Combined portal vein and hepatic vein embolization in heavily pretreated colorectal cancer patients undergoing major hepatic resection: experience in a single cancer US center

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Purpose: To assess the safety and efficacy of liver venous deprivation (LVD - simultaneous hepatic vein with portal vein embolization) before major hepatectomy in heavily pretreated cancer patients

Materials and Methods: From December 2019 to July 2020, 11 consecutive patients with colon cancer and liver metastasis underwent LVD in a context of small future liver remnant (FLR) (baseline FLR < 30% of the total liver volume) prior to major hepatectomy (4 or more Couinaud segments). Mean age was 56.3 years ± 9.9 (standard deviation), with 8 men (73%) and 3 women (27%). Mean BMI was 30.2 kg/m² ± 4.26 (overweight and obese). Portal vein embolization was performed via trans-splenic approach. Hepatic vein embolization was done from right internal jugular vein approach. The hepatic vein was embolized with Amplatzer plugs and the portal vein with N-butyl cyanoacrylate (NBCA). Prior to LVD, all patients received at least two or more lines of systemic chemotherapy and 9 (82%) had simultaneous hepatic arterial infusion pump chemotherapy. Three-dimensional segmentation volumetry was assessed on CT before LVD and 3-6 weeks after the procedure.

Results: LVD was successful in all patients, with no major peri-procedural or post procedural complications. Major hepatic resection was performed in 9 of 11 patients (82%). Dropouts were due to tumor progression (n = 1) or insufficient hypertrophy of contralateral liver (n = 1) in a patient with prior history of radiation to the liver, obesity and hepatic steatosis. After LVD, mean FLR hypertrophy was 146% ± 26. FLR ratio (FLR divided by total liver volume) increased from a mean of 28.33% ± 8.5 to 41.8% ± 11.8. Mean daily FLR increase was 8.27 cc/day ± 4.38 and mean weekly placement of 0.76, 0.74, and 0.76 and had AUC’s of 0.83, 0.76, 0.78. The learned features of high importance included lesion character, COPD status, lesion depth, and patient age. A coarse decision tree requiring only 3 inputs achieved comparable performance as other methods.

Conclusions: We identified an interpretable decision tree to predict chest tube placement post biopsy with an accuracy of 76% and AUC of 0.83. This work suggests that it may be possible to predict the risk of pneumothorax requiring chest tube placement based on an automated decision support tool reliant on easily available clinical and imaging features.
FLR increase was 63.9 cc/week ± 31.6. Mean kinetic growth rate was 3.38%/week ± 2.27. Mean time from procedure to surgery was 48.3 days ± 26.4.

Conclusions: Liver venous deprivation is a safe and effective procedure that allows FLR hypertrophy in heavily pretreated patients with colorectal cancer liver metastasis. Further studies are needed to confirm these results and compare them to portal vein embolization alone.

Abstract No. 27

Proton pump inhibitor use is associated with increased risk of post–transjugular intrahepatic portosystemic shunt hepatic encephalopathy: replication in an independent patient cohort

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Purpose: Hepatic encephalopathy (HE) is a common complication of transjugular intrahepatic portosystemic shunt (TIPS) procedures. Proton pump inhibitor (PPI) use has recently been implicated as a risk factor for HE, potentially due to alterations in the gastrointestinal tract microbiome or effects on ammonium ion excretion. Although generally supporting an association between PPI use and HE, multiple meta-analyses have reported heterogeneity and publication bias, and only two previous studies have examined the role of PPI use in post-TIPS HE. Therefore, further evaluation of the role of PPI use in post-TIPS HE is warranted. The purpose of this study was to determine whether PPI use is associated with an increased risk of post-TIPS HE in an independent patient cohort.

Materials and Methods: This single-institution retrospective study analyzed 86 patients (54 male, mean age 58.2) following TIPS insertion from January 1, 2017, to December 31, 2019. Dates of PPI usage and episodes of new or worsening HE were extracted from medical records. Poisson regression with generalized estimating equations was used to test for an association between PPI use and post-TIPS HE and to test for dose dependence. A Cox proportional hazards model with time dependent covariates was used to analyze post-TIPS survival.

