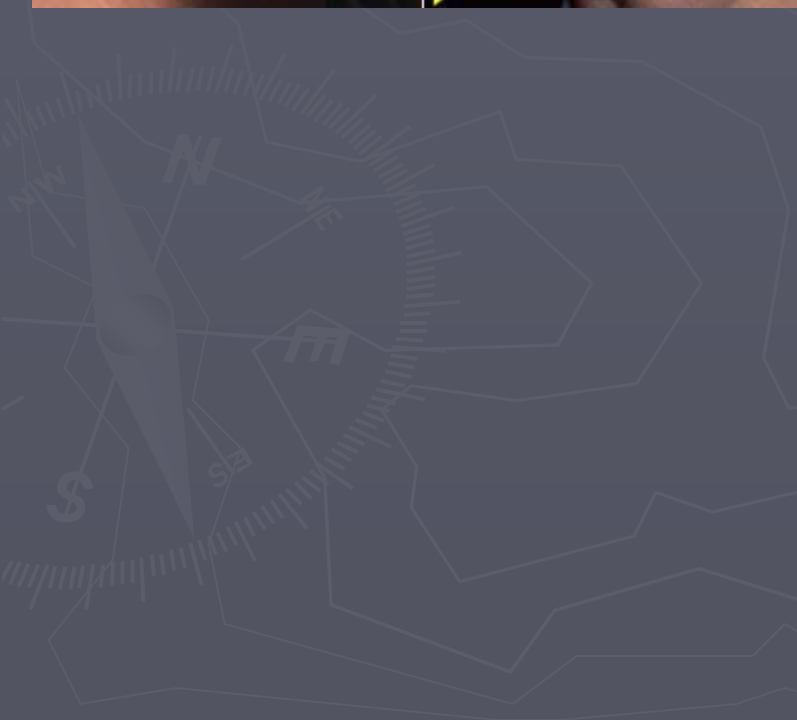


# Extreme Surgery: Techniques for Difficult Hurdles

Alan Langnas D.O.  
Professor of Surgery  
University of Nebraska



# Extremes

- ▶ Staying on the path
- ▶ Arterial reconstruction
  - Intraoperative challenges
  - Post transplant frustrations
- ▶ Splanchnic venous thrombosis
  - Pre transplant consideration
  - Intraoperative approaches
- ▶ Budd Chiari Syndrome
  - Always something wacky
- ▶ Retransplant
  - HODAD
- ▶ Cholangiocarcinoma
  - Surprise? Planned?

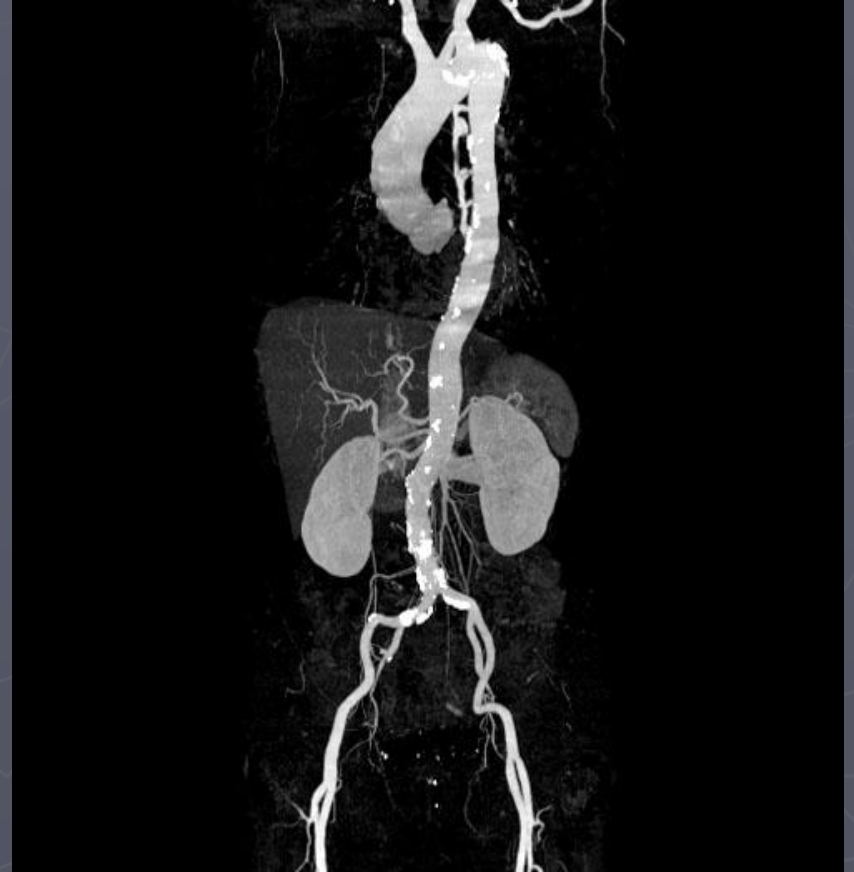


# Avoidance the Best approach



# Arterial Problems

- ▶ Complex reconstruction on back table
- ▶ Unsuitable recipient artery
- ▶ Post-transplant challenges
  - HAT
  - Stenosis/Pseudo aneurisms
  - rupture



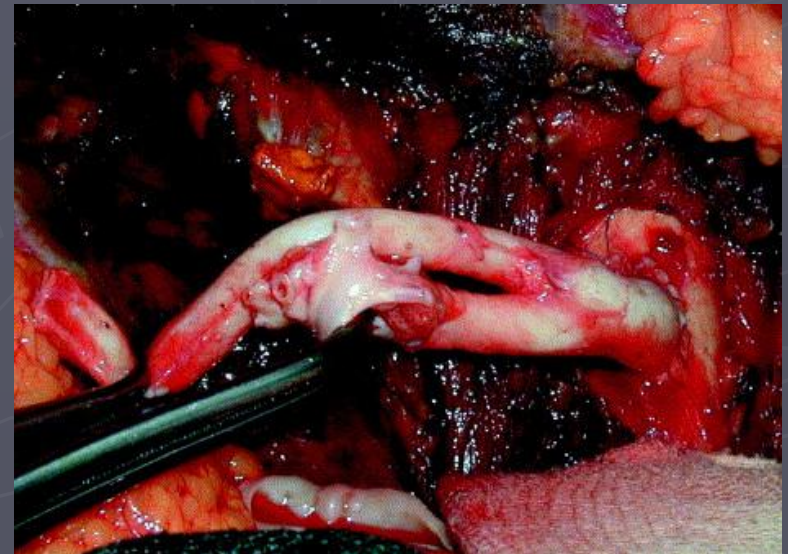
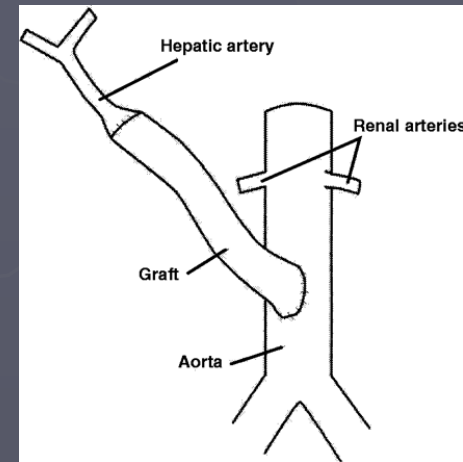
# Back table

- ▶ Broad sharing and other take out our livers
- ▶ Identify injuries
- ▶ What to do?
- ▶ Most arterial injuries can be reconstructed but ....
- ▶ Venous-primary or patch



