Clinical Case

Primary Lung Cancer Versus Metastasis of Thyroid Cancer the Utility of FDG PET CT

Sánchez-Ríos Carla Paola [1], Guzmán-Casta Jordi [1,6], Riera-Sala Rodrigo Fernando [1,6], López-Vratny Claudia [6], Hernández-Dehesa Itzel Ariadna [3], González-Araujo Andrea [5], Correa-Cano Rafael [4], Peña-Mirabal Erika [2], Aguirre-Pérez Natalia [2], Ayala-Domínguez Adriana [7], Elvira-Fabián Karina [8], Carrasco-Cara Chards Sonia [9], Martínez-Barrera Luis Manuel [1], Rodríguez-Cid Jerónimo Rafael [1], Alatorre-Alexander Jorge Arturo [1]

[1]Clinic of Thoracic Oncology, Instituto Nacional de Enfermedades Respiratorias, Ciudad de México, México
[2]Department of Pathology, Instituto Nacional de Enfermedades Respiratorias, Ciudad de México, México
[3]Department of Radiology, Hospital Ángeles Acoxpa, Ciudad de México, México
[4]Resident of Clinical Oncology, Centro Médico Nacional Siglo XXI "IMSS", Ciudad de México, México
[5]Resident of Primary Care, Instituto Mexicano del Seguro Social "IMSS", Guanajuato, México
[6]Health Pharma Professional Research, Ciudad de México, México
[7]Department of Radiooncology, Centro Médico Nacional 20 de Noviembre "ISSSTE", Ciudad de México, México
[8]Centro Médico Hospital ABC Santa Fé, Ciudad de México, México
[9]Facultad de Medicina, Universidad Nacional Autónoma de México, Ciudad de México, México

*Corresponding author: Dr. Jordi Guzmán Casta; *jordioncomed@gmail.com*

Abstract

<u>*Objective:*</u> La distinción de una recurrencia de un cáncer de tiroides versus un cáncer pulmonar primario por la técnica de FDG PET CT. <u>*Results:*</u> La presencia de captación de un único nódulo pulmonar fue positivo para la presencia de un tumor primario de pulmón, pese al antecedente de cáncer de tiroides desde hace 14 años, tanto por unidad Hounsfield y por la localización de la lesión tumoral. <u>*Conclusion:*</u> Es difícil diferenciar únicamente por imagen la presencia de una recurrencia de un cáncer de tiroides y de un primario pulmonar, aunque claramente las unidades Hounsfiled, la localización del tumor y algún otro sitio afectado puede contribuir aparte del confirmatorio del reporte histopatológico.

<u>**Keywords:**</u> *Lung Cancer, Thyroid Cancer, FDG PET CT, Metastasis, Cancer*

Introduction

Solitary pulmonary nodules detected in patients with a history of cancer have a high probability of malignancy, either metachronous lung cancer or metastasis. This distinction represents a crucial issue in the perspective of "personalized medicine", which implies different treatments and prognoses [1].

FDG (Fluorodeoxyglucose) PET-CT (Positron Emission Tomography- Computer Tomography) and solitary pulmonary nodule Role of PET in managing solitary pulmonary nodule characterizing a solitary pulmonary nodule detected incidentally or, as is the case more recently, on CT screening for lung cancer, is a major public health issue. The American College of Chest Physicians (ACCP) recommends the use of thoracic CT scans as one of the main modalities when screening for lung cancer in high-risk populations [2]. PET is not indicated for SPNs of less than 8 mm in diameter in the ACCP guidelines [3,4], or less than 10 mm in the French guidelines [5]. This threshold of 8-10 mm was set to take into account the spatial resolution of PET systems, due to the significant risk of false-negative findings for small lesions. However, over the last decade, the spatial resolution of PET has increased steadily between the first meta-analysis conducted by Gould et al. [6] and the more recent study by Cronin et al. [7] who reported a sensitivity of 95%, a specificity of 82%, a positive predictive value(PPV) of 91% and a negative predictive value (NPV) of 90%.The spatial resolution of the even more recent systems is still better. The use of PET can be avoided for nonsolid nodules (ground glass opacity or mixed nodules) and replaced by thin-section CT of the lungs which performs well in these circumstances [3,5]. This eliminates one of the main sources of false-negative (carcinoma in situ and other forms previously called ''bronchioloalveolar carcinoma'') [8] and false-positive findings

associated with PET (inflammatory episodes or infection). Such nodules are monitored using CT [9].

