

# From Shunt to Shear: Understanding Post-TIPS Hemolytic Anemia and Revision Strategies

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## INTRODUCTION

- Creation of a transjugular intrahepatic portosystemic shunt (TIPS) is a well-established intervention for managing portal hypertension, particularly in patients with ascites or varices that have failed conservative management.
- Hemolytic anemia, thought to represent shear stress within the shunt, is a rare but recognized complication. [1]
- In the early era of TIPS, hemolytic anemia occurred in up to 10% of patients with bare-metal stents. [1] However, the introduction of expanded polytetrafluoroethylene (PTFE)-covered stents, which offer improved performance compared with bare-metal stents, has reduced this risk. [2]
- Despite its rarity, there is limited published literature on the role of TIPS revision in reversing hemolytic anemia, so clinical decision-making is often based on case reports or anecdotal experience.

## ASSESSMENT

### Physical Exam

- fatigue, pallor, jaundice, dark urine
- splenomegaly or hepatomegaly
- history of recent drugs, infections, or autoimmune diseases

### CBC

- low hemoglobin
- normocytic, macrocytic
- reticulocytosis
- peripheral smear: schistocytes

### Labs

- ↑ indirect bilirubin
- ↑ LDH
- ↓ haptoglobin
- negative Coombs test / exclusion of other causes

### Imaging

- Doppler ultrasound: assess shunt patency, stenosis, or high-velocity flow



## MANAGEMENT STRATEGIES

- Goal: reduce shear stress and turbulent flow causing red blood cell lysis

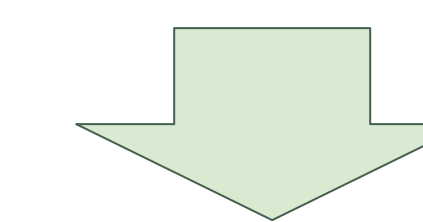
Strategy	Mechanism
diameter reduction	decreases flow through the shunt, reducing shear stress on red blood cells
conversion to PTFE-covered stent	eliminates turbulence from exposed bare-metal surfaces; covered stents reduce hemolysis by creating a smooth lumen
angioplasty (balloon dilation)	relieves focal stenosis in the TIPS, reducing localized turbulence and pressure gradients
embolization of accessory shunts	diverts flow to reduce abnormal shear stress; often targets smaller collateral vessels contributing to high-velocity flow
replacement TIPS	creates a new shunt in a different hepatic tract; used when the original shunt is problematic or irreparable
observation / supportive care	allows self-limiting hemolysis to resolve; typically resolves after ~12 weeks due to endothelialization of the stent [1,4]

## PROPOSED STUDY

- At Dartmouth Health, we propose a descriptive study with these primary objectives:
  - Document and evaluate TIPS revision strategies in managing suspected hemolytic anemia post TIPS placement in patients with liver failure.
  - To describe the presenting features and laboratory markers of suspected hemolytic anemia in patients with prior TIPS placement.
  - To identify cases in which anemia was ultimately attributed to non-hemolytic causes.

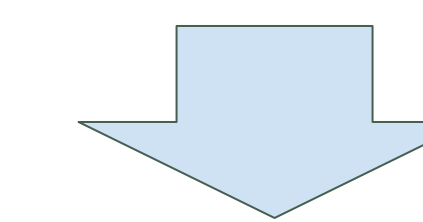
### Study Population

1. Adult patients with TIPS who underwent TIPS revision for suspected hemolytic anemia at Dartmouth Health
2. Between 2011 - 2025
3. Identified using mPower (radiology software) and Epic



### Variables

1. Type of revision: evaluation, angioplasty, diameter reduction, embolization, conversion to a covered stent
2. Laboratory values: hemoglobin, LDH, direct/indirect/total bilirubin, haptoglobin, reticulocyte count
3. Physical exam findings: fatigue, pallor, jaundice, dark urine, splenomegaly, hepatomegaly



### Results

1. Outcomes: post-revision lab value trends, additional revisions
2. Given that hemolytic anemia is a very rare complication, we expect few cases → descriptive case series

## DISCUSSION

Hemolytic anemia after TIPS is uncommon, and evidence guiding management is scarce. This descriptive study could provide additional information on the clinical utility of TIPS revision for hemolytic anemia. Given the rarity of this complication, even small case series contribute valuable insights to the limited existing literature. Additionally, supportive care and observation may be a viable management option in some patients, but further study is needed to clarify its role and outcomes.

## REFERENCES

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