# Arterial inflow options when common HA unavailable

- ▶ Direct to celiac
- ▶ Flip up splenic
- ▶ Direct to aorta
- ▶ Conduit







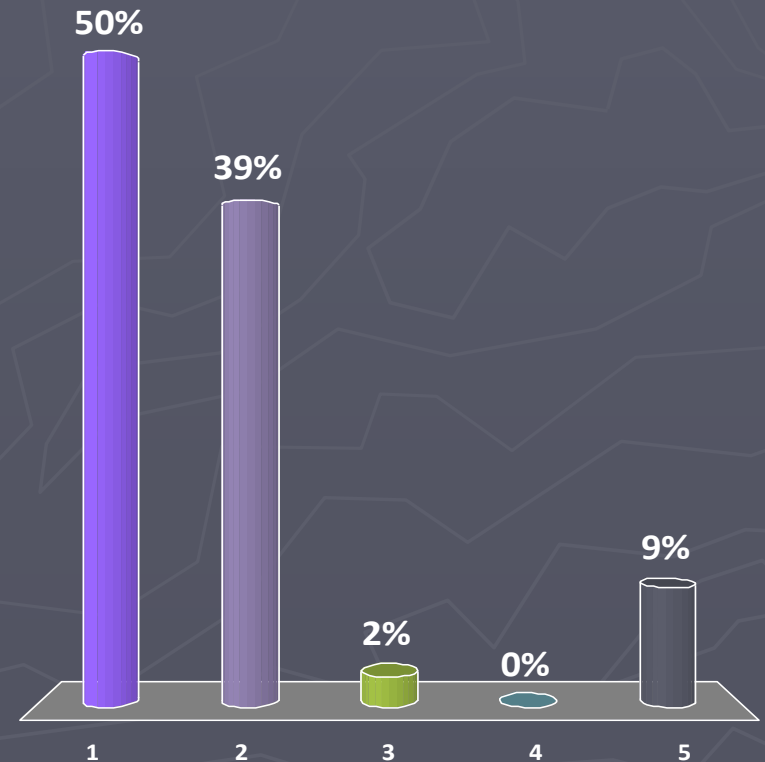
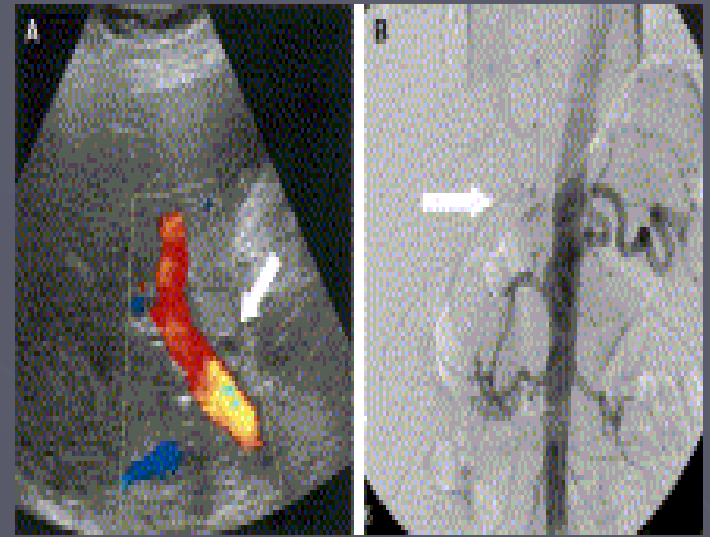
# 62 yo male with history of HCV and HCC undergoes liver transplant with 65 yo standard donor that has 20% macrosteatosis

- ▶ Surgery uneventful- hypotension with unclamping followed by coagulopathy-6 hours and 12 units prbc
- ▶ Mild oliguria. Ultrasound demonstrates patent artery with high resistance
- ▶ Transaminases 1500 and INR 2
- ▶ POD 3 Urine output improves. INR normalized. AST 500
- ▶ Post 5 transaminases increase to 900 and duplex ultrasound ordered—extra-hepatic artery seen but nothing within liver

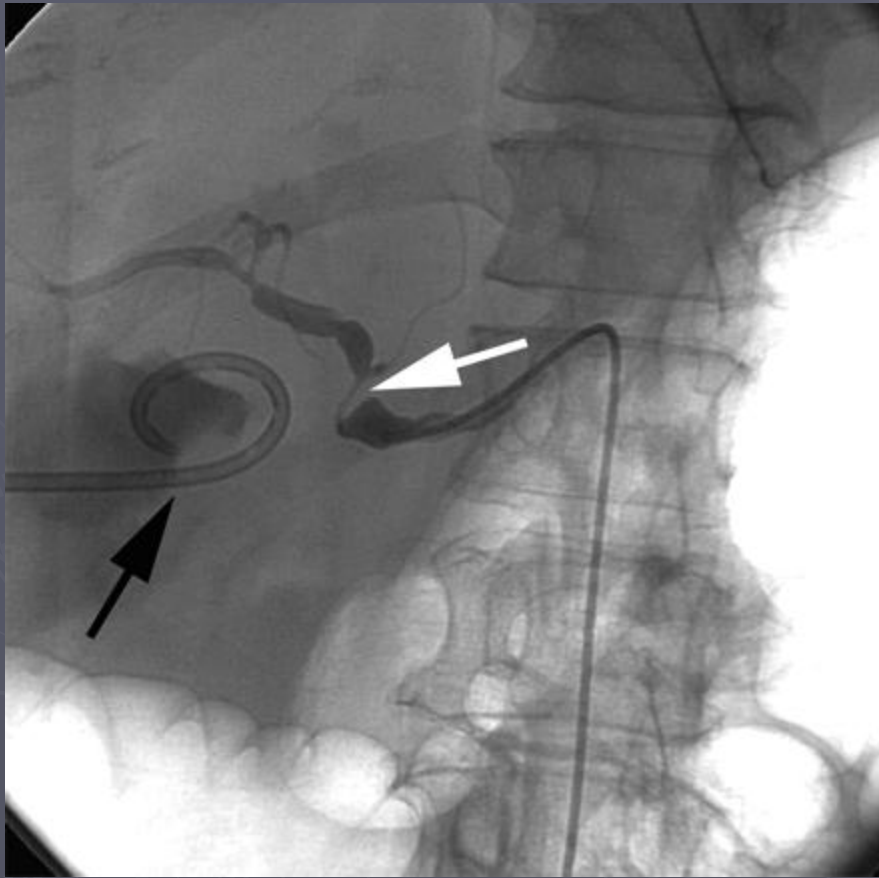


# Options:

1. Return patient to operating room immediately for possible Thrombectomy
2. Angiogram first-then OR
3. Observe
4. Observe and list for 2<sup>nd</sup> transplant
5. Combination



# Arterial stenosis and arterial pseudo aneurysm



Surface 8  
Ex: 27095  
Se: 2 +c  
Volume Rendering No cut

S 8



DFOV 27.0 cm  
STND/+  
202/8

P  
1  
3  
5



No VOI  
kv 120  
mA Mod.  
Rot 0.60s/HE+ 20.6mm/rot  
1.2mm 0.516:1/1.2sp  
Tilt: 0.0  
05:17:01 PM  
W = 657 L = 387

I 262

A

1

Surface 5  
Ex: 18688  
Se: 2 +c  
Volume Rendering No cut

S



DFOV 36.0 cm  
STND/+  
201/5

P  
R



A  
L

No VOI  
kv 120  
mA Mod.  
Rot 0.60s/HE+ 20.6mm/rot  
1.2mm 0.516:1/1.2sp  
Tilt: 0.0  
10:33:57 PM  
W = 395 L = 396

