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Development and Validation of An Individualized Prediction Calculator of Postoperative Mortality Within 6 Months After Surgical Resection for Hepatocellular Carcinoma: An International Multicenter Study

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Introduction : Evidence-based decision-making is critical to optimize the benefits and mitigate futility associated with surgery for patients with malignancies. Untreated hepatocellular carcinoma (HCC) has a median survival of only 6 months. The objective was to develop and validate an individualized patient-specific tool to predict preoperatively the benefit of surgery to provide a survival benefit of at least 6 months following resection.

Methods : Using an international multicenter database, patients who underwent curative-intent liver resection for HCC from 2008 to 2017 were identified. Using random assignment, two-thirds of patients were assigned to a training cohort with the remaining one-third assigned to the validation cohort. Independent predictors of postoperative death within 6 months after surgery for HCC were identified and used to construct a nomogram model with a corresponding online calculator. The predictive accuracy of the calculator was assessed using C-index and calibration curves.

Results : Independent factors associated with death within 6 months of surgery included age, Child-Pugh grading, portal hypertension, alpha-fetoprotein level, tumor rupture, tumor size, tumor number and gross vascular invasion. A nomogram that incorporated these factors demonstrated excellent calibration and good performance in both the training and validation cohorts (C-indexes: 0.802 and 0.798). The nomogram also performed better than four other commonly-used HCC staging systems (C-indexes: 0.800 vs. 0.542~0.748).

Conclusions : An easy-to-use online prediction calculator was able to identify patients at highest risk of death within 6 months of surgery for HCC. The proposed online calculator may help guide surgical decision-making to avoid futile surgery for patients with HCC.

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