



## Orbital Metastasis as the Initial Manifestation of Lung Carcinoma: Case Report and Usefulness of <sup>18</sup>F-FDG PET/CT

Abdelhamid Biyi\*

Department of Nuclear Medicine, Mohammed V University of Rabat, Morocco

### Abstract

Orbital metastases from malignant tumors are relatively uncommon. In 25% of cases it is the first manifestation of an undiagnosed cancer. One of the difficulties encountered by the clinician is to determine the primary site. This is where the PET/CT can play a major role. We report herein the case of a patient with left orbital metastasis from lung carcinoma. This diagnosis was based on both immunohistological and PET/CT findings. This case demonstrates the usefulness of FDG PET/CT in diagnosing primary malignancy in a lung cancer patient with orbital metastasis as the presenting feature.

**Keywords:** Orbital metastases; PET/CT; <sup>18</sup>F-FDG; Carcinoma of unknown primary; Lung cancer

### Abbreviations

PET: Positron Emission Tomography; CT: Computed Tomography; FDG: Fluorodeoxyglucose

### Introduction

Orbital metastases from malignant tumors are relatively uncommon. In 25% of cases it is the first manifestation of an undiagnosed cancer. One of the difficulties encountered by the clinician is to determine the primary site. This is where the PET/CT can play a major role.

We report herein the case of a patient with left orbital metastasis from lung carcinoma. This diagnosis was based on both immunohistological and PET/CT findings.

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#### \*Correspondence:

Abdelhamid Biyi, Department of Nuclear Medicine, Mohammed V Military Teaching Hospital, Mohammed V University of Rabat, P Box 6614 Rabat Instituts, Morocco; E-mail: [abdelhamidbiyi@yahoo.fr](mailto:abdelhamidbiyi@yahoo.fr)

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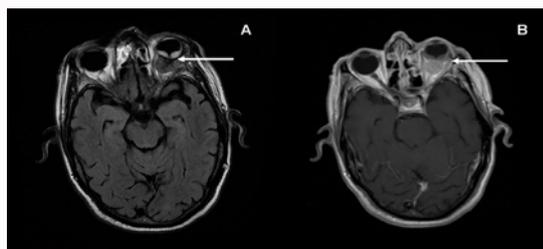
### Case Report

A 62-year-old male with no medical history complained of left orbit pain and decreased visual acuity for a period of 6 months. Physical examination was negative.

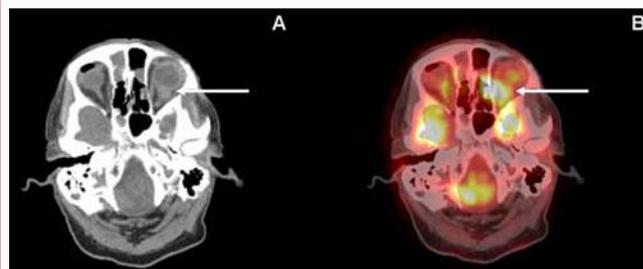
Magnetic resonance imaging (MRI) revealed a homogenous relatively well-defined intraconal mass lesion in the left orbit isointense on T1 sequences and hyperintense on T2 sequences (Figure 1). The patient underwent a left orbitectomy and histopathological examination of the excised mass was consistent with metastatic adenocarcinoma with an immunohistological profile suggestive of lung or thyroid origin (CK+, TTF1+, CK20-). Serum tumor markers were negative. PET/CT performed as a part of the initial process revealed a mild <sup>18</sup>F-FDG uptake in an apical nodule of the upper right lobe with pretracheal lymph nodes involvement and lytic bone metastasis on the right temporal bone and the sternum (Figure 2). Thyroid gland was normal on both <sup>18</sup>F-FDG PET/CT and ultrasound examination. A diagnosis of primary malignancy in the lung with metastases was made based on immunohistological profile of the orbital mass and FDG PET/CT findings, since lung biopsy had not been made. The patient was treated with 6 courses of palliative chemotherapy according to the protocol paclitaxel and carboplatine, followed by radiotherapy on the orbital lesion (30 Gy spread over 10 sessions). Follow up <sup>18</sup>F-FDG PET/CT showed recurrence of the left orbital mass that appears hypermetabolic (Figure 3). The patient is still alive 10 months after the diagnosis of his metastatic cancer.

