high-functioning-teams-0>
- <https://www.forbes.com/forbes/welcome/?toURL=https://www.forbes.com/sites/lizryan/2016/05/12/why-building-a-high-performance-team-is-the-wronggoal/&refURL=http://www.diagnosticimaging.com/practice-management/physician-burnout-and-high-functioning-teams0&referrer=http://www.diagnosticimaging.com/practice-management/physician-burnout-and-highfunctioning-teams-0#170f780a4157>

Aneurysmal Bone Cysts

Leah E. Braswell, MD

10. Which cell type is the hallmark of aneurysmal bone cyst (ABC)?

- A. Endothelial cell
- B. Osteoblast
- C. Fibroblast
- D. Multinucleated giant cell



Correct Answer: D

Rationale:

Giant Cells are the hallmark. Answer A is incorrect. Vascular spaces are NOT lined with endothelium. Answer B is incorrect. Osteoblasts are INHIBITED. Answer C is incorrect. Fibroblasts can be present with healing.

Reference:

- Dabska, M. and Buraczewski, J. (1969), Aneurysmal bone cyst. Pathology, clinical course and radiologic appearances. *Cancer*, 23: 371–389. doi:10.1002/10970142(196902)23:2<371::AID-CNCR2820230213>3.0.CO;2-2

11. Which of the following is a method to reduce blood loss during ABC sclerotherapy treatment?

- A. Use multiple bone needles for access
- B. Insert gelfoam pledgets during needle withdrawal
- C. Inject bupivacaine along periosteum and into soft tissues
- D. Inject bone graft material into lesion

Correct Answer: B

Rationale: Gelfoam is used to prevent bleeding. Answer A is incorrect. Multiple needles to “get it all” and allow outflow. Answer C is incorrect. Bupivacaine for pain reduction. Answer D is incorrect. Vitoss for new bone growth scaffold.

Reference:

- Shiels WE, Beebe AC, Mayerson JL. Percutaneous Doxyxycline Treatment of Juxtaphyseal Bone Cysts. *J Pediatr Orthop*. 2016 Mar;36(2):205-12. doi: 10.1097/BPO.0000000000000413.

12. A 12-year-old boy had initial sclerotherapy of a humerus metaphyseal lesion 2 weeks ago. His mom calls stating that he developed sudden pain on the playground. What’s the most likely cause?

- A. Fracture
- B. Erosion of Vitoss into soft tissues
- C. Osteomyelitis
- D. Expected post-treatment bleeding into residual cavities

Correct Answer: A

Rationale: Fracture can induce acute pain and is the reason we limit activity. Answer B is incorrect. Vitoss erosion is not a thing. Answer C is incorrect. Infection unlikely. Answer D is incorrect. Bleeding is a thing, not a cause of acute pain.

Reference:

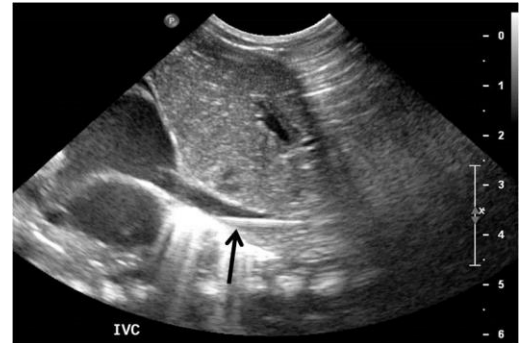
- Shiels WE, Beebe AC, Mayerson JL. Percutaneous Doxyxycline Treatment of Juxtaphyseal Bone Cysts. *J Pediatr Orthop*. 2016 Mar;36(2):205-12. doi: 10.1097/BPO.0000000000000413.

Venous Access

Craig M. Johnson, DO

13. Based on the lecture, for which procedure would this image be appropriate catheter tip verification documentation?

- A. 3 year old right IJ port
- B. Teenager left cephalic PICC
- C. Neonatal right tunneled femoral central line
- D. Neonatal left subclavian Broviac



Correct Answer: C

Rationale: Neonatal tunneled central line for which the appropriate tip position is the intrahepatic IVC to the inferior cavoatrial junction. Answer A is incorrect. Explanation: The appropriate position for 3 year old right IJ port would be superior cavoatrial junction to proximal right atrium. Answer B

is incorrect. Explanation: The appropriate position for teenager left cephalic PICC would be superior cavoatrial junction to proximal right atrium. Answer D is incorrect. Explanation: The appropriate position for neonatal left subclavian Broviac would be superior cavoatrial junction to proximal right atrium.

