# TIPSS Indications and Ultrasound Assessment

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# Disclaimer

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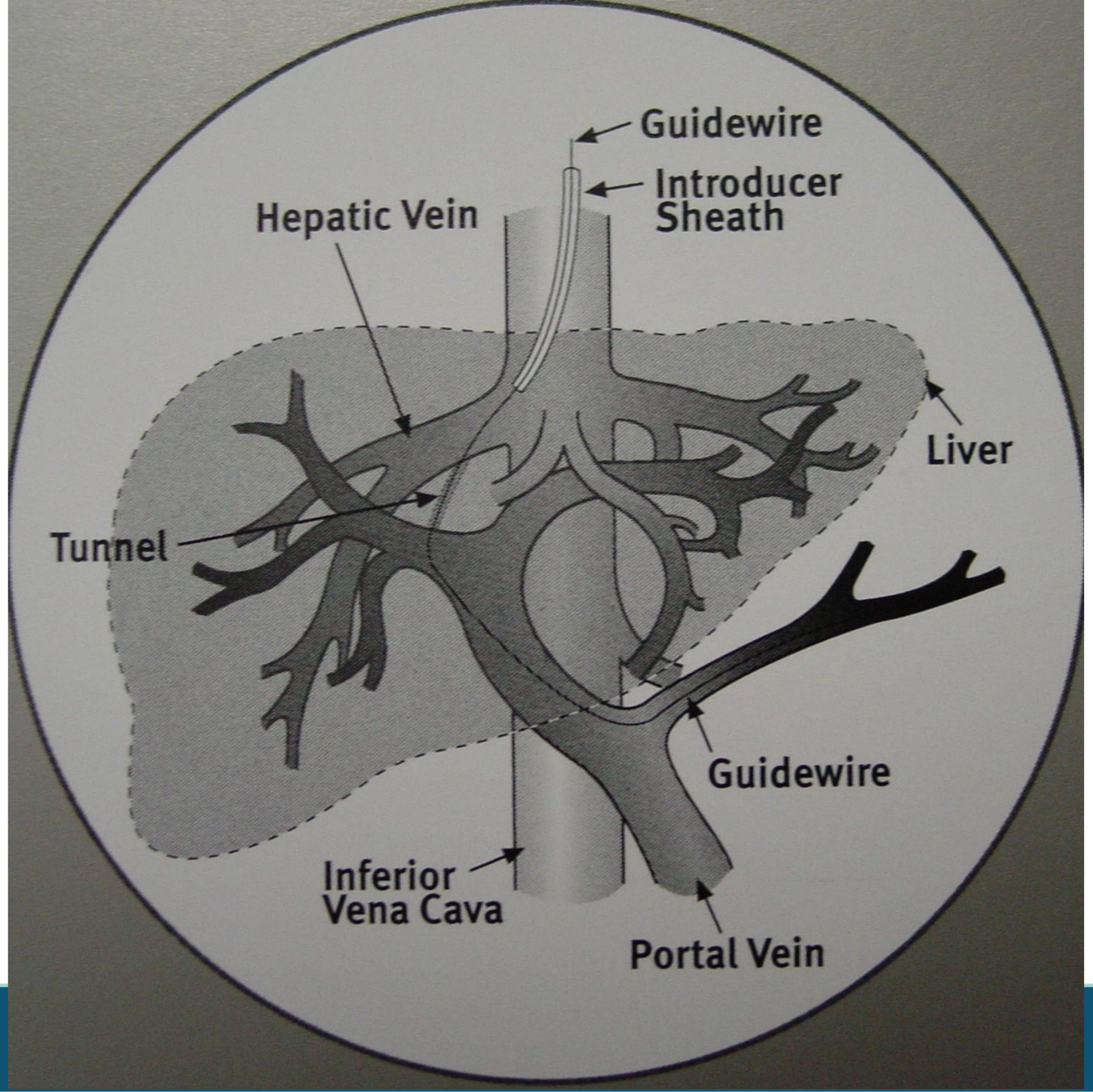
# Disclosure

- Cook Medical
- Gore Medical

# Transhepatic Intrahepatic Porto-Systemic Shunt (TIPSS)

- Creation of an artificial channel between hepatic vein and portal vein to reduce portal pressure


Guidewire
Introducer Sheath
Hepatic Vein
Liver
Tunnel
Guidewire
Inferior Vena Cava
Portal Vein

# Indications for TIPSS

- Variceal bleed uncontrolled by endoscopic treatment (salvage TIPSS)

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- Variceal bleed uncontrolled by endoscopic treatment (salvage TIPSS)
- Variceal bleed controlled by endoscopic treatment – early TIPSS to prevent rebleed (early TIPSS, pre-emptive TIPSS)

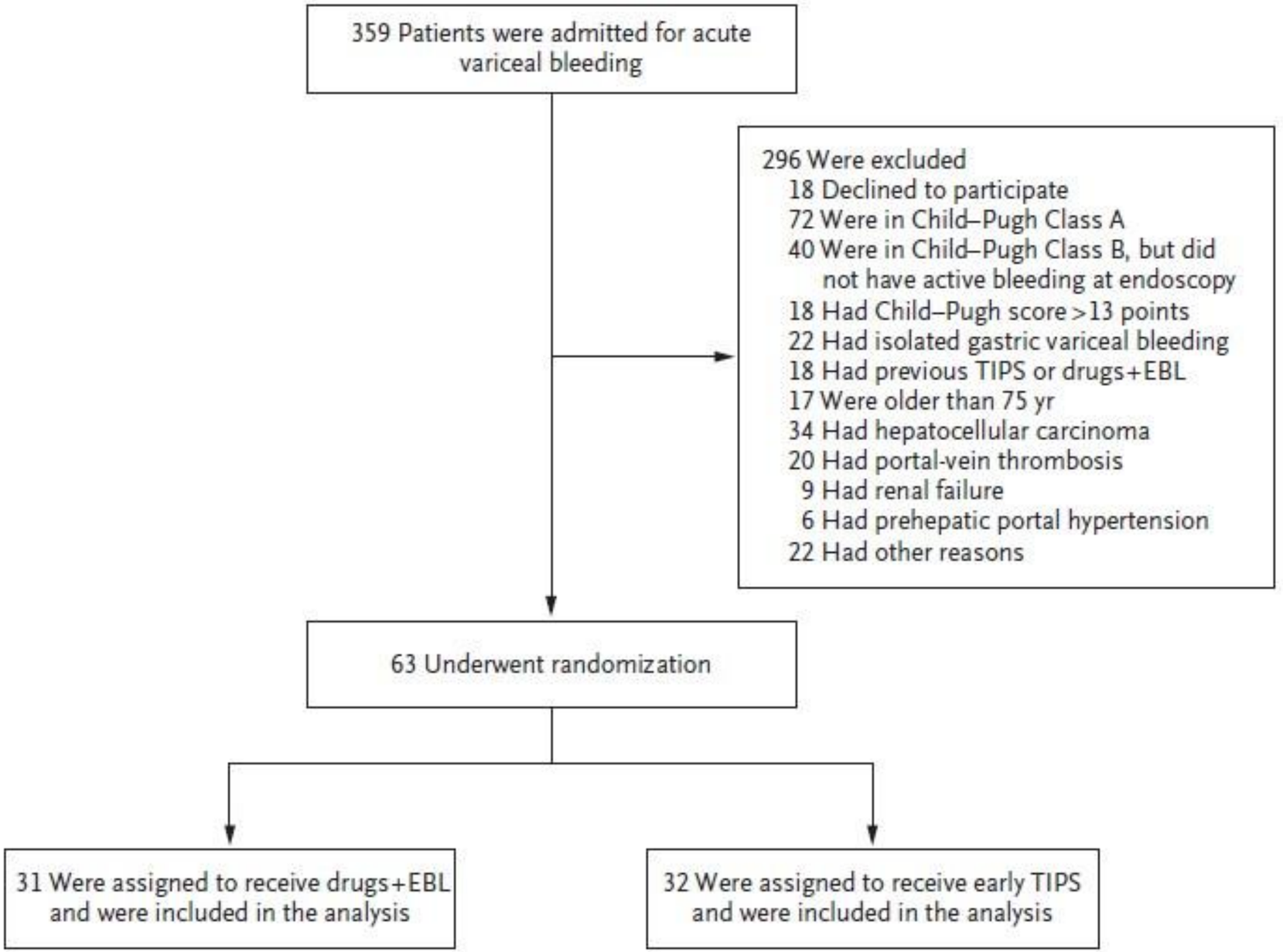
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

