The Effectiveness of Post-Treatment PET/CT Scans in Predicting Outcome in Patients with Head and Neck Squamous Cell Carcinoma

Nicholas Wilson, Heather Imsande, Regan Ferraro, Jen Hammond, Gheorghe Doros, Gustavo Mercier
Department of Radiology

Background

Head and neck squamous cell carcinoma (HNSCC) is the 6th most common cancer worldwide, with a 5-year survival rate of around 50%\(^1,2\). Pre-treatment staging with TNM classification, which accounts for the size and extent of the primary tumor (T), the lymph node involvement (N), and the presence of distant metastases (M), is currently the best indicator of prognosis. Yet staging accounts for less than 30% of variation in the survival of patients with HNSCC\(^3,4\). PET/CT imaging is increasingly used in the assessment and follow-up of patients with HNSCC, and post-treatment scans may be of prognostic value in these patients.

Objective

To determine the effectiveness of post-treatment PET/CT scans in predicting outcome in patients with head and neck squamous cell carcinoma.

Methods

-A retrospective chart review was conducted of the 83 patients with HNSCC at Boston Medical Center who underwent post-treatment PET/CT scans between July 2005 and August 2012.

-Post-treatment PET/CT results were sorted into 2 categories: cure (N=33), and no cure (N=46). The latter group included patients with stable disease, local recurrence, and metastases. The 4 patients with indeterminate post-treatment PET/CTs were excluded.

-Chi-squared tests were used to confirm the similarity of demographic variables, stage, and treatment among the two groups.

-The log-rank test was used to compare the post-treatment PET/CT outcomes to patient survival.

Results

-Of the 33 patients whose post-treatment PET/CT scan demonstrated cure, 2 (6%) died during the study period.

-Of the 46 patients whose post-treatment PET/CT scan demonstrated no cure, 19 (41%) died during the study period.

-The difference in survival between the two groups was statistically significant (p=0.0006).

Conclusion

For patients with HNSCC, the interpretation by the nuclear medicine physician of “cure” in the first post-treatment PET/CT scan does predict survival. This was the case for patients who underwent any combination of chemotherapy, radiation, and surgery at our institution. Therefore, it is reasonable to consider PET/CT as routine in post-treatment assessment.

Figure 1: Patient with squamous cell carcinoma in the oral floor, and a cervical lymph node metastasis (white arrow). (A) CECT of the lymph node, which is not suspect for malignancy by radiologic criteria. (B) PET demonstrates tracer uptake in the lymph node. (C) PET/CECT combines the metabolic and anatomic modalities from PET and CT imaging, respectively. Image from Krabbe, Balink et al. 2011

Figure 2: Survival curve for patients with HNSCC who were found to be cured and not cured on post-treatment PET/CT

References