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Gastroenterology & Hepatology
Advanced Practice Providers

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Liver Resections: Who is a candidate and what are the post-operative risks

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Disclosures

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Speakers Bureau: Gilead, Clinical Area – HCV

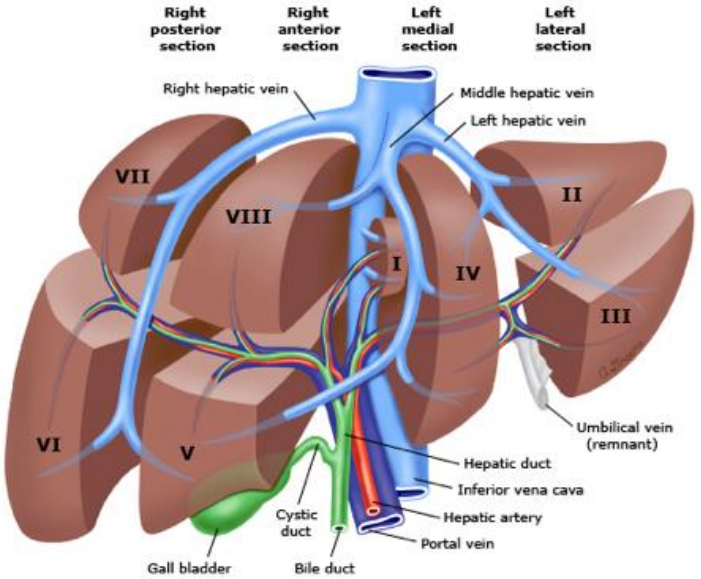
Speakers Bureau: Salix, Clinical Area – Hepatic Encephalopathy

Liver Anatomy

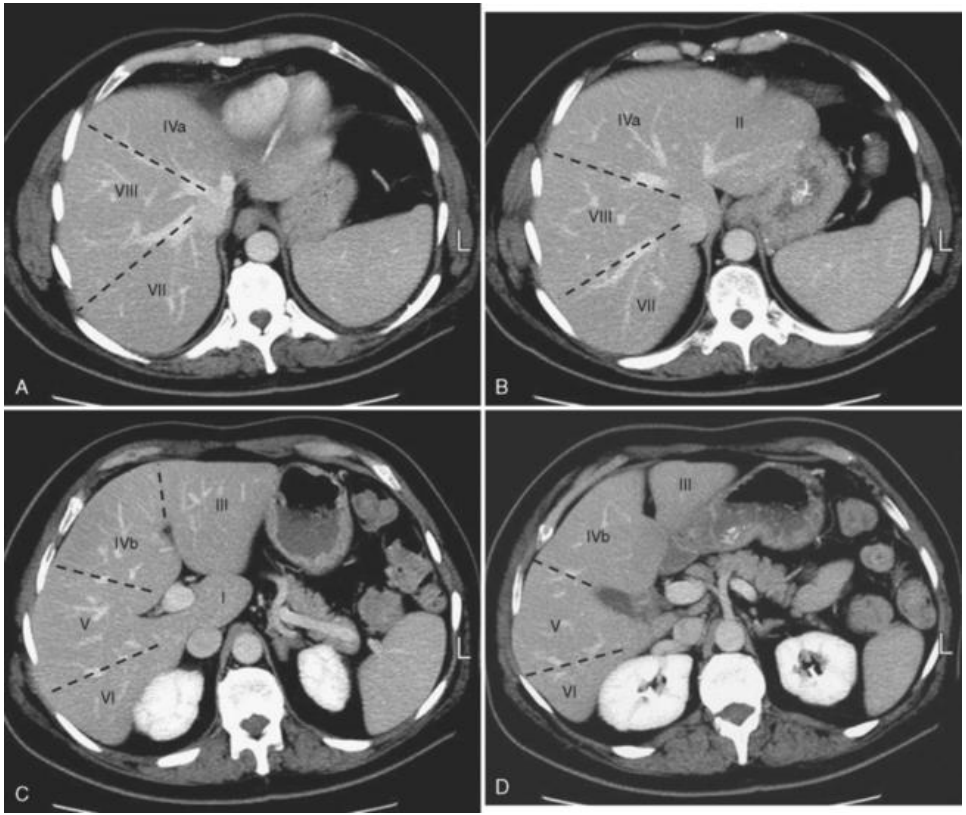
- Two lobar segments – right and left
- Subdivided into eight (Couinaud) segments
- Based upon vascular supply and bile duct distribution
- Basis for various types of resections (more on this later)

