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Case Report

SUPPLEMENTARY ROLE OF FDG PET-CT IMAGING IN THE MANAGEMENT OF A RARE CASE OF MALIGNANT PERITONEAL MESOTHELIOMA.

Ahmad Zaid Zanial *[1], Mohd Wajdi Ghazali [2], Fadzilah Hamzah [2]

[1] Nuclear Medicine Department, Hospital Kuala Lumpur

[2] Nuclear Medicine Department, Hospital Pulau Pinang

ABSTRACT

A case report to highlight the clinical presentation of malignant peritoneal mesothelioma (MPM) and illustrate the role of fluorodeoxyglucose (FDG) positron emission tomography-CT (PET-CT) imaging in the management of this rare carcinoma. A middle-age male with chronic ascites and acute intestinal obstruction was initially diagnosed with metastatic adenocarcinoma to the porta hepatic nodes and omentum. However, CT scan done after completion of chemotherapy still demonstrated gross ascites, omental caking, peritoneal nodules and enlarged porta hepatic nodes. Thus, a review of the earlier histology slides was requested. Evaluation and consensus interpretation by pathologists concluded that the overall histological features and immunostaining were in favour of mesothelioma than metastatic adenocarcinoma. Subsequent FDG PET-CT to further assess the patient and exclude other possible primary malignancy has revealed a metabolically active porta hepatic lesion with multiple peritoneal and nodal deposits in the absence of other abnormal lesion in the thorax or solid organs, in keeping with the clinical diagnosis of peritoneal mesothelioma.

Keywords*: peritoneal, malignant mesothelioma, FDG PET-CT*

INTRODUCTION

Malignant mesothelioma is a rare neoplasm of the mesothelial lining within the human body. Peritoneal mesothelioma constitutes the major form of the disease after pleural mesothelioma. Mesothelioma may arise from both visceral and parietal peritoneum [1]. The incidence of MPM is approximately 6-10% and the disease is characterised by its difficulty to diagnose, poor response to treatment and high mortality [2,3,4]. It is generally more common in men with the incidence rate in industrialised countries ranges between 0.5 and 3 cases per million among men and between 0.2 and 3 cases per million among women [5]. In the United States, its overall prevalence is reported to be approximately 1-2 cases per million people with an estimated incidence of 200-400 new cases annually [1].

Exposure to asbestos is the main known cause of MPM [5]. As a comparison, the lifetime risk of developing mesothelioma of the thorax in heavily exposed individuals is as high as 10% [6]. Latency period between exposure and onset of malignant mesothelioma may be delayed and ranging from 15-60 years. However, several reported MPM cases showed no prior exposure to asbestos [2,3,7]. Symptoms of peritoneal mesothelioma include abdominal pain, ascites, abdominal mass, weight loss and fever [1,3]. In Malaysia, a middle-aged male was previously reported to be diagnosed with MPM after he presented with ascites of unknown origin [8]. Nevertheless, patients' clinical features and history can be elusive [1,2]. Although most often non-confirmatory, imaging techniques such as conventional CT scan as well as functional imaging like PET-CT scan may offer some supportive analytical assistance. Thus, the aim of this case report is to illustrate the role of FDG PET-CT in the evaluation and management of a rare case of MPM that was associated with diagnostic predicament.

CASE REPORT

A 40-year old male with underlying chronic ascites and post emergency surgery for acute intestinal obstruction was initially diagnosed with metastatic adenocarcinoma to the porta hepatic nodes and omentum. Preliminary imaging with CT scan showed only enlarged porta hepatic nodes while the peritoneal fluid cytology was previously inconclusive. However, histopathological and immuno-

histochemistry examination of samples from porta hepatic nodes and omental lesion demonstrated features of metastatic adenocarcinoma with the lung as the most probable occult primary site. Hence, chemotherapy with combined cisplatin and gemcitabine was initiated and later completed in October 2014 after 12 cycles.

Post chemotherapy CT scan in December 2014 showed omental caking and multiple peritoneal nodules with the largest measuring 0.6 x 0.9 cm. No significant change was seen in the enlarged porta hepatic nodes. There was also no CT scan evidence of pleural based lesion, bowel related mass or even other structural lesion seen elsewhere. Thus, a review of previous histology samples was then requested following a multi-disciplinary discussion. Samples were reassessed and microscopic findings revealed cohesive epithelioid cells with tubular and reticular patterns in the background of myxoid stroma. Apart from previously positive for cytokeratin AE1&3 and cytokeratin 7, repeat immunostaining was positive for calretinin. Therefore, consensus interpretation by pathologists in May 2015 concluded that overall these histopathological examination features were in favour of mesothelioma.

