**Supplementary Appendix 2:**

(Not for publication)

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1. Statistical analysis and model building

**Statistical analysis and model building:**

Variables: MELD score was used as a continuous variable. Due to the small number of events, MELD score was not used in its traditional 5 category format. Indeed, when MELD score was reviewed in its traditional 5 categories (<9, 10-19, 20-29,30-39,>40), total complication rate increased from 5 % (MELD 10-19) to 10% (MELD 20-29) to 33% (MELD >40). This observation was not analyzed further, because of the small number of events in each group, unacceptable model fit (based on AIC), and zero procedures performed in MELD category 30-39. (p=0.2, OR: 1.5 95% CI: 0.76, 3.0).

Model building:

For initial model building, clinically relevant variables were included. Logistic regression model was then fitted to determine whether complication status was related to the severity of liver disease and other laboratory markers. An automated variable selection procedure (forward selection) was then used to add any significant variables in to the model avoiding entrance of collinear variables (Using 0.05 significance level for entry in to the model).

To assure inclusion of all potential confounders among measured variables, each remaining variable was added separately in to the model. Variable was considered a confounder if it resulted in 20% or more change in the effect estimates. (No additional variables resulted in 20% change in effect estimates, hence no additional variables were included in to any of the model.)

Given known relationship between MELD score and INR, as well as relationship between Creatinine and Blood Urea Nitrogen (BUN), interaction terms were built to assess for possible effect modification. All procedural complications were assumed to be independent of each other. Akaike Information Criterion (AIC) was used to assess for goodness of fit and the relative quality of the statistical models.

Logistic regression model was fitted to examine the relationship between MELD score and presence vs absence of hemothorax within the HH group. Noting the possibility of overfitting (5 hemothoraces), one additional covariate of INR was added in the model based on clinical relevance and relationship to hemorrhage. After forward selection, the only significant variables included in the model was platelet count level. An interaction term between INR and MELD score was entered in to the model along with the main effects, and did not show statistical significance (p= 0.997). The interaction term was then removed and the final model was fitted with MELD score, INR and platelet count level.

A second model was fitted to examine the relationship between MELD score and presence vs absence of any and all complications. Again, noting small event rate, age, gender were also added in to the model. MELD score did not have any significant effect on the total rate of complications within the HH group (OR: 1.03, p= 0.39). Performing a forward selection method resulted in significant results with a single variable, INR which was included in to the model along with age and gender. Final model comparing patients with and without any complications included INR, age and gender.

Comparing the total complication rate between HH and non-HH group, a univariate regression model showed that the odds of having a complication in all thoracentesis in the HH group, was 6 times higher than the non-HH group (OR: 6.15, 95% CI: 1.4, 26.9, p= 0.015). To explore for other predictors of complication, MELD score, platelet count, INR, BUN and Creatinine were each added separately to the model. Complication rate remained significantly higher in the HH group, after addition of BUN and Creatinine. Given the relationship between the two covariates, an interaction term between BUN and Creatinine was made and added to the model which was found to be non-significant. Final model containing BUN, Creatinine and HH vs no-HH state was fit.