0106

Evaluation of TMJ Disc Displacement With MRI Based Radiomics Analysis

H. Duyan Yüksel[1, 2], K. Orhan[3, 4], B. Evlice[1], Ö. Kaya[5]

[1]Dentomaxillofacial Radiology, Çukurova University Faculty of Dentistry, Adana, Turkey, [2]Biostatistics, Cukurova University Faculty of Medicine, Adana, Turkey, [3]Dentomaxillofacial Radiology, Ankara University Faculty of Dentistry, Ankara, Turkey, [4]Medical Design Application and Research Center (MEDITAM), Ankara University, Ankara, Turkey, [5]Radiology, Cukurova University Faculty of Medicine, Adana, Turkey

Objectives The purpose of this study was to propose a machine-learning model and assess its ability to classify temporomandibular joint (TMJ) disk displacements on magnetic resonance (MR) T1-W and PD-W images.

Methods This retrospective cohort study included 180 TMJs from 90 patients with TMJ signs and symptoms. A Radiomics platform was used to extract (Huiying Medical Technology Co., Ltd, China) imaging features of TMJ pathologies, condylar bone changes and disc displacements. Thereafter, different machine learning (ML) algorithms and logistic regression were implemented on radiomic features for feature selection, classification, and prediction. The following radiomic features included first-order statistic, shape, texture, gray level co-occurrence matrix (GLCM), gray level run length matrix (GLRLM) and gray level size zone matrix (GLSZM). Six classifiers, including logistic regression (LR), random forest (RF), decision tree (DT), k-nearest neighbors (KNN), XGBoost and support vector machine (SVM) were used for a model building which could predict the TMJ pathologies. The performance of models was evaluated by sensitivity, specificity and ROC curve. The TMJ diskdisplacements were classified as; (0) Normal, (1) ADDwR, (2) ADDwoR.

Results A total of 90 patients and 180 TMJs (19 men and 71 women; mean age, 33.6±16.8; range between 13-79 years) were included in this study. KNN classifier was found to be the most optimal machine learning model for prediction of TMJ pathologies. The AUC, sensitivity, and specificity for the training set were 0.944, 0.771, 0.918 for normal, ADDwR and ADDwoR while testing set were 0.913, 0.716, 1 for normal, ADDwR and ADDwoR. For TMJ Disk Diplacment Large Area High Gray Level Emphasis, firstorder_Skewness, firstorder_minumum, RootMeanSquared, GrayLevelNonUniformity, firstorder_ Kurtosis, Long Run High Gray Level Emphasis, were selected.

Conclusions This study has proposed a machine learning model by KNN analysis on TMJ MR images, which can be used to TMJ disc displacements.