# Early Use of TIPS in Patients with Cirrhosis and Variceal Bleeding

Juan Carlos García-Pagán, M.D., Karel Caca, M.D., Christophe Bureau, M.D., Wim Laleman, M.D., Beate Appenrodt, M.D., Angelo Luca, M.D., Juan G. Abraldes, M.D., Frederik Nevens, M.D., Jean Pierre Vinel, M.D., Joachim Mössner, M.D., and Jaime Bosch, M.D., for the Early TIPS (Transjugular Intrahepatic Portosystemic Shunt) Cooperative Study Group

N Engl J Med 2010;362:2370-9.


359 Patients were admitted for acute variceal bleeding
296 Were excluded
18 Declined to participate
72 Were in Child–Pugh Class A
40 Were in Child–Pugh Class B, but did not have active bleeding at endoscopy
18 Had Child–Pugh score >13 points
22 Had isolated gastric variceal bleeding
18 Had previous TIPS or drugs+EBL
17 Were older than 75 yr
34 Had hepatocellular carcinoma
20 Had portal-vein thrombosis
9 Had renal failure
6 Had prehepatic portal hypertension
22 Had other reasons
63 Underwent randomization
31 Were assigned to receive drugs+EBL and were included in the analysis
32 Were assigned to receive early TIPS and were included in the analysis

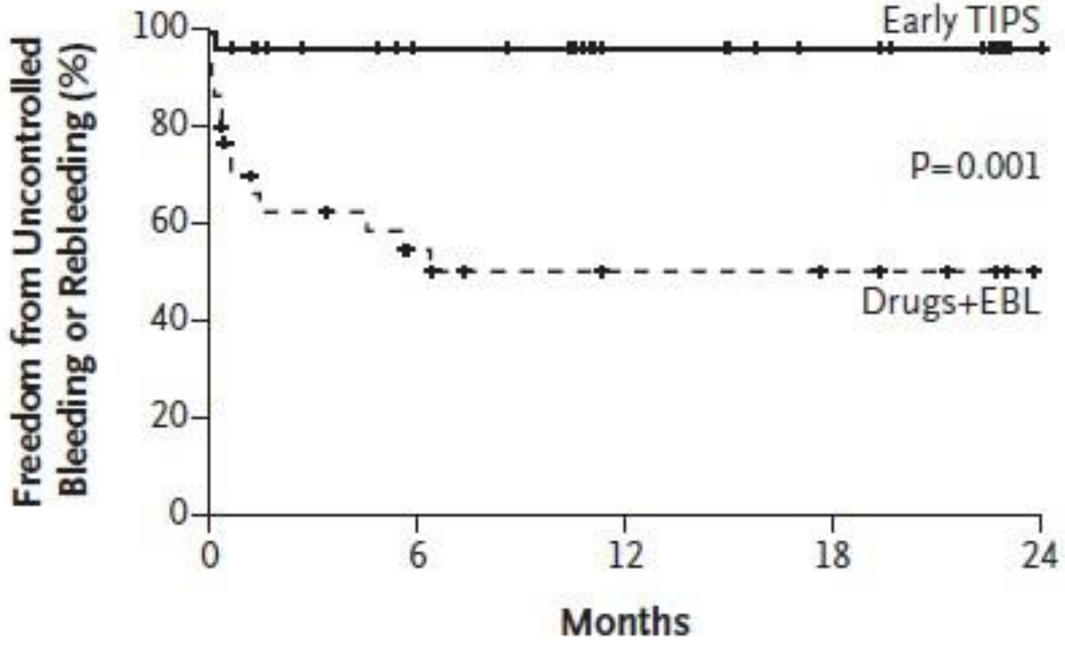
## BACKGROUND

Patients with cirrhosis in Child–Pugh class C or those in class B who have persistent bleeding at endoscopy are at high risk for treatment failure and a poor prognosis, even if they have undergone rescue treatment with a transjugular intrahepatic portosystemic shunt (TIPS). This study evaluated the earlier use of TIPS in such patients.

## METHODS

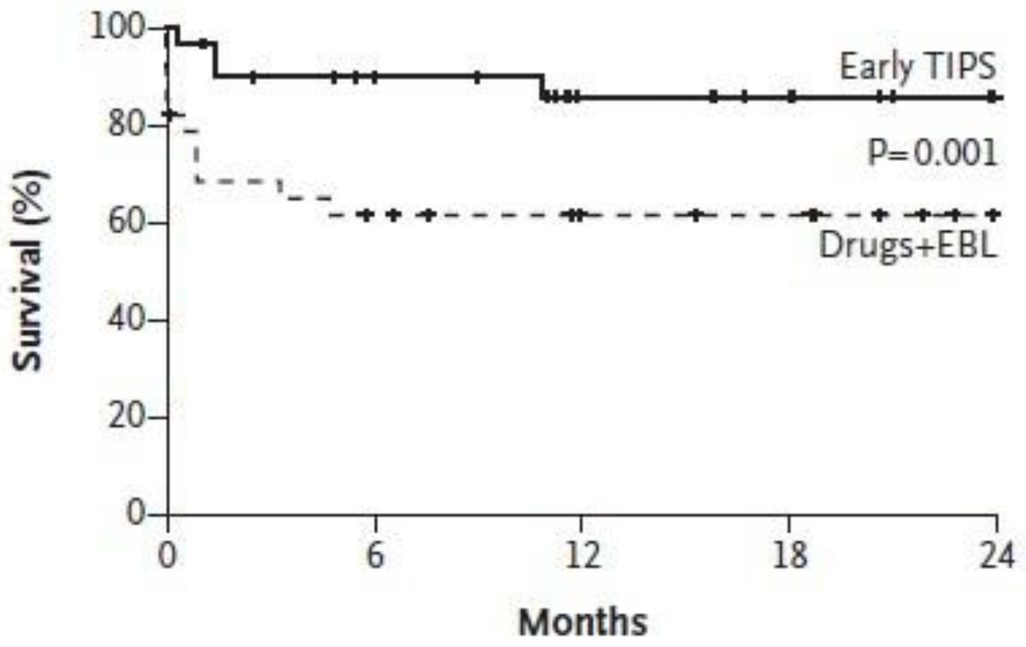
We randomly assigned, within 24 hours after admission, a total of 63 patients with cirrhosis and acute variceal bleeding who had been treated with vasoactive drugs plus endoscopic therapy to treatment with a polytetrafluoroethylene-covered stent within 72 hours after randomization (early-TIPS group, 32 patients) or continuation of vasoactive-drug therapy, followed after 3 to 5 days by treatment with propranolol or nadolol and long-term endoscopic band ligation (EBL), with insertion of a TIPS if needed as rescue therapy (pharmacotherapy–EBL group, 31 patients).