I

# Case Report- Mr. B

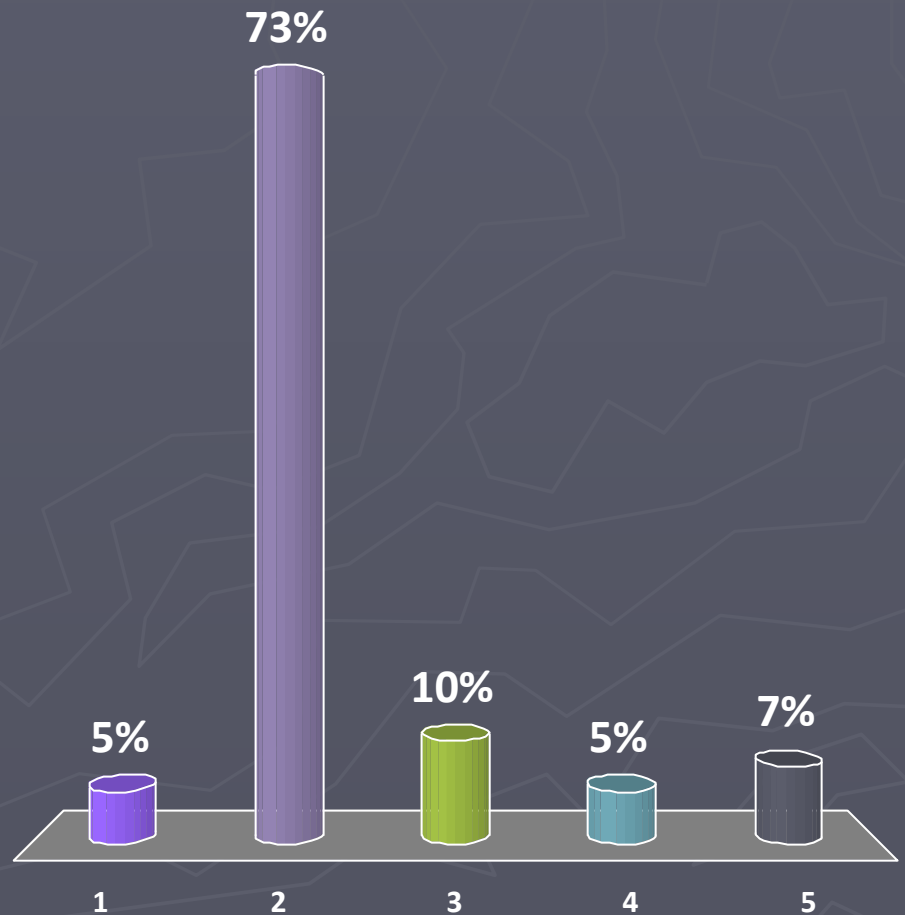
- ▶ 50 yo man with alpha-1-antitrypsin
  - Fatigue, encephalopathy, ascites and peripheral edema.
  - 3 variceal bleeds with last requiring 13 units blood.
  - Ultrasound demonstrated portal vein thrombosis and MR angiogram reveal extensive thrombosis of splenic and SMV.
  - History of DVT, pulmonary embolus, vena caval filter and is taking Coumadin
  - Was referred for consideration of multivisceral transplant

# MRA PRE TX



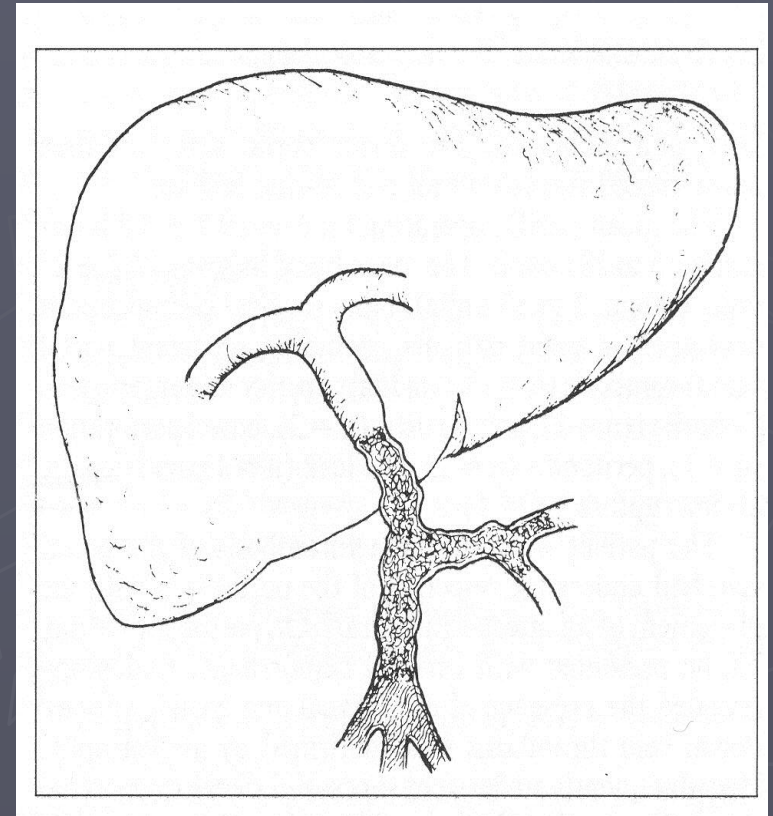
# What would you offer this patient?

1. Hospice
2. Combined liver/small bowel transplant
3. Isolated liver transplant
4. Mesocaval shunt
5. TIPS



# Total Splanchnic Venous Thrombosis

- ▶ Prevalence and risk factors
- ▶ Imaging studies
- ▶ Pre-transplant management
- ▶ Operative choices
  - Thrombectomy
  - Mesoportal jump graft
  - Caval-portal hemi transposition
  - Multivisceral transplantation





# Prevalence and Risk factors

- ▶ In cirrhotic patients 2 to 26%
  - Hospital Beaujon (Gut 2005)
    - ▶ 15 of 251 had porto/mesenteric or splenic
    - ▶ Multivariate analysis suggested low platelet count and history of variceal bleeding increased risk
  - Birmingham (Transplantation 2000)
    - ▶ 16 of 779 had extensive porto/mesenteric disease
  - Cardarelli Hospital ( J Hepatology 2004)
    - ▶ 32 of 701 had porto/mesenteric/splenic
    - ▶ mutation 20210 of the prothrombin gene increases more than fivefold the risk of PVT.