Liver Anatomy

Segmental anatomy of liver



Drawing depicting the functional segments of the liver (Couinaud segments). Segments II to IV make up the left lobe and segments V to VIII constitute the right lobe.


IVa
VIII
VII
L
A
IVa
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VII
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IVb
I
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C
III
IVb
V
VI
L
D

Liver Regeneration

- Healthy livers
  - Significant regeneration weeks to months after resection[1]
- Slower in obese patients (BMI >30)[2]

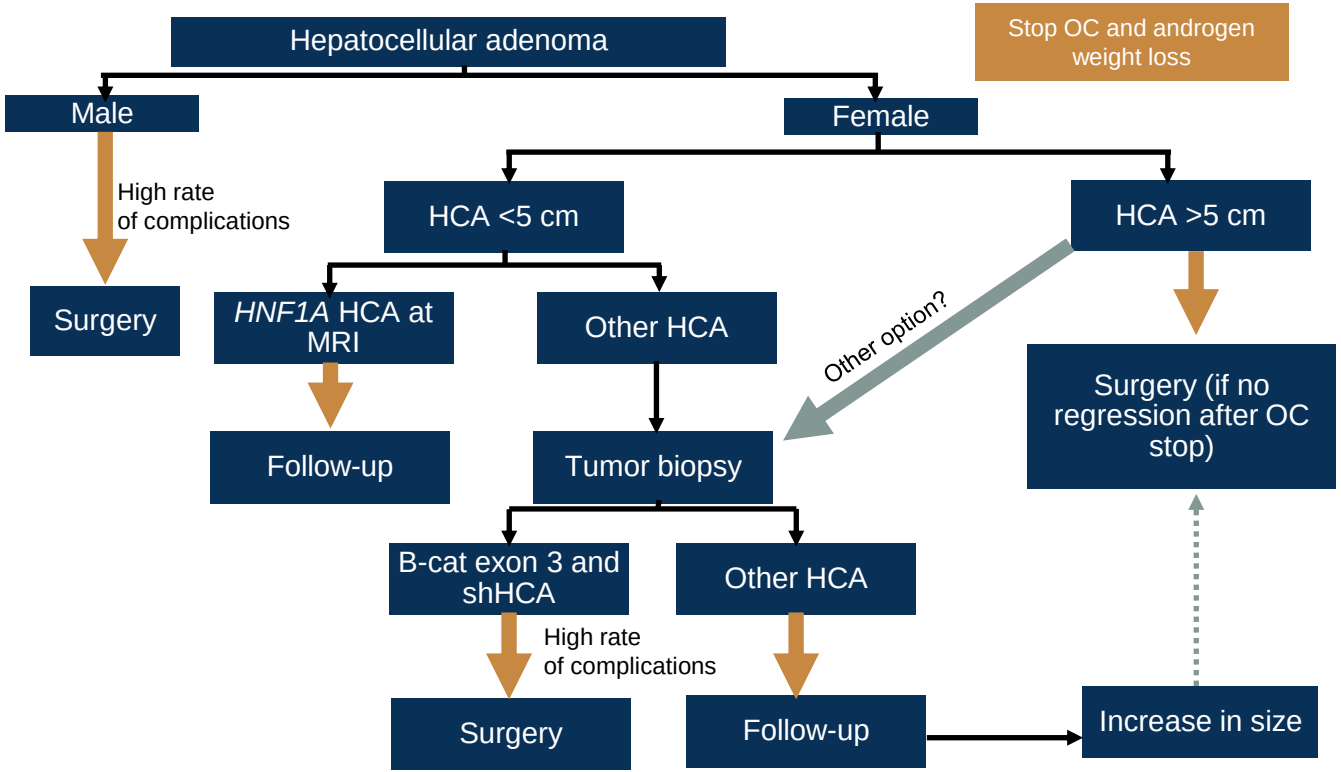
1. Kele et al. 2012; 2. Truant et al. 2013.

