Liver Benign
Part 2

Nathalie Sela
Staff: Dr. Quan

Wednesday Seminar Teaching
Feb 24th, 2016
Objectives

- **Medical Expert:**
  - Epidemiology, clinical presentation, diagnosis and management of cystic & solid liver lesions
  - Epidemiology, clinical presentation and diagnosis of bile duct cysts
  - Etiology, presentation, investigation, management of hemobilia
  - Indications, and use of transplantation for liver disease

- **Collaborator:**
  - Role of imaging in differentiating benign solid and cystic hepatic masses

- **Manager:**
  - Determining patient suitability for transplant

- **Scholar:**
  - Review of some of the most recent seminal papers on topic
Solid Liver Lesions

- **Benign**
  - Hemangioma
  - Focal Nodular Hyperplasia (FNH)
  - Adenoma
  - Angiomyolipoma
  - Mesenchymal hamartoma
  - Solitary fibrous lesion

- **Malignant**
  - HCC
  - Metastatic disease
## Benign Solid Lesions

<table>
<thead>
<tr>
<th></th>
<th>Adenoma</th>
<th>FHN</th>
<th>hemangioma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence /100000</td>
<td>1-4</td>
<td>3-4</td>
<td>400-7500</td>
</tr>
<tr>
<td>Solitary %</td>
<td>90</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Imaging</td>
<td>US, CT</td>
<td>US, CT, MRI</td>
<td>CT, MRI</td>
</tr>
<tr>
<td>Gross features</td>
<td>Hemorrhage, necrosis</td>
<td>Central scar</td>
<td>Blood filled cyst</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Imaging, biopsy</td>
<td>Imaging, biopsy</td>
<td>Imaging</td>
</tr>
<tr>
<td>Treatment</td>
<td>Discontinue OCP, Surgical resection</td>
<td>FU imaging</td>
<td>Surgical resection if symptomatic</td>
</tr>
<tr>
<td></td>
<td>Focal Nodular Hyperplasia</td>
<td>Adenoma</td>
<td>Fibrolamellar HCC</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------</td>
<td>--------------------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>Central scar (20%)</td>
<td>well-demarcated heterogeneous mass</td>
<td>variable</td>
</tr>
<tr>
<td>CT</td>
<td>Arterial enhancing, <strong>Central scar</strong> (20%)</td>
<td>absence of central scar, <strong>hemorrhage</strong></td>
<td>Central scar (75%) Calcifications LN enlargement</td>
</tr>
<tr>
<td>MRI</td>
<td>Iso-hypointense</td>
<td>Variable</td>
<td>Isodense</td>
</tr>
<tr>
<td>• T1</td>
<td>Hypo central scar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• T2</td>
<td>Iso-hyperintense</td>
<td>Mildly hyperintense</td>
<td>Hypointense central scar</td>
</tr>
<tr>
<td></td>
<td>Hyper central scar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Gd</td>
<td>early arterial enhancement, central scar retains contrast on delayed scans</td>
<td>Early arterial enhancement</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear Med</td>
<td><strong>Positive</strong> (80%)</td>
<td>focal lesion with rim of increased uptake (25%)</td>
<td><strong>Negative</strong></td>
</tr>
<tr>
<td>Tc99m sulphur colloid scan</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cystic Liver Lesions

- Simple cyst
- Polycystic Liver Disease
- Infectious cyst
  - Pyogenic abcess
  - Hydatid cyst
  - Amebic liver abcess
- Neoplastic
  - Cystadenoma
  - Cystadenocarcinoma
Polycystic Liver Disease

- Inherited autosomal dominant
  - Chromosome 19p and 6q
- Associated with PCKD
- Cysts throughout liver variable sizes
  - >20 cysts
- M=F
Polycystic Liver Disease

- Clinical Presentation
  - Majority asymptomatic
  - Abdominal discomfort RUQ
  - Complications
    - Fever if rupture or infected
    - Jaundice if compress bile duct
    - Portal hypertension if compress portal vein
Polycystic Liver Disease
Polycystic Liver Disease: Management

