Perioperative Medicine: Liver Disease

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Objectives

By the end of this module, readers should be able to:
• Recognize patients with liver disease pre-operatively
• Estimate surgical risks for patients with cirrhosis
• Identify ways to help reduce perioperative risks in patients with cirrhosis
Your patient

Mr. C is a 57 yo man who presents for pre-op evaluation for left inguinal hernia repair.

Past Medical History:
Cirrhosis
Ascites requiring LVP (last 4 months ago)
Hepatitis C
EtOH use
CKD (Cr 1.4) secondary to MPGN.
Goals of pre-operative evaluation

1. Identification and/or diagnosis of medical condition
2. Estimation of surgical risk
3. Risk reduction
4. Post-operative monitoring and management of potential complications
Diagnosis of liver disease

• History
• Exam for cirrhosis
  • Terry nails (LR 16-22), gynecomastia (LR 5.8-35), facial telangiectasia (LR 5.9-10), spider nevi (LR 4.3), ascites (LR 7.2), splenomegaly (LR 3.5)¹, jaundice, edema

¹ Udell, JA et al. JAMA. 2012;307(8):832-42

http://www.assh.org/Public/HandConditions/PublishingImages/Fig7_sysdis_web.jpg
Pre-operative diagnosis of liver disease

• Pre-op liver panel not recommended in healthy patients
• Obtain liver panel if evidence of liver disease
• Perform further evaluation if AST/ALT > 3x normal, ↑ bilirubin, ↓ hepatic synthetic function, ↓ platelets
• Surgery can proceed in asymptomatic patients with mild elevations in AST/ALT (<3x normal)
• Consider Hepatology referral
Factors affecting surgical risk

• Etiology of liver disease
• Severity of liver disease
  • Presence of cirrhosis and portal HTN
• Type of surgery
Contraindications to surgery

• Acute viral hepatitis
  • 10 to 13% post-operative mortality\(^1\)
  • Defer elective (+/- urgent) surgery until clinical and biochemical resolution

• Acute alcoholic hepatitis
  • Defer elective (+/- urgent) surgery until clinical and biochemical resolution (~ 12 weeks with EtOH abstinence)

• Acute liver failure

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Does etiology of liver disease affect post-operative risk?

- Chronic viral hepatitis
  - No ↑ in surgical risk (mild/moderate disease, preserved hepatic function)$^1$
- Non-alcoholic fatty liver disease (NAFLD)
  - Trend toward ↑ morbidity/mortality after hepatic resection
  - Role of obesity, DM, CV disease, diagnosis of cirrhosis?
  - NAFLD contribution to surgical risk is unknown

Pre-operative assessment in patients with suspected liver disease

Suspect liver disease from history/physical

Labs – Liver panel, INR, BMP, CBC

No cirrhosis, portal HTN, acute hepatitis, liver failure
Proceed with surgery

Imaging – Ultrasound, CT, MRI, endoscopy

Acute hepatitis
Defer elective surgery until resolution

Risk stratification

+ Cirrhosis or portal HTN

Malik SM and Ahmad J. Med Clin N Am. 2009;93:917-29
Mr. C

Exam: Vitals normal.
Mild abdominal distention, no edema, alert, oriented.

Labs
Na 138  AST 63  INR 1.3
K+ 4.9  ALT 54
BUN 26  Bilirubin 1.0
Cr 1.37  Albumin 3.2
## Child-Turcotte-Pugh classification

<table>
<thead>
<tr>
<th>Clinical Trait</th>
<th>1 Point</th>
<th>2 Points</th>
<th>3 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascites</td>
<td>None</td>
<td>Present</td>
<td>Moderate/Severe</td>
</tr>
<tr>
<td>Encephalopathy</td>
<td>None</td>
<td>Grade 1-2</td>
<td>Grade 3-4</td>
</tr>
<tr>
<td>Bilirubin (mg/dL)</td>
<td>&lt;2</td>
<td>2-3</td>
<td>&gt;3</td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
<td>&gt;3.5</td>
<td>2.8-3.5</td>
<td>&lt;2.8</td>
</tr>
<tr>
<td>INR</td>
<td>&lt;1.3</td>
<td>1.3-2.3</td>
<td>&gt;2.3</td>
</tr>
</tbody>
</table>

Child’s A: 5-6 points  Child’s B: 7-9 points  Child’s C: 10-15 points
# Cirrhosis & perioperative mortality

<table>
<thead>
<tr>
<th>Type of Surgery</th>
<th>Child’s class</th>
<th>Mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major abdominal</td>
<td>A</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>76-82</td>
</tr>
<tr>
<td>Cardiac</td>
<td>A</td>
<td>0-11</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>18-50</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>67-100</td>
</tr>
<tr>
<td>Emergency surgery</td>
<td>A</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>100</td>
</tr>
</tbody>
</table>

Malik, SM and Ahmad J. Med Clin N Am.2009;93:917-29
Model for End-Stage Liver Disease (MELD)