Most Common Indications

- Malignant tumor
  - Primary (HCC or cholangioCA)
  - Secondary (CRC, NET, GB, etc.)
- Benign liver conditions – symptomatic!
  - Adenomas vs. Focal nodular hyperplasia (EOVIST MRI)
  - Hemangiomas, simple cysts, complex cysts

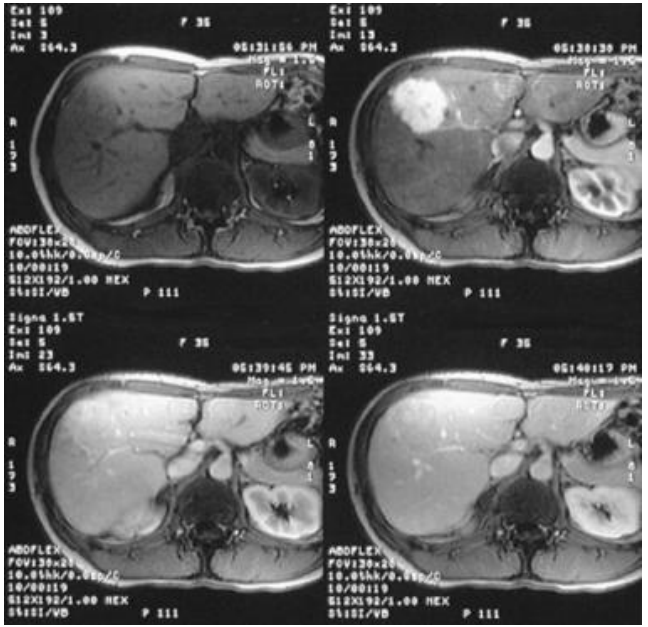
Benign Liver Conditions

- Adenomas – benign but premalignant (10% lifetime risk)
  - Risk factors:
    - Size >5 cm
    - Subtype – determined by biopsy
    - Hepatocyte nuclear factor (HNF)
  - Inflammatory HNF
  - Beta catenin – highest risk of malignant transformation

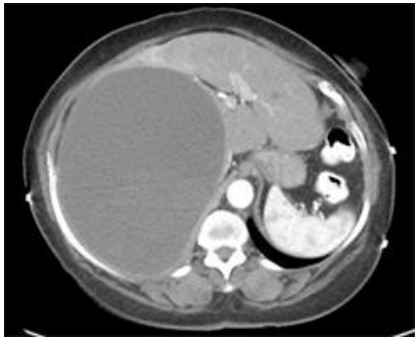

Hepatocellular adenoma
Stop OC and androgen weight loss
Male
Female
High rate of complications
HCA <5 cm
HCA >5 cm
Surgery
HNF1A HCA at MRI
Other HCA
Other option?
Surgery (if no regression after OC stop)
Follow-up
Tumor biopsy
B-cat exon 3 and shHCA
Other HCA
High rate of complications
Surgery
Follow-up
Increase in size

Benign Liver Conditions

- Focal Nodular Hyperplasia (FNH)
  - Almost never requires resection
  - No need for serial imaging
  - No need to stop birth control



