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Performance of Artificial Intelligence in predicting survival following deceased donor liver transplantation: retrospective study using multicenter data from the Korean Organ Transplant Registry (KOTRY)

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Introduction : Although the Model for End-stage Liver Disease (MELD) score is commonly used to prioritize patients awaiting liver transplantation, previous studies have indicated that MELD score may fail to predict well for the postoperative patients. Similarly, other scores (D-MELD score, Balance of risk score) that have been developed to predict transplant outcome have not gained widespread use. These scores are typically derived from linear statistical models. The aim of this study was to compare the performance traditional statistical models with machine learning approaches in predicting survival following liver transplantation using multicenter data.

Methods : Data came from 785 deceased donor liver transplant recipients enrolled in the Korean Organ Transplant Registry (KOTRY, 2014~2019). Five machine learning methods and 4 traditional statistical models were compared for the prediction of survival.

Results : Of the machine learning methods, random forest (RF) yielded the highest area under the receiver operating characteristic curve (AUC-ROC) values (1 month = 0.89, 3 month =0.92, 12 month = 0.87) for predicting survival. The AUC-ROC values of Cox regression analysis was 0.76, 0.85 and 0.80 for 1month, 3month and 12 month posttransplant survival, respectively. However, the AUC-ROC values of the MELD, D-MELD and BAR score were all below 0.70.

Conclusions : Machine learning algorithms such as random forest was superior than the conventional cox regression model and previously reported survival scores in predicting 1 month, 3month 12 month survival following liver transplantation. Therefore, artificial intelligence may have significant potential in providing assistance with clinical decision making during liver transplantation including matching donors and recipients.

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