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CASE REPORT

# Primary hepatic (extranodal) lymphoma: utility of [$^{18}$F]fluorodeoxyglucose-PET/CT

**Nagabhushan Seshadri[a], Rupa Ananthasivan[b], Rashmi Kavindran[a], G. Srikanth[c] and Suresh Chandra[d]**

*[a]Department of Nuclear Medicine and PET-CT; [b]Department of Radiology; [c]Department of Surgical Gastroenterology; [d]Department of Pathology, Manipal Hospital, Rustom Bagh, Airport Road, Bangalore 560085, India*

*Corresponding address: Dr Nagabhushan Seshadri, Department of Nuclear Medicine, Royal Liverpool University Hospital, Prescot Street, Liverpool, L7 8XP, UK.*
*Email:* s_n_bhushan@yahoo.com

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**Abstract**

Primary hepatic lymphoma is extremely rare. Although the utility of fluorodeoxyglucose (FDG)-positron emission tomography (PET) for imaging extranodal lymphoma has been reported, there is very little literature describing its use in primary hepatic lymphoma. This case report demonstrates the effect of FDG-PET/computed tomography (CT) in a case of unifocal primary hepatic lymphoma and its usefulness in the assessment of treatment response.

**Keywords:** *Primary hepatic lymphoma; fluorodeoxyglucose; positron emission tomography; PET/CT.*

## Introduction

Non-Hodgkin lymphoma (NHL) can be either nodal or extranodal in origin. Although lymphomas are generally thought of as tumours of lymph nodes, about 40% of these arise at extranodal sites[1]. Extranodal sites of lymphoma have been reported in the lung, pleura, thymus, breast, spleen, liver, pancreas, musculoskeletal system and the central nervous system[2].

As a group, these extranodal NHLs often show distinctive pathologic, radiologic, and clinical features from nodal lymphomas. Extranodal lymphomas are of two types. They can be extranodal in origin (i.e. primary extranodal lymphoma) or the extranodal lymphoma is a result of either regional spread of nodal lymphoma or hematogeneous dissemination. It is particularly important from a prognostic point of view to distinguish primary extranodal lymphoma from secondary extranodal involvement by disseminated nodal disease.

Hepatic involvement by lymphoma is usually secondary in nature and is seen in up to 15% of patients with NHL[3]. Primary hepatic lymphoma (PHL) is extremely rare, constituting <0.4% of all extranodal NHLs. The utility of [$^{18}$F]fluorodeoxyglucose (FDG)-positron emission tomography (PET) in the imaging of extranodal NHL involving various structures has been reported[2,4]. Recently, diagnosis of multifocal PHL using [$^{18}$F]FDG-PET/computed tomography (CT) has been documented[5]. To the best of our knowledge this is the first case in literature where unifocal PHL has been detected using [$^{18}$F]FDG-PET.

## Case report

A 43-year-old woman presented with a 2 weeks history of fever associated with chills and intermittent pain in the right upper quadrant of the abdomen. She had a history of similar complaints in the past, and was diagnosed as pyogenic liver abscess 8 months previously at another hospital, for which she had undergone biopsy and fluid aspiration. The histopathology at that time revealed inflammatory granuloma and was subsequently treated with antibiotics. Her blood tests revealed increased alanine aminotransferase, aspartate aminotransferase, lactate dehydrogenase and alkaline phosphatase but normal alpha-fetoprotein values. She also had an increased total leukocyte count and erythrocyte sedimentation rate (ESR). Ultrasonography of the abdomen revealed a heterogeneous hypoechoic area in the left



 

lobe of the liver with poorly defined margins. As the patient had a history of liver abscess, it was thought that this could represent its sequelae. CT abdomen showed an irregular 10×7 cm hypodense lesion with cystic areas in the left lobe of the liver, with no arterial or portal phase enhancement; these characteristics were indeterminate for chronic liver abscess and a suspicion of hydatid cyst was also raised. Fine-needle aspiration biopsy of the liver was not useful. But in view of her previous history, increased ESR and total leukocyte count, a working diagnosis of chronic liver abscess was made. The patient was posted for surgical excision of the left lobe lesion. On surgical exploration a frozen section biopsy revealed a malignant lymphoma which on paraffin sections showed large lymphoid cells with irregular nucleus and prominent nucleoli (Fig. 1) and immunohistochemistry was found to express CD45 and CD20 markers with negative Pan CK and CD30 markers, confirming the diagnosis as a malignant lymphoma, large cell, immunoblastic, diffuse type.

