Peri-operative Abnormal Liver Function Test

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Liver Disease and Surgery

1: 700 got abnormal LFT

10% of cirrhotic pts need surgery within 2 yr of diagnosis

Effect of Surgery to Liver

- Increase of peri-operative morbidity and mortality
- Pulmonary dysfunction
- Alteration of hepatic blood flow

Increase of peri-operative morbidity and mortality
Effect of Surgery to Liver

- Increase of peri-operative morbidity and mortality
- Pulmonary dysfunction
- Impairment of drug metabolism
- Alteration of hepatic blood flow

Increase of peri-operative morbidity and mortality
Hepatic Blood Flow

- Hepatic flow
- 30
- 70
Effect of Surgery to Hepatic Blood flow

- Decreased portal vein flow
- Decreased hepatic artery flow (decrease C.O., Decreased MAP)
- Ventilation (PPV, PEEP)
- Surgical procedure

Maze M. Miller RD, ed. Anesthesia. 4th ed. 1994
Effect of Surgery to Hepatic Blood flow

- Decrease portal in flow
- Cirrhosis
- Liver Ischemia
Effect of Surgery to Liver

- Impairment of drug metabolism
- Alteration of hepatic blood flow
- Pulmonary dysfunction

Increase of peri-operative morbidity and mortality
Impair Drugs Metabolism

- Incidence of drug induced hepatitis
  - Halothane 1;6,000-35,000
  - Hepatotoxicity of enflurane or isoflurane administration is extremely rare

Longer Action of Anesthetic agents

Neuromuscular blockage

• Effects may be prolonged because of decreased biliary excretion, reduced plasma pseudocholinesterase activity, and an increase in volume of distribution

• **Atracurium and ciratracurium are favored**

Others

• Morphine, meperidine, benzodiazepine and barbiturate: **induce vasodilatation** → prefer fentanyl

Effect of Surgery to Liver

- Increase of peri-operative morbidity and mortality
- Pulmonary dysfunction
- Impairment of drug metabolism
- Alteration of hepatic blood flow

Increase of peri-operative morbidity and mortality
Pulmonary Dysfunction in Cirrhosis

**Intrinsic cardiopulmonary disease**
- COPD
- Congestive heart failure
- Pneumonia
- Asthma

**Specific to Liver Disease**
- Associated with specific liver diseases
- Fluid retention complicating portal hypertension
- Pulmonary Vascular abnormalities
**Pulmonary Dysfunction Specific to Liver Disease**

**Associated with specific liver diseases**
- Panacinar emphysema: $\alpha_1$antitrypsin deficiency
- Fibrosing alveolitis, pulmonary granulomas: PBC

**Fluid retention complicating portal hypertension**
- Ascites
- Hepatic hydrothorax

**Pulmonary Vascular abnormalities**
- Hepatopulmonary syndrome
- Portopulmonary hypertension
Pulmonary Dysfunction

• Severe hypoxemia (pO2 < 60 mmHg) → relative contraindication to surgery
• Hypercarbia should be avoided in patients with liver disease during mechanical ventilation
  – pCO2 should be maintained in the range of 35 - 40 mmHg during surgery
Consultation Period

Preoperative

Postoperative
Preoperative Evaluation and Management of Liver Disease

Peri-operative risk assessment

- Screening for liver disease
- Risk assessment for patients with liver disease

Management of liver disease before surgery

- Disease specific
- Treatment of complication
Screening for liver disease

Hx and PE to exclude findings or risk factors for liver disease

Biochemical screening for liver disease is controversial.
Risk Assessment for Patients with Liver Disease

- Type and severity of liver disease
- Type of operation
- Other co-morbid disease
Type and Severity of Liver Disease

Patients in whom surgery is contraindicated
- Acute or fulminant hepatitis
- Severe chronic hepatitis

Patients at variable increased risk
- Cirrhosis

Patients with minimally increased risk
- Mild chronic hepatitis
- NAFLD, AIH, hemochromatosis, WD
Acute Hepatitis and Surgery

