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O-129 - PREDICTING AREAS OF LOCAL RECURRENCE IN GLIOBLASTOMAS USING VOXEL-BASED RADIOMIC FEATURES OF POSTOPERATIVE MRI AND MACHINE LEARNING

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Resumen

Introduction: The globally accepted surgical strategy in glioblastomas (GBM) is removing the enhancing tumor (ET). However, the peritumoral (PT) region harbors infiltration areas responsible for future tumor recurrence. Our study aims to create a predictive model that identifies these areas using a voxel-based analysis of magnetic resonance imaging (MRI) radiomic features.

Methods: Data from patients diagnosed with GBM who underwent gross total resection surgeries between January 2019 and January 2020 were retrospectively collected. Structural multiparametric MRI sequences were preprocessed. After automatic segmentation and deformable coregistration, the postoperative PT region was divided into two volumes of interest labeled recurrence or nonrecurrence sites depending on the overlap with the ET in the follow-up study where recurrence was diagnosed. Then, voxel-based radiomic feature extraction was performed. The study sample was randomly split into training and testing data sets in a 70/30 ratio. After feature reduction, a predictive model of recurrence using machine learning classifiers was built and validated in the testing cohort.

Results: A total of 47 patients were included. The entire data set included 2,019,285 voxels and 2,838 radiomic features. After random splitting, the class imbalance was handled using undersampling techniques. The training dataset was reduced to 368,990 voxels, and 20 radiomic features were selected by feature importance scores. Boosted tree classifiers were used for model training. In the test dataset, category boosting (CatBoost) obtained the best performance, with an average area under the curve of 0.9 and classification accuracy of 93%.

Conclusions: In this study, we obtained a predictive model that facilitates the identification of areas of tumor recurrence using postoperative MRI. Our approach is the first step to carry out tailored supramarginal resections and radiotherapy treatments guided by artificial intelligence to improve the overall survival of these patients.