Tranjugular Intrahepatic Portosystemic Shunt

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BIDMC Radiology
Overview

- Portal Hypertension
- Indications, Contraindications
- The Procedure
- Case Review
- Complications
- Outcomes
- Follow-up
A Brief History

• **1969- Rosch**
  – first described technique in dogs

• **1982- Colapinto**
  – first clinical use in bleeding patient

• **1980s- first metallic stents**

• Today, TIPS has replaced surgical porto-caval shunts (1-3% vs. 30-70% mortality).
Portal Hypertension

- Portal-IVC gradient of 12mm Hg or greater.
- Post Procedure: < 10mm Hg
Portal Hypertension

Some Causes:

• Prehepatic:
  – Portal vein thrombosis
  – External compression (tumor)

• Intrahepatic/sinusoidal:
  – Cirrhosis (alcoholic, viral, idiopathic)
  – Schistosomiasis

• Posthepatic:
  – Budd-Chiari syndrome
  – Constrictive pericarditis
Portal Hypertension

• Poiseuille’s Law: Resistance inversely proportional to $r^4$.

• In cirrhosis, the radius decreases at the hepatic microcirculation (sinusoidal portal hypertension).
  – Mechanical: disturbance of hepatic architecture
Basic Shunt Anatomy
Indications

Proven\(^1\):

• GI variceal bleeding
  – Failed medical therapy, including sclerotherapy
• Refractory ascites

Promising:

• Intractable hepatic hydrothorax
• Hepatorenal syndrome
• Portal hypertensive gastropathy

Esophageal Varices

http://www.gehealthcare.com/seem/rad/us/education/msucmeti.html#about
Contraindications

**Absolute:**
- Right-sided heart failure
- Polycystic liver disease
- Severe hepatic failure

**Relative:**
- Active intrahepatic/systemic infection
- Severe hepatic encephalopathy
- Hypervascular tumors in stent path
- PV thrombosis
TIPS Placement

1. Cannulate R internal jugular vein
2. Wedge catheter in distal R hepatic vein
3. CO2 portogram
4. Advance needle through parenchyma
5. Portal venography
6. Calculate porto-caval pressure gradient
7. Dilate tract, deploy stent
8. Embolize any persistent varices
Patient Presentation
Patient KP

- 62 y.o. Indian female.
- Dx with Hep C cirrhosis two years ago.
- 5 months ago, upper GI bleed from esophageal varices, s/p sclerotherapy and band ligation.
- Recent EGD reveals persistent gastric varices.
- No ascites, encephalopathy, or coagulopathy.
Catheter Tip In Hepatic Vein

Courtesy of Dr. Clouse & Dr. Faintuch
Catheter in Portal Vein

Courtesy of Dr. Clouse & Dr. Faintuch
Portogram

Courtesy of Dr. Clouse & Dr. Faintuch
Stent Placement

Courtesy of Dr. Clouse & Dr. Faintuch

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Dr. Gillian Lieberman
Stent Placement

Courtesy of Dr. Clouse & Dr. Faintuch
Varix

Courtesy of Dr. Clouse & Dr. Faintuch
Post Embolization

POST COILS
Complications

- **Errant Puncture**
  - Pneumothorax
  - R atrial laceration (arrhythmia)
  - Capsular
  - Portal Vein (Intra vs. extrahepatic)
  - Arterial
  - Biliary tree

-Courtesy Dr. Clouse
Complications

• Malpositioned Stent

• Acute Occlusion of Shunt

• Portosystemic Shunt
  - R Heart Failure
  - Pulmonary Edema
  - Hepatic Encephalopathy 15-35%

-Courtesy Dr. Clouse
Outcomes

- Technical success >93%
- Procedural mortality 1-3%
- Cumulative 30-day survival 85-97%
- Mortality related to co-morbidities

-Courtesy Dr. Clouse
Follow-Up

• Color Doppler US*
  - Within 24 hours
  - Every 3 months for first year
  - Every 6 months thereafter

* mean peak velocity 135-200 cm/sec
Patient KP: Follow-Up US

Courtesy of Dr. Clouse & Dr. Faintuch
Shunt Flow

Courtesy of Dr. Clouse & Dr. Faintuch
KP’s Post-Op Course

• POD#1 and #2, Patient KP c/o SOB

• Improved with Lasix

• PA and LAT CXR performed
PA CXR

• Mild CHF
• Atelectasis
• Pleural effusions
• Mild Cardiomegaly
• Stent

Courtesy of Dr. Clouse & Dr. Faintuch
KP’s Post-Op Course

• Additionally, during the POD#1 ultrasound a hypoechoic liver mass was noted

• Not seen during pre-op study
POD #1 US

Map 3
170dB/C 2
Persist Off
2D Opt: FSCT
Fr Rate: Surv
SonoCT™

Courtesy of Dr. Clouse & Dr. Faintuch
CT

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CT Findings

• Shrunken, nodular liver. Splenomegaly.

• Multiple ill-defined, peripherally enhancing lesions with low central attenuation in right posterior and inferior aspects of liver

• Highly suspicious for Hepatoma/HCC
  – Post-instrumentation, infection also on DDX
US-Guided Biopsy

Map 3
170dB/C 4
Persist Med
2D Opt:Gen
Fr Rate:High

Guide to target distance: 11.0 cm

Courtesy of
Dr. Clouse &
Dr. Faintuch
Pathology of Lesion

• As of this presentation, pathology results are not yet available.
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