Acute viral hepatitis

- 58 patients with acute viral (42) or drug (16) hepatitis who underwent laparotomy
- 9.5% mortality, 11.9% serious complication in viral hepatitis

Alcohol hepatitis

- Mortality rates 55-100%
- Open liver biopsy
- Portosystemic shunt surgery
- Exploratory laparotomy

Harville DD, Summerskill WHJ. JAMA. 1963;184(4):257-261
Greenwood SM, Leffler CT, Minkowitz S. Surg Gynecol Obstet 1972; 134:600
Severe Chronic Hepatitis

• Patients with symptomatic and histologically severe chronic hepatitis have increased surgical risk, particularly in those with impaired hepatic synthetic or excretory function, portal hypertension, or bridging or multilobular necrosis on liver biopsy.
Cirrhosis and Surgery

Mortality rate (%) of abdominal surgery in cirrhotic pts, according to CTP

- Child A
- Child B
- Child C

Garrison RN. 1984
- 10
- 31
- 76

Mansour A. 1997
- 10
- 30
- 82

Neef H. 2011
- 10
- 17
- 63

MELD score and peri-op mortality

<table>
<thead>
<tr>
<th>MELD Score Range</th>
<th>30 Days mortality rate (%)</th>
<th>7 Days mortality rate (%)</th>
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<tbody>
<tr>
<td>0-7 (n=351)</td>
<td>5.7</td>
<td>1.9</td>
</tr>
<tr>
<td>8-11 (n=257)</td>
<td>10.3</td>
<td>3.3</td>
</tr>
<tr>
<td>12-15 (n=106)</td>
<td>25.4</td>
<td>7.7</td>
</tr>
<tr>
<td>16-20 (n=35)</td>
<td>44</td>
<td>14.6</td>
</tr>
<tr>
<td>21-25 (n=13)</td>
<td>53.8</td>
<td>23</td>
</tr>
<tr>
<td>&gt; 26 (n=10)</td>
<td>90</td>
<td>30</td>
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Comparing CTP/MELD

MELD score; AUC = 0.755

CTP score; AUC = 0.698

P = 0.20

Hoteit MA et al. World J Gastroenterol 2008; 14(11): 1774-1780

195 cirrhosis who underwent surgery at 2 teaching hospitals, 5-year period.

The combined endpoint of death or hepatic decompensation was considered to be the primary endpoint.
Type of Surgery

- Intraabdominal surgery
- Cardiac surgery
- Orthopedic surgery

Emergency | Elective
Cardiac Surgery in Cirrhosis

- 58 cirrhotic pts requiring cardiac surgery
- Jan 2004-Jan 2009
- 48 (72%) for valve replacement, 9 (16%) for CABG and 7 (12%) for both.

Orthopedic Surgery in Cirrhosis

Hip arthroplasty

• High risk of peri-operative complications and early prosthetic failure.
  – Those with a higher Child-Turcotte-Pugh score are at higher risk. (52.9% in Child B,C compared with 10.2% in patients with Child’s class A (p = 0.004))
  – Infection is a common cause of failure and may be difficult to treat.
  – Emergency cases had higher risk of complication

Emergency Surgery

Mortality rate(%) of elective / emergent surgery in cirrhosis

- Elective
- Emergency

Hoteit MA et al. World J Gastroenterol 2008;14(11):1774-1780
## Other Co morbid Disease

<table>
<thead>
<tr>
<th>Predictors of complication</th>
<th>Predictors of mortality</th>
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<tbody>
<tr>
<td>- CTP class B C</td>
<td>Male gender</td>
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<tr>
<td>- Etiology of cirrhosis other than PBC</td>
<td>- CTP B and C</td>
</tr>
<tr>
<td>- <strong>Ascites</strong></td>
<td>- Etiology of cirrhosis other than PBC</td>
</tr>
<tr>
<td>- <strong>Preoperative Gi bleeding</strong></td>
<td>- <strong>Ascites</strong></td>
</tr>
<tr>
<td>- Elevation of Cr</td>
<td>- <strong>Preoperative infection</strong></td>
</tr>
<tr>
<td>- Preoperative infection</td>
<td>- ASA class 4 and 5</td>
</tr>
<tr>
<td>- COPD</td>
<td>- Respiratory surgery</td>
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<tr>
<td>- ASA class 4 and 5</td>
<td></td>
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<tr>
<td>- Invasiveness of surgical procedure</td>
<td></td>
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<tr>
<td>- Intraoperative hypotension</td>
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Prediction of Peri-operative Complication in Cirrhosis