### Discussion

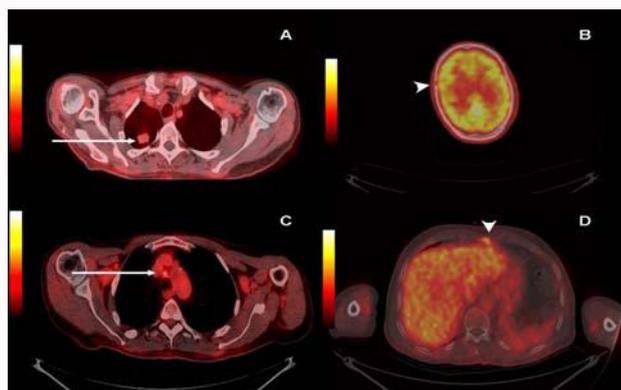
Carcinoma of unknown primary (CUP) represents a heterogeneous group of metastatic malignancies for which no primary site of the tumor can be identified [1]. The anatomical site of origin remains occult after checking patient history, careful clinical examination and extensive



**Figure 1:** Transaxial magnetic resonance image showing a homogenous and well-defined intraconal mass lesion in the left orbit (arrows): isointense on T1 sequences (A) and hyperintense on T2 sequences (B).



**Figure 3:** Transaxial follow up FDG PET/CT showing recurrence of the left orbital mass that appears hypermetabolic (arrow). CT image (A), PET/CT fusion image (B).



**Figure 2:** Transaxial FDG PET/CT images showing a mild  $^{18}\text{F}$ -FDG uptake in an apical nodule of the upper right lobe (A, arrow), lytic bone metastasis on the right temporal bone and the sternum (B and D, arrowheads), and pretracheal lymph nodes (C, arrow).

diagnostic workup. These efforts to detect the primary tumor are often time consuming, expensive and so unsuccessful.

Because of its high sensitivity,  $^{18}\text{F}$ -FDG PET/CT may be an interesting alternative to other radiological investigations in detecting the unknown primary tumor. Elective use of PET-CT is currently limited to patients with squamous-cell lymphadenopathy of the neck (cervical carcinoma of unknown primary site). In these patients, PET-CT may guide the biopsy, determine the extent of disease, facilitate the planning of radiation therapy, and help with surveillance [2]. In contrast, the value of  $^{18}\text{F}$ -FDG PET/CT is less well studied in CUP patients with extra cervical metastases. Moller et al. reviewed the utility of  $^{18}\text{F}$ -FDG PET/CT as a diagnostic test in patients with extra cervical CUP site.  $^{18}\text{F}$ -FDG PET/CT detected the primary tumor site in 39.5% patients with extra cervical CUP. The lung was the most commonly detected primary tumor site, accounting for 50% of all cases. The pooled estimated sensitivity, specificity, and accuracy for  $^{18}\text{F}$ -FDG PET/CT in the detection of the primary tumor site was 87%, 88%, and 87.5%, respectively [3].

Orbital metastases from malignant tumors are relatively uncommon. Their incidence has been estimated in several studies between 1% and 13% of all orbital tumors [4]. One third of cases don't have any history of a primary malignancy [5]. Breast and lungs are the most common sites of the primary tumor followed by prostate, melanoma and colorectal cancers [6]. Metastatic adenocarcinoma is the most frequent histological type [7].

Typical manifestations of orbital metastasis include a palpable mass causing displacement or proptosis, pain, inflammation, bone involvement, chemosis, and eyelid swelling [8].

Cancer type and tumor histology determine the clinical course and treatment approach. For orbital pulmonary metastases treatment is usually palliative, with the intent of both local tumor control and preservation of vision. Systemic chemotherapy has proved curative effect in most cases, but radiotherapy may be the mainstay for orbital metastases, with objective response rates up to 79% and the ability to save the quality of vision in 80% of cases without an invasive procedure which can decompress the compressive optic nerve [5,9]. Palliative fractionated radiation to the orbit at doses of 30 Gy to 40 Gy is commonly employed which should be given with caution so as to prevent eyelashes loss and lachrymal apparatus injury [10].

Prognosis is bad in most cases and depends on the type and location of the primary tumor. Out of 245 cases of orbital metastasis published in medical literature, mean rate of survival since metastasis was detected amounted to 9.3 months [11].

## Conclusions

In up to 25% of patients with orbital metastatic lesions, orbital metastasis is the initial presentation of previously undiagnosed cancer. This case demonstrates the usefulness of FDG PET/CT in diagnosing primary malignancy in a lung cancer patient with orbital metastasis as the presenting feature.

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