On further questioning, he denied any prior respiratory symptoms, exposure to asbestos and family history of malignancy. A PET-CT scan was requested by the attending oncologist for further evaluation to determine the extent of disease and exclude other possible primary malignancy. FDG PET-CT in August 2015 revealed a metabolically active lesion exhibiting the highest standardised uptake value (SUV) at the porta region with SUV 8.9 as well as an enlarged paracaval lymph node with SUV 5.9 and several other peritoneal and omental nodules with SUV 2.0 to 2.4 as shown in Figure 1, 2 and 3. Subsequently he continued to be under oncology management for further chemo-radiation therapy and follow-up visits.

DISCUSSION

The histopathological findings of mesothelioma generally can be divided into 3 pathological types; (a) epitheliod (55-66%) which can appear pathologically similar to adenocarcinoma, (b) sarcomatoid (10-15%) and (c) bi-phasic (20-35%) which has both epithelioid and sarcoma-toid features [9]. In addition, a histological subtype car-ries an important prognostic factor with epitheloid sub-type showing the longest survival while the sarcomatoid subtype has the worst prognosis [10]. At present, surgical resection by cytoreductive surgery combined with either heated intraperitoneal chemotherapy or systemic chemotherapy is among the treatment strategies that have been described [1,2]. Despite the current multimodality approach, small improvement in survival has underscored the obvious need for less morbid and more effective interventions for peritoneal mesothelioma patients.

In this case report, establishing a diagnosis was a clinical dilemma as the initial reported histopathological findings did not match the subsequent overall condition and progress of the patient. Accurate diagnosis of peritoneal mesothelioma depends on histologic and immunohisto-chemical examination. Several immunohistochemical

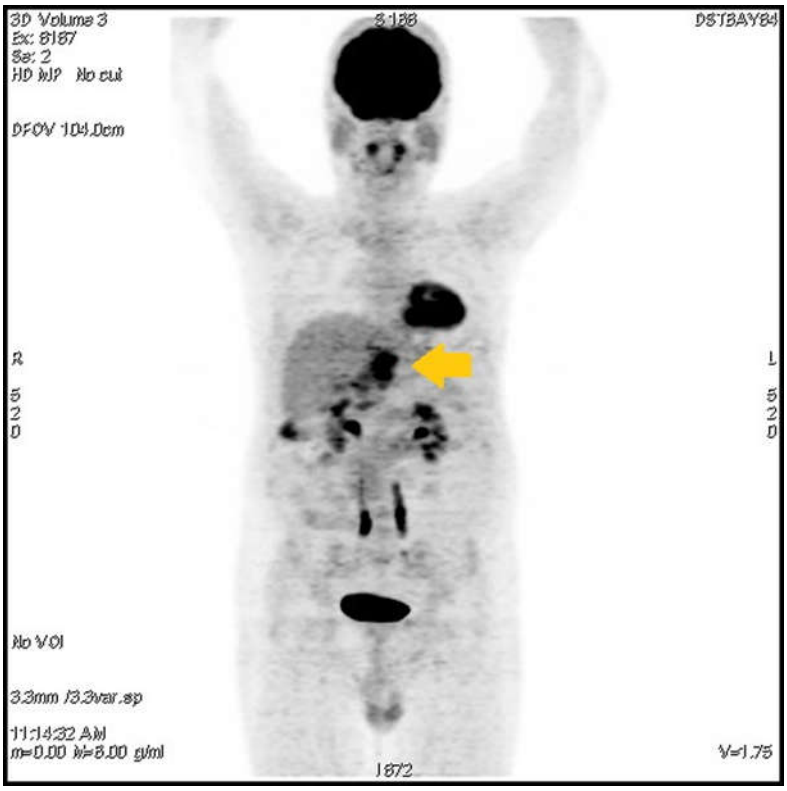

Figure 1: Maximum intensity projection (MIP) image of FDG PET-CT showing abnormal increased radiotracer uptake in the midline abdomen adjacent to the liver (arrow).

