

Comparison of MRI and 18F-FDG PET/CT in Identification of Local Perineural Spread in Patients with Residual or Recurrent Head and Neck Squamous Cell Carcinoma After Therapy: A Case Report and Review of Literature

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Keywords: MRI, ¹⁸F-FDG PET/CT, Perineural, Head and Neck Squamous Cell Carcinoma

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Purpose: Perineural spread (PNS) represents a well-established pathway for the spread of head and neck squamous cell carcinoma (HNSCC) and has been considered to be a negative prognostic risk factor. PNS in head and neck cancers most commonly involved cranial nerve of the maxillary and mandibular division of the trigeminal nerve and the facial nerve. There has been a recognized need for better and more accurate methods for the detection of PNS in order to detect recurrence and plan appropriate treatment. The aim of this study was to compare magnetic resonance imaging (MRI) and fluorine-18 fluorodeoxyglucose positron emission tomography/computed tomography (¹⁸F-FDG PET/CT) in the detection of PNS in a residual or recurrent tumor.

Methods: The capability of MRI and ¹⁸F FDG PET/CT to detect and delineate the extent of persistent or recurrent HNSCC with PNS after therapy in a 41-year-old male with a history of aggressive SCC in the left mandible was studied. The initial treatment was local resection followed by chemo-radiotherapy (CRT). However, the lesion recurred. A left side mandibulectomy along with anterior lateral thigh free flap reconstruction and neck dissection was then performed. At his one-year follow up, an MRI and PET-CT study were performed.

Results: PNS of the tumor from the left infratemporal fossa into the intracranial compartment via the left foramen ovale was found in MRI. A PET-CT study at the same time showed no perineural spread. These findings appear to show that MRI is reliable and accurate than PET-CT for the detection of PNS in the case of a residual/recurrent HNSCC.

Conclusions: Recent studies have shown the benefit of MRI in detecting a residual tumor in HNSCC with PNS, the sensitivity and specificity could be as high as 95-100% and 84-85% respectively. In our study, MRI was found to perform better in the detection of a perineural spread than ¹⁸F-FDG PET/CT. The value of MRI in detecting these patterns of disease as compared with other imaging modalities has been well described in recent literature. Although some studies have revealed that perineural spread can be detected on PET/CT, MRI appears to be the modality of choice. Our PET-CT findings showed no perineural spread. This fact may be related to the imaging dose, which should be evaluated as a dose-dependent factor in future studies. Therefore, while both MRI and ¹⁸F-FDG PET/CT imaging has been used to detect residual or recurrent tumors, MRI has been found to have a higher sensitivity in detecting local perineural spread.