References:

- Subramanian S, Moe D. Infant lower extremity tunneled picc placement and confirmation of catheter tip position using only ultrasound guidance: description of a novel technique. *J Vasc Interv Radiol.* 2013;24(4):S30.
- Zhang K, Johnson C, Weber F, Rabinowitz D. "Neonatal and Infant Image-Guided Tunnelled Peripherally Inserted Central Venous Catheter: Infection and thrombosis rates in lower extremity vs. traditional upper extremity placement." Society of Pediatric Interventional Radiology. 5th International Meeting of the Society of Pediatric Interventional Radiology. October 28, 2017 Denver, CO.
- Baskin KM, Towbin R. Central Venous Access. In: Towbin, R, Baskin KM, eds. In: Pediatric Interventional Radiology. Cambridge: Cambridge University Press, 2015; 22-96.

14. Based on the Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines, which is the preferred site for dialysis catheters?

- A. Cone beam CT guided IVC placement
- B. Teenager right basilic 4Fr dual lumen PICC
- C. Left Subclavian Vein
- D. Right Internal Jugular Vein

Correct Answer: D

Rationale: Right Internal Jugular Vein with the (KDOQI) initiative indicating that jugular access is preferred. Explanation: Answer A is incorrect. Explanation: Cone beam CT guided IVC placement would be an option of last resort for a dialysis catheter only when other options are not available. Answer B is incorrect. Explanation: Teenager right basilic 4 fr dual lumen PICC should not be an option for dialysis and adequate flow rates. Answer C is incorrect. Explanation: Left Subclavian Vein is not the preferred site for dialysis catheter placement and can interfere or prevent maturation of arm fistulas and grafts.

References:

- National Kidney Foundation. Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines vascular access. https://www.kidney.org/professionals/guidelines/guidelines_commentaries/vascular-access - Accessed 2.1.2018.
- Baskin KM. Central Venous Access and Related Interventions. In: Temple M, Marshalleck F, Eds. In: Pediatric Interventional Radiology: Handbook of Vascular and Non-Vascular Interventions. New York: Springer, 2014; 107-131.

15. Which of the following veins has been found to have the highest rate of catheter-related thrombosis?

- A. Basilic vein
- B. Cephalic vein
- C. Brachial vein
- D. Internal jugular vein

Correct Answer: B

Rationale: Cephalic Vein with up to 57% of PICC-related thrombosis found within this commonly used vessel. Answer A is incorrect. Explanation: The basilic vein was only identified to have catheter related thrombosis in up to 14% of PICC-related thrombosis. Answer C is incorrect. Explanation: The brachial vein was only identified to have catheter related thrombosis in up to 10% of PICC-related thrombosis. Answer D is incorrect. Explanation: The internal jugular veins by definition cannot be labelled a PICC as this is a central venous access site. Additionally, the jugular vein when used for venous catheterization is known to have the lowest venous thrombosis rate of any commonly used veins in the body.

References:

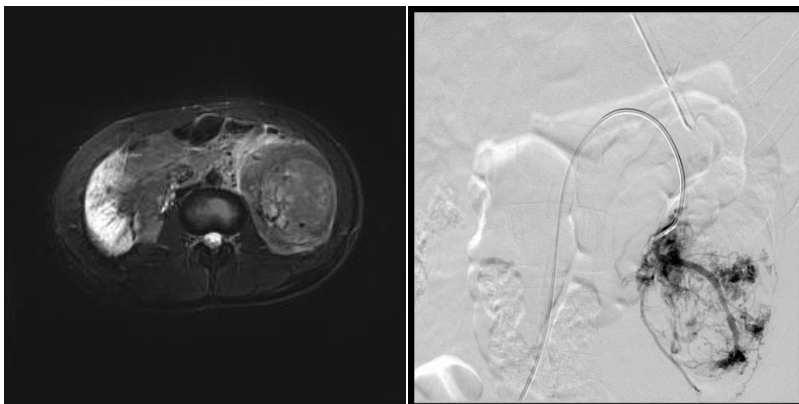
- Baskin KM, Towbin R. Central Venous Access. In: Towbin, R, Baskin KM, eds. In: Pediatric Interventional Radiology. Cambridge: Cambridge University Press, 2015; 22-96.
- Baskin KM. Central Venous Access and Related Interventions. In: Temple M, Marshalleck F, Eds. In: Pediatric Interventional Radiology: Handbook of Vascular and Non-Vascular Interventions. New York: Springer, 2014; 107-131.

GU Interventions

Seth E. Vatsky, DO

16. Post Hoc analysis of patients participating in the EXIST-1 trial demonstrated the following in regards to Angiomyolipoma (AML) progression or regression?

- A. A response rate among patients with AML of 75.8%
- B. An average AML size reduction in responders of <25%
- C. A short lived response, with rapid regrowth lesion regrowth following 3 months of treatment
- D. A poorly tolerated treatment in the study population, with >50% of the patients having to withdraw from the trial because of medication side effects.



Correct Answer: A

Rationale:

A response rate among patients with AML of 75.8% was observed in those undergoing treatment with coexisting Subependymal Giant Cell Astrocytoma (SEGA).

