

## Introduction

Transjugular intrahepatic portosystemic shunt (TIPS) is an effective and minimally invasive procedure that is used to achieve decompression of the portal vein. Traditionally, it has been used to treat cirrhotic patients suffering from esophageal varices and/or recurrent ascites. However, current literature suggests that TIPS may be safely used in additional indications, including treating Budd-Chiari syndrome, ectopic varices, esophageal variceal hemorrhage and portal vein thrombosis. The effectiveness and safety of TIPS in the treatment of the above conditions will be analyzed by reviewing current literature.

## Two Most Common Indications for TIPS Placement

Indication:  
Secondary prophylaxis of esophageal variceal hemorrhage.

Evidence:

1. Meta-analysis in 1999 demonstrated that TIPS is superior in long term prevention of rebleeding to endoscopic therapy. 19% incidence of rebleeding with TIPS vs 47% incidence of rebleeding with endoscopy. (1)
2. Critical guideline is that post-TIPS portosystemic pressure gradient is less than 12 mm Hg to prevent rebleeding.

TABLE 7. Results of the Meta-analysis for Trials Comparing TIPS With ET for Prevention of Variceal Rebleeding

Variable	Trials	Patients	P for Statistical Heterogeneity	Fixed Effect Model		Random Effect Model	
				OR (95% CI)	P	OR (95% CI)	P
Variceal rebleeding	11	811	0.24	3.80 (2.76-5.23)	<.001	3.62 (2.52-5.21)	<.001
Total gastrointestinal rebleeding	6	457	0.22	3.19 (2.12-4.80)	<.001	3.13 (1.89-5.16)	<.001
Deaths	11	811	0.77	0.97 (0.71-1.34)	.87	0.97 (0.71-1.33)	.86
Deaths due to rebleeding	8	602	0.026	1.97 (1.10-3.53)	.022	1.99 (0.80-4.93)	.14
Deaths due to other causes	8	602	0.98	0.53 (0.34-0.84)	.006	0.56 (0.36-0.86)	.006
Hepatic encephalopathy	10	746	0.55	0.43 (0.30-0.60)	<.001	0.45 (0.32-0.63)	<.001

