Iodine-131-SPET/CT and $^{18}$F-FDG PET/CT for the identification and localization of mediastinal lymph node metastases from differentiated thyroid carcinoma

**Abstract**

Mediastinal lymph node metastases (MLNM) from differentiated thyroid carcinoma (DTC) are considered difficult to diagnose. The aim of this study was to assess the value of iodine-131 ($^{131}$I) single photon emission tomography/computed tomography (SPET/CT) and of $^{18}$F-fluorodeoxyglucose ($^{18}$F-FDG) positron emission tomography/computed tomography (PET/CT) for the diagnosis of MLNM from DTC. *Five hundred and eleven consecutive patients* operated for DTC and treated with $^{131}$I for ablation of the remnant thyroid and/or for treatment of metastases were enrolled in the study and underwent an $^{131}$I whole body scan ($^{131}$I-WBS). Thirty seven sites of increased $^{131}$I uptake, on the $^{131}$I-WBS that could be an indication for MLNM were re-evaluated by a $^{131}$I-SPET/CT scan. Thirty four other patients with negative $^{131}$I-WBS but having elevated serum thyroglobulin (Tg), were examined by $^{18}$F-FDG PET/CT to possibly diagnose MLNM. A total of 44 DTC patients with MLNM were identified, among the above 37 and 34 cases: 25/37 (67.6%) cases were examined and identified by $^{131}$I-SPET/CT and 19/34 (55.9%) cases by $^{18}$F-FDG PET/CT. A total of 25 and 19 cases were identified. The male-to-female ratio and the average age in patients with $^{18}$F-FDG-avid MLNM were significantly higher than in patients with $^{131}$I-avid MLNM. Among the above 44 patients, 40 patients had superior mediastinal nodal metastases, 9 had aortic nodal metastases and only 1 inferior mediastinal nodal metastases. A patient could have metastases in more than one site.

In conclusion, our study suggests that in 511 operated DTC patients, treated for remnant ablation and/or for metastases and examined by $^{131}$I-WBS, there were 37 cases doubtful of having MLNM in the $^{131}$I-WBS and 34 cases doubtful, because of negative $^{131}$I-WBS and elevated Tg. The $^{131}$I-SPET/CT scan was sensitive for detecting MLNM in 25 of the 37 cases and the $^{18}$F-FDG PET/CT in 19 of the 34 cases. These hybrid imaging modalities, when applied as above, were suitable for detecting more MLNM and thus, better supporting treatment planning in these DTC patients.

**Keywords:** $^{131}$I-SPET/CT - $^{18}$F-FDG PET/CT - Mediastinal lymph node metastases - Differentiated thyroid carcinoma

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