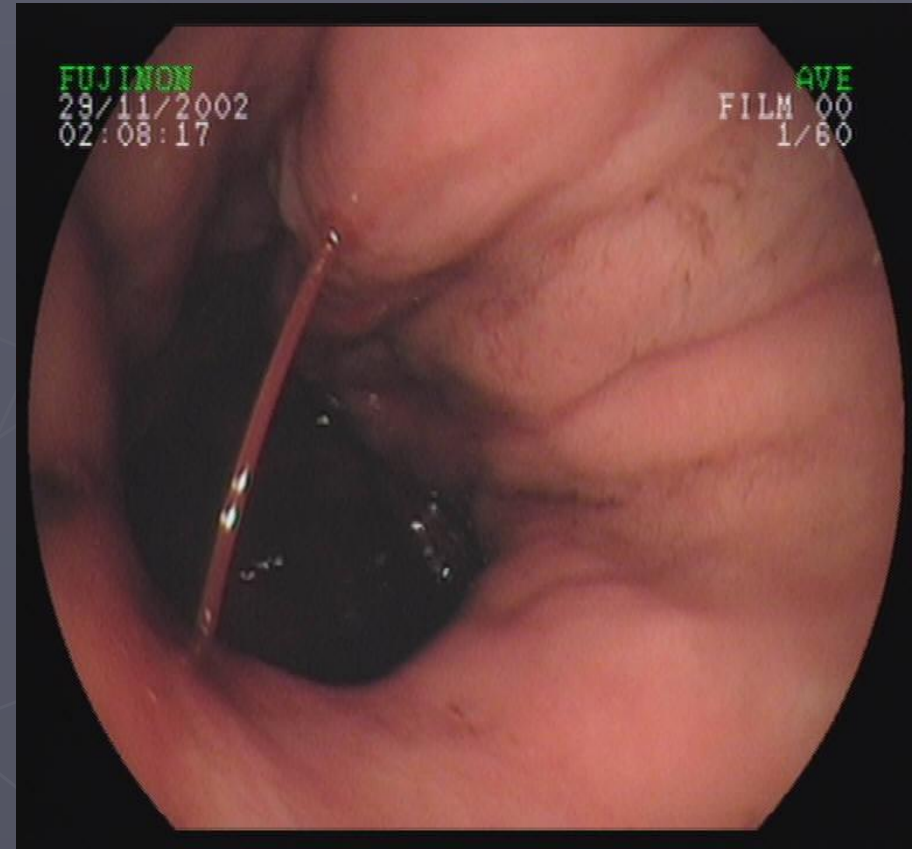
# Imaging Studies

- ▶ Ultrasound
- ▶ CT angiogram
- ▶ MR angiography-
  - gadolinium enhanced
- ▶ Angiography
- ▶ Operating room



# Pre-transplant management

- ▶ Repeat imaging
  - 3 to 6 months
- ▶ Anticoagulation
  - Pro
    - ▶ recanalization of venous thrombosis
    - ▶ No evidence of increased bleeding
    - ▶ Vit K antagonists
  - Con
    - ▶ Are you kidding????
    - ▶ Worsen variceal bleed
    - ▶ Increase bleeding during liver transplant



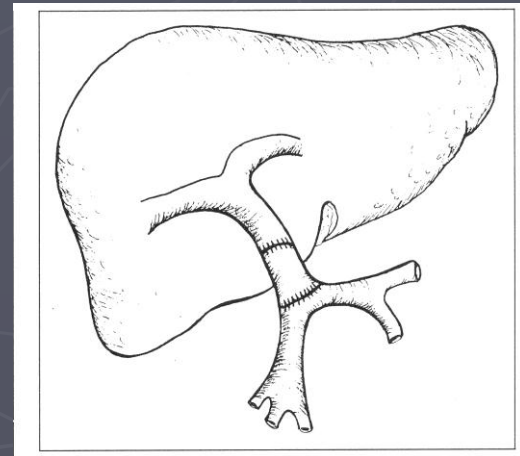
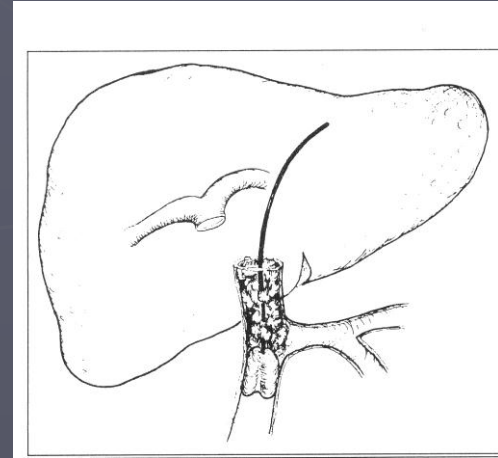
# Selecting the best operation

- ▶ Thrombectomy or use recanalized portal vein
- ▶ Mesoportal graft or other extra-anatomic inflow
- ▶ Cavo-portal hemi transposition
- ▶ Multivisceral transplant

# Thrombectomy, use of recanalized portal vein, or resection of phlebosclerotic portal vein with graft placement

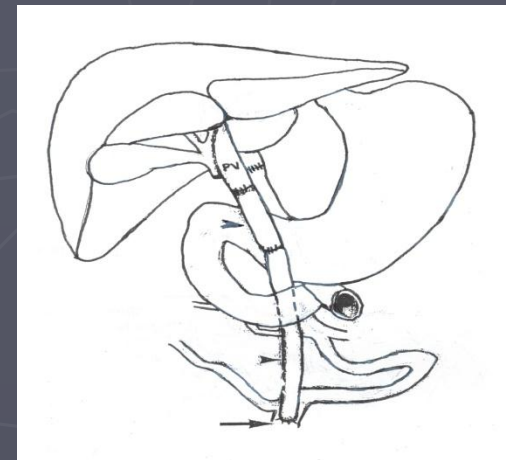
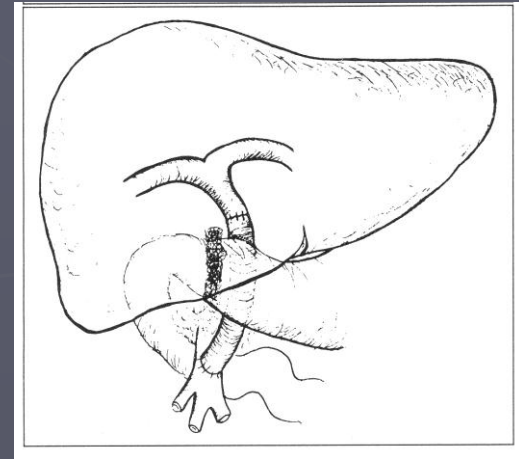
## Good first step

- Thrombectomy
    - infrequently used
  - Characterize portal flow
- ▶ Grafts needed when donor pancreas used
  - ▶ Avoid extensive peri-pancreatic dissection
  - ▶ ?endovascular stents

