

F-18-FDG PET in presurgical oro-maxillofacial carcinomas

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Background. We performed an analysis of the diagnostic impact of F-18-FDG-PET in presurgical oro-maxillofacial malignancies.

Patients and methods. The diagnosis of the malignant primary was made clinically and was histologically verified before FDG-PET and the cervical CT examinations were performed in 25 patients of this study. For the FDG-PET investigation a full ring PET scanner was used (ECAT EXACT HR+, Siemens). Thoracic CT was performed only if pathological findings on FDG-PET scans required it.

Results. The primary was clearly identified with FDG-PET in all patients. Active cervical lymph node sites were seen in 9/25 patients (ipsilateral: 8/25; ipsi- and contralateral: 1/25). Lung-metastases were found in 2/25 patients. Cervical CT: The primary was recognised in all patients. Artefacts caused by dental implants did not allow visualising the extension of the tumour in 9/25 patients. Ipsilateral lymph node sites were seen in 7/25 patients (size: 0.9-1.6 cm), and ipsi- and contralateral lymph node sites in 7/25 patients (size: 0.8-1.8 cm). The lung metastases primarily recognised with FDG were visualised with CT in both patients, too.

Conclusion. FDG-PET is a sensitive diagnostic modality for the preoperative visualisation of active, i.e. suspicious malignant lymph nodes. Distant metastases were demonstrated in 8% of the patients on whole body PET. The usefulness of FDG-PET and CT for establishing the diagnosis of the primary is limited. The preoperative importance of CT lies primarily in the accessibility of the algorithms for the intraoperative reconstruction of the facial structures.

Key words: mouth neoplasms - diagnosis; maxillofacial neoplasms - diagnosis; tomography, emission - computed, fluorine radioisotopes; F18-FDG, PET

Introduction

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Diagnosis of maxillofacial malignancies remains a special problem for diverse radiological imaging modalities, even in the preoperative stage. Artefacts caused by metallic crowns and dental implants reduce the diagnostic impact of magnetic resonance imaging (MRI) and of computed tomography (CT). We

analysed the diagnostic value of F-18-Fluorodeoxy-glucose positron-emission-tomography (FDG-PET) as an alternative or additional method for preoperative evaluation of oro-maxillofacial malignant tumours.

Patients and methods

The series consisted of 25 patients, 17 males, and 8 females, aged between 38-69 years. The primaries were diagnosed clinically and histologically verified before FDG-PET and CT-examinations were performed. The serum glucose levels ranged between 70-110 mg/dl. F-18-FDG was injected intravenously in a dose of 333 -370 MBq. The acquisition on a full ring PET scanner (ECAT EXACT HR+, Siemens, Medical Systems/CTI, Knoxville, USA) with an axial field of view of 15.5 cm resulting in 63 transverse slices with a slice thickness of 2.5 mm started between 70-90 minutes after injection. The transmission scans were obtained with 68-Ge rod sources (4 min acquisition time per bed position) alternating with the emission scans of 8 min each. The transmission data were reconstructed with filtered back projection, the emission data were corrected for random events, dead time, scatter and attenuation, and were reconstructed with ordered subset iterative reconstruction (OSEM; 2 iterations, 8 subsets). The resulting in-plane image resolution of transaxial images was about 4 to 5 mm full width at half maximum. FDG-PET was done as whole body imaging method in all patients. Cervical CT was done in all patients, too. Thoracic CT was performed only if pathological findings on FDG-PET scans required it.

Results

FDG-PET: Intense localised pathological FDG-uptake indicating the primary was ob-

served in 25/25 patients. Intense pathological FDG-uptake in ipsilateral lymph node sites was seen in 8/25 patients, in ipsi- and contralateral lymph node sites in 1/25 patient. Lung-metastases were found in 2/25 patients.

Cervical CT: The primary was recognised in all patients. Multiple artefacts caused by metallic crowns and dental implants did not allow visualising the extension of tumour in all patients. Ipsilateral lymph node sites were seen in 7/25 patients (size: 0.9-1.6 cm), ipsi- and contralateral lymph node sites were demonstrated in 7/25 patients (size: 0.8-1.8 cm). Radiologically unsuspected lymph nodes < 1 cm could be seen highly active on the FDG-PET study in 2/25 patients. On the other hand, lymph nodes > 1 cm were inactive on FDG-PET in 2/25 patients.

Thoracic CT was done after FDG-PET in 2/25 patients: the lung metastases recognised with FDG were visualised with CT in both patients, too.

Discussion

The majority of malignant oro-maxillofacial tumours are squamous cell carcinomas originating in mucosal structures.¹ The incidence of oro-maxillofacial malignancies is still increasing. The age of the patients is still de-

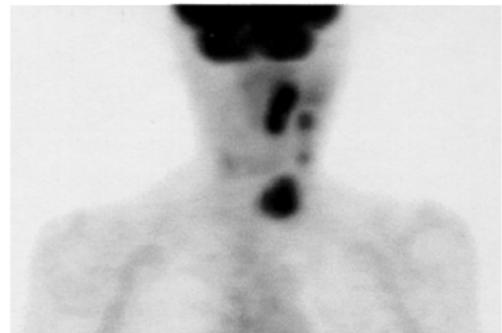


Figure 1. F18-FDG-PET scan of a 69 year old woman with squamous cell carcinoma of the left maxilla, infiltration of the left sinus maxillaris, left cervical lymph nodes, left supracerical lymph node bulk.

creasing at time of clinical presentation. The earliest possible diagnosis and subsequent treatment planning are essential parameters for better prognosis of these patients. Management and prognosis depend on the age of the patient, local tumour invasion, presence of local lymph nodes (ipsi- and contralateral cervical lymph nodes) and distant metastases at time of clinical presentation. Preoperative staging is essential in order to choose the individual therapeutic regime.²⁻⁵

We analysed the diagnostic value of FDG-PET as an alternative or additional method for preoperative evaluation of oral-maxillofacial malignant tumours knowing some data from the scientific literature.⁶⁻⁸

All in all, we found FDG-PET to be a quite sensitive, non-invasive diagnostic modality for preoperative staging of patients suffering from oro-maxillofacial malignancies. FDG-PET proved to be favourable for the visualisation of active, i.e. of suspicious malignant lymph nodes and for the detection of distant metastases in these patients. It is known that distant metastases are a rare condition at the initial staging of oro-maxillofacial malignancies. Nevertheless they were demonstrated in 8 % of our patients on the whole body PET-investigations.

On the other hand, the malignant primary is usually identified by means of clinical findings and confirmed to be malignant by biopsy. Therefore the usefulness of FDG-PET for recognition of the malignant primary itself and for establishing the diagnosis is limited. The radiological imaging modalities monitor the malignant tumours and their metastases by the size and structural changes and not by metabolic activities. And there is of course the well-established preoperative importance of CT for determining the algorithms needed for the intraoperative reconstruction of the facial structures. The diagnostic impact of FDG-PET is of extraordinary diagnostic importance in patients with artefacts caused by metallic crowns and dental implants.

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