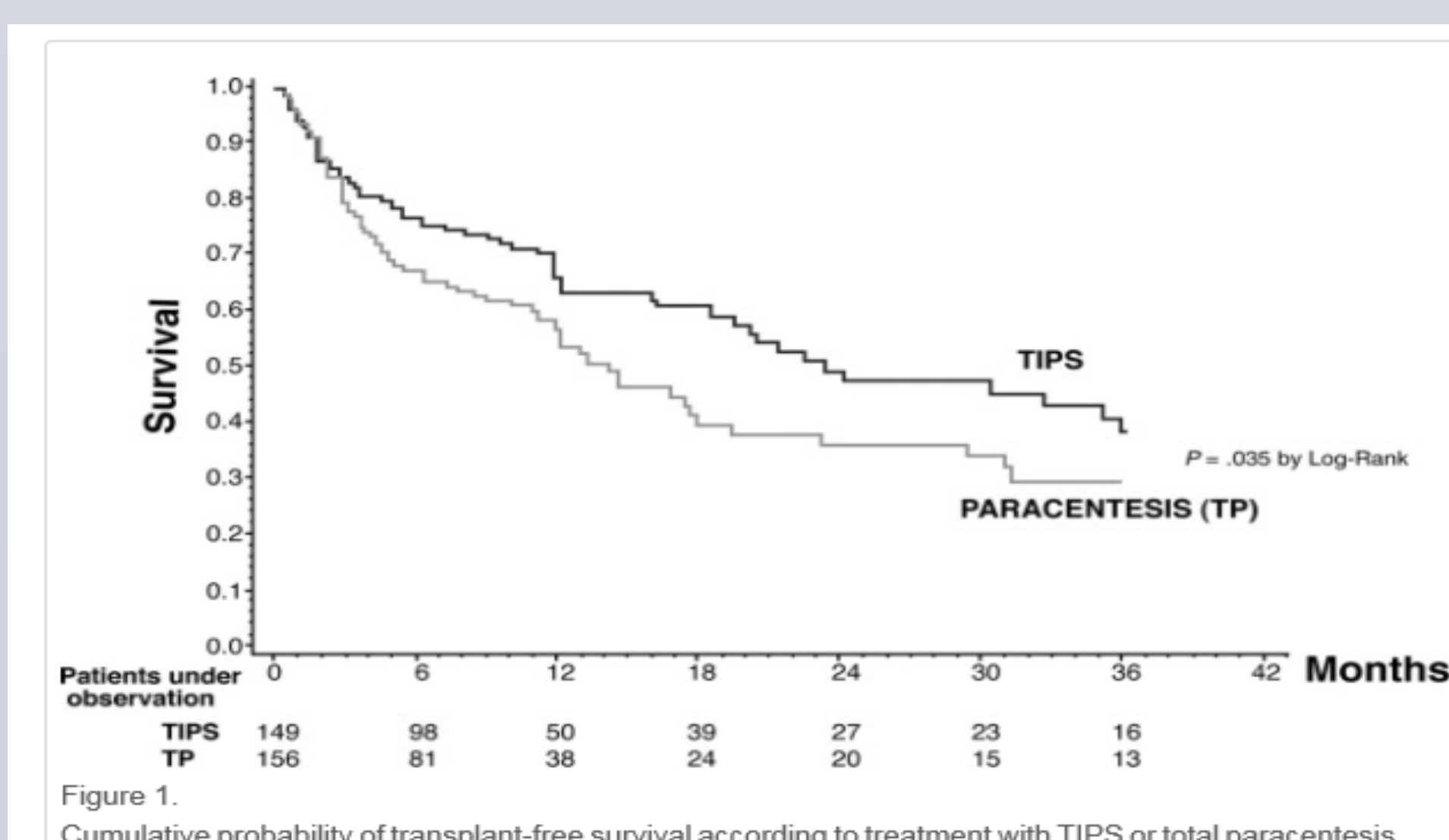
NOTE: OR <1.0 means a favorable effect of ET.

Indications:

Refractory ascites with cirrhosis, defined as patients who fail to respond to initial noninvasive therapies such as dietary sodium restriction (2000 mg/day), oral diuretics (primarily spironolactone and furosemide). (2)

Evidence:

Meta-analysis by Salerno et al. of four randomized controlled trials compared survival rates of patients who underwent TIPS to patients who underwent large volume paracentesis in the treatment of refractory ascites. Patients who underwent TIPS had a statistically significant greater survival rate when compared to patients managed with large volume paracentesis. (3)