• Surgical Indications
  ◦ Symptomatic

• Surgical Options
  ◦ Aspiration and sclerotherapy
  ◦ Fenestration
  ◦ Liver resection
  ◦ Liver transplantation
Polycystic Liver Disease: Management

Aspiration

Fenestration
Liver Resection

- Cyst rich segments
- At least 1 segment which is cyst free
- Considered when fenestration is unlikely to reduce liver volume
- Symptom relief 85%
- recurrence 35%
Liver Transplantation

- Only curative treatment severe PLD
- Disabling symptoms with complications
  - Portal HTN
  - Malnutrition
- Morbidity 40%
- Survival 5 year 92%
Amebic Liver Abscess

- Most frequent extraintestinal manifestation of *Entamoeba histolytica*
  - Protozoa
- Fecal oral transmission
- Right lobe more common
- 4% with amebic colitis have liver abscess
- RF
  - Travel
  - Endemic: Mexico, India, Central and South America
  - Male 12:1
- 2-7% rupture risk
Amebic Liver Abscess: Clinical Presentation

- **Acute symptoms <14 days**
  - Fever
  - Abdominal pain
    - RUQ
    - Dull
    - Constant
    - Radiate to R shoulder
  - Nausea
  - Vomiting
  - Jaundice (10%)
- **Pulmonary 20-45%**
  - Non productive cough, right lung base dullness
Amebic Liver Abscess: Diagnosis

- Elevated WBC
- Elevated AST in acute phase
- Serologic testing
• Ultrasound
  ◦ 75-80% sensitivity

• CT
  ◦ Smooth margin and contrast enhancing peripheral rim
  ◦ 88-95% sensitivity
Amebic Liver Abscess: Management

• Medical Treatment
  ◦ Flagyl 750mg TID x 10 day
  ◦ Luminal agent prevent recurrence
    • diloxanide furoate,
    • Iodoquinol
    • Paromomycin
Amebic Liver Abscess: Management

- Needle aspiration ± drain

Indications

- High risk abscess rupture >5cm
- Left lobe
- Failure of medical therapy within 7 days
Bile Duct Cyst

- Single or multiple cysts throughout the biliary tree
- Incidence 1:100,000
- More common in women 3:1
- Potential for malignancy
  ◦ Older adults
  ◦ Type I and IV 10-30%

- Complications
  ◦ Cholelithiasis, Choledocholithiasis, Hepatolithiasis
  ◦ Cholangitis
  ◦ Pancreatitis
  ◦ Intraperitoneal cyst rupture
  ◦ Biliary cirrhosis
  ◦ Bleeding due to erosion of the cyst into adjacent vessels
# Bile Duct Cyst Classification

<table>
<thead>
<tr>
<th>TYPE</th>
<th>SHAPE</th>
<th>DESCRIPTION</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td><img src="image1.png" alt="Image" /></td>
<td>Choledochal cyst: cilindric or fusiform segmental dilatation</td>
<td>77% - 87%</td>
</tr>
<tr>
<td>II</td>
<td><img src="image2.png" alt="Image" /></td>
<td>Choledochal diverticulum: supraduodenal segment</td>
<td>&lt; 2%</td>
</tr>
<tr>
<td>III</td>
<td><img src="image3.png" alt="Image" /></td>
<td>Choledochocele: intraduodenal diverticulus</td>
<td>&lt; 1.5%</td>
</tr>
<tr>
<td>IV-A</td>
<td><img src="image4.png" alt="Image" /></td>
<td>Multiple cysts at intra and extrahepatic ducts</td>
<td>&lt; 19%</td>
</tr>
<tr>
<td>IV-B</td>
<td><img src="image5.png" alt="Image" /></td>
<td>Multiple cysts at extrahepatic ducts only</td>
<td>&lt; 11%</td>
</tr>
<tr>
<td>V</td>
<td><img src="image6.png" alt="Image" /></td>
<td>Multiple cysts at intrahepatic ducts only (Caloli’s Disease): segmental or diffuse</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 1** - Classification of biliary cystic dilatation as revised by Todani\(^49\). Frequency data from Vercruysse et al.\(^51\)
Bile Duct Cyst: Clinical Presentation

