Comparison of Diagnostic Performance between MRI including Diffusion-weighted Imaging and FDG-PET/CT in Patients with Head and Neck Cancer

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Background:

Recent studies show that diffusion-weighted imaging (DWI) has high contrast and can be helpful in detecting cancerous tissue, and that primary or metastatic lesions have been identified with higher diagnostic accuracy by DWI (1-3). The purpose of this study was to compare the diagnostic accuracy of MRI including DWI with FDG-PET/CT in pre-therapeutic or post-therapeutic assessment of head and neck cancer.

Patients and methods:

Twenty-two consecutive patients (M:F=16:6, ranging from 44 to 81 yr, mean 68 yr) with known or suspected head and neck cancer underwent both MRI and FDG-PET/CT scans at the same day. These examinations were performed for staging before treatment in 15 patients and for follow-up or restaging in 7 patients. MR imaging for a head and neck field was performed using a 1.5-T MR imaging system with a phased-array coil. Diffusion-weighted images were obtained by the single-shot echo planar imaging technique using the following imaging parameters: TR/TE=4000/80, b-factors=0 and 1000 sec/mm^2, and a parallel imaging factor of 2. For the PET/CT scan, after at least 4-hour fast, ^{18}F-FDG was injected intravenously, and image acquisition of the whole body was obtained 60 minutes later. MR and PET/CT images were interpreted separately and independently by at least two well-trained radiologists and/or nuclear medicine physicians with clinical information. Based on the final diagnoses determined by histopathological examinations or clinical follow-up for at least one year, the diagnostic performance was compared between the two modalities.

Results:

Excluding one case for staging due to lack of follow-up, 21 patients were analyzed. For initial staging (n=14), 12 patients were confirmed to have squamous cell carcinoma and two had benign lymphadenitis. Although there were three primary sites that were not identified on MR, the patient-based sensitivity and specificity of MRI for a primary tumor were 75% (3/9) and 100% (2/2), respectively, whereas those of PET/CT were 83% (2/12) and 100% (2/2), respectively. For nodal staging, the sensitivity and specificity of MRI were 100% (5/5) and 100% (7/7), respectively, whereas those of PET/CT were 80% (4/5) and 100% (7/7), respectively. A case, in which a positive node was accurately diagnosed only by MR, is demonstrated in Fig. 1. In 7 cases for follow-up or re-staging, no cases were interpreted as positive by either modality, and no recurrence was found during the follow-up period in this population, i.e. all true negatives.

Conclusion:

Our preliminary data indicate that MRI including DWI and FDG-PET/CT had comparable diagnostic accuracy for detecting primary sites or regional nodal metastases in patients with head and neck cancer.

References:

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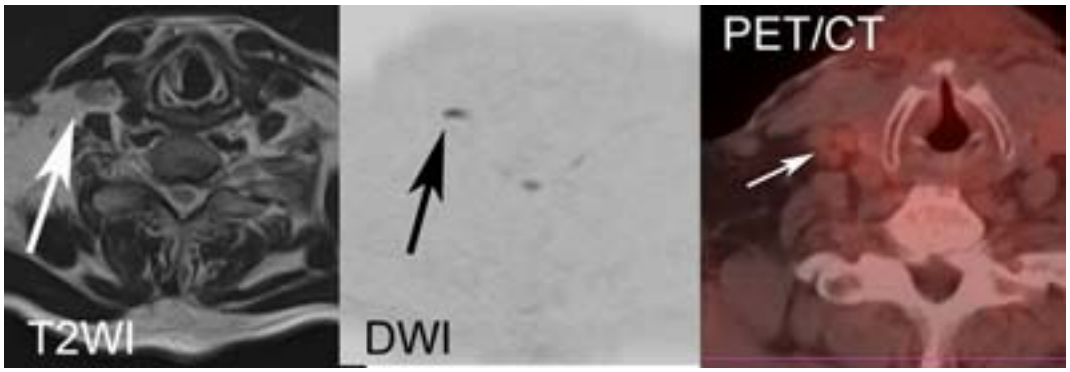

Fig. 1
Lymph node swelling (white arrow) with abnormal signal (black arrow) is seen on MR, but it is not FDG-avid (small arrow). Metastasis from tongue cancer was confirmed by biopsy.