Explanation: Answer B is incorrect. Explanation: >80% of responders achieved a clinically relevant response rate of >50%. Answer C is incorrect. Explanation: Sustained mean reductions in responders were present over nearly 4 years of treatment. Answer D is incorrect. Explanation: Everolimus was generally well tolerated by patients,

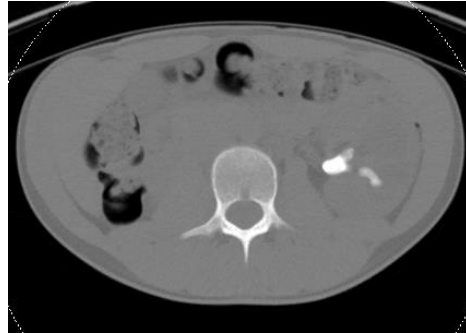
although all patients experience at least 1 adverse event. 3 patients discontinued Everolimus during the study because of an adverse event.

References:

- Bissler JJ, Franz DN, Frost MD, et al. The effect of everolimus on renal angiomyolipoma in pediatric patients with tuberous sclerosis being treated for subependymal giant cell astrocytoma. *Pediatr Nephrol*. 2018;33(1):101-109. doi:10.1007/s00467-017-3806-1.

17. In the management of nephrolithiasis >20mm in size, the primary acceptable treatment options for stone removal in the pediatric population are:

- A. Percutaneous Nephrolithotomy (PCNL) or Shockwave Lithotripsy (SWL)
- B. Laproscopic Surgery or SWL
- C. Retrograde Intrarenal Surgery or PCNL
- D. Open stone extraction



Correct Answer: A

Rationale:

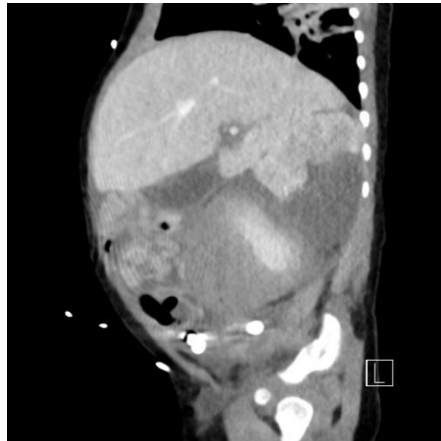
Percutaneous Nephrolithotomy or Shockwave Lithotripsy (SWL) are the first line approach according to the AUA 2016 recommendations. PCNL has the highest stone free rate (SFR >90%) of all interventions in this category, with a similar complications rate to SWL or retrograde surgery. Decreases in complication rates of PCNL have been attributed to improved operative techniques and the wide spread availability of “mini” and “micro” perc devices. Longer hospitalization times have been reported with PCNL. Answer B is incorrect_- Laproscopic Surgery or SWL. While SWL is a primary option for these patients with SFR of 73-83%, Laparoscopic surgery should only be considered in patients with coexisting anatomic abnormalities. PCNL and SWL have high rates of success and lower complications rates in comparison to both laparoscopic and robotic techniques. Answer C is incorrect_- Retrograde Intrarenal Surgery or PCNL. PCNL and SWL are the preferred method for treatment of large stone burden. However, RIRS is technically possible in this setting; there is a higher complication rate with potential for ureteral perforation. RIRS is preferred in patients with smaller stone burden (<20mm).

References:

- Nelson CP, Pace KT, Jr VMP, et al. American Urological Association (AUA) Guideline SURGICAL MANAGEMENT OF STONES : American Urological Association Surgical Management. 2016;(April):1-50.
- Zhang W, Zhou T, Wu T, et al. Retrograde Intrarenal Surgery Versus Percutaneous Nephrolithotomy Versus Extracorporeal Shockwave Lithotripsy for Treatment of Lower Pole Renal Stones: A Meta-Analysis and Systematic Review. *J Endourol*. 2015;29(7):745-759. doi:10.1089/end.2014.0799.

18. The 'acceptable' range of post procedure hemorrhage in percutaneous nephrostomy alone (i.e. – not associated with stone removal) in the adult population is:

- A. 1-10%
- B. 12-14%
- C. 1-4%
- D. 0.1-0.6%



Correct Answer: C

Rationale: According to the JVIR Standards of Practice (2016) the acceptable range of hemorrhagic complications in the setting of isolated percutaneous nephrostomy (PCN) is 1-4% with a threshold for root cause analysis when rates exceed 4%. Answer A is incorrect. Explanation: 1-10% is the complication rate range for septic shock in the setting of PCN. Answer B is incorrect. Explanation: 12-14% is the reported hemorrhagic complications rate in the setting of percutaneous nephrostomy performed in the setting of percutaneous nephrolithotomy. Answer D is incorrect. Explanation: 0.1-0.6% is the reported complication rate for pleural transgression/complication

Reference:

- Pabon-Ramos WM, Dariushnia SR, Walker TG, et al. Quality Improvement Guidelines for Percutaneous Nephrostomy. *J Vasc Interv Radiol.* 2016;27(3):410-414. doi:10.1016/j.jvir.2015.11.045.