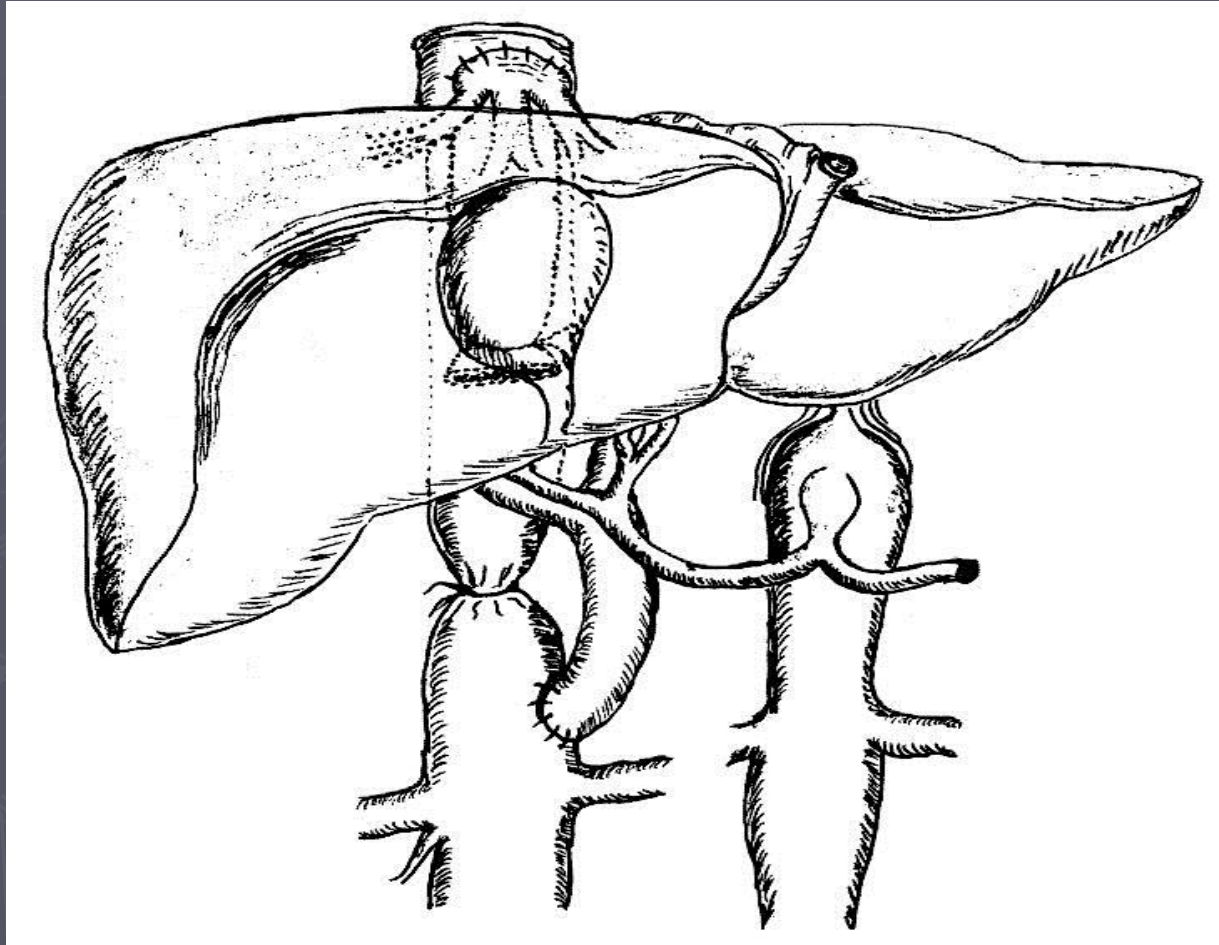


# Mesoportal or other extra-anatomic bypass

- ▶ Safe and effective
- ▶ Preferred approach for most patients
- ▶ adequate portal inflow and splanchnic decompression
- ▶ SMV approached similar to mesocaval shunt ( Rex)
- ▶ Avoids peri-pancreatic dissection
- ▶ Coronary, middle colic biliary collateral



# Cavo-portal Hemi transposition

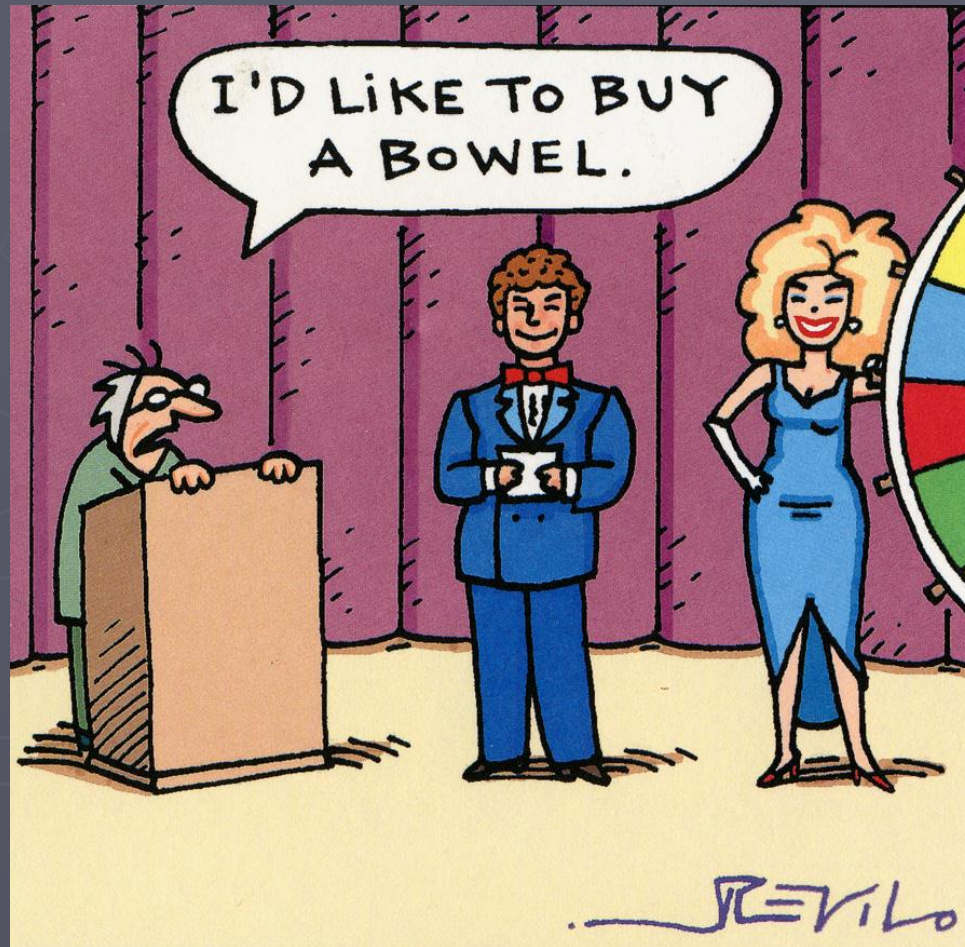


# Cavo-portal Hemitransposition

- ▶ when hepatopetal flow to the liver graft cannot be established by other techniques
- ▶ Satisfactory graft function ( early)
- ▶ Does not deal with portal hypertension
- ▶ Ascites/ GI bleeding
- ▶ Miami-23 patients
- ▶ 63% 1 year survival with 11/23 currently alive
  - 7/23 post operative GI bleed
  - Postoperative ascites
  - Cases of deaths sepsis /pulmonary embolus

