

# North American Practice-Based Recommendations for TIPS in Portal Hypertension

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## General Considerations

### Pre-TIPS

- **Team-based approach** (incl. GI/hepatology and IR) is needed for assessing candidacy, planning, & management
- **There is no absolute MELD cut-off**; MELD score > MELD-Na or CTP for predicting 90-day post-TIPS mortality
- Check multiphasic **cross sectional imaging** (CT/MRI) & **echocardiography**
- Preprocedural liver transplant (LT) evaluation **should not delay TIPS**

### Procedural

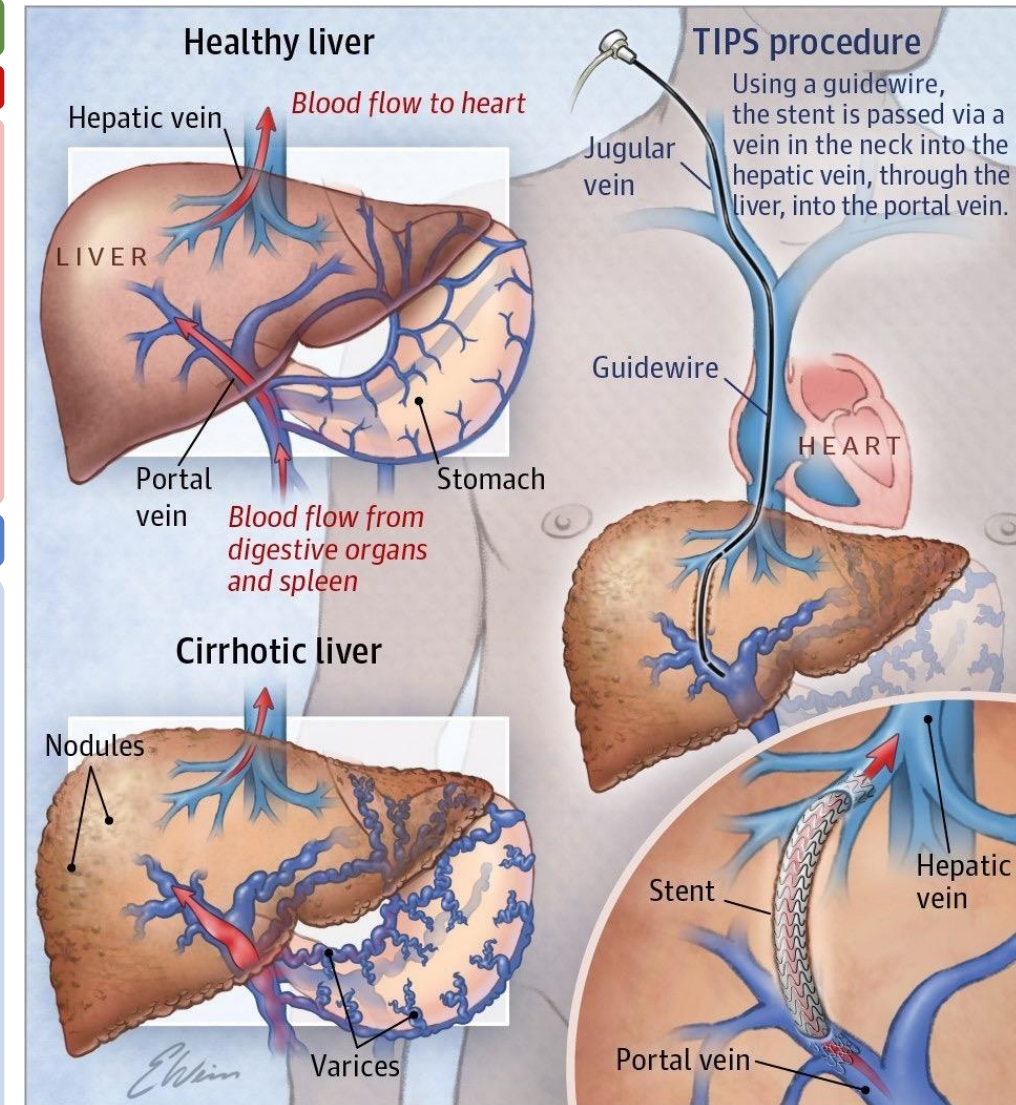
- Expanded polytetrafluoroethylene (**ePTFE**)-covered stent grafts have ↑ patency, ↑ ascites control, and ↓ rebleeding
- **Controlled-expansion stent** allows for incremental & reliable expansion for tailoring amount of shunting
- Correcting INR or plt to threshold not recommended
- Peri-procedural antibiotic use depends on patient risk factors
- Use free hepatic vein or IVC pressure rather than RA pressure for calculating portosystemic gradient (PSG) pre and post TIPS placement
- **If potential LT candidate**, ensure TIPS does not extend into RA & leaves segment of unstented main portal vein

### Absolute Contraindications

- Severe congestive HF or severe untreated valvular heart disease (ACC/AHA stage C or D)
- Moderate-severe pulmonary HTN despite medical optimization
- Uncontrolled systemic infection
- Refractory overt hepatic encephalopathy (HE)
- Unrelieved biliary obstruction
- Lesions or tumors in liver parenchyma precluding TIPS creation

### Post-TIPS

- Monitor overnight after TIPS creation
- **US findings suggestive of TIPS dysfunction:**
  - Change in intrahepatic portal vein flow direction
  - Abnormal flow velocities in TIPS
  - Persistent or recurrent ascites
  - Low spec (33-95%) and high false positive (50%)
- Checking TIPS venography + intervention is based on indication
  - **Varices:** if US with TIPS dysfunction or persistent/recurrence of portal hypertensive complications → obtain TIPS venography and manometry +/- intervention
  - **Ascites:** if ascites controlled → no TIPS venography
  - **Thrombus:** routine TIPS venography within 1-2 mo.