## Budd-Chiari Syndrome

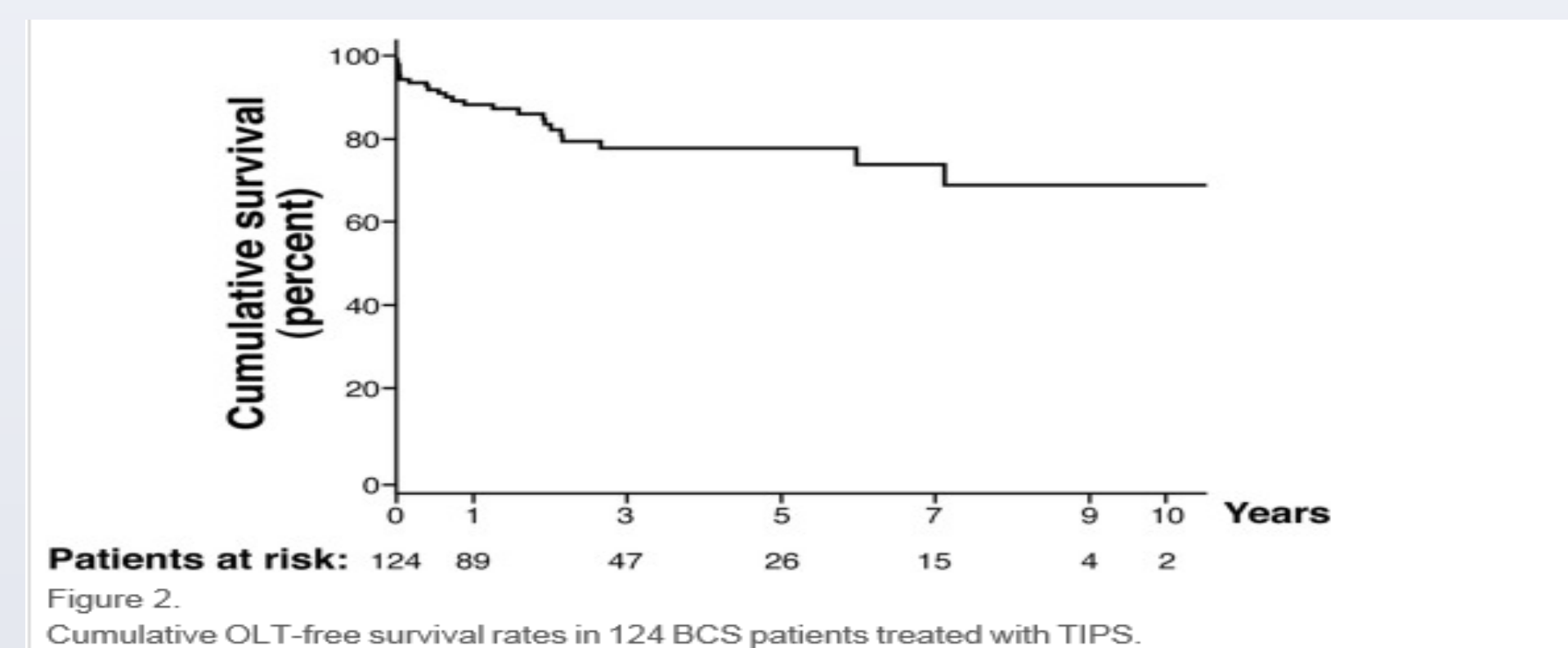
TIPS is often technically challenging as there may be occluded normal hepatic veins. A direct shunt between the IVC and PV may be an alternative.

Indications

1. Patients who fail to improve with anticoagulation therapy.
2. Patients who failed thrombolytic therapy with poor hepatic reserve
3. An occluded IVC.
4. Portal vein-intrahepatic vena caval pressure gradient >10 mmHg.
5. A bridge to liver transplant in patients in the emergent acute setting of Budd-Chiari Syndrome.

Evidence

1. Garcia-Pagan JC et al. demonstrated that patients had transplant-free survival rates of 88% at one year and 69% at ten years in patients who underwent TIPS status post failure anticoagulation treatment. (4)



## Ectopic Varices

Ectopic varices comprise 1 to 5% of variceal bleeds in patients with intrahepatic portal hypertension due to cirrhosis. (5, 6). Intestinal, peritoneal or stomal varices should benefit from portal decompression.

Indications

1. Patients who fail pharmacologic or endoscopic therapy.
2. Patients with varices inaccessible by means of endoscopy in whom banding or injection cannot be performed.
3. Patients who are not candidates for surgical shunt therapy.

Evidence

1. TIPS is an effective treatment option for cirrhotic patients with bleeding stomal or anorectal varices unresponsive to conservative management
  - Shibata et al. demonstrated the successful use of TIPS in treating 12 patients with active bleeding secondary to ectopic varices (7)
  - Complications
    - Three patients had encephalopathic changes after transjugular intrahepatic portosystemic shunting.
    - Two patients died within 30 days of transjugular intrahepatic portosystemic shunting of causes unrelated to the procedure.
    - Four patients required shunt revision within one year of placement.
2. There are a number of case reports that support using TIPS to treat ectopic varices
  - TIPS were placed in 9 patients (six women and three men, aged 36-85 years [mean, 64 years]) with small- (n = 6) and large- (n = 3) intestinal varices. (8)
    - Six patients were actively bleeding at the time of shunt placement.
    - Mean preprocedure portosystemic gradient was reduced from 26.8 mm Hg +/- 5.1 to 8.8 mm Hg +/- 2.9 after TIPS placement
    - Bleeding was controlled in all but one case, in which supplemental variceal embolization was required.