A




| No. at Risk | | | | | |
|---|---|---|---|---|---|
| Early TIPS | 32 | 24 | 15 | 11 | 5 |
| Drugs+EBL | 31 | 13 | 7 | 7 | 3 |

B




| No. at Risk | | | | | |
|---|---|---|---|---|---|
| Early TIPS | 32 | 24 | 17 | 12 | 7 |
| Drugs+EBL | 31 | 18 | 13 | 10 | 5 |

# Early TIPSS

- Less rebleeding
- Clear survival benefit at  1yr
- But small number of patients
- French and German trial since has not demonstrated clear survival benefit
- So should we be doing early TIPSS????

# REACT-AVB

- Randomised controlled trial of EArly transjugular intrahepatiC porTosystemic stent-shunt in Acute Variceal Bleeding (REACT-AVB)
- Multicentre UK trial
- 294 patients, 1:1 randomization
- Viatorr Controlled Expansion stent
- Primary outcome: Transplant free survival at 1 year
- Started recruitment in March 2024

# REACT-AVB

- Secondary outcomes:
  1. Transplant free survival at 6 weeks (from randomisation)
- 2. Rebleeding (from randomisation)
- a. Early (within 6 weeks)
- b. Late (6 weeks to 1 year)
  3. Adverse events related to treatment (up to 12 months after randomisation)
- 4. Other complications of cirrhosis:
- a. New onset ascites
  b. New onset encephalopathy
  c. Spontaneous bacterial peritonitis d. Hepatocellular carcinoma
- 5. Child-Pugh score at 6 and 12 months.
  6. MELD score at 6 and 12 months.
  7. Health-related quality of life (EQ-5D-5L) at 6 and 12 months.
  8. Use of healthcare resources, costs and cost-effectiveness based on cost per Quality-Adjusted Life- Year (QALY) estimated using the EQ-5D-5L and cost per death avoided at one year, and modelled cost per QALY over patient lifetime.
  9. Use of alternative therapies (including diuretics and non-selective beta-blockers)

# REACT-AVB

- Inclusion criteria:
  1. Liver cirrhosis as defined clinically, radiologically (USS and transient elastography) or on histology.
- 2. Acute variceal bleed (oesophageal or gastric) with haemostasis following initial endoscopic therapy.
- 3. Child-Pugh score 7-13.
- 4. Age >= 18

# REACT-AVB

- Exclusion Criteria:
  1. Failure to control acute bleeding (as per Baveno 6 criteria)(5) prior to randomisation
- 2. Previous portosystemic shunt or TIPSS
  3. Known occlusive portal vein thrombosis precluding TIPSS
  4. Active cancer including hepatocellular carcinoma affecting 1 year survival
  5. Contraindication to non-selective beta blockers such as asthma.
- 6. Clinically significant encephalopathy causing recurrent hospital admissions
- 7. Pregnancy or lactating women
- 8. Evidence of heart failure refractory to treatment
- 9. Severe active septicaemia

# Indications for TIPSS

- Variceal bleed uncontrolled by endoscopic treatment (salvage TIPSS)
- Variceal bleed controlled by endoscopic treatment – early TIPSS to prevent rebleed (early TIPSS, pre-emptive TIPSS)
- Diuretic resistant ascites
- Intolerance of diuretics
- Recurrent hydrothorax from hepatic cause
- Reduce portal hypertension to facilitate abdominal surgery

# Indications for TIPSS

- Budd-Chiari Syndrome
- Ectopic variceal bleed
- To provide outflow in PV/SMV thrombosis

# Contraindications for TIPSS

- Significant pulmonary arterial hypertension
- Heart failure or severe cardiac valvular insufficiency
- Rapidly progressive liver failure
- Severe or uncontrolled hepatic encephalopathy
- Uncontrolled systemic sepsis
- Unrelieved biliary obstruction
- Extensive hepatic malignancy
- Chronic portal vein thrombosis?

# Complications of TIPSS

- Bleeding
- Failure of procedure
- Encephalopathy
- Stenosis/thrombosis of TIPSS

# TIPSS

- Study the CT thoroughly
- Anatomical variants
- Patency of vessels – occlusive or non occlusive thrombus
- Perform US to decide which hepatic vein to cannulate and which portal vein to puncture
- Real time US guidance to facilitate puncture of portal vein form hepatic vein


13


Right
Left

# TIPSS

- Bare stents were used since 1980s
- Significant intimal hyperplasia causing stent dysfunction 50% at 1yr and 80% at 2 yrs
- Covered stent used in the past 20 years
- Stenosis rate <20% at 1 year