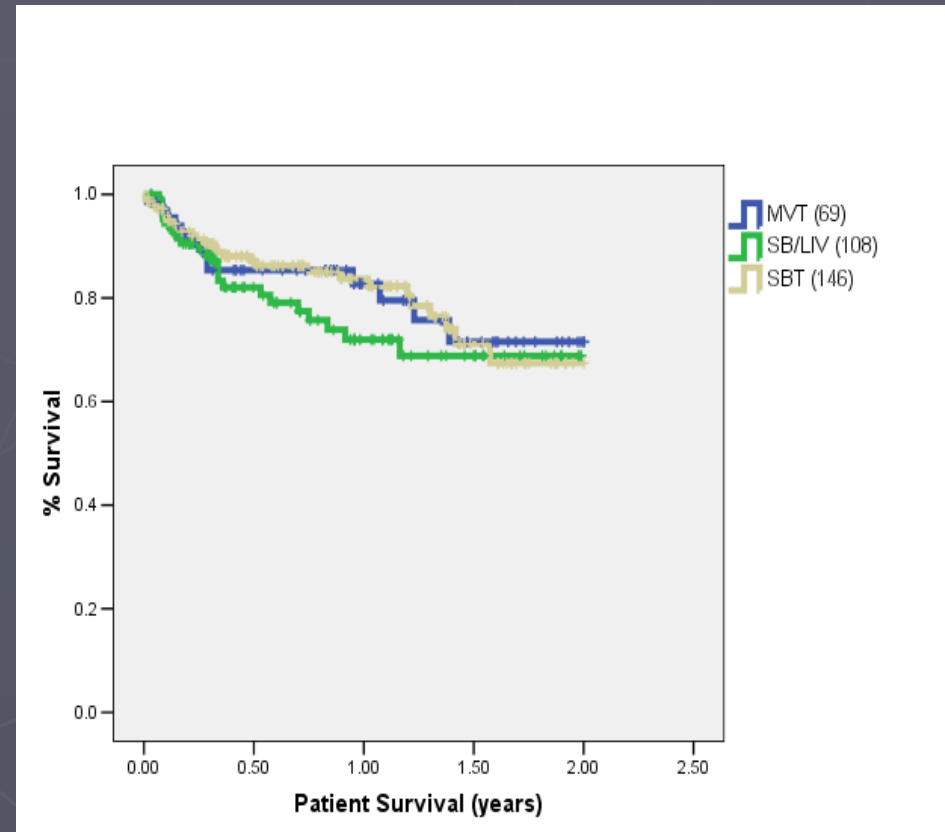


# Multiviseral transplant



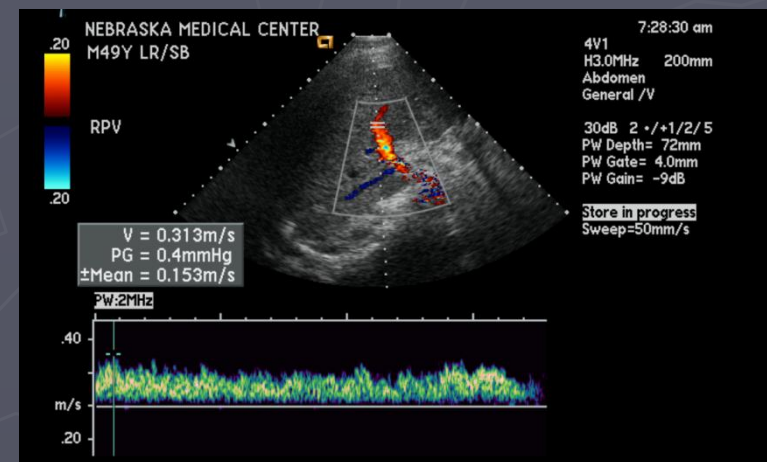
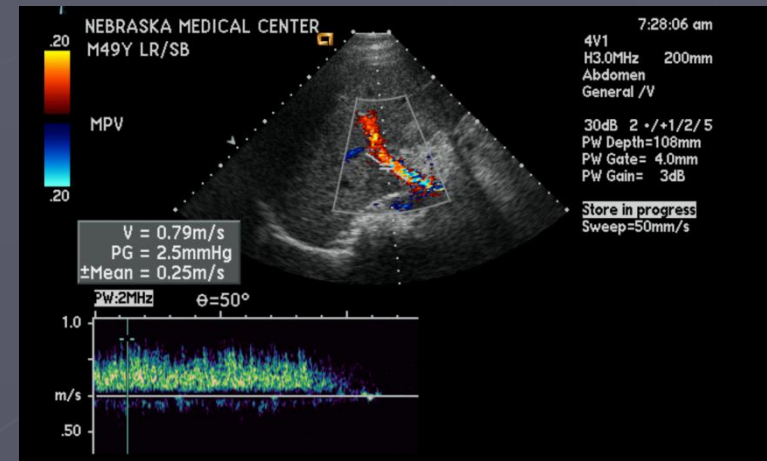
# Multivisceral Transplantation

- No Splanchnic venous opportunities
- Very effective
  - ▶ Pretransplant decision
  - ▶ Limited donor pool
  - ▶ Postoperative care specialized
  - ▶ Decreased survival



# Case report—Mr. B

- ▶ At transplant SMV not suitable
- ▶ Good flow through recanalized portal vein or collateral
- ▶ Good PV flow on post-op ultrasound
- ▶ Postoperative variceal bleed
  - Stopped anticoagulation
- ▶ Done well



53 year old man with history of PSC s/p living unrelated living donor right lobe oltx 6 years ago

- ▶ Maintenance immunosuppression had been tacrolimus and prednisone
- ▶ Presented with jaundice and failure to thrive
- ▶ Biopsy shows chronic rejection without significant fibrosis
- ▶ Developed renal failure requiring dialysis 4 weeks ago
- ▶ MELD 37+
- ▶ Ultrasound shows portal vein thrombosis, Smv thrombosis and splenic vein thrombosis
- ▶ No known underlying hypercoagulable condition



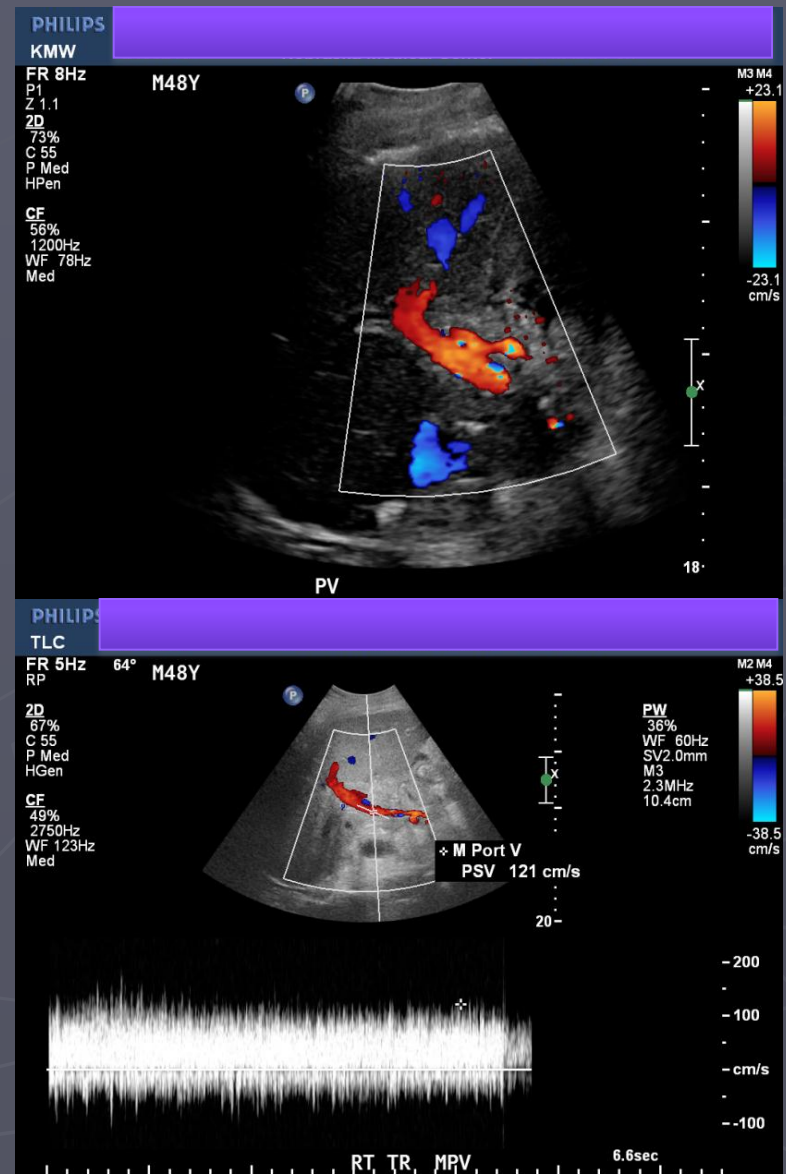
Large varix in mesentery



Porta hepatis with large hepatic artery

# What we did ....

- ▶ Listed for isolated liver and kidney, worked up living kidney donor
- ▶ Transplanted with cadaveric liver/kidney – used mesenteric varix for portal inflow
- ▶ Anticoagulated post operatively