## Esophageal Variceal Hemorrhage

Indications

1. TIPS is an accepted second line therapy following failure of initial pharmacologic or endoscopic therapy.
2. TIPS shows promise as an early intervention for patients at high risk for failure of standard therapy.

Evidence

1. TIPS is highly effective as salvage therapy in high-risk patients with active variceal hemorrhage.
2. Compared to endoscopic therapy, TIPS had a lower rate of rebleeding, but higher incidence of hepatic encephalopathy without any statistically significant difference in survival (9)

## Hepatic Hydrothorax

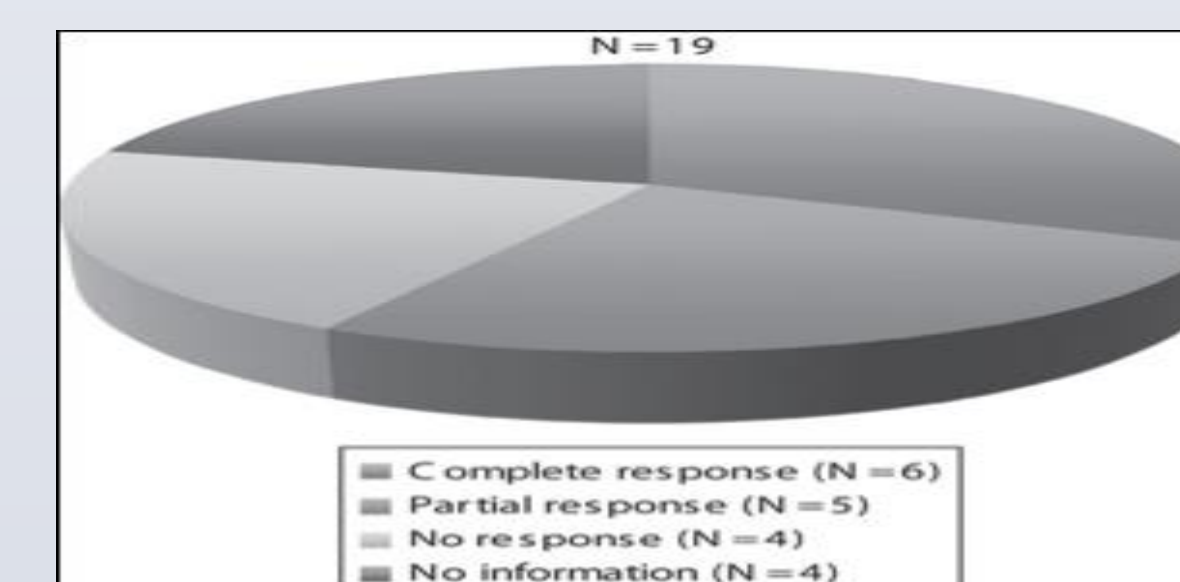
Refers to the presence of pleural effusion >500 ml in a patient with cirrhosis who has no other reason to have pleural effusion.

Indication

1. Patients with a known diagnosis of cirrhosis, known portal hypertension and pleural effusion who remain symptomatic despite the use of sodium restriction and diuretics.

Evidence

1. A retrospective study by Campos et al demonstrated a response rate of 73.3% with 40% of patients experiencing a complete response and 33.3% of patients having a partial response. (10)



## Portal Hypertensive Gastropathy

Indications

1. Patients with hemorrhagic gastritis with or without esophageal varices caused by portal hypertension
2. Patients who suffer from uncontrollable portal hypertensive gastropathy (PHG) refractory to standard therapies