MELD score = (9.6 \times \log_e [\text{creatinine}]) + (3.8 \times \log_e [\text{bilirubin}]) + (11.2 \times \log_e [\text{INR}]) \times 6.4)*

MELD < 10 – Low risk
MELD 10-15 – Intermediate risk
MELD > 15 – High risk

* Several online calculators
MELD score and surgical risk (Teh, et al)

A

B

MELD score and surgical risk (Teh, et al)

<table>
<thead>
<tr>
<th>MELD Score</th>
<th>Ninety-day mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 8</td>
<td>9.7%</td>
</tr>
<tr>
<td>9-11</td>
<td>17.7%</td>
</tr>
<tr>
<td>12-15</td>
<td>32.3%</td>
</tr>
<tr>
<td>&gt;15</td>
<td>55.8%</td>
</tr>
</tbody>
</table>
Perioperative risk calculator for patients with cirrhosis

What is the age? 
What is the ASA score? Enter 3 for compensated cirrhosis Enter 4 for decompensated cirrhosis
What is the bilirubin? (mg/dl)
What is the creatinine? (mg/dl)
What is the INR?
What is the etiology of cirrhosis? Alcoholic or Cholestatic Viral/Other

Probability (%) of Mortality
7 days
30 days
90 days
1 year
5 years

Mr. C

• Child’s Class B
• MELD score 12
• Probability of post-operative mortality
  7-day $\rightarrow$ 2.4%
  30-day $\rightarrow$ 9.5%
  90-day $\rightarrow$ 15%
MELD/Child’s score
Imaging/EGD

MELD < 10
Child’s A
No portal HTN
-> Proceed with surgery

MELD 10-15
Child’s B
+/- portal HTN
-> Type of surgery
  - Elective
    - Low-risk surgery
      - Proceed with caution
  - High-risk surgery
    - Consider alternate surgical and non-surgical options

MELD >15
Child’s C
+ portal HTN
-> Defer surgery

Type of surgery

Emergent

Low-risk surgery
- Proceed with caution

High-risk surgery
- Consider alternate surgical and non-surgical options

Malik, SM and Ahmad J. Med Clin N Am 2009;93:917-29
ACS NSQIP

http://riskcalculator.facs.org/
## Post-operative morbidity

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>8%</td>
</tr>
<tr>
<td>Ventilatory dependence</td>
<td>7.8%</td>
</tr>
<tr>
<td>Other infections</td>
<td>7.5%</td>
</tr>
<tr>
<td>Re-operations</td>
<td>7%</td>
</tr>
<tr>
<td>Ascites</td>
<td>6.7%</td>
</tr>
<tr>
<td>Bacteremia</td>
<td>6.7%</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>5%</td>
</tr>
<tr>
<td>GI bleeding</td>
<td>4.6%</td>
</tr>
<tr>
<td>Hepatorenal syndrome</td>
<td>3.3%</td>
</tr>
<tr>
<td>Grade 4 encephalopathy</td>
<td>1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk reduction for patients with cirrhosis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drug metabolism</strong></td>
</tr>
<tr>
<td>Limit benzodiazepines (ie. diazepam)</td>
</tr>
<tr>
<td>Short-acting analgesics favored</td>
</tr>
<tr>
<td>Attention to acetaminophen dosing</td>
</tr>
<tr>
<td><strong>Pulmonary</strong></td>
</tr>
<tr>
<td>Manage ascites (↓ restrictive physiology)</td>
</tr>
<tr>
<td>Pre-op assessment pulmonary HTN or HPS</td>
</tr>
<tr>
<td>Pulmonary hygiene</td>
</tr>
<tr>
<td><strong>Renal insufficiency</strong></td>
</tr>
<tr>
<td>Pre- and post-operative labs</td>
</tr>
<tr>
<td>Monitor urine output</td>
</tr>
</tbody>
</table>
## Risk reduction for patients with cirrhosis

<table>
<thead>
<tr>
<th>Area</th>
<th>Details</th>
</tr>
</thead>
</table>
| **Bleeding**  | Correct coagulopathy with Vit. K & FFP  
Transfuse platelets (discuss goal w/surgeon)  
Consider cryoprecipitate, DDAVP, Factor VII  
Appropriate treatment of varices  
Small case series support pre-op TIPS<sup>1</sup> |
| **Infection** | Standard precautions  
Manage ascites to ↓ abdominal wound dehiscence                                                                                       |
| **Encephalopathy** | Pay attention to medications  
Maintain K+ and Mg+  
No data to support prophylactic lactulose                                                  |

Take Home Points

• Diagnose and assess severity of cirrhosis pre-operatively

• Use the Child class, MELD scores, and online risk calculator to help estimate surgical risk

• Treat ascites pre-operatively to help reduce risk of pulmonary and infectious complications
References

5. Udell, JA et al. Does this patient with liver disease have cirrhosis? JAMA. 2012;307(8):832-42