Benign Liver Conditions



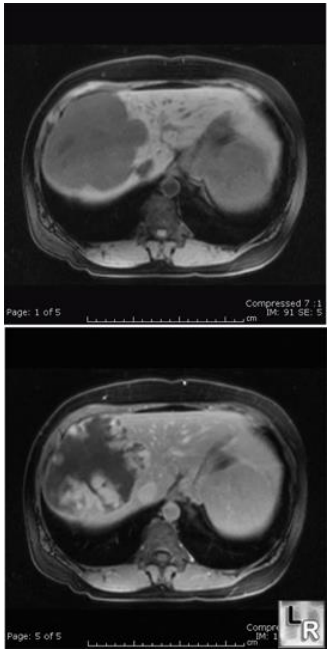
Liver cysts

- Simple vs. Complex – A cyst is a cyst
- Almost always benign
  - Rare incidence of cystadenoma – solid component on MRI
  - 10% lifetime risk of malignant transformation into cystadenocarcinoma
- Resect only if:
  - Cystadenoma in a young person
  - Symptomatic

Benign Liver Conditions

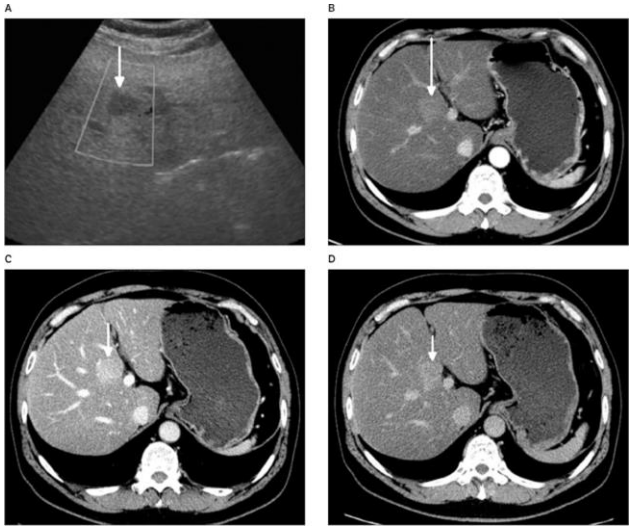
Hemangiomas

- Should almost never be resected
- Rarely symptomatic
- Rarely bleed
- Rarely cause high-output heart failure
- Rarely cause Kasabach-Merritt Syndrome
- Consumptive coagulopathy



Other Things That Don’t Need to Be Resected

- Regenerative nodules
- Focal fatty sparing
- LiRADS 1-2 lesions

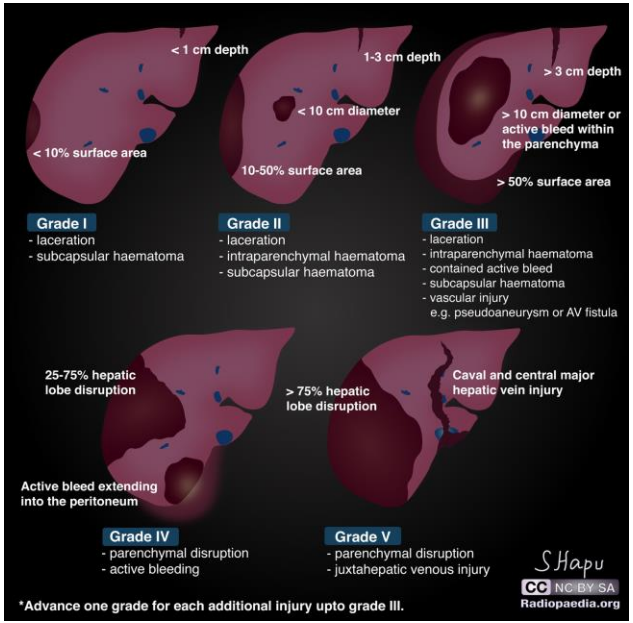


If the patient does not have underlying liver disease, the lesion is probably benign – step back and look at the clinical scenario

Bayesian Statistics

Rare Indications

- Hepatic trauma
  - Control hemorrhage
- Hepatic abscesses
  - Bacterial or amebic
- Intrahepatic stone disease
  - Biliary stricture or segmental atrophy



Is the Lesion Resectable?

