Preoperative Transjugular Intrahepatic Portosystemic Shunt Placement for Extrahepatic Abdominal Surgery

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Abstract

Extrahepatic abdominal surgery in patients with portal hypertension is associated with a high rate of perioperative complications and death due to the increased risk of liver failure, perioperative bleeding, and ascites. One proposed method to facilitate surgery in these patients is with preoperative placement of a transjugular intrahepatic portosystemic shunt (TIPS). By decompressing the portal circulation, this presurgical measure would theoretically decrease the potential for bleeding and improve the ability to control ascites in the perioperative and postoperative period. This article reviews the use of TIPS prior to abdominal surgery in patients with portal hypertension.

Keywords

- TIPS
- portal hypertension
- abdominal surgery

Objectives: Upon completion of this article, the reader will be able to identify the risks associated with abdominal surgery in patients with portal hypertension and the role of TIPS in the management of these patients.

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Extrahepatic abdominal surgery in patients with portal hypertension is associated with a high complication rate despite advancements in surgical techniques and medical management and carries a mortality rate ranging from 10 to 57%.[1] The high perioperative risk in these patients may preclude them from undergoing surgical procedures which may be curative or improve quality of life. Surgical portosystemic shunts have been proven to facilitate abdominal operations in patients with portal hypertension by reducing the degree of hypertension and its associated risks.[2,3] Placement of a transjugular intrahepatic portosystemic shunt (TIPS) is a less invasive alternative which may similarly achieve improved outcomes in these patients. This article explores the current use and outcomes of preoperative TIPS for extrahepatic abdominal surgery in patients with portal hypertension.

The increased perioperative risk in patients with portal hypertension is multifactorial. Portal hypertension results in venous congestion, which increases the risk of intra-abdominal hemorrhage. Varices are frequently present in these patients, which compounds the risk of perioperative bleeding. Additionally, patients with portal hypertension frequently have ascites, which can lead to poor wound healing and peritonitis in the postoperative period.[4] Due to splanchnic vasodilation and portosystemic shunting, patients with portal hypertension have reduced hepatic blood flow, predisposing them to liver hypoperfusion during surgery, which can subsequently result in liver failure.[5,6] It is also important to note that portal hypertension often develops in the setting of cirrhosis and liver dysfunction, which increases the propensity for bleeding secondary to coagulopathy. Preoperative TIPS may mitigate surgical risk in patients with portal hypertension by decreasing the risk of bleeding from venous congestion and varices, as well as by managing postoperative ascites.[7]

Preoperative Transjugular Intrahepatic Portosystemic Shunt in Portal Hypertension

There have been a limited number of studies which have evaluated preoperative TIPS for extrahepatic abdominal

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Table 1 Preoperative TIPS for extrahepatic abdominal surgery in portal hypertensive patients

Study	Abdominal surgery type	No. of patients	Child–Pugh score	Time from TIPS to surgery	HVPG (mm Hg)	Procedure-related complications and negative outcomes	Deaths from operative mortality
Azoulay et al (2001)	Tumor resection, AAA repair, Hartman's reversal	7	Child A–C	1–5 mo	18 ± 5 to 9 ± 5 mm Hg	1 persistent post-op ascites; 1 liver failure	1
Gil et al (2004)	Tumor resection	3	Child A–B	14–45 d	20–28 to 6–7 mm Hg	1 post-op transfusion; 1 cardiac insufficiency; 1 encephalopathy	0
Grübel et al (2002)	Colectomy, nephrectomy	2	Child C	3–8 wk	17–26 to 8–14 mm Hg	None	0
Schlenker et al (2009)	Abdominal and pelvic resections	7	Child A–B	1–32 d	9–22 to 3–10 mm Hg	1 new ascites; 2 encephalopathy; 1 liver failure	1
Kim et al (2009)	AVR, colectomy, herniorrhaphy	6	Child A–C; Mean MELD 15	6–46 d	Unknown	1 renal failure; 3 encephalopathy	0
Menahem et al (2015)	Colorectal resection	8	Child A–C	1–9 wk	15.5 ± 2.9 to 7.5 ± 1.9 mm Hg	1 bacterial peritonitis; 1 encephalopathy; 3 ascites; 1 hemorrhage; 3 liver failure	2

Abbreviations: AAA, abdominal aortic aneurysm; AVR, aortic valve replacement.

surgery in the setting of portal hypertension, which are summarized in ►**Table 1** (single case reports excluded).[1,4,8–11] Except for one case in the cohort of Schlenker et al, all patients had varices and/or ascites.[4] TIPS significantly decreased mean hepatic venous pressure prior to surgery in all cases that were reported. Transfusions were noted only if significant, defined as more than two units of red blood cells transfused.

Clinical Outcomes

As discussed earlier, the main causes of morbidity and mortality in patients with portal hypertension undergoing surgery include liver failure, perioperative bleeding, and ascites.[4,6] Of these 33 cases, surgery was complicated by ascites (either persistent postoperative or new-onset) in 5 patients and by bacterial peritonitis in 1 patient. Significant hemorrhage was reported in one patient, who required five units of red blood cells.