Sankar, K et al. JAMA 2017

# Considerations by Indication

## Ascites/Hepatohydrothorax

- TIPS > serial large volume paracentesis (LVP) for refractory ascites and transplant free survival (TFS)
- Consider TIPS in patients w/:
  - Refractory Ascites
  - >3 LVP in 1 year
  - Hepatohydrothorax on max medical therapy, requiring frequent thoracentesis, or are symptomatic (hypoxia, resting dyspnea)
- **↑ bili, ↑ MELD, CTP C, and advanced age** are associated w/ post-TIPS complications, but there is no specific MELD or age cut offs
- Procedural considerations:
  - **Staged approach:** start with small diameter (8 mm) TIPS w/ diuretics, followed by progressive dilation at 6 wk intervals

## Variceal Bleeding

- Recommended for acute variceal bleeding:
  - CTP C or CTP B w/ active bleeding at endoscopy (**Pre-emptive TIPS** w/in 72 hrs of admission)
  - Rebleeding during admission following successful endoscopic ligation (**Rescue TIPS**)
  - Profuse bleeding preventing endoscopic band ligation or persistent bleeding despite endoscopic ligation (**Salvage TIPS**)
- Recommended for bleeding gastric fundal varices:
  - TIPS ± variceal obliteration (VO) if no expertise in endoscopic cyanoacrylate glue injection, or if hemostasis not achieved w/ glue
  - TIPS ± VO for 2' ppx or rebleeding after endoscopic therapy
- Procedure considerations to decrease rebleeding risk:
  - Obtaining **PSG < 12 mm Hg** or **relative reduction of PSG by >50-60%** from pre-TIPS gradient
  - Concurrent embolization at time of TIPS creation
- Following TIPS for variceal hemorrhage, check US w/ doppler 1-6 mo after initially, then q 6-12 mo.
- Get TIPS venogram if suspecting stenosis or occlusion, **or if patient rebleeds after TIPS**

## Novel Indications

- Cirrhosis and complete portal vein thrombosis?
  - TIPS can be considered for LT listing
- Noncirrhotic portal HTN and extrahepatic portal vein obstruction?
  - If fails AC and thrombectomy/thrombolysis, TIPS can be considered
- Budd-Chiari syndrome?
  - If no improvement with medical therapy and are not candidates for percutaneous revascularization, can consider TIPS or DIPS

- Pre-op TIPS for reduction of surgical complications or perioperative outcomes after nontransplant abdominal surgery?
  - Insufficient evidence for TIPS
- Hepatopulmonary Syndrome?
  - Not recommended
- Hepatorenal Syndrome?
  - Not recommended

# Cardiopulmonary, Renal, and Neurologic Considerations

## Cardiopulmonary

## Renal

## Neurologic

### Concerns

- Cardiac decompensation post-TIPS happens because of pre-TIPS subclinical cardiac dysfunction and post-TIPS worsening in hyperdynamic circulation from increased preload and CO w/ concomitant decreased SVR

- Unknown if TIPS causes AKI or benefits CKD
- Increased Cr is risk factor for post-TIPS HE

- Risk of overt HE after TIPS is 25-50%

### Pre-procedure

- Prior to TIPS, check cardiac echo, assessing for:
  - LVEF, LV global longitudinal strain (normal:  $\geq 18\%$ )
  - Diastolic dysfunction
  - RVSP (normal up to  $< 45$  mm Hg), TAPSE (normal  $> 1.6$  cm)
  - Valves
- Need cardiology referral if
  - Abnormal RVSP or TAPSE for R heart cath to evaluate for RV dysfunction or pulm HTN
  - Moderate to severe TR despite volume optimization

- Serum creatinine or GFR are best markers to assess kidney function pre or post-TIPS

- Consider evaluating for covert or minimal HE
- Risks factors for post-TIPS HE:
  - Prior HE
  - CTP C
  - MELD  $> 18$
  - Older age
  - Increase Cr
  - Hyponatremia
  - Sarcopenia

### Avoid?

- Avoid TIPS if:
  - Grade III Diastolic dysfunction
  - LVEF  $< 50\%$
  - Caution in Portopulmonary HTN (POPH)

- RRT is not a contraindication for TIPS
- No absolute Cr or CKD cut off

- Avoid TIPS in patients with cognitive impairment and poor social support
- Avoid in overt HE

### Procedure

- If systolic and/or diastolic function, or mild POPH getting TIPS, recommend 8-mm stent

- Reduce renal complications post-TIPS?
  - Albumin if concurrent LVP w/  $> 5L$
  - Adequate hydration
  - Judicious use of iodinated contrast

- To limit post-TIPS HE, start with smaller diameter controlled-expansion stent
- Consider embolization of spontaneous portosystemic shunts  $> 6mm$  to minimize post-TIPS HE or to treat refractory HE

### Post-procedure

- Post-TIPS echo surveillance at 3 mo or earlier if systolic and/or diastolic dysfunction, pulm HTN, or moderate-severe valvular disease

- If develops AKI post-TIPS, follow renal function closely within 1 wk of discharge after TIPS creation

- No role for medical ppx to prevent HE post-TIPS, if no prior hx of overt HE
- Treat post-TIPS overt HE w/ lactulose and rifaximin
- Consider TIPS stent diameter reduction if persistent or refractory HE post-TIPS