- Majority present before age 10
- Triad
  - Abdominal pain
  - Jaundice
  - Palpable mass
- Adults may present:
  - Nausea, vomiting, fever, pruritus, weight loss
- Clinical presentation of complications
  - Pancreatitis, cholangitis, and obstructive jaundice
Bile Duct Cyst: Diagnosis

- Ultrasound initial investigation
- CT or MRCP to characterize the biliary tree
  - MRCP superior for pancreatic duct assessment
- ERCP (100% sensitivity)
  - Therapeutic (type III cysts)
Bile Duct Cyst: Management

- **Type I, II, IV**
  - Risk for malignancy
  - Surgical resection of cysts
  - Roux en Y hepatojejunostomy

- **Type III**
  - Symptomatic
  - ERCP with sphincterotomy

- **Type V**
  - Supportive
  - Liver transplant
Hemobilia

- Bleeding from hepatobiliary tree
- Rare cause of acute UGIB
- Iatrogenic
  - Recent hepatic or biliary tree instrumentation
  - Liver biopsy
  - TIPS
  - Intrahepatic stents
- Non-traumatic
  - Hepatic artery aneurisms
  - Hepatic or bile duct tumors
  - Gallstones
  - Hepatic abscess
Hemobilia: Clinical Presentation

• Triad:
  ◦ Biliary colic
  ◦ Obstructive jaundice
  ◦ Occult or acute GI bleed
Hemobilia: Diagnosis

- CT angiography abdomen/pelvis
Hemobilia: EGD
Hemobilia: Management

- Stop source of bleeding
- Arterial embolization
- Surgical resection of malignancy
  - Hepatic
  - Biliary
Liver Cirrhosis

- Late stage of progressive hepatic fibrosis
- Distortion of hepatic architecture and nodule formation
- Most common causes in NA (80%)
  - Hepatitis C
  - ETOH
  - NASH
Stages of Liver Damage

- **Fatty Liver**: Deposits of fat cause liver enlargement.
- **Liver Fibrosis**: Scar tissue forms. More liver cell injury occurs.
- **Cirrhosis**: Scar tissue makes liver hard and unable to work properly.
Liver Cirrhosis: Clinical Presentation

- Constitutional
  - Anorexia
  - Fatigue
  - Weight loss
  - Weakness

- Hepatic decompensation
  - Jaundice
  - Pruritis
  - Ascites
  - Encephalopathy
  - Upper GI bleed
- Digit clubbing
- Astrixis
- Fetor hepaticus
- Splenomegaly
Natural History of Cirrhosis

- **Compensated Cirrhosis**
  - Asymptomatic
  - 10-12 years
  - Inflammation and fibrosis

- **Decompensated Cirrhosis**
  - Ascites
  - Portal hypertension
  - GI bleed
  - Encephalopathy
  - Jaundice
Natural History of Cirrhosis

- **Compensated cirrhosis**
  - 1-3% mortality / year
  - Higher in esophageal varices

- **Decompensated cirrhosis**
  - First event:
    - Ascites
    - GI bleed
  - 2 year survival 45%
  - Median survival 2-4 years
Child’s Pugh Classification

Child-Turcotte-Pugh (CTP) classification of the severity of cirrhosis

<table>
<thead>
<tr>
<th></th>
<th>Points*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Encephalopathy</td>
<td>None</td>
</tr>
<tr>
<td>Ascites</td>
<td>None</td>
</tr>
<tr>
<td>Bilirubin (mg/dL)</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
<td>&gt;3.5</td>
</tr>
<tr>
<td>PT (sec prolonged)</td>
<td>&lt;4</td>
</tr>
<tr>
<td>or INR</td>
<td>&lt;1.7</td>
</tr>
</tbody>
</table>

CTP score is obtained by adding the score for each parameter
CTP class: A = 5-6 points
B = 7-9 points
C = 10-15 points
## Child-Pugh Classification