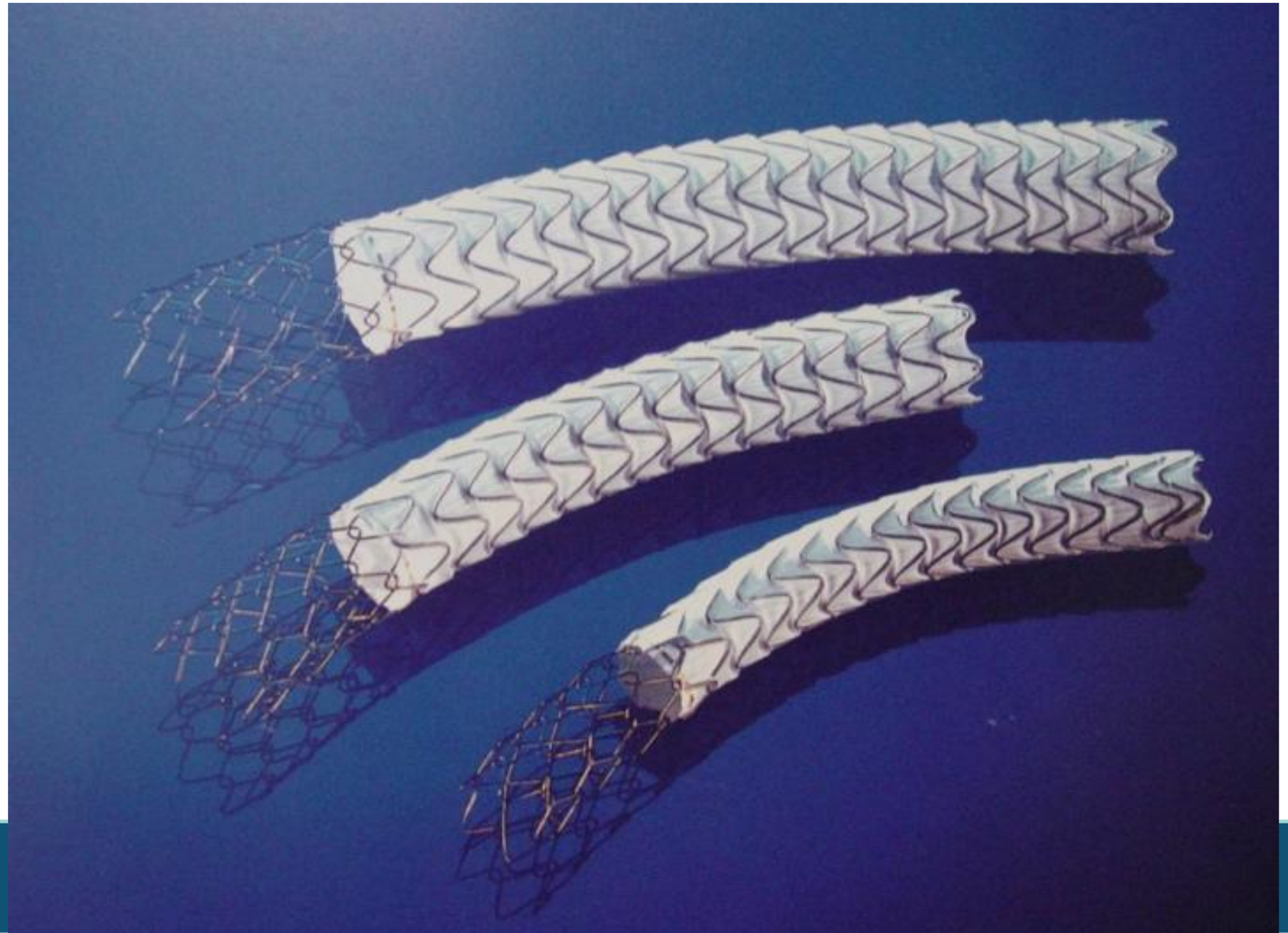
# TIPSS dysfunction

- Asymptomatic
- Ascites
- Variceal bleed
- Abdominal Pain

# US surveillance

- Can pick up TIPSS stenosis before symptoms occur
- Before stenosis becomes thrombosis
- Stemosis is most common in HV end of stent

# Most commonly used stent for TIPSS



# US assessment of flow through TIPSS

- 2cm uncovered stent (10 mm) within portal vein to anchor stent and to allow flow into/out of portal vein branches
- PTFE covered stent (dilated to between 6mm – 10 mm) in intraparenchymal tract up to HV/IVC junction to prevent intimal hyperplasia
- Stent is echogenic on US, stenosis of stent may be visible on plain US
- Stent stenosis will cause velocity change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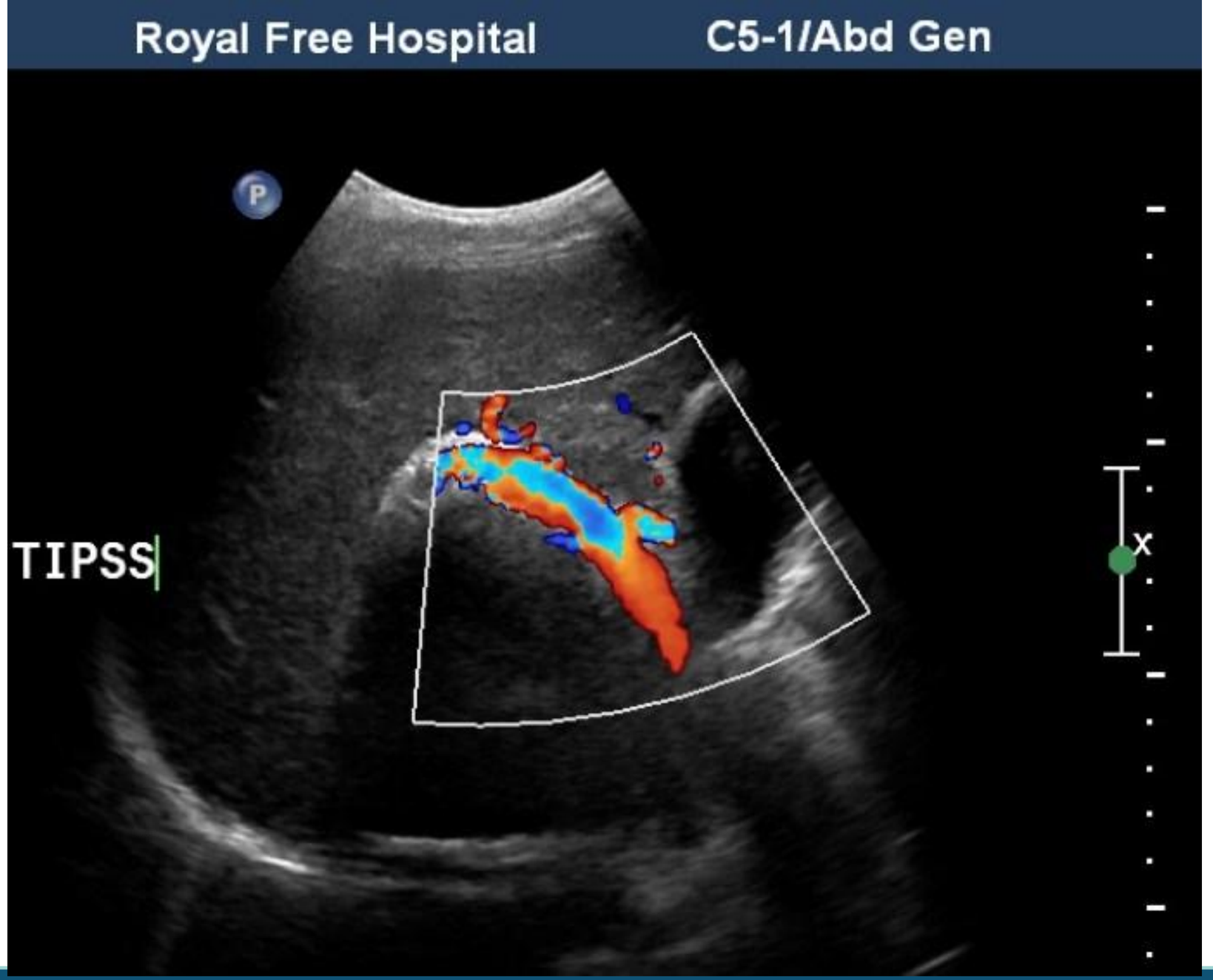
C5-1/Abd Gen
P
X
22