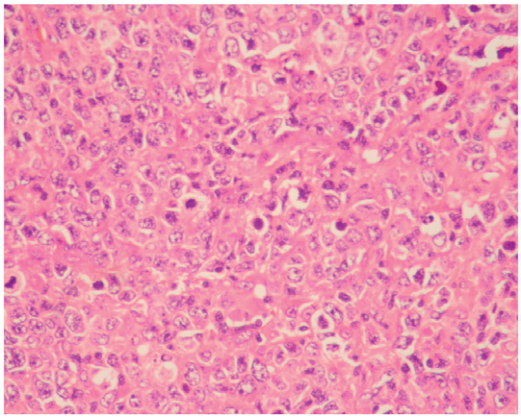

*Figure 1* **Biopsy on paraffin sections showed large lymphoid cells with irregular nucleus and prominent nucleoli.**

An [$^{18}$F]FDG-PET/CT scan was done at this stage to determine the extent of disease. It showed a large irregular hypodense lesion involving predominantly the left lobe of the liver measuring 10×8×9 cm in size (Fig. 2, upper

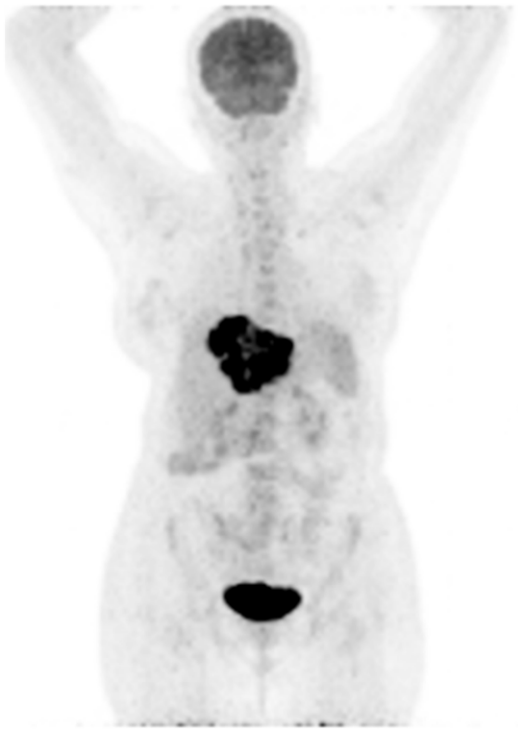

*Figure 3* **Maximum intensity projection of pre-treatment PET image showing intense FDG uptake in the liver lesion with no other focus of abnormal FDG identified elsewhere in the body.**

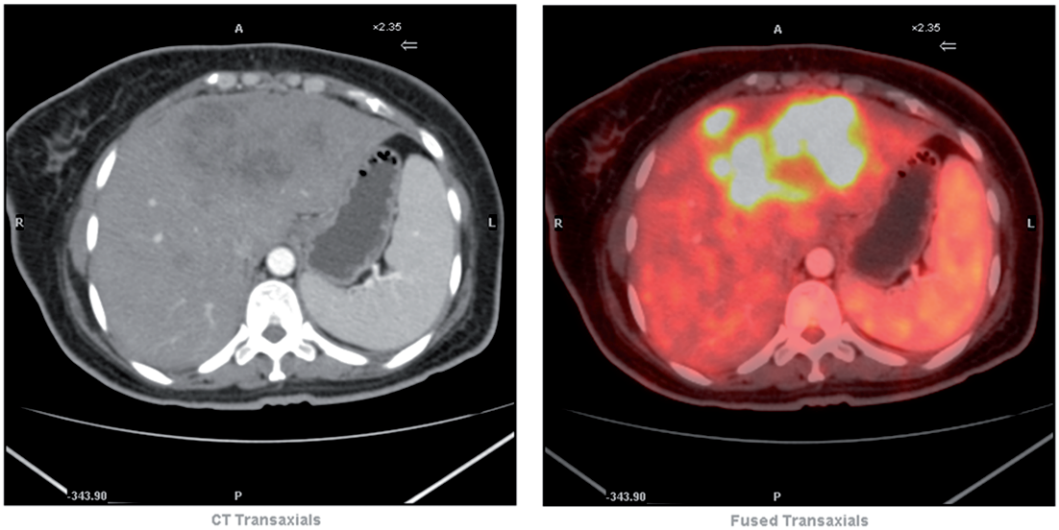


*Figure 2* **Staging [$^{18}$F]FDG-PET/CT revealed a large irregular hypodense lesion involving predominantly the left lobe of the liver measuring 10 × 8 × 9 cm in size (left panel) with intense heterogeneous FDG uptake of $SUV_{max}$=37.1 (right panel).**