# Conclusion

- ▶ Pre-transplant imaging critical
- ▶ Anti-coagulation
- ▶ Splanchnic venous thrombosis should not be an obstacle to successful transplantation
- ▶ Select operation to fit anatomy
  - Plan
  - Splanchnic inflow
  - Limited roles of cavo-portal hemi-transposition and multivisceral
- ▶ Splanchnic venous thrombosis should not be an obstacle to successful transplantation

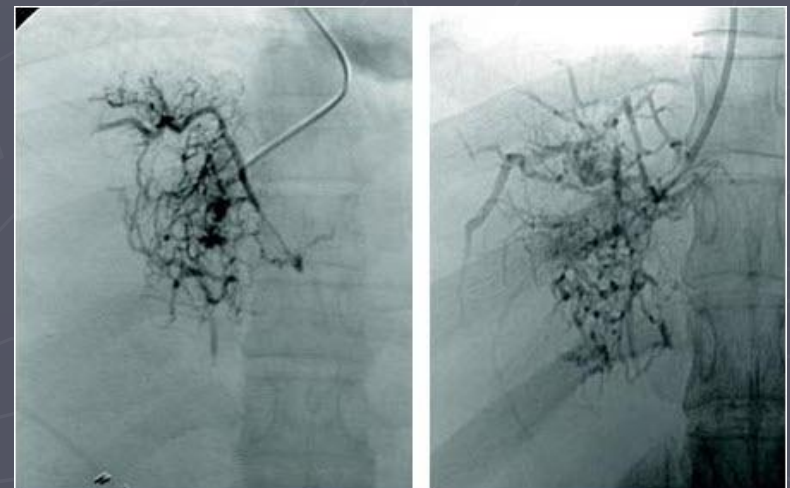
# Budd-Chiari Syndrome

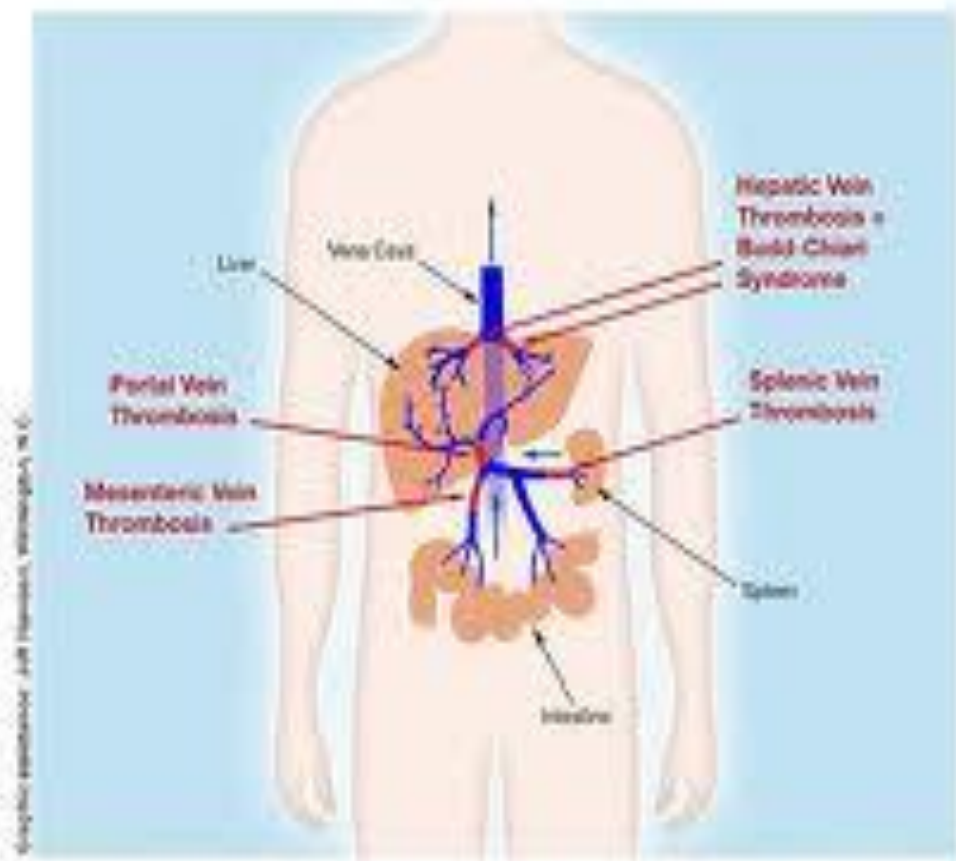




# Technical Challenges of Budd Chiari

- ▶ Liver Huge-
- ▶ Caudate lobe hypertrophy with displacement of cava or distorted anatomy
- ▶ Previous operations
  - Prior porto-caval shunt
- ▶ Venous Thombosis
  - PVT
  - Caval thrombosis
- ▶ Nasty Collaterals



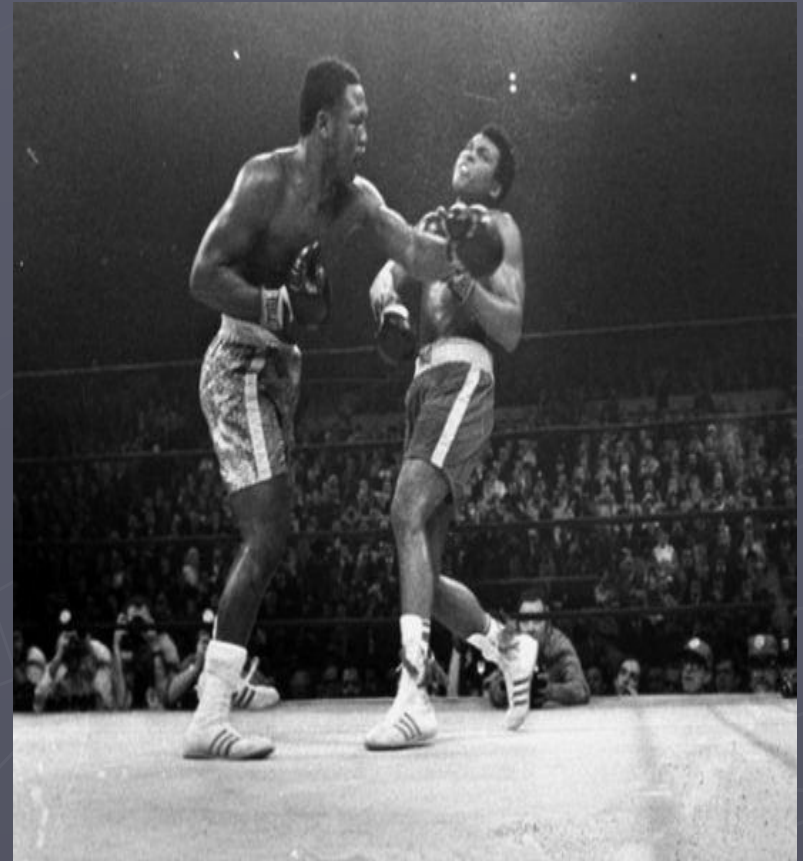


© M. Hoffmann, Universität Wien, Österreich

© Stephen Mal, M.D.

# Retransplantation

- ▶ Never know what to expect
- ▶ Stay on the path..
- ▶ Be patient and meticulous with dissection but sometimes....
- ▶ Venous bypass
- ▶ HODAD....Bi-HODAD



Hands of death and destruction

# Cholangiocarcinoma

- ▶ What to do when you are faced with a positive or equivocal margin at time of transplant?
- ▶ What to do when pathologists return new information the next day?