Royal Free Hospital
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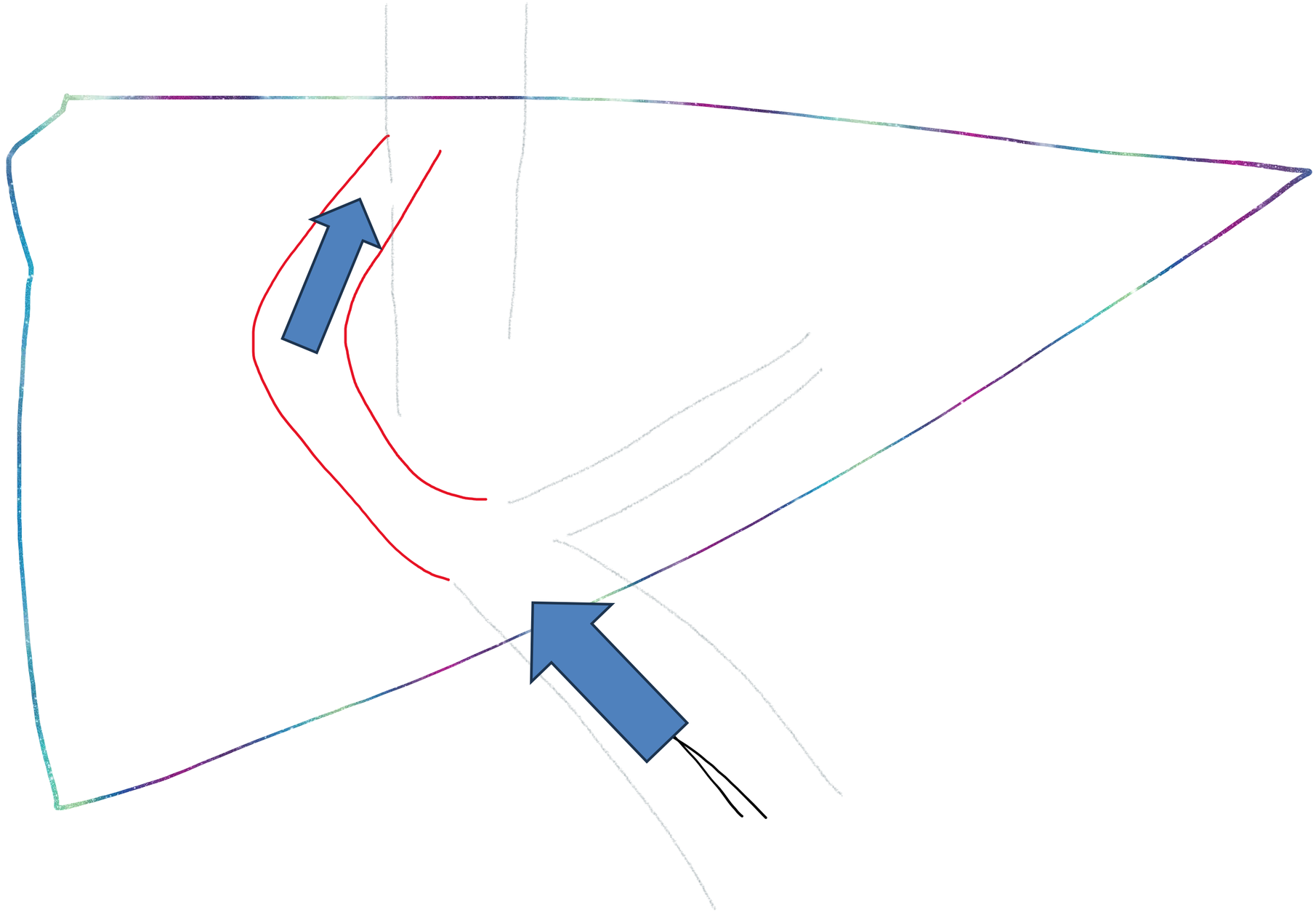
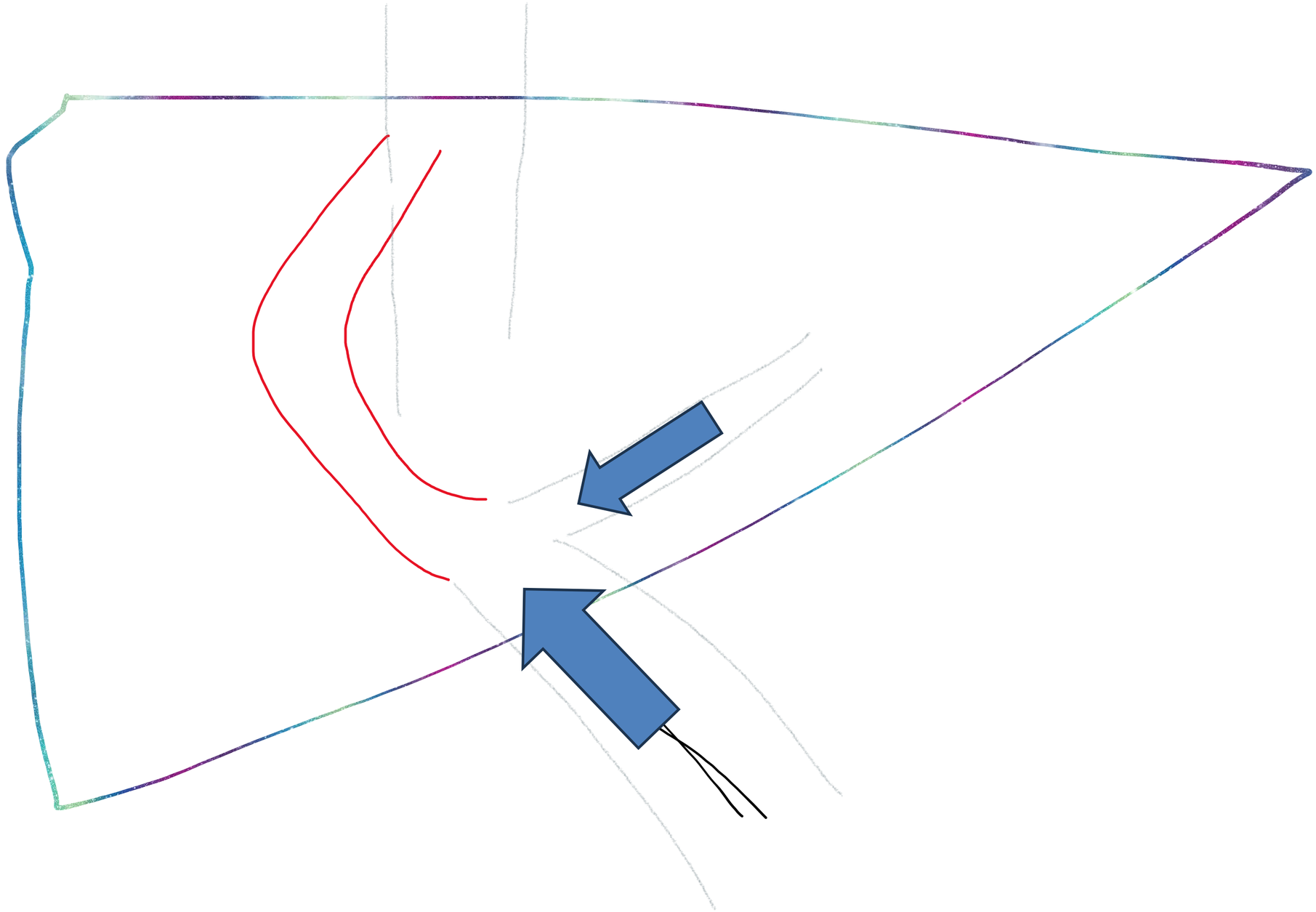


