PORTAL VEIN THROMBOSIS

Resident(s): Nathan Kohler, MD, PHD, Cody O’Dell, MD, MPH; Bo Liu, MD
Attending: Francisco Contreras, MD; Jay Moskovitz, MD
Program/Dept(s): Florida Hospital/Diagnostic Radiology
CHIEF COMPLAINT & HPI

• Chief Complaint
  • Abdominal pain and distention

• History of Present Illness
  • 68 yo WM with PMH of cirrhosis, HTN, DM, Hodgkin Lymphoma and new diffuse large B-Cell lymphoma of the stomach, s/p pericardial window and cholecystectomy
  • The patient was referred for further evaluation in the setting of failed TIPS placement at an OSH.
  • At the OSH, the patient presented with abdominal pain and distention and underwent US guided paracentesis with 5.6 L fluid drained.
RELEVANT HISTORY

- Past Medical History
  - New diffuse large B-Cell lymphoma s/p chemotherapy/radiotherapy, Stage II Hodgkin Lymphoma s/p chemotherapy, DM, HTN, Diverticulosis, CAD, pericarditis and liver cirrhosis.

- Past Surgical History
  - Pericardiocentesis with pericardial window
  - Cholecystectomy

- Family & Social History
  - None

- Review of Systems
  - Abdominal pain and distention

- Medications
  - Nadolol 20mg PO QD, Glimepiride

- Allergies
  - NKDA
DIAGNOSTIC WORKUP

- Physical Exam
  - T 98.0, HR 65, RR 16, BP 127/73, 100% RA
  - NAD, Lungs clear
  - Regular S1/S2, No Murmurs, No JVD
  - Abdomen Distended, S, NT, +BS, RUQ scar

- Laboratory Data
  - N-Terminal Pro BNP 592
  - Total Protein 6.1, Albumin <2.8 g/DL
  - T Bilirubin 0.7, Alk Phos 158, ALT 19, AST 32
WHAT WAS THE MODIFIED VERSION OF THE CHILD-PUGH SCORE ORIGINALLY INTENDED TO DO?

1. Classify patients with liver cirrhosis undergoing TIPS procedures.
2. Classify patients with liver cirrhosis undergoing surgical shunt procedures?
3. Classify patients with esophageal varices undergoing surgical transection of the esophagus?
4. Classify patients with cirrhosis waiting for liver transplants?
1. Classify patients with liver cirrhosis undergoing TIPS procedures.

2. Classify patients with liver cirrhosis undergoing surgical shunt procedures?

3. Classify patients with esophageal varices undergoing surgical transection of the esophagus? The Child-Pugh score was originally used to classify patient’s undergoing transection of the esophagus for variceal bleeding. It has subsequently been used to predict survival in patient’s undergoing TIPS.

4. Classify patients with cirrhosis waiting for liver transplants?

1. Classify patients with liver cirrhosis undergoing TIPS procedures.

2. Classify patients with liver cirrhosis undergoing surgical shunt procedures?

3. Classify patients with esophageal varices undergoing surgical transection of the esophagus? The Child-Pugh score was originally used to classify patient’s undergoing transection of the esophagus for vericeal bleeding. It has subsequently been used to predict survival in patient’s undergoing TIPS.

4. Classify patients with cirrhosis waiting for liver transplants?

HOW IS THE MODIFIED CHILD-PUGH SCORE CALCULATED?

<table>
<thead>
<tr>
<th>Measure</th>
<th>1 Point</th>
<th>2 Points</th>
<th>3 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Bilirubin (mg/dL)</td>
<td>&lt;2</td>
<td>2-3</td>
<td>&gt;3</td>
</tr>
<tr>
<td>Serum Albumin (g/dL)</td>
<td>&gt;3-5</td>
<td>2.8-3.5</td>
<td>&lt;2.8</td>
</tr>
<tr>
<td>PT/INR</td>
<td>&lt;1.7</td>
<td>1.71-2.30</td>
<td>&gt;2.30</td>
</tr>
<tr>
<td>Ascites</td>
<td>None</td>
<td>Mild</td>
<td>Moderate to severe</td>
</tr>
<tr>
<td>Hepatic Encephalopathy</td>
<td>None</td>
<td>Grade I-II (or suppressed with medication)</td>
<td>Grade III-IV (or refractory)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Points</th>
<th>Class</th>
<th>One year survival</th>
<th>Two year survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-6</td>
<td>A</td>
<td>1</td>
<td>0.85</td>
</tr>
<tr>
<td>7-9</td>
<td>B</td>
<td>0.81</td>
<td>0.57</td>
</tr>
<tr>
<td>10-15</td>
<td>C</td>
<td>0.45</td>
<td>0.35</td>
</tr>
</tbody>
</table>
HOW IS THE MELD SCORE CALCULATED?