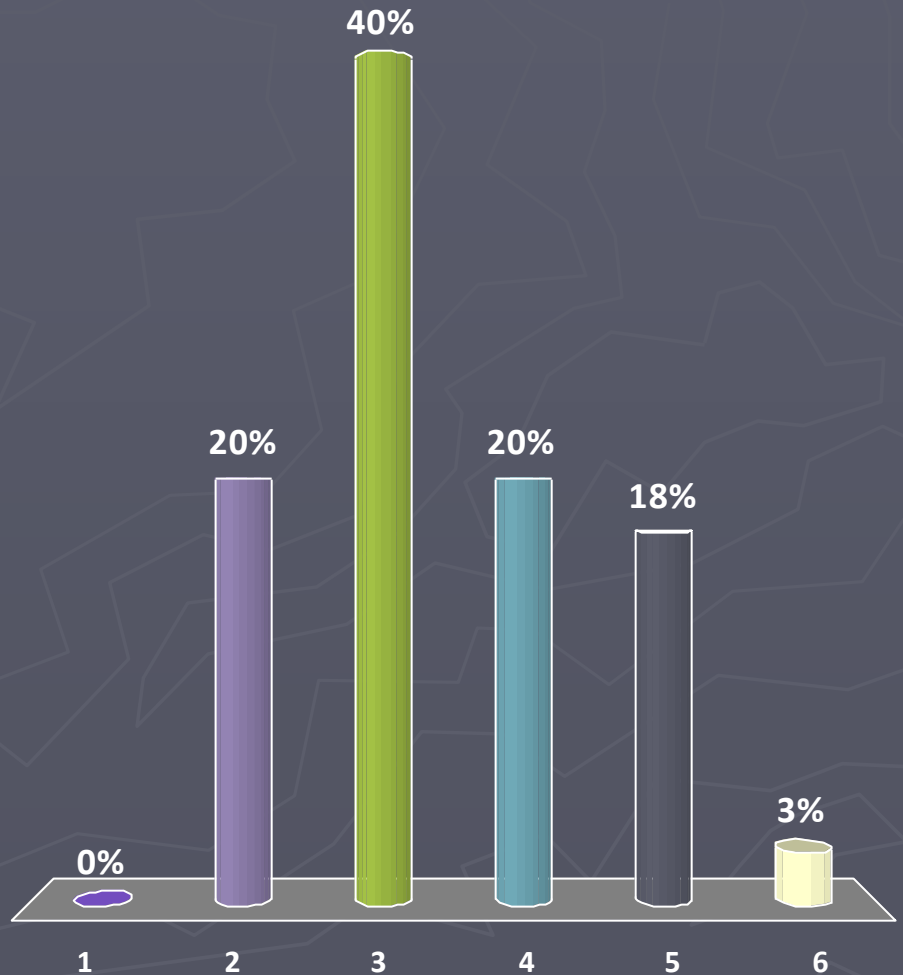
Nodes sampled are negative

# What to do???

- ▶ Options
- ▶ Abandon transplant
- ▶ Whipple now
- ▶ Whipple later
- ▶ Perform liver transplant but Never Whipple—its hopeless
- ▶ Total pancreatectomy-cause that pancreatic anastamosis is nothing but trouble

# What to do???

1. Options
2. Abandon transplant
3. Whipple now
4. Whipple later
5. Perform liver transplant but Never Whipple—its hopeless
6. Total pancreatectomy—cause that pancreatic anastamosis is nothing but trouble



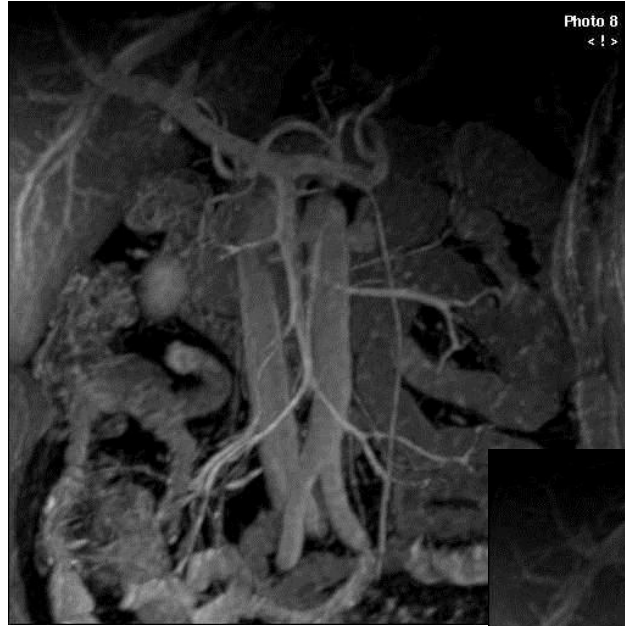


# Conclusion

- ▶ Stay on the path...if u make wrong turn..work to get back on...
- ▶ Arterial issues will become more prevalent
- ▶ Splanchnic venous thrombosis will require some deliberate creativity
- ▶ Budd Chiari always a pain
- ▶ Retx---be prepared to HODAD
- ▶ Changiocarcinoma





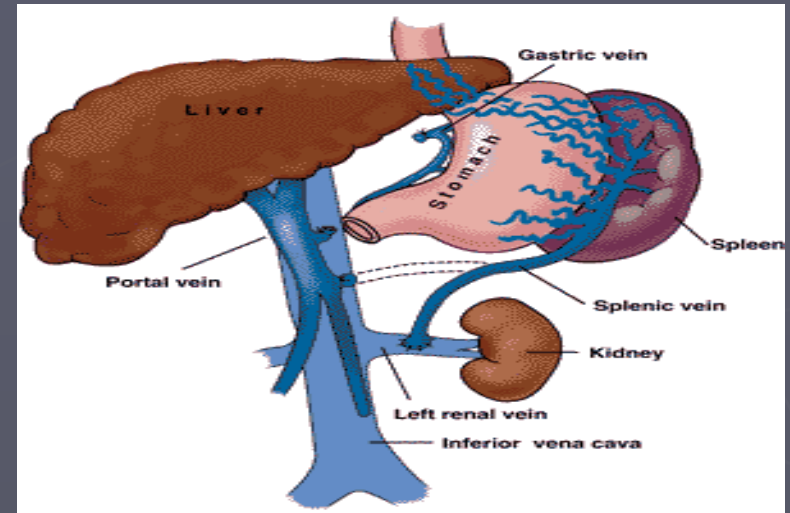


# A Selective Approach to Managing Total Splanchnic Venous Thrombosis in Liver Transplantation

Alan Langnas  
Professor of Surgery  
Chief of Transplantation  
University of Nebraska Medical Center

# Risk factors

- ▶ Hepatocellular carcinoma
  - Typically not tx candidates
- ▶ Portosystemic shunt
  - Failed central shunts
  - Distal splenorenal- 10% risk of PVT
- ▶ Budd-Chiari syndrome
- ▶ Hypercoagulable conditions



Thrombophilic risk factors <i>n</i> (%)	PVT	CCG	<i>P</i> value
Previous sclerotherapy	25 (31.6)	18 (23.1)	0.23
Abdominal surgery	23 (29.1)	27 (34.6)	0.46
FVL	8 (11.4)	4 (5.1)	0.16
PTHR 20210	15 (21.4)	4 (5.1)	0.003
MTHFR TT677	15 (21.4)	11 (14.1)	0.24
ACA IgG (> 10 U/ml)	25 (43.9)	37 (48.7)	0.58
ACA IgM (> 10 U/ml)	9 (14.0)	13 (17.1)	0.63
Homocysteine (>13 μmol/l)	17 (28.3)	31 (41.9)	0.10