Different Clinical Risk Scores for Prediction of Early Mortality after Liver Resection for HCC.

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INTRODUCTION

• Prediction of early mortality after hepatectomy is important. Hepatocellular carcinoma (HCC) is essential to identify high-risk patients and to decrease the postoperative mortality rate.

• Recently, several postoperative clinical risk scores were developed to predict mortality post-hepatectomy, however which one is the best remains undetermined.

• In 2005, Balzan et al. proposed the 50-50 criteria on postoperative day 5 which included portal venous time (PT) < 90% and serum bilirubin > 50 μM/L and showed that it was an accurate and early predictor of liver failure and death after liver resection. Whereas, Mullen et al. 3 found that postoperative peak serum bilirubin > 7 mg/dl alone was a better predictor of operative mortality because PT usually affected by intraoperative or postoperative fresh-frozen plasma infusion.

• In 2013, Hyder et al. proposed a clinical risk model that could predict 90-day mortality after hepatectomy. It incorporated serum creatinine, PT-INR, and serum bilirubin on postoperative day 3 as well as the grade of postoperative complications.

• Regarding liver resection for HCC: Lee et al. found 6 independent perioperative risk factors of early mortality: PTV > 50%, the presence of diabetes mellitus (DM), postoperative Albumin < 3 g/dl, major liver resection, intraoperative blood loss and presence of major surgical complications. They combined them with a scoring system called risk assessment for early mortality (RAM score) which was effective in predicting post-operative mortality as well as early recurrence.

• Therefore, the aim of this study was to evaluate the performance of these different postoperative clinical risk scores in predicting early mortality after hepatectomy.

PATIENTS AND METHODS

• It is a retrospective cohort study of adult patients who underwent liver resection for HCC from June 2011 to July 2016 (n=240) at Kyoto University Hospital.

• Postoperative complications were divided into 50-50 criteria, peak bilirubin > 7 mg/dl, MELD ≥ 15, RAM ≥ 3, and day 3 serum creatinine ≥ 1.5 mg/dL. In the present study, we evaluated the receiver operating characteristics of these scores in predicting early mortality after hepatectomy.

Calculation of the Different Clinical Risk Scores

• The 50-50 criteria were considered when PT-INR > 1.7 and serum bilirubin > 3 mg/dl on postoperative day 5.

• The MELD was calculated from the INR: serum total bilirubin (bilb) in mg/dL, and serum creatinine (cre) in mg/dL, obtained on the 3rd, 5th and 7th day postoperatively according to this formula: MELD = 9.55 x log(e) (bilb)+ 1.15 x log (cre) + 3.78 + 11.20 x loge (INR) + 6.43.

• Hyder et al.1 score was measured according to their formula: day 3 PT-INR x 2.5 + complication grade ≤ 1.5 + day 3 serum bilirubin + 0.15 x day 3 serum creatinine ≤ 0.5.

• Whereas, RAM score was a point-based clinical risk score which includes 6 independent variables: diabetes mellitus (1p), albumin ≤ 3.5 g/dl (2p), intraoperative blood loss > 1000 ml (1p), age > 60 years (1p), blood transfusion during resection (1p), blood loss > 800 ml (1p), and major surgical complications (1p).

RESULTS

• To evaluate the efficiency of each score in predicting 90 days mortality after liver resection we used the receiver operating characteristics curves (ROC). The area under the ROC curve (AUC) was used to assess the accuracy of each score. The Bland & Altman method was used for comparison of the AUCs of different scores to determine the more suitable score for predicting early mortality.

• Logistic regression analysis was performed to determine the grading system for early mortality post-hepatectomy. Factors with p < 0.1 in the univariate analyses were entered into a multivariate analysis. Odds ratio and 95% confidence interval (CI) were calculated for each factor.

• Patient survival was performed using the Kaplan-Meier method and the differences in survival between groups was compared using the Log-rank test.

• The 90 days mortality rate after hepatic resection was around 2.5%.

• The sensitivity and specificity of 50-50 criteria for prediction of 90-days mortality was 33% and 99%, comparable to the peak bilirubin ≥ 7mg/dl (33% and 99%). As shown in figure 1, both were weak predictors of 90-days mortality after liver resection (AUC 0.65 and 0.66, respectively p>0.05).

• The other clinical risk scores including Hyder score: RAM score, and MELD on POD 3.5 and 7 showed a good discriminative performance in predicting 90-days mortality with AUC of 0.89, 0.91, 0.88, 0.89, and 0.89, respectively (all p < 0.001) as shown in figure 2 & 3.

• The AUC of RAM was the highest among all the previous clinical risk models. However, after pairwise comparison of these clinical scores, there was no significant difference between them as shown in Table 1.

• Hyder and RAM scores depend on the assessment of postoperative complications in their calculation which might be difficult to assess within the first week postoperatively. On the other hand, postoperative MELD score especially on POD 3 was a simple, well-known, good predictor of early mortality and could be calculated as early as the third day postoperatively.

• Moreover, MELD score on postoperative day 3 was an independent risk factor for 90-days mortality with an odds ratio of 1.4 (95% CI 1.06-1.81, p=0.02).

CONCLUSIONS

• The present study analyzed the different clinical risk scores that could predict early mortality after liver resection for HCC aiming to categorize patients in the initial postoperative period into high and low-risk patients and provide high-risk patients more intensive medical care.

• Postoperative MELD score was superior to 50-50 criteria and peak bilirubin > 7 mg/dl and comparable to Hyder et al. and RAM scores in predicting early mortality post-hepatectomy. Furthermore, a well-known clinical risk score, easier to calculate and could identify high-risk patients as early as the 3rd day postoperatively. However, further large, multicenter, studies are required to validate our findings.

REFERENCES


