

Efficacy of diffusion-weighted MR imaging and PET/CT for predicting tumor response to chemoradiation therapy in squamous cell carcinoma of head and neck

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Purpose :

The aim of this study was to evaluate the efficacy of apparent diffusion coefficient (ADC) and standardized uptake value (SUV) for prediction and early detection of treatment response to chemoradiotherapy (CRT) in squamous cell carcinoma of head and neck (SCCHN). In addition, The correlation of ADC and SUV was also evaluated.

Materials and Methods :

A 24 patients who were newly diagnosed with HNSCC were enrolled in this study. All patients had AJCC stage III / IV disease, and were treated with CRT. DWI was performed on all patients before treatment (pre-Tx), and 3 weeks after the start of treatment (3w-Tx). PET/CT was performed on 22 patients before treatment (pre-Tx). The current study was focused on assessing therapeutic response of primary tumor because metastatic lymph nodes were followed by planned neck dissection. Assessment of therapeutic response of primary tumor was performed at 3 weeks after the start of treatment and 8 weeks after the completion of treatment based on the ratio of the tumor decrease , and therapeutic response was classified at CR, PR, SD, and PD using RECIST. The relationship between the threapeutic response and imaging parameters such as ADC value of pre-Tx, ADC value of 3w-Tx, the ratio of change in ADC within 3w-Tx, and SUVmax of pre-Tx was examined.

Results :

There were significant correlations between the ratio of change in ADC within 3w-Tx and the ratio of tumor decrease within 3w-Tx and between SUVmax of pre-Tx and the ratio of tumor decrease within 3w-Tx ($r = 0.73$, $p = 0.01$, and $r = -0.67$, $p = 0.04$, respectively). In assessment of tumor response at 8 weeks after the completion of treatment, the CR group showed significantly higher increase in ADC value of 3w-Tx than the PR group ($p = 0,03$), in addition, the ratio of change in ADC within 3w-Tx of the CR group tended to be higher than that of the PR group. SUVmax of pre-Tx of the CR group tended to be lower than that of the PR group in assessment of tumor response at 8 weeks after the completion of treatment. There were no significant correlations between SUVmax of pre-Tx and ADC value of pre-Tx, ADC value of at 3w-Tx, and the ratio of change in ADC within 3w-Tx.

Conclusion :

ADC and SUVmax may be used as one of a biomarker respectively for monitoring of tumor response to CRT in SCCHN. Particularly, it is likely that ADC is a promising value in differentiating complete responder from partial responder to CRT and will aid in accurately predicting treatment response.