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MORPHOMETRY-BASED RADIOMICS FOR PREDICTING PROGNOSIS IN SOFT TISSUE SARCOMAS OF EXTREMITIES FOLLOWING RADIOTHERAPY

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Abstract

Cancer ranks as the leading cause of death worldwide. Especially cancers like soft tissue sarcomas of extremities (STSE) pose a challenge in oncological management. Thus, the assessment of prognosis in patients with such cancers is important for making medical decisions. Radiomics is a promising approach that has shown a wide range of potential applications including predicting prognosis. Therefore, this study focused on finding out whether the morphometry-based radiomics features could be used to predict the prognosis of patients with STSE following radiotherapy. Thirty patients with histologically proven STSE following radiotherapy were retrospectively evaluated. The deidentified images, contours and clinical data from The Cancer Imaging Archive were utilized. Twenty-nine three-dimensional morphometric features were extracted for each patient. For each morphometric feature, whether there was a significant difference between the patients who developed recurrence or metastasis and patients who were recurrence or metastasis-free after radiotherapy, was tested using the two-sample t-test (one-tailed) with the 95% confidence level. Among the extracted features oriented minimum bounding box-based volume density was uniform across all patients and the centre of mass shift was also uniform for all the patients except for one. Excluding those two features p-values were obtained for each morphometric feature. According to the results surface-to-volume ratio demonstrated a significant difference (p-value of 0.029) between the patients who developed recurrence or metastasis and the patients who were free of recurrence or metastasis after receiving radiotherapy for STSE. Therefore, morphometric features such as surface-to-volume ratio could be utilized as predictors for assessing the prognosis of patients with STSE following radiotherapy.

Keywords: *prognosis, radiomics, radiotherapy*