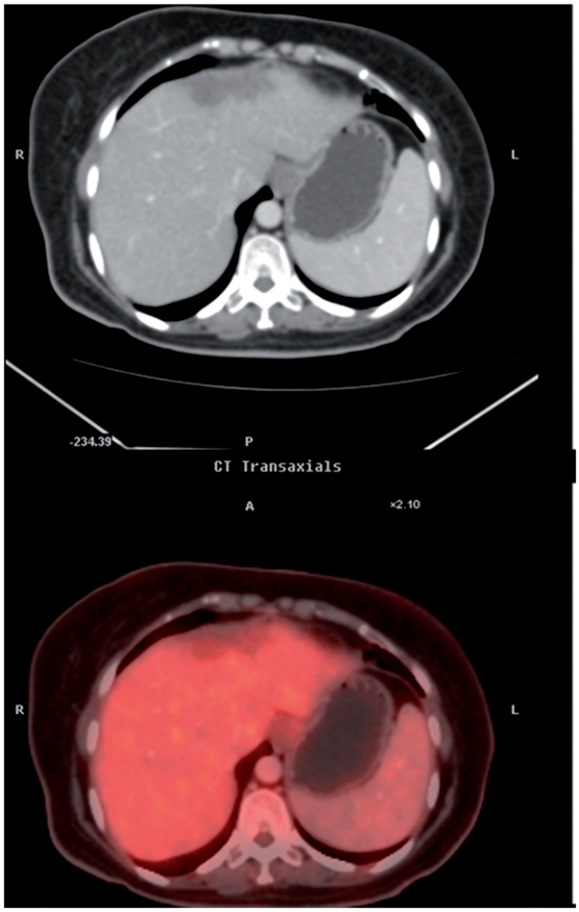


*Figure 4* **Post chemotherapy [$^{18}$F]FDG-PET/CT study showed that there was a persistent hypodense lesion in the liver on the CT component of the examination (upper panel); however, the FDG uptake corresponding to the liver lesion had completely resolved (lower panel) thus confirming necrotic changes.**

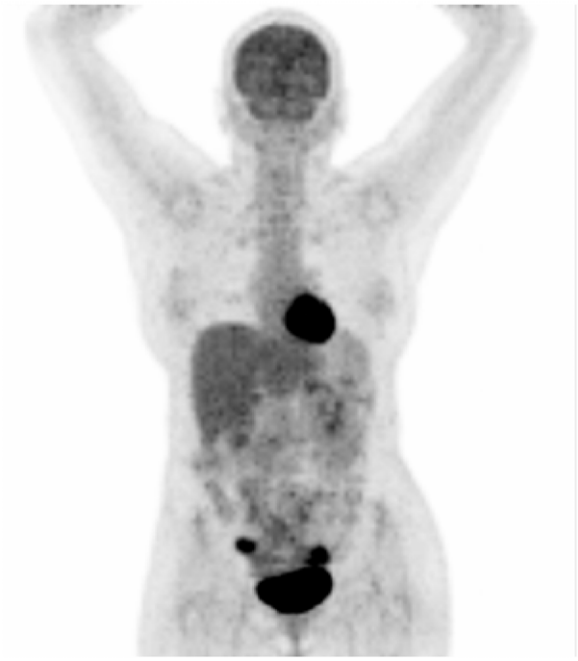

*Figure 5* **Maximum intensity projection of post treatment PET image confirming disappearance of FDG uptake in the liver lesion with no other abnormal focus of FDG uptake identified elsewhere.**

panel) with intense heterogeneous FDG uptake of standardised uptake value $(SUV)_{max}$ of 37.1 (Fig. 2, lower panel). No other focus of abnormal FDG was detected elsewhere in the body as can be appreciated on the maximum intensity projection PET image (Fig. 4).

Subsequently the patient underwent treatment with chemotherapy (6 cycles of R-CHOP) and a follow-up FDG-PET/CT study was organized to look for treatment response 3 weeks after completion of chemotherapy. The PET study showed that the FDG uptake in the liver lesion had completely disappeared (Figs. 4 and 5) leaving behind a hypodense area on CT, thus confirming necrotic changes.

## Discussion

PHLs can present as solitary lesions simulating metastasis, but multifocal involvement is more common and seen in about 50% of cases. Diffuse hepatic involvement is rare and more commonly seen in Chinese patients[6,7]. Diffuse large cell lymphoma is the most common subtype of primary hepatic NHL[8].

Patients with PHL have liver functions that are usually deranged with increased alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, and lactate dehydrogenase levels. In contrast, serum carcinoembryonic antigen and α-fetoprotein levels are invariably normal.

There is a strong association with PHL and chronic hepatitis C infection. PHL has also been described against a background of impaired immune surveillance, such as acquired immunodeficiency syndrome (AIDS)[8]. However, the case described here is unusual because no such immunosuppression was identified in this patient.

The number of extranodal sites involved is important for the prognostic evaluation of patients with NHL and is considered to be very important for choosing appropriate treatment[9]. [$^{18}$F]FDG-PET has been reported as an excellent non-invasive functional imaging modality of malignant lymphoma and is highly accurate for staging disease[10]. The data on the role of [$^{18}$F]FDG-PET in PHL is rather limited. Nevertheless, the available evidence shows it can accurately evaluate the distribution of disease by screening the whole body non-invasively and in defining the primary sites of malignant lymphoma, that is, extranodal in origin or not[2,4,5]. FDG-PET was valuable in this case by excluding other sites of involvement and thereby demonstrating the primary unifocal hepatic origin of lymphoma. The post treatment

FDG-PET/CT study showed complete resolution of FDG uptake; however, the CT study showed a relatively smaller but persistent hypodense lesion suggesting necrotic changes rather than residual tumour. These findings on CT alone would have been difficult to ascertain response to treatment. This demonstrates that a post treatment FDG-PET study can be extremely useful in evaluating treatment response in such cases.

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