Results: After TIPS creation there were 49 episodes of new or worsening HE among 35 patients on chronic PPI therapy (1.88 episodes per person-year), 44 episodes among 35 patients on intermittent PPI therapy (2.26 per person-year on PPIs and 0.75 off PPIs), and 7 episodes among 16 patients never on PPIs (0.49 per person-year). In univariable analysis PPI use was associated with a 3.65-fold increased rate of new or worsening HE (incidence rate ratio (IRR) = 3.65; 95% CI: 1.60-8.35; P = 0.002). In multivariable regression after accounting for older age (IRR = 1.03; CI: 0.99-1.06; P = 0.15) and higher model for end stage liver disease (MELD) score (IRR = 1.19; CI: 1.10-1.29; P < 0.001), PPI use was an independent risk factor for post-TIPS HE (IRR = 4.70; CI: 1.07-20.6; P = 0.04). Further analysis of only those patients who used PPIs showed an increased risk of HE with higher doses (IRR = 1.11 per 10 mg omeprazole or equivalent; CI: 1.00-∞; P = 0.048). In multivariable survival analysis PPI use did not predict post-TIPS mortality (HR = 0.80; CI: 0.36-1.77; P = 0.58).

Conclusions: In an independent patient cohort PPI use was associated with increased risk of post-TIPS HE in a dose dependent manner. In addition to being a reproducible risk factor, PPI use may represent one of the few modifiable risk factors associated with post-TIPS HE.

Abstract No. 28

Sustained improvement in hepatic function following transjugular intrahepatic portosystemic shunt for Budd-Chiari syndrome

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Purpose: While transjugular intrahepatic portosystemic shunt (TIPS) has been shown to relieve hepatic venous obstruction and is a viable alternative to liver transplantation (LT) in Budd-Chiari syndrome (BCS), the effect of TIPS on liver function in patients with BCS is unclear, particularly outside the immediate post-treatment period.

Materials and Methods: 20 patients with BCS who underwent TIPS from 1999-2018 were included. Demographic data and clinical data at the time of TIPS procedure, 6-month, and 12-month post TIPS were collected.

Results: There were 13 (65%) women and 7 (35%) men with a mean age of 42.6 ± 12.8 years. 8 (40%) patients had a JAK-2 mutation. Time from BCS diagnosis to TIPS procedure was 10.3 ± 23.3 months. Median follow-up time was 8.4 years. The ascitic burden significantly decreased from pre-TIPS (moderate ascites 10/17 (58.8%)) at 6 (moderate ascites 1/16 (6.3%), P = 0.0001) and 12 (1/13 (7.7%, P = 0.0007)) months follow-up, respectively. Hepatic encephalopathy was present in 5/17 (29.4%) at 6-months (moderate HE 11/17 (64.7%) and severe HE 4/17 (23.5%) at 6 months, and 4/13 (30.8%) 12-months post-TIPS. Serum albumin significantly improved from pre-TIPS (3.0 ± 0.6) through 6 (3.5 ± 0.7 (P = 0.03)) and 12 (3.7 ± 0.6 (P<0.01)) month follow up. Similarly, total protein significantly improved at 6-months after TIPS (pre-TIPS 6.4 ± 1.4, 6-month 7.3 ± 1 (P = 0.03)). Child-Pugh Score significantly decreased with a score of 9.4 ± 1.8 pre-TIPS, as compared to 7.6 ± 1.8 at 6-months (P = 0.007), and 7.4 ± 1.5 (P = 0.05) at 12-months post-TIPS. 15 (75%) patients required TIPS revision with 4/15 (26.7%) within 30 days; 2/15 (13.3%) between 1 month and 1 year, and 9/15 (69.2%) after 1 year. 8 (40%) patients underwent LT at mean 7.68 ± 6 years after TIPS. 3 (15%) patients died at 1.9, 9.8, and 16.9 years following TIPS.

Conclusions: In patients with BCS, TIPS significantly resolves symptoms and improves liver synthetic function at 1-year. Despite the frequent need for revision, TIPS for BCS also has good long-term durability and is able to prolong time to LT in a large proportion of patients.

Abstract No. 29

Percutaneous mesocaval shunt creation: a retrospective review of 5 patients with midterm outcomes

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