Evidence

1. TIPS was effective in the treatment of PHG
  - o TIPS lowered the portal venous pressure in patients suffering from PHG in 12 patients (11)
    - 9 patients had variceal bleeding (bleeding from esophageal varices in seven and gastric varices in two)
    - 3 had refractory ascites
    - 1 had hemorrhage from severe PHG
  - o On endoscopy, PHG improved in 9 out of 10 patients.
    - Esophagogastric varices improved in 8 out of 11 patients
    - In one patient with massive haematemesis, haemorrhage from severe PHG completely stopped after TIPS

## Portal Vein Thrombosis (PVT)

Indications

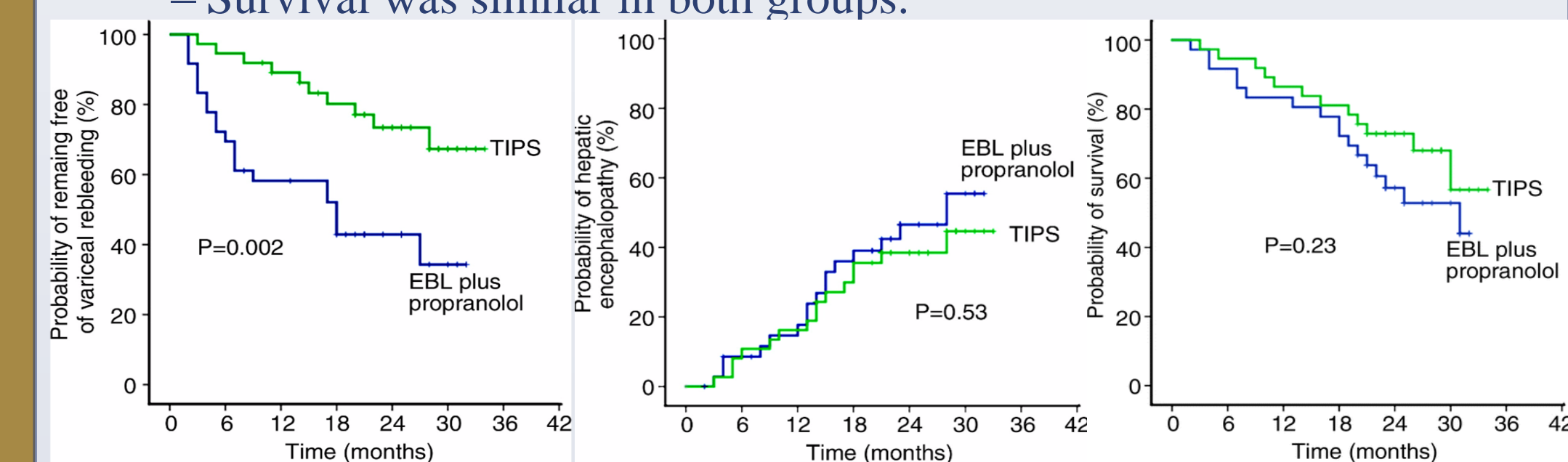
1. Acute PVT thrombus that is resistant to anticoagulation (~10% of acute PVT cases).
2. Progression of PVT in patients on low molecular weight heparin.
3. Patients who have a contraindication to anticoagulation.
4. Withholding of anticoagulation due to concerns of hemorrhage from gastroesophageal varices, low platelet counts, and/or impaired coagulation in chronic PVT in noncirrhotic patients (30% of chronic PVT cases).
5. Symptomatic massive portal vein thrombosis with/without cavernous transformation in noncirrhotic patients.

Independent predictors of success

1. Presence of portal cavernous transformation.
2. Degree of thrombus within the main portal vein, the portal vein branches, and the superior mesenteric artery.

Evidence

1. TIPS was more effective than endoscopic band ligation + propranolol in preventing recurrent esophageal variceal bleeding in patients with advanced cirrhosis and portal vein thrombosis. (12)
  - There was no increase in incidence of hepatic encephalopathy.
  - Survival was similar in both groups.



## Conclusion

TIPS is an effective and minimally invasive procedure that has grown in use over time. It has a proven track record in the treatment of refractory ascites and prophylaxis of esophageal variceal hemorrhage. However, new literature is demonstrating that TIPS' use can be expanded further in the treatment of hepatic disease.

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