CLINICAL STUDY

Comparison of Bleeding Complications between Transplenic versus Transhepatic Access of the Portal Venous System

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ABSTRACT

Purpose: To evaluate the incidence of bleeding complications between transsplenic (TS) and transhepatic (TH) access in portal venous interventions.

Materials and Methods: Retrospective review of patients who underwent TS or TH access for portal venous system interventions from January 2000 to August 2017. Only procedures with clinical and laboratory follow-up were included (n = 148). Twenty-four TS procedures were performed in 22 patients, and 124 TH procedures were performed in 114 patients. The main indications were for angioplasty/stent, embolization of varices/shunt, or portal vein embolization, with no difference between the groups. Mean patient age and sex were not significantly different between the groups (*P* values .445 and .682, respectively). Mean follow up was 2.3 years (range 0.1–14.2). There was no significant difference between the international normalized ratio ($P = .300$) and platelets ($P = .234$) before the procedure between the 2 cohorts.

Results: Technical success of vascular access and procedural success was achieved in 22/24 (91.6%) TS procedures and 120/124 (96.8%) TH procedures ($P = .238$). There was no significant difference in bleeding complications between the 2 groups (3/24 [12.5%] TS vs 10/124 [8.1%] TH; $P = .44$). There was no significant difference in major bleeding complications (SIR classification $\geq$ C; 1/24 [4.2%] TS vs 4/124 [3.2%] TH; $P = .789$).There was no significant difference in the hemoglobin before or after the procedure (g/dL), with average change −1.1 g/dL (range −3.4 to +1.0) in the TS group and 1.0 g/dL (range −4.5 to +1.9) in the TH group ($P = .540$). Finally, there was no significant difference in proportion of patients requiring blood transfusion after the procedure ($P = .520$), with 2 (8.3%) in the TS group requiring an average of 4 units (range 2–6) and 17 (13.7%) in the TH group requiring an average of 3.5 units (range 1–26).

Conclusions: These data suggest no significant difference in bleeding complications between TS and TH access for portal venous interventions.

ABBREVIATIONS

BMI = body mass index, INR = international normalized ratio, PTA = percutaneous transluminal angioplasty, TH = transhepatic, TIPS = transjugular intrahepatic portosystemic shunt, TS = transsplenic

The portal venous system can be accessed by several different methods. Transhepatic (TH) access is the standard technique and involves direct percutaneous puncture of the portal vein and its branches (1). Additional methods for access include via a transjugular intrahepatic portosystemic shunt (TIPS), a portosystemic varix, and direct percutaneous puncture of the splenic vein, and transsplenic access (2). Similarly to transhepatic access, transsplenic (TS) access

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EDITORS' RESEARCH HIGHLIGHTS

- This single-center retrospective study compared technical success and bleeding complications after transhepatic (TH; n = 124) and transsplenic (TS; n = 24) portal interventions. Medical record review included imaging, laboratory parameters, and transfusion requirements.
- TH approaches were more frequent in patients after transplantation, and TS in hepatectomy patients (eg, small liver remnant, liver dysfunction after transplant or infarcts, failed transhepatic approaches and other indications). Otherwise, underlying pathologies were similar. Author preferences also influenced the choice of approach.
- In this comparison, the authors found no significant differences in technical outcomes and bleeding complications between the 2 groups. The disproportionately smaller size of the TS group suggests a cautionary note regarding conclusive proof that bleeding risks are similar—larger replicative TS series will be important. Still, the study supports selected safe use of the approach when its added therapeutic value may be important.

can be performed with fluoroscopy and/or ultrasound and can be used to perform similar portal venous system interventions (3). TS access can be performed in procedures not ideal for TH access, such as livers infiltrated with tumor, transplant livers in which direct puncture may cause unnecessary injury, or livers with attenuated intrahepatic portal veins (4).

Because the spleen is a highly vascular structure, TS access is considered to have an increased risk of hemorrhagic complications, which limits its use by interventionists (5). Concern for hemorrhagic complications has been described in case reports and series (6–9), although a study of 46 TS procedures demonstrated the safety of the method (4). Another study focused on portal venous interventions after liver transplantation and found a similar risk of bleeding complications when TS access was compared with TH access (10), which also can be prone to hemorrhagic complications (11). As such, the aim of the present study was to compare bleeding complications between TS and TH access for portal venous system interventions.

MATERIALS AND METHODS

This retrospective review was approved by the Institutional Review Board. All patients who underwent TS or TH access for portal venous system diagnostic or therapeutic interventions from January 2000 to August 2017 were identified in an institutional database (n = 171). Patients without adequate clinical and laboratory follow-up or who experienced another invasive procedure 1 week before or after were excluded (n = 23). Adequate clinical follow-up was defined as outpatient or inpatient follow-up ≥ 1 week following the procedure. Average follow-up was 2.3 years (SD 3.1, range 0.1–14.2). Adequate laboratory follow-up was defined as having obtained pre- and postprocedural hemoglobin and hematocrit measurements within 1 week of the procedure. Although not an inclusion criteria, pre- and postprocedural imaging consisting of computerized tomography, magnetic resonance imaging, or ultrasound was reviewed to further investigate for hemorrhagic complications. Imaging before the procedure was available in 146/148 patients (98.6%) and imaging after the procedure in 141/148 (95.3%), as further detailed in Table 1.

Table 1. Imaging before and after the Procedure by Access Modality

Imaging before the Procedure	No. of Procedures	Imaging after the Procedure	No. of Procedures
CT	125	CT	94
MR	13	US	23
US	8	CT and US	16
None	2	MR	6
		MR and US	2
		None	7
TOTAL	148	TOTAL	148

US = ultrasonography.

The outcomes of this study were bleeding complications, which were detected by postprocedural imaging, clinical evaluation as charted by the institution's electronic medical record, requirement for an additional procedure owing to hemorrhage, or requirement for red blood cell transfusion. Data for whether postprocedural red blood cell transfusion was required and the number of units transfused were also obtained from the institutional electronic medical record. Change in hemoglobin was an additional outcome that was measured. It was obtained by subtracting the highest hemoglobin ≤ 1 week before the procedure from the lowest hemoglobin ≤ 1 week after or until red blood cell transfusion. Nonhemorrhagic complications also were assessed by chart review and imaging after the procedure. The exposure variable was a portal venous system intervention by either TS or TH access. Potential confounders were variables that could influence the chance of a hemorrhagic complication, such as body mass index (BMI), international normalized ratio (INR) and platelet count before the procedure, largest device inserted, and whether the puncture tract was closed. An effect modifier was patients who were not followed long enough after the procedure to properly detect a hemorrhagic complication, and as such patients without outpatient or inpatient follow-up of ≥ 1 week after the procedure were excluded.