Increased Bleeding Risk After Image Guided Percutaneous Random Liver Biopsy in Patients Undergoing Workup for Cardiac Transplant

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Background

- Liver biopsies are commonly performed in cardiac transplant candidates to evaluate for fibrosis secondary to congestive hepatopathy, since there is a known correlation between the degree of hepatic fibrosis and transplant outcomes.[1,2]
- In quality improvement review at our institution, patients undergoing image-guided (CT or US) percutaneous random liver biopsy as part of a pre-cardiac transplant workup were observed to have a markedly increased risk of hemorrhagic post-procedure complications compared to patients undergoing liver biopsy for other indications.
- Hemorrhagic post-procedure complications include hemoperitoneum and/or subcapsular hematoma identified on post-procedure imaging, which was performed based on clinical indications post procedure (e.g. increased abdominal pain, hypotension, tachycardia).

Purpose of Study

Determine the incidence of post-biopsy hemorrhage in pre-cardiac transplant patients relative to other patient populations and propose and apply a new safety protocol to reduce the bleeding risk.

Methods

- IRB approved retrospective database review of all patients who underwent percutaneous CT or US guided liver biopsy at our institution between 1/1/2019 and 12/31/2020.
- Divided patients into 2 groups: those undergoing biopsy as part of a workup for cardiac transplant vs. all other indications.
- Tabulated the hemorrhagic complication rate in each group.
- Proposed a series of safety measures to reduce complications in this specific patient population.
- Analyze complication rate in this patient population after the safety measures were implemented (1/1/2021-9/1/2021).

Examples of Hemorrhagic Complications

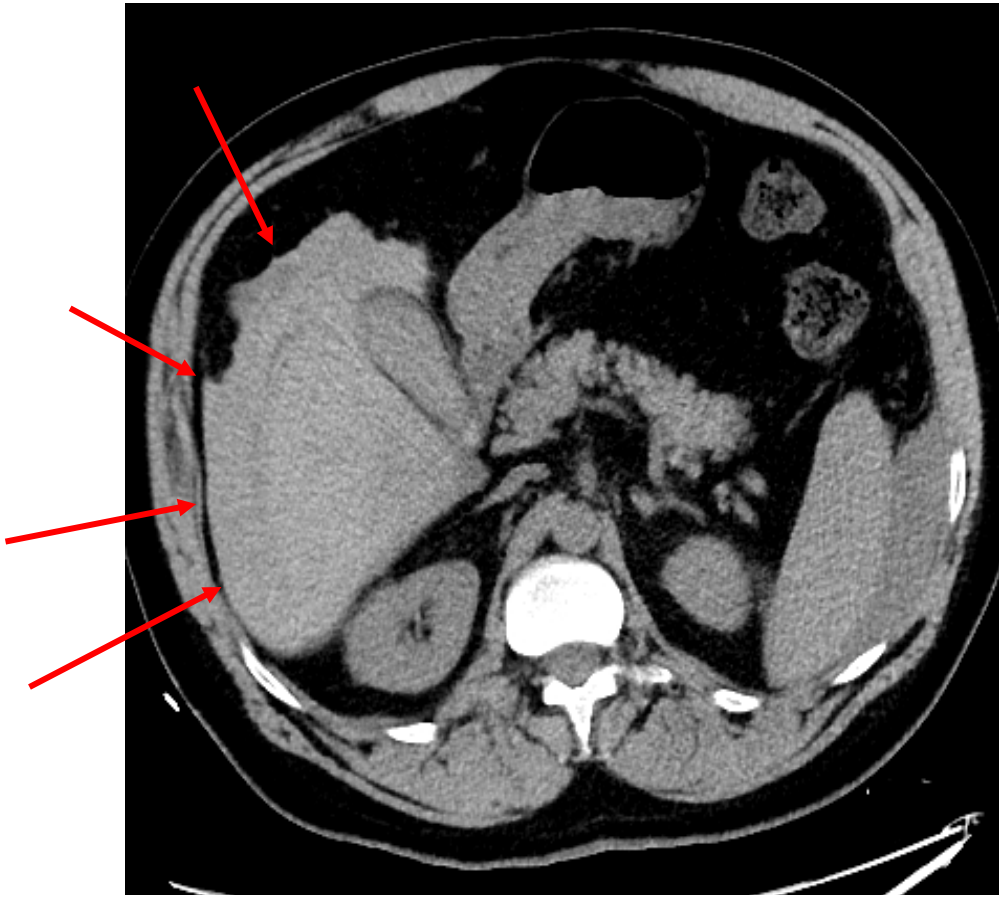


Figure 1. Non-contrast axial CT demonstrates a perihepatic hematoma adjacent to the inferior right hepatic lobe 9 hours after a CT guided random liver biopsy in a patient undergoing workup for cardiac transplant.