The sensitivity of FDG is limited for certain histological types such as adenocarcinoma in situ and various neuroendocrine tumors. In addition, high tissue uptake of this tracer is not a specific feature of cancer. The use of other radiopharmaceuticals is therefore theoretically plausible [9].

Clinical Case

80 years old female. History of thyroid cancer without specifying lineage at 14 years of age treated with hemithyroidectomy as a sequel to dysphonia and the need for hemicneck resection.

Secondary hypothyroidism in current treatment with Levothyroxine 50 mcg every 24 hours in control. Denies exposure to active and passive tobacco. Denies exposure to biomass, solvents, hydrocarbons. As the only exposure, he refers to household fumes for more than 60 years. He came for a check-up for a long-standing intermittent productive cough with whitish expectoration associated with dyspnea on great exertion. A chest X-ray was requested showing a radiopaque image in the right apex characterized by a simple and contrasted chest tomography characterized by a window tomography for lung parenchyma, spiculated nodular hyperdense image with contrast medium enhancement up to 70 HU (Hounsfield Units). No apparent satellite images. See **Figure 1**.
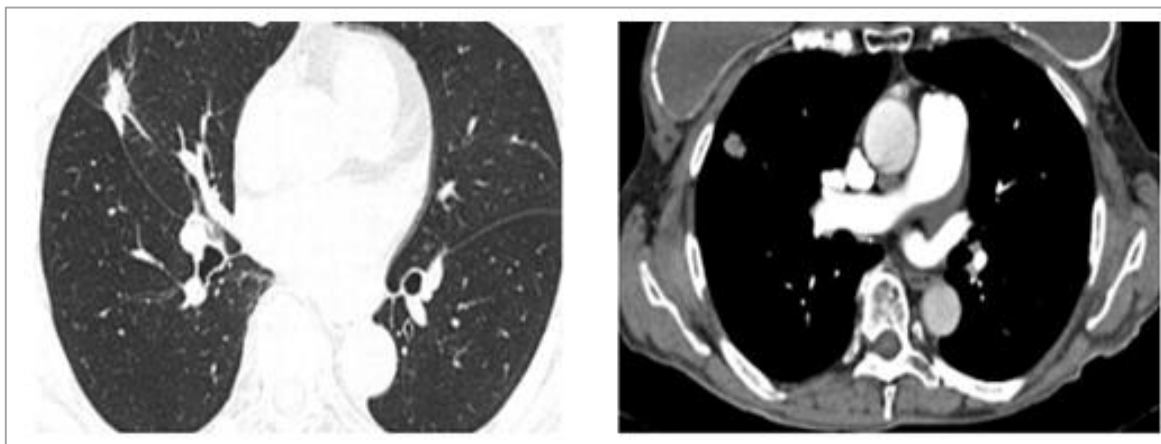

Figure 1: Simple and contrasted chest tomography, axial cuts. Parenchyma window with spiculated nodular hyperdense image with a density of 22.1 mm x 18.9 mm in the middle lobe not calcified, 13 HU. Soft tissue window same heterogeneous nodular image with contrast medium enhancement up to 70 HU. No apparent satellite images.