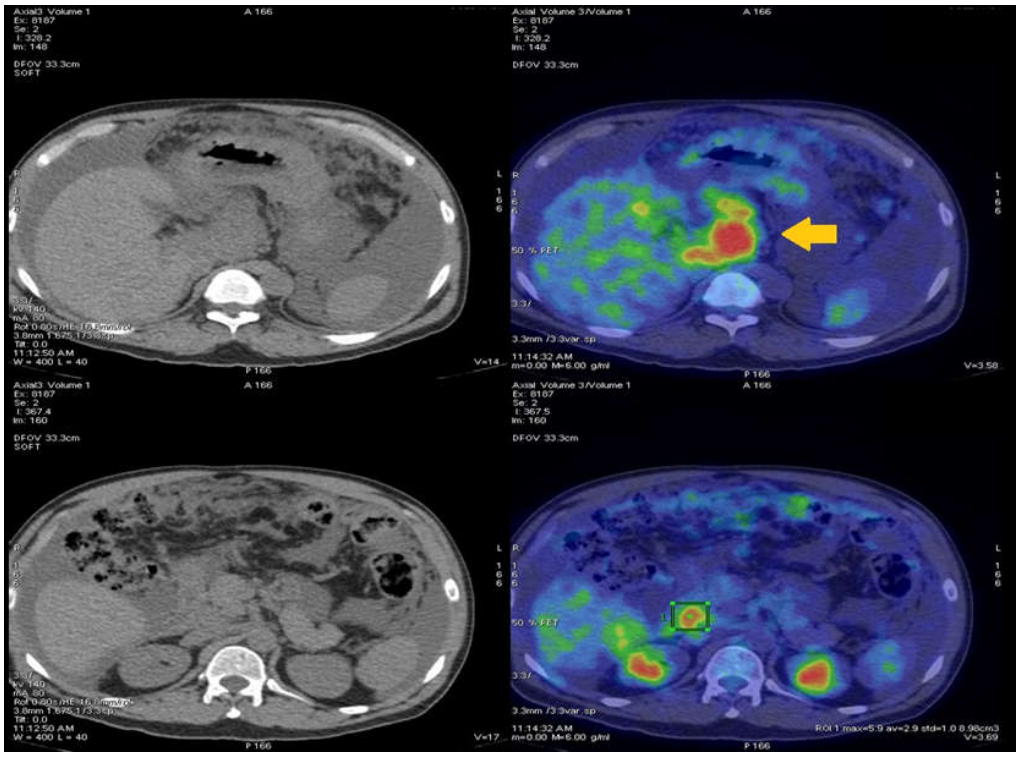

Figure 2: Fused axial images of FDG PET-CT showing metabolically active porta hepatic lesion (arrow) and enlarged paracaval lymph node.