Examples of Hemorrhagic Complications

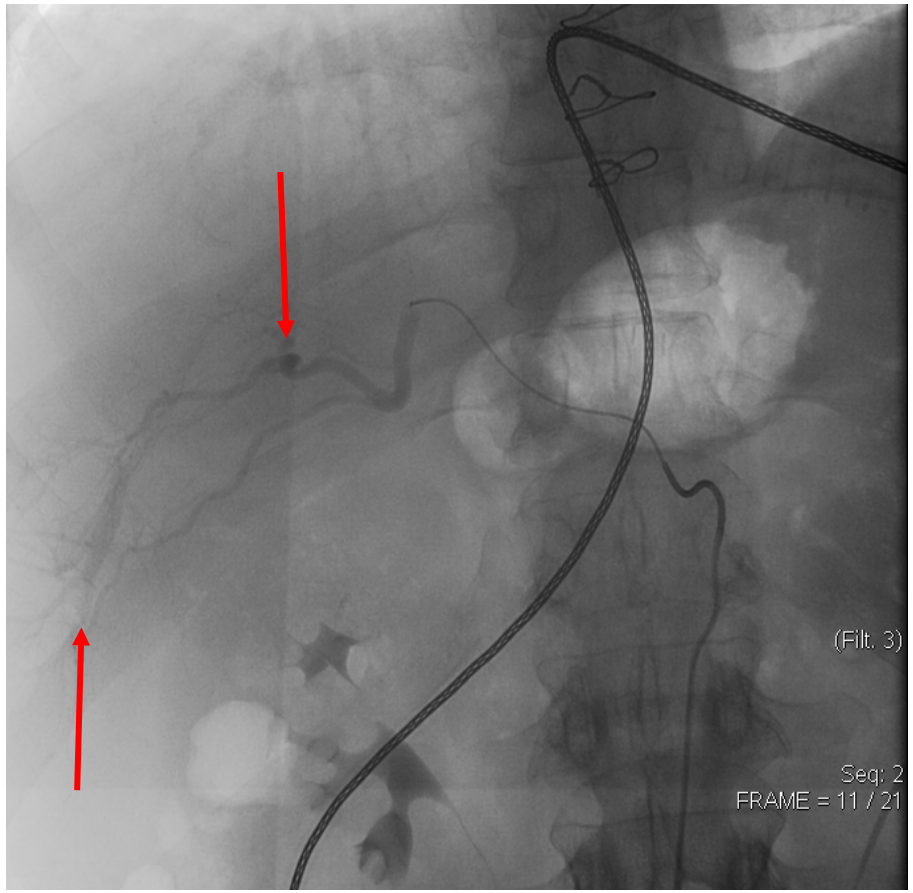
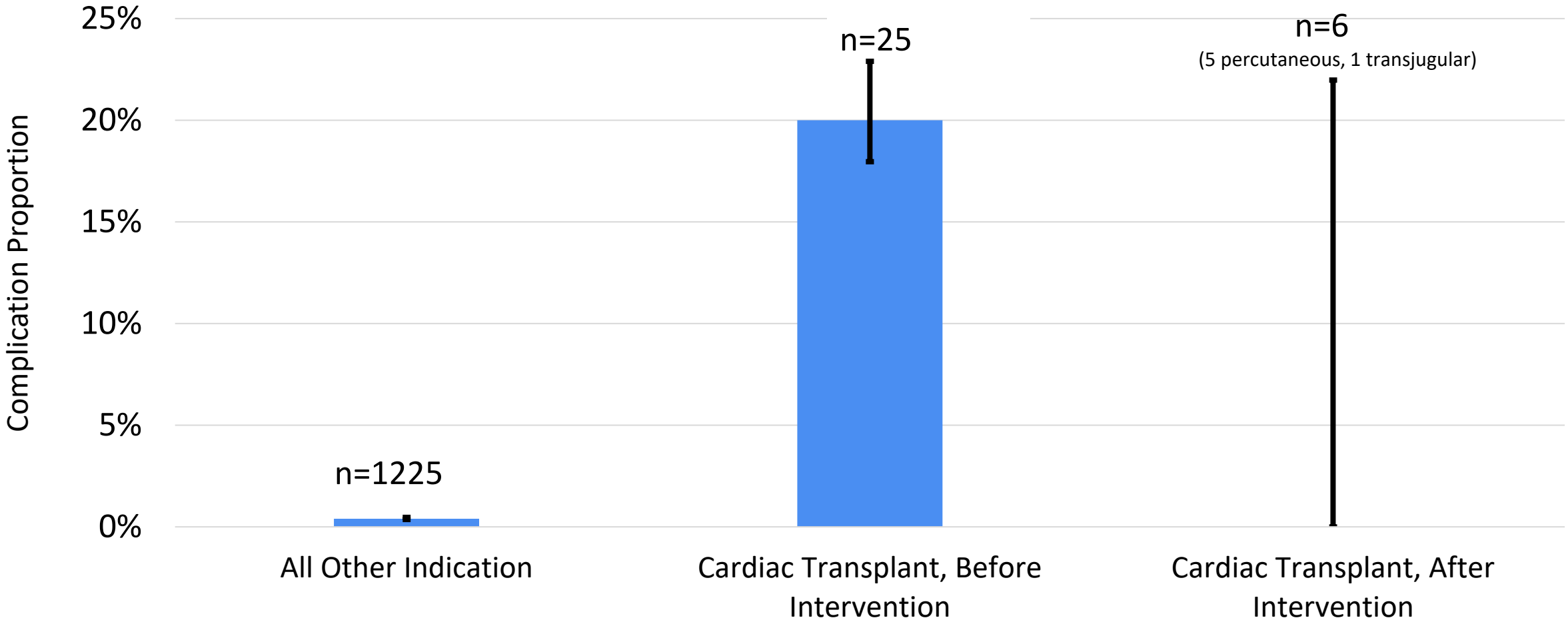