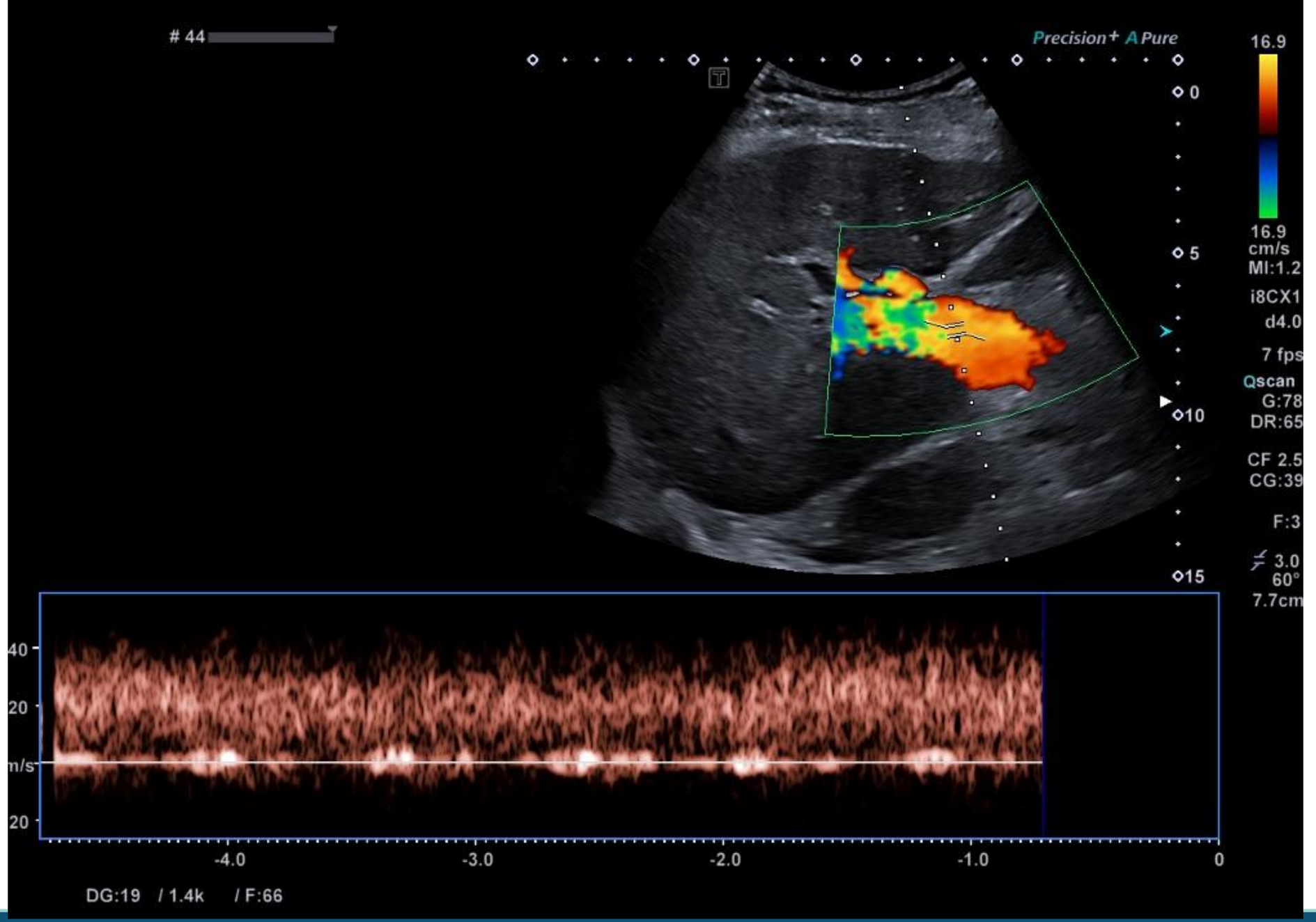
# US assessment of TIPSS

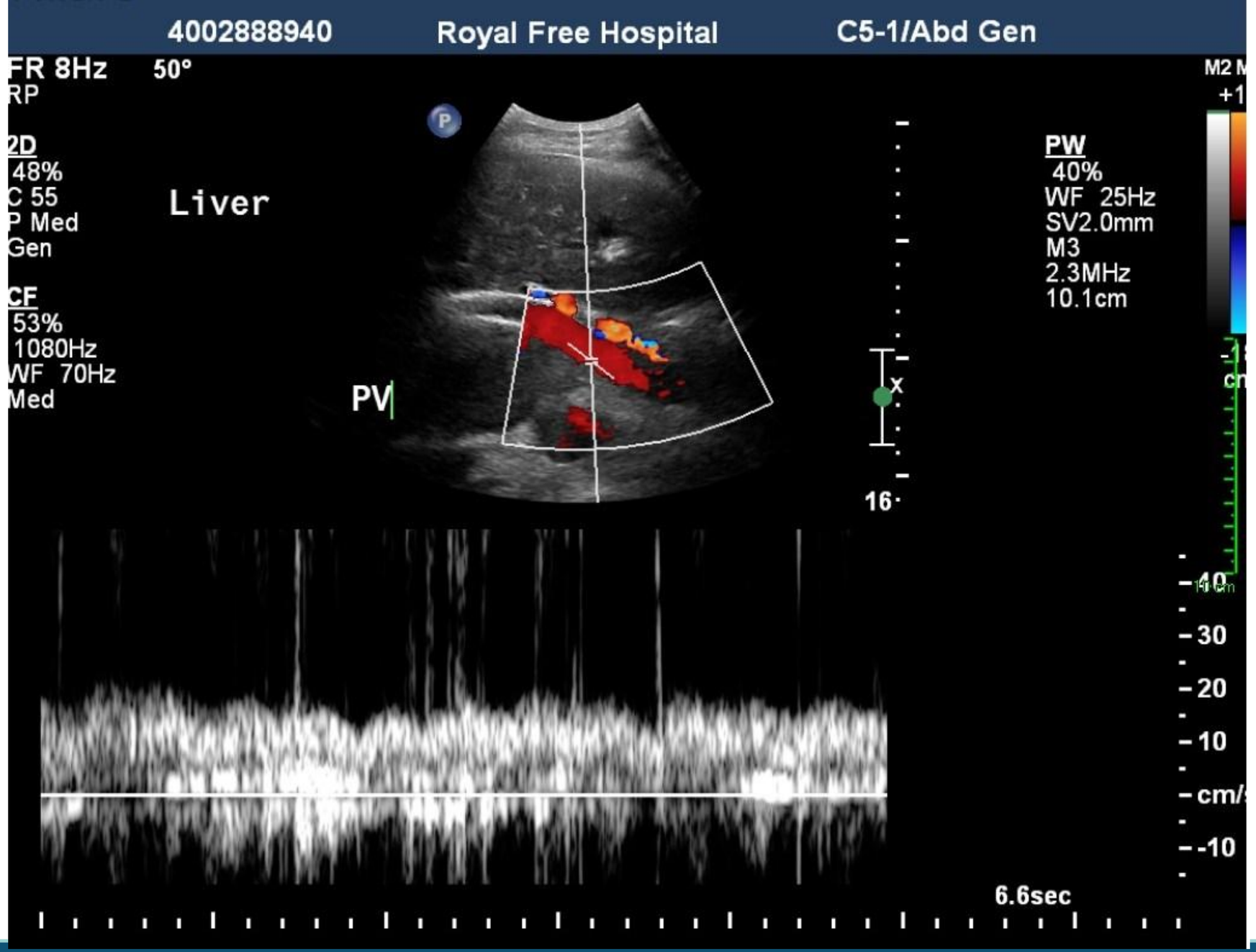
- Within first 48 hours after TIPSS creation, there may be an echogenic barrier in the top end (HV/IVC end) of the stent to prevent good US images and Doppler studies
- Look for ancillary signs – forward flow in main portal vein and reverse flow in left portal vein