It is classified as a high-risk nodule for malignancy by the Mayo and Brock score with a 70% probability of malignancy.
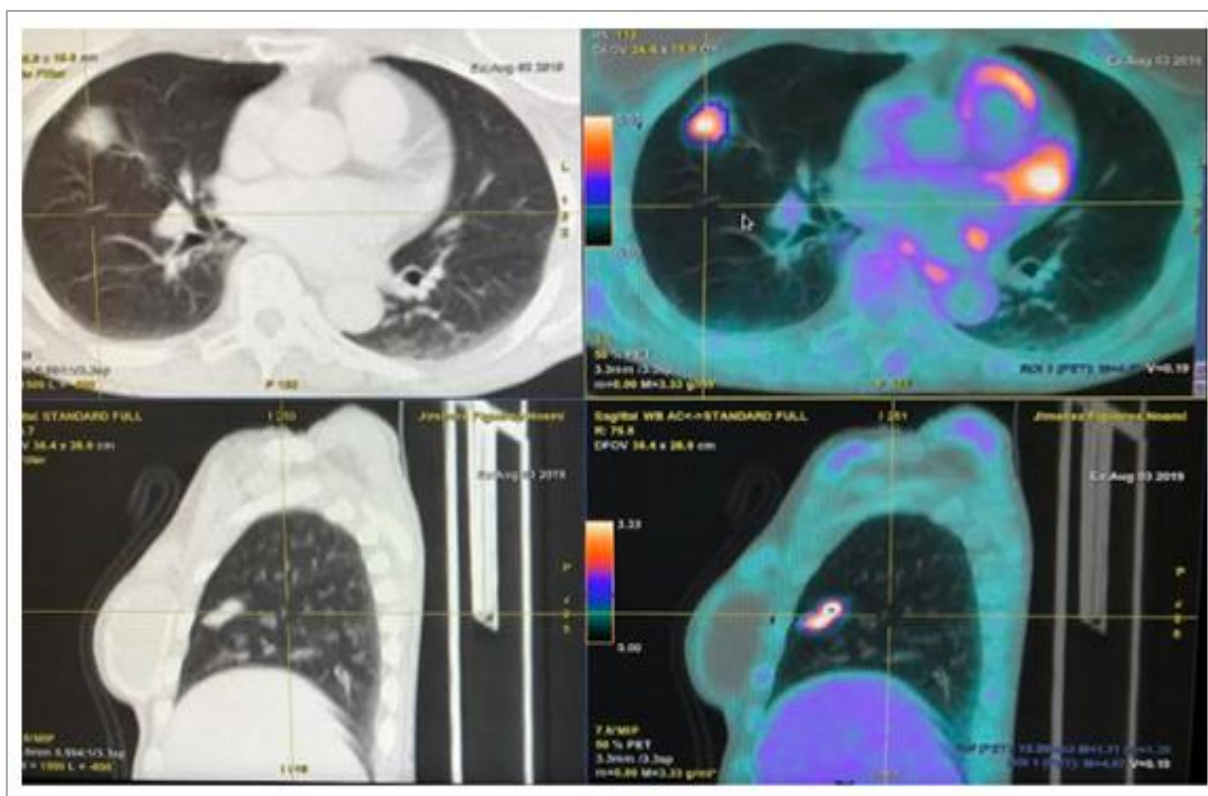

Figure 2: PETC CT with FDG was requested, reporting a pulmonary nodule in the middle lobe that, due to its behavior and metabolism, suggests metastatic activity of a known primary, although the presence of a second primary in the lung should be considered SUV max 4.0. Right inferior paratracheal nodes 9 mm diameter SUV mx 2.0.