• The Mayo End-stage Liver Disease Score was developed by Kamath et. Al. to predict survival in patients with end-stage liver disease.

\[ MELD = 9.6 \log e^{Cr} + 3.8 \log e^{bilirubin} \log e^{INR} + 6.4 \ (\ast Et) \]

• \( \ast Et \): Etiology (0 if cholestatic or alcoholic, 1 otherwise)

• CHILD-PUGH Score: Employed to predict operative outcomes in patients undergoing TIPS
  • Bilirubin <2mg/dL, Albumin <2.8 g/DL, INR <1.7, Ascites – poorly controlled = 9 Points
  • CHILD-PUGH Class B – 30% operative mortality

• MELD Score: Predictive of operative mortality in patients undergoing elective TIPS:
  • MELD Score: 9 – Predicted mortality 0%
Figure 1: A CTA/CTV study was performed prior to intervention. The liver was shrunken and nodular consistent with cirrhosis. The patient was found to have a thrombosed portal vein (arrow) with cavernous transformation in the porta-hepatis. There was diffuse ascites throughout the abdomen.
THE 2003 SIR INDICATIONS FOR TIPS

- Uncontrollable variceal hemorrhage.
- Recurrent variceal hemorrhage despite endoscopic therapy.
- Portal hypertensive gastropathy.
- Refractory ascites.
- Hepatic hydrothorax.
- Budd-Chiari syndrome.
WHICH OF THE FOLLOWING IS NOT A CONTRAINDICATION FOR TIPS?

- Elevated right or left heart pressures.
- Heart failure or cardiac valvular insufficiency.
- Rapidly progressive liver failure.
- Portal vein thrombosis.
- Severe or uncontrolled hepatic encephalopathy.
THAT’S CORRECT!

- Portal vein thrombosis. Portal vein thrombosis is no longer a contraindication for TIPS.
- Elevated right or left heart pressures.
- Heart failure or cardiac valvular insufficiency.
- Rapidly progressive liver failure.
- Severe or uncontrolled hepatic encephalopathy.
- Uncontrolled systemic infection or sepsis.
- Unrelieved biliary obstruction.
- Polycystic liver disease.
- Extensive primary or metastatic hepatic malignancy.
- Severe uncorrectable coagulopathy.

Portal vein thrombosis. Portal vein thrombosis is no longer a contraindication for TIPS.

- Elevated right or left heart pressures.
- Heart failure or cardiac valvular insufficiency.
- Rapidly progressive liver failure.
- Severe or uncontrolled hepatic encephalopathy.
- Uncontrolled systemic infection or sepsis.
- Unrelieved biliary obstruction.
- Polycystic liver disease.
- Extensive primary or metastatic hepatic malignancy.
- Severe uncorrectable coagulopathy.

Figure 2. A CO2 portogram was performed during an initial preintervention evaluation. The portogram demonstrated complete portal vein occlusion with cavernous transformation at the porta-hepatis.
DIAGNOSIS

- Refractory ascites
- Cirrhosis
- Portal vein occlusion
Figure 3. Transhepatic access to the portal venous system was obtained and a portogram was conducted demonstrating portal venous thrombosis with cavernous transformation.
INTERVENTION

• Figure 4. A marker catheter was introduced into the portal venous system to determine the necessary length for the tips shunt (not pictured). A pigtail catheter was then introduced into the confluence of the intrahepatic portal veins to provide a target for the TIPS needle.
Figure 5. Access to the right hepatic vein was obtained through the transjugular approach and a hepatic venogram was performed.
INTERVENTION

- Figure 6. The tips tract was then created using the TIPS needle targeting the pigtail catheter.
Figure 7. The track was ballooned and a stent was successfully introduced between the right hepatic vein and portal vein.
INTERVENTION

- Figure 8. The shunt tract and portal vein were then serially ballooned to establish adequate flow.
Figure 9. The following day it was determined that the shunt had partially thrombosed.
• Figure 10. The tract was serially dilated and an EKOS Ekosonic catheter was placed into the portal venous system. TPA and ultrasound were then used to reduce the portal vein clot burden.
SHUNT THROMBOSIS

- Figure 11. The following day, a portogram was conducted and the shunt and portal venous system were determined to be clot free.
Figure 12. Follow up evaluation of the TIPS was conducted using Doppler sonography. The shunt maintained patency on follow up.

A. Distal TIPS.

B. Proximal TIPS.
SUMMARY & TEACHING POINTS

- Workup of a TIPS includes MELD score evaluation.
- TIPS placement can be performed in an occluded portal venous system.
- TIPS can occlude in the immediate post interventional period.
- Catheter based thrombolysis can be used to recannulate an occluded TIPS.
- Serial Doppler imaging can be performed for TIPS follow-up.
REFERENCES & FURTHER READING


