False positive PET/CT of pleural lesion decades after pleurodesis

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Section: Chest imaging
Area of Interest: Thorax
Procedure: Diagnostic procedure
Technique: CT
Technique: PET-CT
Special Focus: Neoplasia Case Type: Clinical Cases
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Patient: 51 years, male

Clinical History:

A 51 year old gentleman presented with cough for four months and weight loss but no shortness of breath, fever, history of travel or previous tuberculosis. He was a heavy smoker and worked with asbestos in the past. He had right pneumothorax and pleurodesis in the 1970s but no other medical problems.

Imaging Findings:

The patient underwent a chest radiograph which showed peripheral right middle zone opacity (Figure 1) and hence CT thorax was performed, which showed 2 cm x 1.7 cm right middle lobe peripheral pleural based lesion with a central area of high attenuation (Figures 2, 3, 4, 5 and 6). There were also emphysematous changes.

The case was discussed in the lung cancer MDT and it was decided that the patient should undergo FDG-PET. PET showed this lesion to be hypermetabolic (Figures 4 and 5) and there were a few other pleural based lesions which were hypermetabolic as well. Later, the results were discussed again in an MDT meeting and it was decided to perform CT guided biopsy for a histological diagnosis, as it was difficult to rule out malignancy and mesothelioma at that point.

The CT guided biopsy demonstrated no evidence of malignancy and the changes seen were consistent with foreign body type giant cell reaction, probably related to previous pleurodesis.

Discussion:

Background:

Pleurodesis is performed to prevent recurrence of pneumothorax or recurrent pleural effusion. It can be performed chemically or mechanically.

Fluorodeoxyglucose (FDG)-positron emission tomography (PET) is being used more and more to differentiate benign from malignant focal lesions and it has been shown to be more efficacious than conventional chest computed tomography (CT). However, FDG is not a cancer-specific agent and false positive findings in benign diseases have been reported. Infectious diseases (mycobacterial, fungal, bacterial infection), sarcoidosis, radiation pneumonitis and post-operative surgical conditions have shown intense uptake on PET [1].

Clinical perspective:

In our patient, there was a long term history of cough associated with weight loss and there were also strong risk factors for lung malignancy including heavy smoking and working with asbestos. The FDG-PET was suspicious for
malignancy and mesothelioma. A cohort study following patients from 14 to 40 years after pleurodesis for pneumothorax did not show evidence of mesothelioma or increased incidence of lung cancer [2, 3]. Another study demonstrated that more than two decades post-pleurodesis, a large percentage of patients have pleural thickening, demonstrated on plain chest x-ray and this may lead to mild restrictive impairment which might explain some of the chest symptoms, such as long-standing cough with good long term outlook [4]. Fanggiday et al, demonstrated a case with FDG-avid pulmonary nodules, mimicking lung cancer. After histopathological examination they appeared to be the result of persistent inflammation due to talcage pleurodesis, which had occurred 48 years before [5].

Imaging Perspective:
The FDG-PET demonstrated an area of high uptake at the suspicious lesion, which made the diagnosis of cancer more probable, but was not confirmed on histology.

Outcome:
In the era of FDG-PET, a diagnostic dilemma is emerging, as it appears that many of the changes may manifest as chronic inflammatory lesions with increased metabolic activity [2]. PET/CT offers the opportunity to accurately localize the areas of increased FDG uptake within the regions of pleural thickening caused by pleurodesis. However, the dilemma of misleading FDG accumulation cannot be solved by this imaging modality and hence histological evaluation is needed.

Teaching point:
Metabolic imaging with FDG-PET has a definitive role in the evaluation and management of malignancy. However, false positive or negative PET images are frequently encountered. Proper interpretation and accurate characterization of an abnormality is accomplished with increased awareness of possible false positive and negative conditions [1].

Differential Diagnosis List: Pleurodesis nodule., Mesothelioma., Chronic pleuritis.

Final Diagnosis: Pleurodesis nodule.

References:
Figure 1

Description: Chest Radiograph Showing right mid zone nodule. Origin: Department of Radiology, Scunthorpe General Hospital, Scunthorpe, UK
Description: Subpleural nodule on right side in CT of the chest

Origin: Department of Radiology, Scunthorpe General Hospital, Scunthorpe, UK
Figure 3

Description: Right upper lobe subpleural nodule in contrast enhanced CT of the chest. Origin: Department of Radiology, Scunthorpe General Hospital, Scunthorpe, UK
Figure 4

Description: Coronal PET showing hypermetabolic lesion Origin: Department of Radiology, Scunthorpe General Hospital, Scunthorpe, UK
Figure 5

Description: Axial PET CT showing hypermetabolic lesion
Origin: Department of Radiology, Scunthorpe General Hospital, Scunthorpe, UK
Figure 6

Description: Coronal reformat of the CT chest on lung windows. Origin: Department of radiology, Scunthorpe General Hospital, Scunthorpe, UK
Description: Coronal reformat of CT chest on mediastinal window
Origin: Department of radiology, Scunthorpe General Hospital, Scunthorpe, UK
Description: Sagittal reformat of CT of the chest on mediastinal window Origin: Department of radiology, Scunthorpe General Hospital, Scunthorpe, UK