18F-FDG PET-CT to evaluate immediate response after radiofrequency ablation of lung tumours

Clinical History:

A 35-year-old female patient with a history of synovial sarcoma resection of the lower left limb. Follow-up CT showed a lung nodule. During follow-up, an increase in size of the lung lesion was observed. Radiofrequency ablation of the pulmonary lesion was performed under CT guidance.

Imaging Findings:

Follow-up chest CT demonstrated a 6.6 mm nodule in the anterior segment of the right upper lobule, with progressive growth in time, reaching 27 mm. (Fig. 1)
PET-CT demonstrated metabolic activity of the pulmonary nodule. (Fig. 2)
CT-guided pulmonary RFA was performed. (Fig. 3)
A total 8 mCi of FDG was administered immediately after the procedure. Sixty minutes later PET-CT was performed and demonstrated no metabolic activity of the treated lung nodule. (Fig. 4) Follow-up CT at 3 and 6 months showed cavitary sequelae and no evidence of the lesion. (Fig. 5)

Discussion:

Lung radiofrequency ablation (RFA) is a minimally invasive technique used to treat pulmonary malignancies as an alternative to surgery and radiotherapy, with minimal procedure-related complications. [1]
RFA is indicated in patients with early stage non-small cell lung cancer (NSCLC) who are not eligible for surgery, in patients with end stage NSCLC, cases with tumour recurrence and in metastatic lung disease. In a curative intent, RFA success depends on anatomical criteria, such as nodule size and location. Lesions larger than 5 cm should be excluded from RFA, whereas lesions from 3 to 5 cm should be considered with caution because of the high incidence of recurrence. [2]

The most common CT findings during lung RFA are: a cone-shaped sectorial hyperaemia or hyperaemia rim, characterized by ground-glass opacity, which may circumferentially or partially envelop the target lesion and intralesional bubbles. [3]
These findings might be related to reported appreciable rates of recurrence, varying from 7% to 55% between 1 and
3 years of follow-up. [4] Considering this, PET-CT realization immediately after ablation could help to decrease the recurrence rate. PET/CT imaging allows immediate analysis of the lesion’s metabolic activity and is accurate for staging, surveillance and therapeutic response evaluation. [5, 6] It has become a useful tool for assessing treatment response during and after RFA; and a reliable predictor of local recurrence. [7] During ablation the lesion presents a peripheral ring-shaped area of hypermetabolic activity surrounding the ablated tumour. [8]

In this reported case, performing PET/CT immediately after the procedure was a useful technical tool, assessing ablation and allowing the possibility to continue the procedure if hyperactivity remained, aiming to decrease the chance of tumour recurrence. Further larger studies are needed in order to consider this modified algorithm, as a step forward for improving ablation procedures success rates. [9]

**Differential Diagnosis List:** Lung metastasis, Lung metastasis, Lung tumour

**Final Diagnosis:** Lung metastasis

**References:**


Figure 1

a

Description: May 2011. Lung metastasis in the anterior segment of the right upper lobule of 6.6 mm in diameter is seen. Origin: Department of Diagnostic and Interventional Radiology, Hospital Alemán, Argentina.

b

Description: Chest CT of December 2013, showing increasing size of lung metastasis compared with previous study (Fig. 1a). Origin: Department of Diagnostic and Interventional Radiology, Hospital Alemán, Argentina.
Figure 2

a

Description: April 2013. Metabolic activity of lung metastases is seen. Origin: Department of Diagnostic and Interventional Radiology, Hospital Alemán, Argentina.

b

Description: December 2013. The image shows progression of the metabolic activity of lung metastases, despite treatment (Fig. 2a). Origin: Department of Diagnostic and Interventional Radiology, Hospital Alemán, Argentina.
Figure 3

**a**

**Description:** The image shows pulmonary metastases treated with 15 gauge multitined expandible needle-electrode. **Origin:** Department of Diagnostic and Interventional Radiology, Hospital Alemán, Argentina.

**b**

**Description:** The image shows pulmonary metastases treated with 15G multitined expandible needle-electrode. **Origin:** Department of Diagnostic and Interventional Radiology, Hospital Alemán, Argentina.
Figure 4

a

Description: Ground-glass area around the lesion, sign of a successful procedure. Origin: Department of Diagnostic and Interventional Radiology, Hospital Alemán, Argentina.

b

Description: PET-CT 1 hour after RFA. Shows absence of metabolic activity of the metastasis in the lung. Origin: Department of Diagnostic and Interventional Radiology, Hospital Alemán, Argentina.
Figure 5

a

Description: CT follow-up at 3 months. Cavitary sequelae and no evidence of the lesion. Origin: Department of Diagnostic and Interventional Radiology, Hospital Alemán, Argentina.

b

Description: CT follow-up at 6 months. Cavitary sequelae and no evidence of the lesion. Origin: Department of Diagnostic and Interventional Radiology, Hospital Alemán, Argentina.