

ARTICLE OF THE MONTH

Fagelman E, Wang R, Tomlinson A, Romano D, Schlichting N, Zerillo J, DeMaria S, Smith N.

**Intraoperative Intracardiac Thrombus in Liver Transplant: A 9-year Retrospective Review
Focusing on Treatment and Outcomes.** *Liver Transplantation*. April 2022.

“This study characterizes incidence and outcomes surrounding intracardiac thrombosis (ICT) during liver transplantation over 9 years at a single center before and after the routine use of transesophageal echocardiography (TEE). Adult liver transplantation patients from 2011 to 2020 were divided into eras based on routine TEE use. ICTs were identified by querying anesthetic records for search terms. Descriptive statistics included counts and proportions for baseline recipient, donor, intraoperative, and postoperative characteristics. Outcome data were based on date of hospital discharge and date of death. The incidence of ICT increased in the TEE era (2016-2020) compared with the pre-TEE era (2011-2015; 3.7% [25/685] vs. 1.9% [9/491]; $p < 0.001$). Patients with ICT had significantly higher Model for End-Stage Liver Disease-sodium (MELD-Na) scores, pretransplant hospitalization, malignancy, drug-induced liver injury, hypertension, deep vein thrombosis, reperfusion syndrome, transfused platelets and cryoprecipitate, and use of hemostatic medications. A higher proportion of patients in the ICT group underwent simultaneous liver-kidney transplantation. The patients with ICT were similar, except patients in the pre-TEE era had higher MELD-Na scores and incidences of hepatitis C virus and lower incidences of encephalopathy. In the pre-TEE era, all ICTs presented as intraoperative cardiac arrest, and the 30-day mortality in the setting of ICT was 66.7% (6/9). During the TEE era, 80% of ICTs were diagnosed incidentally or attributed to hemodynamic instability ($p = 0.002$). The 30-day mortality rate was 36% (9/25) in the TEE era ($p = 0.25$). ICT incidence increased in the TEE era, yet the mortality rate was lower, suggesting that routine intraoperative TEE may lead to the early detection of ICT prior to hemodynamic collapse.”

Comments made by Cara Crouch, MD

Intracardiac thrombus (ICT) is a rare but devastating complication during orthotopic liver transplantation (OLT). This study evaluates the incidence of ICT before and after TEE use during OLT became standard at a single institution. As expected, there was a higher incidence of ICT found once TEE use became standard practice, however, an important point to note from this article is the lower mortality rate during the TEE era (36% vs 66.7% in the pre-TEE era). The authors point out that earlier detection of thrombi via TEE may allow for more prompt treatment prior to the progression to full cardiovascular collapse.

This article also provides a thorough review of a single institutions experience with ICT over a 9-year period and the authors provide extensive baseline characteristics of the patients who developed this complication. The authors found that patients undergoing simultaneous liver-kidney transplant (SLK) seemed to have a higher incidence of ICT, though the use of intraoperative renal replacement therapy (non-heparinized circuit) was higher in patients undergoing SLK and the authors question if this may be the reason. Patients who experienced ICT were more likely to have post-reperfusion syndrome, platelet and cryoprecipitate transfusion, as well as administration of recombinant factor VII, tranexamic acid and desmopressin. This article offers good support for the standardization of intraoperative TEE use in patients undergoing liver transplantation. However, it is

understood that this may not be feasible at some institutions, the authors also highlight several intraoperative factors that appear to be correlated with the development in ICT. This information may prove useful in helping to determine which patients may benefit from TEE probe placement given that they are higher risk for this potentially fatal complication.

References:

1. Fagelman E, Wang R, Tomlinson A, Romano D, Schlichting N, Zerillo J, DeMaria S, Smith N. **Intraoperative Intracardiac Thrombus in Liver Transplant: A 9-year Retrospective Review Focusing on Treatment and Outcomes.** *Liver Transplantation.* April 2022.