The case is discussed in a multidisciplinary session of Oncological Pulmonology / Thoracic Oncology and Thorax Surgery. Due to clinical and tomographic characteristics and studies of metabolic activity, it was decided to take the patient for intraoperative biopsy with the main diagnostic suspicion of primary lung cancer. Bronchodilator spirometry: suggestive of restriction without significant response calculating FEV1 ppo: 55.9% with low risk of pulmonary complications. He was admitted to the operating room for a diagnostic biopsy with a positive intraoperative for malignancy, so he proceeded to lobectomy and lymph node dissection. The definitive result of a histopathological study was obtained: mucoproducer adenocarcinoma of acinar pattern.
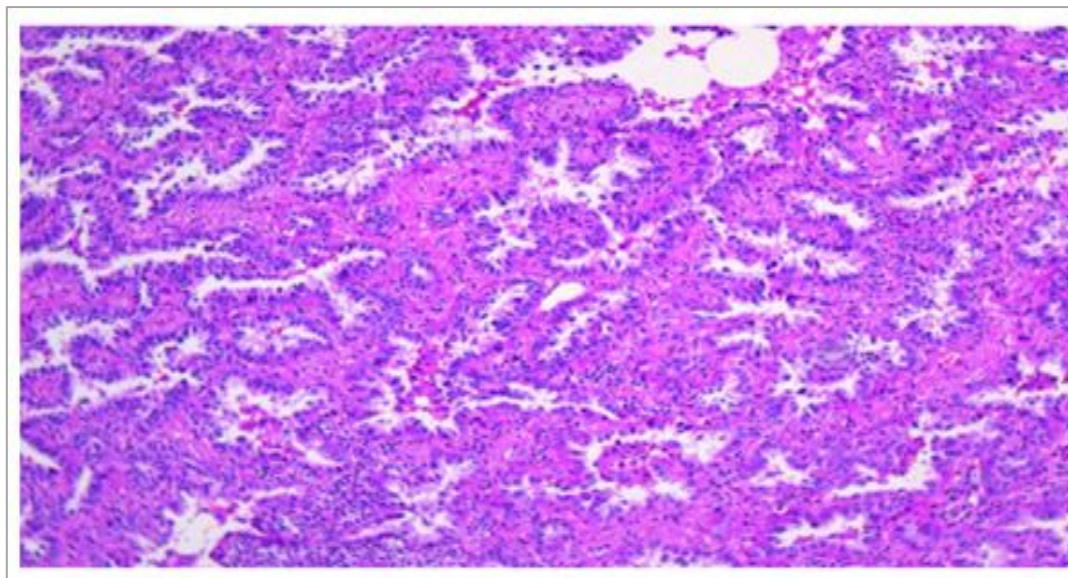
Figure 3: Muco-producing acinar pattern adenocarcinoma Napsin A +++ / +++ CK AE1 AE3 +++ / +++, TTF1 +++ / +++ CK7 +++ / +++. 14 mm x 12 mm surgical specimen with free surgical edges and negative subcarinal ganglion exploration.

The patient did not present complications in the immediate or mediate postoperative period. I continue pulmonary rehabilitation with adequate tolerance and follow-up with Oncological Pulmonology and Thorax Oncology. To this day without recurrence of the disease.

Conclusion and Discussion

In cancer patients, despite its high detection rate, FDG PET / CT, as well as any other clinical-anatomical feature, cannot distinguish whether a malignant solitary pulmonary nodule is metachronous lung cancer or metastasis. which supports the need for differential histological diagnosis. In this patient staged in T1b N0 M0 Stage I who underwent right upper lobectomy and lymph node dissection, curative treatment for lung cancer was offered.

List of abbreviations

FDG (Fluorodeoxyglucose)
PET-CT (Positron Emission Tomography- Computer Tomography)
American College of Chest Physicians (ACCP)
Negative predictive value (NPV)
Positive predictive value (PPV)
HU (Hounsfield Units).

Data Availability

How readers can access the data underlying the findings of the study, giving links to online repositories and providing deposition codes where applicable: *E-mail: pao1144tost@gmail.com*

Conflicts of Interest

 "The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper."

Authors' contributions

The individual contributions of authors to the manuscript should be specified in this section.

SRCP: First consult to the patient
GCJ: Redaction of the article
RSRF: Redaction of the article
LVC: Redaction of the article
HDIA: Radiological images
GAA: Searching the bibliography
CCR: Searching the bibliography
PME: Histopatological images
APN: Histopatological images
ADA: Redaction of Article
EFK: Redaction of Article
CCCS: Searching the bibliography
MBLM: Chairman
RCJR: Chairman
AAJA: Chairman

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