# US Doppler signs of Dysfunction

- Main portal vein velocity <30 cm/s
- In stent velocity >190 cm/s
- In stent velocity <90 cm/s
- Change from previous study >40cm/s
- Remember to adjust doppler angle
- Set color scale appropriately
- Echogenic material within stent = thrombus


# 44
Precision+ A Pure
16.9
16.9
cm/s
MI:1.2
i8CX1
d4.0
7 fps
Qscan
G:78
DR:65
CF 2.5
CG:39
F:3
3.0
60°
7.7cm
0
5
10
15
40
20
m/s
20
-4.0
-3.0
-2.0
-1.0
0
DG:19 / 1.4k / F:66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Royal Free Hospital
C5-1/Abd Gen
FR 8Hz
50°
RP
2D
48%
C 55
P Med
Gen
CF
53%
1080Hz
WF 70Hz
Med
Liver
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PW
40%
WF 25Hz
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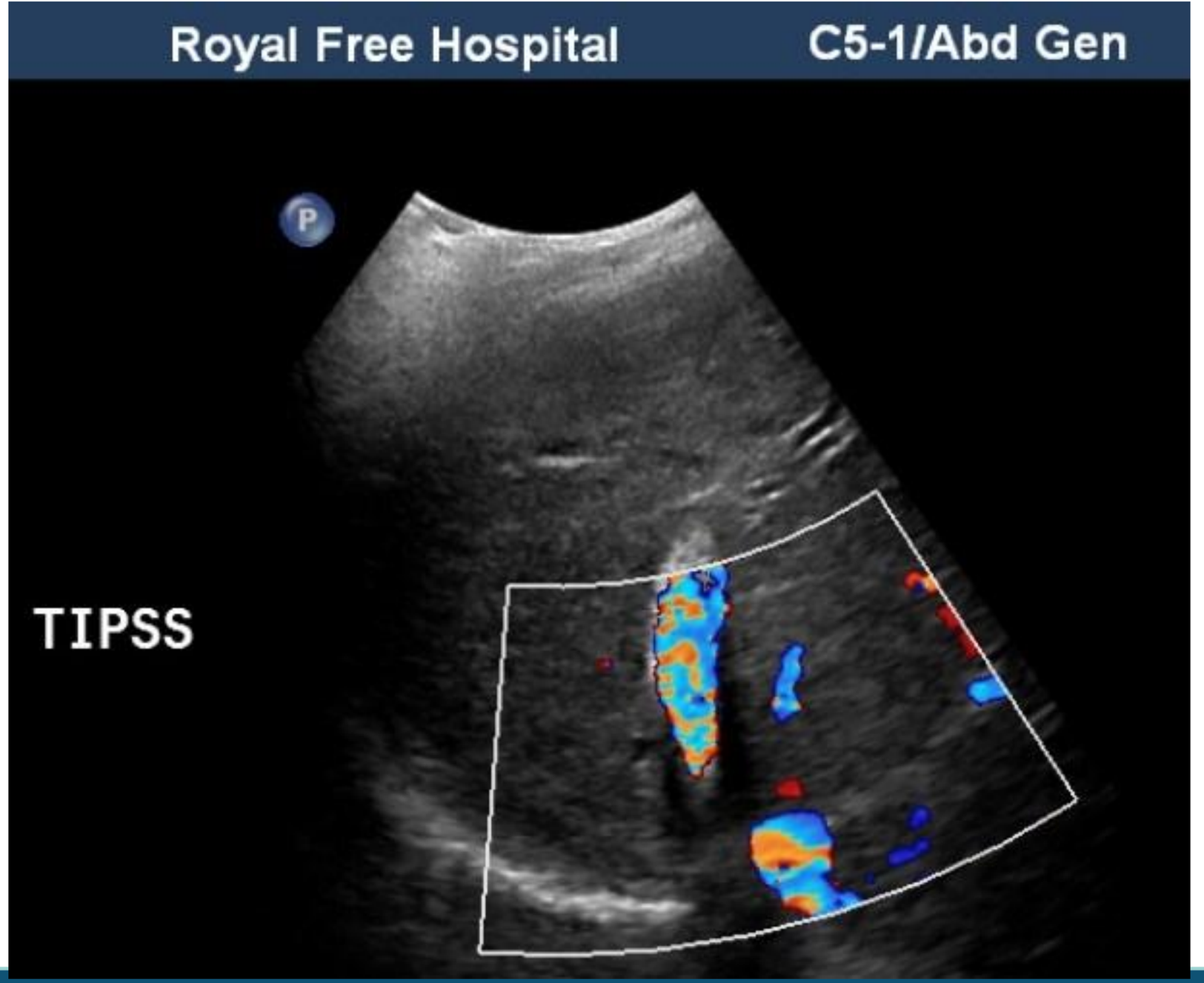
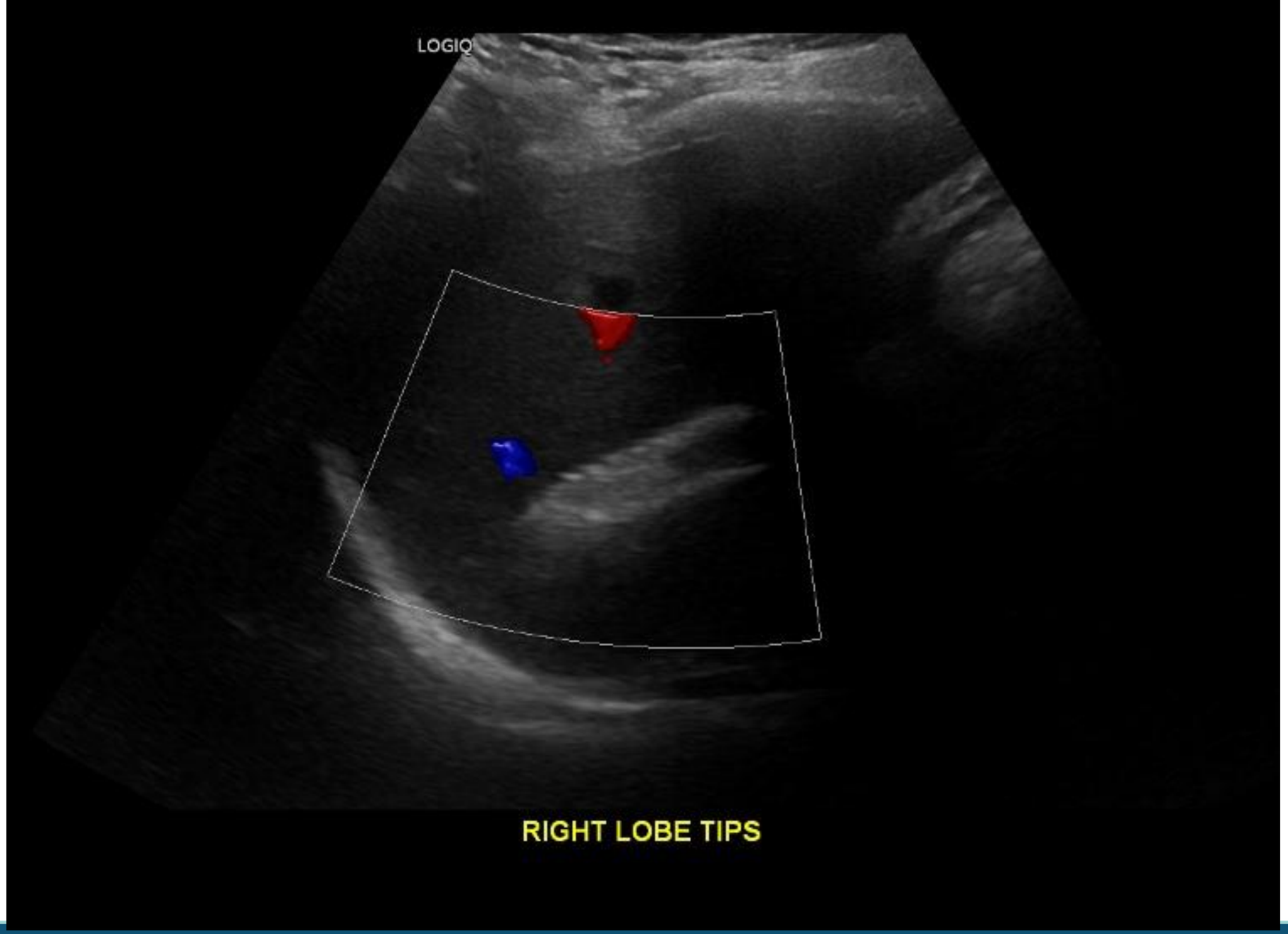
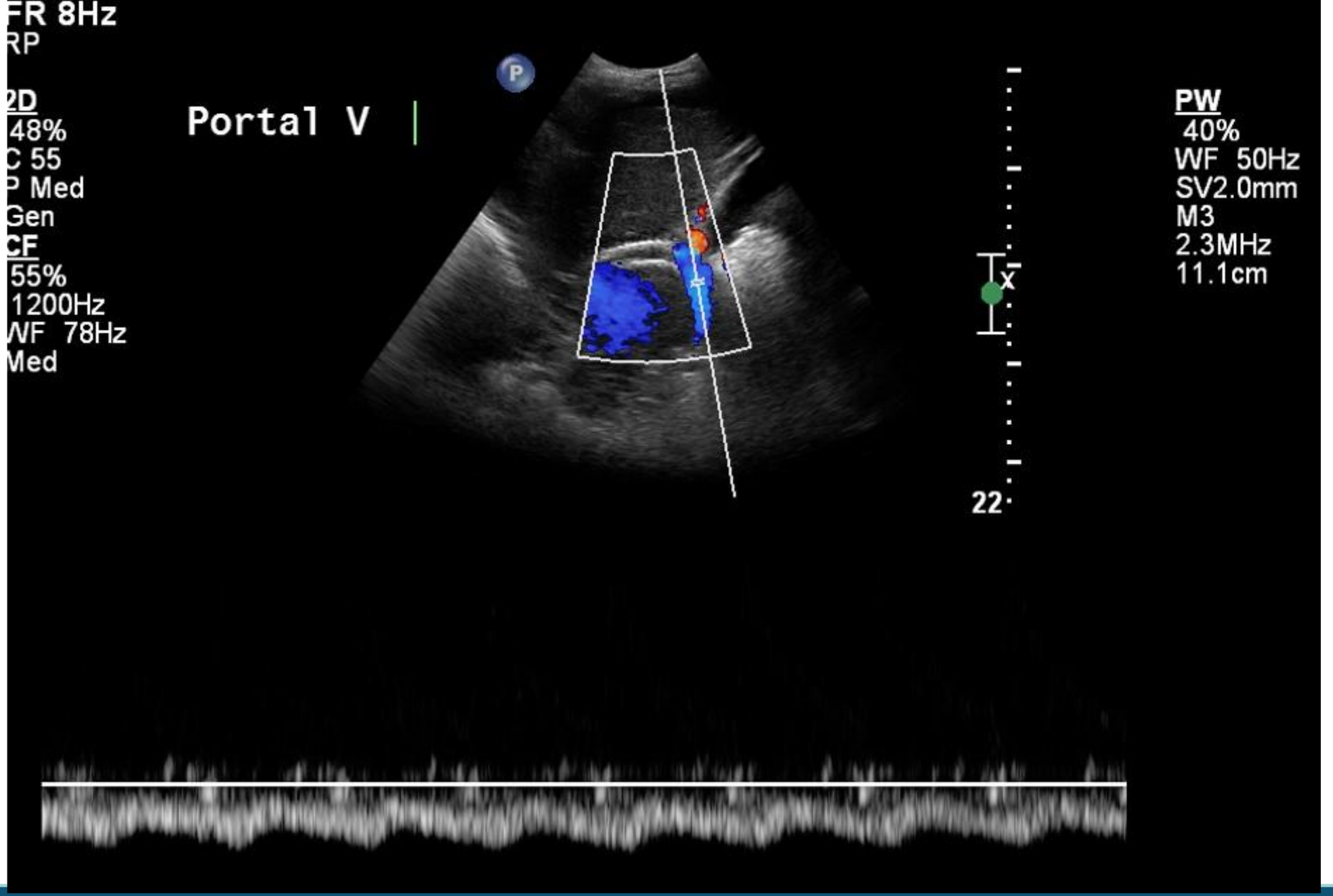
10
cm/s
-10
6.6sec


Royal Free Hospital
C5-1/Abd Gen
P
TIPSS


LOGIQ
RIGHT LOBE


LOGIQ
RIGHT LOBE TIPS


FR 8Hz
RP
2D
48%
C 55
P Med
Gen
CF
55%
1200Hz
WF 78Hz
Med
Portal V
PW
40%
WF 50Hz
SV2.0mm
M3
2.3MHz
11.1cm
22

# TIPSS Indications and Ultrasound Assessment

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