In these series, there were a total of five cases of liver failure, four of which resulted in operative mortality. The one mortality from the study of Azoulay et al had the highest Child-Pugh score in their cohort (12 pre-TIPS, 11 post-TIPS).[8] The postoperative course was complicated by persistent ascites, followed by liver failure and multiorgan failure leading to death within 60 days of surgery. The two patients who died in the series of Menahem et al had the highest pre-TIPS MELD scores (14 and 15) in their cohort.[11] Furthermore, their anastomoses were not diverted, resulting in anastomotic leakage and a second operation. Both patients subsequently developed terminal liver failure and died of multiple organ failure. The single mortality from the study of Schlenker et al was not a liver transplant candidate and died of liver failure 14 months after surgery.[4]

Overall, these studies concluded that portal decompression by placement of a preoperative TIPS makes abdominal surgery safer in patients with portal hypertension. However, due to the small number of patients and the lack of a control group who did not receive a TIPS, a reduction in morbidity or mortality in abdominal surgery with preoperative TIPS cannot be demonstrated by these studies. Furthermore, it is difficult to determine from these studies which postoperative complication would be decreased by placement of a preoperative TIPS.

However, a controlled study by Vinet et al did compare the clinical outcomes of 18 cirrhotic patients who underwent TIPS placement prior to abdominal surgery to 17 cirrhotic patients who did not undergo preoperative TIPS.[12] TIPS was placed on average 72 days before surgery. The study showed no significant difference in operative blood loss, postoperative complications, or 1-month and 1-year survival rates. The study was limited by the significantly higher mean Child–Pugh scores in the patients who received TIPS(7.7 vs. 6.2; $p < 0.05$), but the results were similar after adjusting for this variable. The hepatic venous pressure gradient was not measured in all subjects in the control group; so, it is possible the degree of portal hypertension differed between the two groups.[12]

Patient Selection for Preoperative Transjugular Intrahepatic Portosystemic Shunt

TIPS is a relatively safe procedure with a procedure-related mortality of only 1.2%, but the 1-year survival rate for patients undergoing TIPS placement is only 50% due to underlying liver disease and other comorbidities.[13,14] Therefore, patient selection will be critical, and the potential benefits of preoperative TIPS must be weighed against the risks of the TIPS procedure.

Given that progressive liver failure was the most common cause of death among patients with preoperative TIPS, these studies suggest preoperative TIPS should be limited to those with only mild to moderate underlying hepatic dysfunction (Child–Pugh class A or B). Patients with preserved liver function, but severe ascites, extensive abdominal varices, or both, may be the best candidates for preoperative TIPS. This is because these patients would be at high risk for postoperative complications, but less likely to experience hepatic failure after the procedure due to preserved liver function.[4]

However, preoperative TIPS may still have a role in patients with more severe hepatic dysfunction. Despite a preoperative mean MELD score of 15 among the patients in the study of Kim et al, the 1-year patient survival was 74%.[10] The patients from the study of Grübel et al were Child–Pugh class C and did not experience any procedure-related complications and remained free of surgical complication for at least 10 months postoperatively.[9] However, these studies are limited by a small sample size (six patients and two patients, respectively), and therefore the appropriateness of preoperative TIPS placement in patients with severe liver dysfunction is difficult to determine.

Preoperative Transjugular Intrahepatic Portosystemic Shunt Timing

The most appropriate timing for preoperative TIPS placement is difficult to definitively conclude from these studies. The risk of postoperative bleeding is decreased by reducing the portosystemic gradient, which occurs immediately after TIPS placement. However, improvement or resolution of ascites occurs more slowly.[4] Controlling ascites is largely dependent on natriuresis, which can be delayed for up to 4 weeks after TIPS placement[15]; therefore, TIPS placement should probably occur at least several weeks before surgery if the patient has ascites. Gil et al suggested a delay of 1 month from TIPS to abdominal surgery may be most appropriate for optimal portal decompression.[1] While patients with portal hypertension who need emergent surgeries are at an increased risk for postoperative morbidity and mortality,[16–18] TIPS may still serve to mitigate perioperative and postoperative risk related to venous congestion and variceal bleeding.

Conclusion

Preoperative TIPS may make extrahepatic abdominal surgery safer by decreasing the risk of bleeding and improving the control of ascites in the perioperative and postoperative period. TIPS placement is less invasive than conventional surgical portosystemic shunt surgery, but it is not free of complications. Therefore, patient selection is critical and TIPS placement should only occur after the potential benefits of preoperative TIPS are weighed against the risks of TIPS and subsequent surgery. Several small studies suggest that TIPS may enable select patients with portal hypertension to undergo extrahepatic abdominal surgeries that might not otherwise be feasible by mitigating the risks associated with venous congestion, varices, and ascites. However, the efficacy of preoperative TIPS for extrahepatic abdominal surgery needs to be further validated with larger or prospective clinical trials.

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