- Imaging studies (CT or MRI with properly timed contrast)
  - Margins of resection
    - At least 1cm for malignancies
    - Benign lesions can be excised with limited margins
  - Future liver remnant (FLR)
  - Location of lesion

Future Liver Remnant

- 20% normal liver
- 30% steatohepatitis or moderate chemotherapy exposure
- 40% mild cirrhosis or major chemotherapy exposure
  - Decreased FLR = Increased risk of death

Think Twice If...

- Future liver remnant <20%
  - Role of pre-op portal vein embolization?
    - Preoperative PVE stimulates liver hyperplasia in remnant liver
- Cirrhosis – Mortality highest among these patients!
  - Transjugular liver biopsy ideal to determine this prior to surgery
  - Require even larger volume of functional liver

Complications

- Small for size syndrome (SFSS)
  - Rising Alk Phos
  - Ascites
  - Bilirubin climbs
  - Coagulopathy
- *This is liver failure and can only be cured by liver transplantation*

Complications

- Bile leak
- Postoperative bleeding
- Hypergylcemia
- Pulmonary and kidney complications

Contraindications

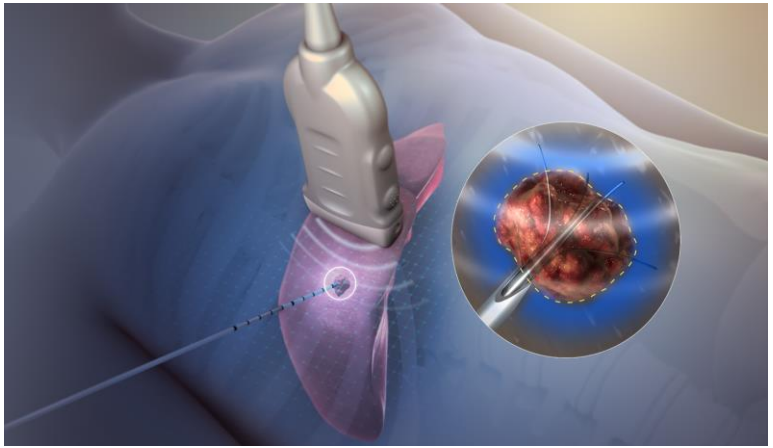
- Child-Pugh B and C with FLR <40% – Absolute contraindication
- Child-Pugh A and B
  - Relative vs. Absolute?
    - FLR
    - Comorbidities
    - Availability of liver transplant

Contraindications (Continued)

- Comorbidities limiting safe anesthesia
- Location of disease near major vascular/biliary structures that would preclude margin-negative resection
- Vascular invasion in some malignancies
  - IVC – absolute contraindication
  - Hepatic vein away from IVC – not an absolute contraindication

Resection vs. Ablation

- Deciding factors
  - Size (Ablation works best if <2cm)
  - Location
  - Liver function
- Other alternatives: TACE, Y90, SBRT, transplant



Pregame

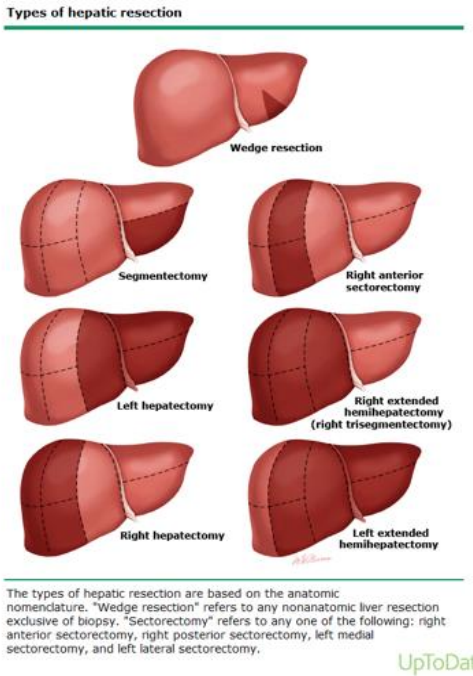
- Nutrition
  - High-protein diet
  - Low calorie, low fat diet one week before
- Prehab
  - Increased physical activity