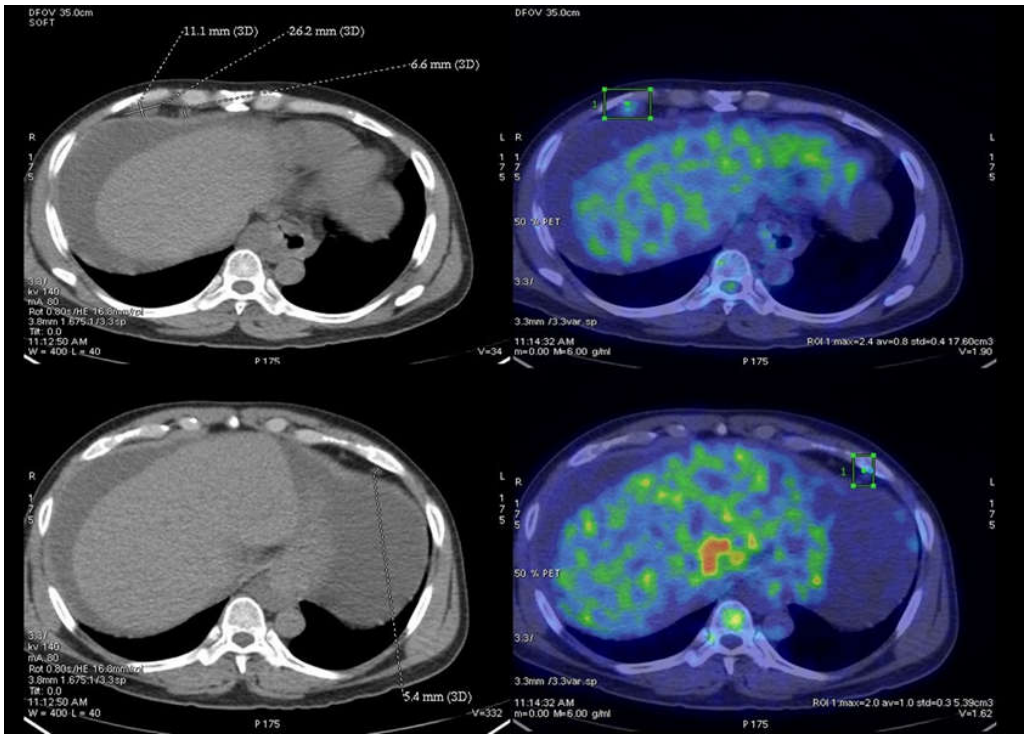

Figure 3: Fused axial images of FDG PET-CT showing mild metabolically active peritoneal nodules.

markers such as epithelial membrane antigen, calretinin, Wilms' tumour-1 protein, cytokeratin 5/6, antimesothelial cell antibody-1 and mesothelin may be positive in MPM [1,7]. However, the challenges would be in cases where there is only low yield or inadequate sampling taken for interpretation. Hence, for some patients despite the limitations, imaging may have a role in aiding the diagnostic work-up by complementing the histological findings with the abnormalities seen on scan.

CT scan is the commonest imaging tool being utilised in oncology as it is widely available. However, generally radiological presentation of mesothelioma is non-specific and it is challenging as well as not possible to distinguish a

benign from a malignant process and a primary from a metastatic disease [1]. It was previously documented that the usual findings of MPM would appear as a solid enhancing soft-tissue mass within the mesentery, omentum or peritoneum, with nodular peritoneal and omental masses may be seen in early phase of the disease progression followed by confluent plaque-like masses and eventually omental caking as the disease evolved [2]. Ascites may also be present [1,2]. It has been highlighted that in this ''wet'' type of peritoneal mesothelioma with ascites, CT scan may reveal widespread small nodules and ascetic fluid, but no dominant mass [11].

Literature review revealed only little published information available on the manifestations of MPM on ultrasound, MRI as well as FDG PET-CT imaging [1,4]. On the other hand, FDG PET-CT for pleural mesothelioma has been described as being useful in the disease staging and pre-operative evaluation especially in detecting intrathoracic and extra-thoracic lymphadenopathy, meta-static disease as well as predicting the prognosis, evaluating treatment response and detecting recurrence [12,13]. The basis for this is that PET-CT scan has the abil-ity to detect high glucose metabolism of tumour cells following the administration of FDG which is a radioactive -labelled glucose analogue. Interesting to note that FDG PET-CT has also been used to guide and determine the most appropriate biopsy site in cases of pleural mesothelioma [12,13].

A retrospective study of 24 cases with suspected peritoneal carcinomatosis revealed that FDG PET adds to conventional imaging in the disease staging of peritoneal carcinomatosis apart from being a useful diagnostic tool when peritoneal biopsy was either unavailable or inappropriate [14]. In another publication, FDG PET-CT done for a patient with unknown primary malignancy was shown to facilitate the diagnosis by demonstrating a lesion in the greater omentum to be metabolically active, although with limitation in detecting subcentimeter metastatic pleural nodules [4]. As for our patient, the mass at the porta hepatic region was metabolically active, associated with multiple peritoneal and nodal deposits in the absence of any abnormal radiotracer uptake in the thorax or other solid organs to suggest FDG-avid distant metastasis or other possible primary malignancy. These PET-CT scan findings which were representative of malignant mesothelioma in the abdomen had corresponded to his clinical diagnosis.

CONCLUSION

MPM is a rare malignancy that can be difficult to diagnose and treat. In this case report, the FDG PET-CT had demonstrated findings that corresponded to the clinical diagnosis of malignant mesothelioma in the abdomen with no significant scan evidence of distant metastasis or other possible sites of primaries. FDG PET-CT has a promising part to be utilised in the management of MPM. It may have a supplementary role not only in the disease staging but also in aiding the diagnostic work-up such as determining the most appropriate site for biopsy and excluding other possible site of primary malignancy.

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Corresponding author: Ahmad Zaid Zanial
Email address: ahmadzaidx@gmail.com

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