Low Surgical Risk Liver disease

NAFLD/NASH
- No data of increase risk of surgery
- Mortality of bariatric surgery: 4% (60-90% got NAFLD or NASH even cirrhosis)

AIH
- Steroid stress dose

Wilson disease
- Dose reduction of D-penicillamine

Hemochromatosis
- Evaluation of other organ dysfunction: cardiac, pulmonary, endocrine
Pre-operative Management of Complication of Liver Disease

Coagulopathy and Thrombocytopenia
- Correction with FFP
- Plt transfusion: as indicated

Ascites
- Should be treated aggressively to reduce the chance of wound dehiscence and abdominal wall herniation
- Intraoperative suction can induced PPCD → Alb replacement

Hepatic encephalopathy
- Increase mortality: up to 88%
- get rid of precipitate factor.

Renal dysfunction
- Can develop both pre/post operation.
- Need close monitor.
Post operative Jaundice

• Incidence of Postoperative hepatic dysfunction 1% (mild jaundice to hepatic failure)

• Incidence of abnormal postoperative liver function tests (LFT’s) 25 – 75%.

Post operative Jaundice

Jaundice

Pre hepatic caused

Hemolysis
Hematoma

Hepatocellular

Hepatic caused

Cholestasis

Post Hepatic caused

Bile duct disease
Hepatic Caused

**Hepatocellular**

- Ischemic hepatitis
- Drug induced hepatitis
- Viral hepatitis

**Cholestasis**

- Benign postoperative cholestasis
- Cholestatic of sepsis
- TPN induced cholestasis

Initial-2 wk

2-3 wk

Common in long-term used and neonate

Cholestasis in Postoperative Period

Benign postoperative cholestasis

- **Multifactorial etiology** e.g. prolonged abdominal surgery, CVT surgery, transfusion, hematoma, decrease hepatic perfusion and hypoxemia
- AST/ALT < 5 times ULN, ALP 2-4 times
- Diagnosis depends upon excluding other causes
- **Complication**: coagulopathy (Vit K def)
- **Prognosis depend on underlying condition**

Faust TW, Reddy KR. Clin Liver Dis 2004;8: 151–66
Cholestasis of Sepsis

- **Mechanism**: decreased basolateral transport and canalicular transport of bile acids.
- AST/ALT mild elevation, ALP 2-4 times, high DB
- Occur within a few days of the onset of bacteremia
- **Search for a hepatobiliary cause**: US
- Full work up to evaluate for infection.
- Empiric antibiotic coverage: in selected cases
- Hepatic parameters may improve within a couple of weeks

Post Hepatitis Caused of Postoperative Jx

- Upper abdominal surgery
  - Biliary stricture
  - Biliary trauma
- Retained CBD stone
- Acalculous cholecystitis

Ddx: Intrahepatic cholestasis
Abdominal imaging is indicated

Faust TW, Reddy KR. Clin Liver Dis 2004;8: 151–66
Stepwise Approach of Postoperative Jaundice

- Hx and PE (any suggestion of CLD??)
- Type of surgery, number of blood products transfused, perioperative hemodynamic parameters, and anesthetic and other medications used
- Pattern and timing of LFT abnormalities
- Use of TPN
- Carefully screened for infections.
- Use of imaging and liver biopsy may be required in selected cases.
Conclusion

• Increase of peri-operative morbidity and mortality was observed in symptomatic liver disease patients.
• Carefully screen for liver disease by history taking and physical examination should be done in all patients.
• Operative risk assessment is the most important information for managing liver disease patient in peri-operative period.
• Stepwise approach by taking all patient’s information and LFT pattern can guide to diagnosis of post-operative jaundice.
THANK YOU FOR YOUR ATTENTION