Pregame (Continued)

- Prophylactic antibiotics
  - Hepatic resection – “clean” surgery
  - Cholecystectomy
  - GI structures
- Thromboprophylaxis
  - SubQ heparin
  - SCDs

Game Plan

- Anatomic resection
  > nonanatomic resection
  - Better outcomes
  - Less bleeding
- Segment 2 & 3 – celebrate!



Game Plan (Continued)

- Minimally invasive approaches
  - Ablation
  - Wedge
  - Left lateral sectionectomy
  - Left hepatectomy
- Consider segment IV, V, and VIII depending on tumor geography

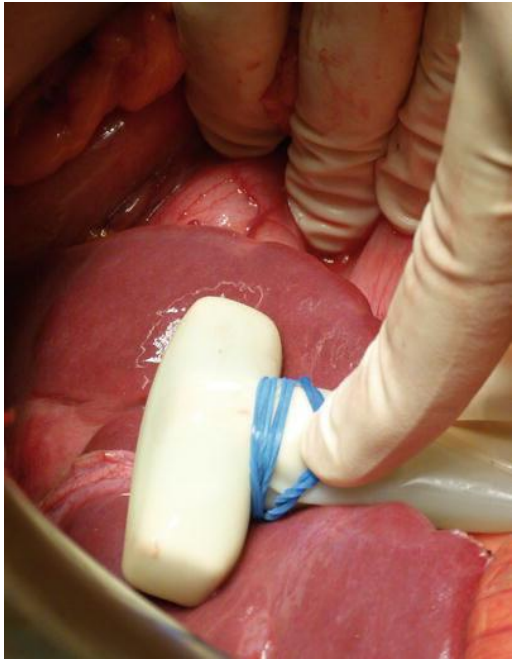
Game Time (Continued)

Diagnostic laparoscopy

Intraoperative ultrasound

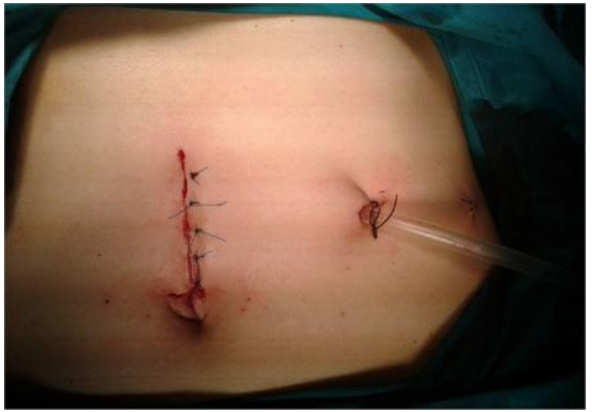
Unresectable hepatic or extrahepatic lesions

Abort mission!



After the Game

- Major resection
  - ICU or step-down
    - Glucose, Coags, Hypophosphatemia
- Minor resection
  - Resume diet and OOB on POD 1
- Discharge day 4-6



After the Game (Continued)

- Follow up with surgery in 1-2 weeks
- PCP, hepatology, med onc within 1 month
  - Adjuvant therapy
- Surveillance at least every 3 months
  - Recurrence
    - Re-resection?
    - Transplant
    - Palliative care

References

Kele PG, de Boer M, van der Jagt EJ, Lisman T, Porte RJ. Early hepatic regeneration index and completeness of regeneration at 6 months after partial hepatectomy. *Br J Surg*. 2012;99(8):1113-1119. doi:10.1002/bjs.8807.

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