<table>
<thead>
<tr>
<th>Points</th>
<th>Class</th>
<th>1 year survival</th>
<th>2 year survival</th>
<th>Peri-operative mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-6</td>
<td>A</td>
<td>100</td>
<td>85</td>
<td>10</td>
</tr>
<tr>
<td>7-9</td>
<td>B</td>
<td>81</td>
<td>57</td>
<td>30</td>
</tr>
<tr>
<td>10-15</td>
<td>C</td>
<td>45</td>
<td>35</td>
<td>80</td>
</tr>
</tbody>
</table>

- Severity and prognosis in chronic liver disease
Natural History of Cirrhosis

- **End stage liver disease**
  - Damaged liver with minimal synthetic function and no potential for recovery

- **Fulminent liver failure**
  - Progression from good health to liver failure with encephalopathy within 8 weeks
  - 75% mortality

- Only potential treatment is **liver transplantation**
MELD Score

MELD Score = 9.57 * ln (Serum Creatinine in mg/dL)  
+ 3.78 * ln (Serum Bilirubin in mg/dL)  
+ 11.2 * ln (INR) +6.43

- Transplant candidate MELD ≥ 15
- <15 mortality rate of waitlist = surgery
- Exception points
<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Initial</th>
<th>Appeal</th>
<th>Extension</th>
<th>Total</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familial Amyloidosis</td>
<td>25</td>
<td>3</td>
<td>54</td>
<td>82</td>
<td>0.6%</td>
</tr>
<tr>
<td><strong>HCC (not meeting criteria)</strong></td>
<td>1,482</td>
<td>31</td>
<td>1,895</td>
<td>3,408</td>
<td>26.0%</td>
</tr>
<tr>
<td><strong>HCC Meeting Criteria (Stage T2)</strong>*</td>
<td>1,735</td>
<td>0</td>
<td>2,731</td>
<td>4,466</td>
<td>34.1%</td>
</tr>
<tr>
<td>Hepatic Artery Thrombosis (HAT)</td>
<td>59</td>
<td>4</td>
<td>11</td>
<td>74</td>
<td>0.6%</td>
</tr>
<tr>
<td>Hepatopulmonary Syndrome</td>
<td>245</td>
<td>19</td>
<td>225</td>
<td>489</td>
<td>3.7%</td>
</tr>
<tr>
<td>Metabolic Disease</td>
<td>80</td>
<td>0</td>
<td>24</td>
<td>104</td>
<td>0.8%</td>
</tr>
<tr>
<td>Non-metastatic hepatoblastoma</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>0.0%</td>
</tr>
<tr>
<td>Portopulmonary Hypertension</td>
<td>73</td>
<td>5</td>
<td>87</td>
<td>165</td>
<td>1.3%</td>
</tr>
<tr>
<td>Primary Oxaluria</td>
<td>18</td>
<td>0</td>
<td>28</td>
<td>46</td>
<td>0.4%</td>
</tr>
<tr>
<td>Other specify</td>
<td>2,288</td>
<td>226</td>
<td>1,762</td>
<td>4,276</td>
<td>32.6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6,011</td>
<td>288</td>
<td>6,817</td>
<td>13,116</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Liver Transplant: Contraindications

- Cardiopulmonary disease that cannot be corrected and is a prohibitive risk for surgery
- HCC with metastatic spread
- Uncontrolled sepsis
- Acute liver failure with a sustained ICP > 50 mmHg or a CPP < 40 mmHg
- Persistent non-adherence with medical care
- Lack of adequate social support
Liver Transplant Assessment

- Laboratory testing
  - ABO Rh typing, LFT, Cr, AFP, viral serology, CBC, INR, bilirubin
- EGD to evaluate varices
- Cardiopulmonary evaluation
  - ECG, echo, PFT, stress testing
- Cancer Screening
  - CT thorax/abdo/pelvis, skin exam, colonoscopy, pap smear
- Psychosocial evaluation and education
Etiology of Liver Disease