Figure 2. Hepatic angiogram demonstrating an arteriovenous fistula arising from an inferior right hepatic artery branch 24 hours after three 18-gauge core samples of the liver were obtained using CT guidance as part of a cardiac transplant workup (top arrow demonstrates inflow from the hepatic artery and bottom arrow demonstrates fistulous connection with the venous system.)

Safety Protocol/Considerations

- Flag high risk patients through orders in the EMR to alert the team (specifically identify patients as pre-cardiac transplant as opposed to history of “evaluate for fibrosis”)
- Schedule biopsies in AM to allow for immediate post-procedure monitoring and possible intervention during daytime hours when complete team is available
- Close monitoring post-procedure in extended 24 hour overnight recovery in order to detect any bleeding complications earlier
- Hold anticoagulation prior to and post procedure according to the SIR consensus guidelines for high risk procedures[4]
- Only obtain a single 18-gauge core sample (all prior bleeding complications occurred with 2 or more 18 G core samples)
- Perform routine placement of a 5 mL gelfoam slurry at the biopsy site[5]
- Perform transjugular liver biopsies in patients with proven elevated right heart pressures

Results – Hemorrhagic Complication Rates



Conclusions

- Pre-cardiac transplant patients have a significantly higher risk of bleeding after image-guided percutaneous liver biopsy compared to patients undergoing liver biopsy for any other indication.
- A new safety protocol was designed specifically for this patient population.
- After implementation of the safety protocol, there was a significant decrease in the rate of bleeding complications in this group.

References

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4. Patel, I., Rahim, S., Davidson, J.C., et. Al. Society of Interventional Radiology consensus guidelines for the periprocedural management of thrombotic and bleeding risk in patients undergoing percutaneous image-guided interventions – Part II: Recommendations. *J Vasc Interv Radiol*, 2019, June.
5. Fandrich, C.A., Davies, R.P., Hall, P.<. Small gauge gelfoam plug liver biopsy in high risk patients: safety and diagnostic value. *Australas Radiol.* 1996, August; 40(3): 230-4.