- Hepatitis C: 33%
- Hepatitis B: 12%
- Alcohol: 14%
- Cryptogenic/NASH: 9%
- Cholestatic: 10%
- Hepatocellular Carcinoma: 7%
- Other Malignancies: 6%
- Metabolic: 4%
- Pediatric Diseases: 4%
- Miscellaneous: 1%
- Other: 4%
Etiology of Liver Disease
Etiology of Liver Disease

- **ETOH**
  - 6 month abstinence
  - Evaluation by addiction counsellor
  - Stable social supports

- **Hep C**
  - Most common
  - 25% develop recurrent cirrhosis within 5 years

- **HCC**
  - No evidence of extrahepatic disease or vascular invasion
  - <stage II: single tumor <5cm or 2-3 tumors <3cm
  - Worst survival (74% at 5 year)
Donor Allocation in Canada

- MELD score
- Code Status
- Time on waiting list

<table>
<thead>
<tr>
<th>Code Status</th>
<th>Medical Status</th>
<th>Urgency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>At home</td>
<td>Non-urgent</td>
</tr>
<tr>
<td>1T</td>
<td>At home with tumor</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Hospitalized</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>In ICU</td>
<td>Urgent</td>
</tr>
<tr>
<td>3F</td>
<td>In ICU, fulminent failure</td>
<td></td>
</tr>
<tr>
<td>4F</td>
<td>ICU, intubated, fulminent</td>
<td></td>
</tr>
</tbody>
</table>
Donor Allocation in Canada

- Trillium Gift of Life Network
  - Manage wait list
  - Organ allocation

- Nationwide agreement organ sharing for urgent cases across country
  - Informal
Surgical Technique

• Incision bilateral sub-costal with upper extension to xiphoid
  ◦ Mercedes

• Stages
  ◦ Hepatectomy
  ◦ Anhepatic phase
  ◦ Implantation
Implantation

A: Gall bladder removed

B: Donor liver transplanted

Diseased liver removed

Inf. vena cava

Portal vein

Hepatic artery

Common bile duct

Anastomoses
Immunosuppression

- CNI (Cyclosporin, Tacrolimus) are primary agents
- Addition of other agents (Steroids, MMF, Azathioprine) used to decrease risk of rejection or allow for lower doses of the primary agents.
- Early: multiple meds, high doses
  - Pred + CNI +/- (MMF/AZA)
- Late – fewer meds, lower doses
  - Most patients CNI alone (usually Tacrolimus)
  - Exceptions:
    - Autoimmune hepatitis, PSC, PBC (usually 2 drugs)
    - Renal dysfunction (MMF/AZA + lower CNI dose)
Immunosuppression: CNI

- Block Calcineurin → ↓IL-2 → ↓T-Cell Activation
- Cyclosporin
  - Initial dosage 10 to 15 mg/kg/day divided into 2 doses.
- Tacrolimus
  - Initial dose 0.1 to 0.15 mg/kg/day orally

- Renal dysfunction
Recipient Survival

![Graph showing recipient survival over years. The x-axis represents years from 0 to 9, and the y-axis represents the portion surviving from 1.0 to 0.1. Different colored lines represent various conditions such as PBC, PSC, HEP C, ALD, HEP B, Autoimmune, Cancers, Metabolic, Fulminant, and Other conditions. The graph illustrates the survival rates over time for each condition.]
Summary

- Imaging plays important role in differentiating different solid and cystic lesions of liver
  - US, CT, MRI
- Management of bile duct cyst depends on type
- Liver transplantation is only curative option for end stage liver disease
  - Wide variety of etiology
Questions?

what is it, gall bladder?
can't you see I have a lot to do?
I maked these

you made STONES?

YOU'RE JUST SUPPOSED TO HOLD WHAT I GIVE YOU!
GET OUT! GO ON!

I maked these
Hepatectomy

- Common complication is excessive bleeding
- Dissection of liver hilum structures
  - Preserve length
  - Preserve tissue around CBD to avoid devascularization
  - Recognize anatomic variation of arterial supply
- Avoid injury to R adrenal and R renal vein