Role of Nuclear Imaging in Staging and Follow up of Lymphoma

Essay
Submitted for partial fulfilment of Master degree in Radiodiagnosis

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Abbreviations	
MALT	Mucosa-associated lymphoid tissue
GALT	Gut-associated lymphoid tissue
BALT	Bronchus-associated lymphoid
HL	Hodgkin lymphoma
HD	Hodgkins disease
NHL	Non-Hodgkin Lymphoma
EBV	Epstein-Barr virus
WHO	World health organization
RS	Reed-Sternberg giant cells
NK	Natural killer cells
DLBCL	Diffuse large B-cell lymphoma
MZL	Marginal zone B-cell lymphoma
AIDS	Acquired immunodeficiency syndrome

67Ga	Gallium
CT	Computed tomography
MRI	Magnetic resonance imaging
CSGF	Colony stimulating growth factor
PET	Positron Emission Tomography
FDG	Fluorodeoxyglucose
LOR	Line of Response
AC	Attenuation correction
SUV	Standardized Uptake Value
ROI	Region of interest
SUR	Standardized Uptake Ratio
SPECT	Single Photon Emission Computed Tomography
MBQ	Mega Becquerel
LSO	Lutetium Orthosilicate
GLUT	Glucose Transporter

Introduction

Hodgkin's disease (HD) and non-Hodgkin's lymphoma (NHL) are lymphoproliferative disorders representing fewer than 8% of all malignancies but whose incidence has recently been rising by 3%–5% per year. These malignancies are potentially curable with current treatment modalities, even in advanced or recurrent disease. The prognosis and survival of patients with lymphoma depend on 3 key points, 2 of which are determined at the moment of diagnosis: histologic grade and clinical stage. The third is response to treatment. Precise staging is crucial to the proper selection of therapy for these patients, to prevent over- or under treatment***(Rodríguez, 2006)***

Advances in imaging techniques have improved the assessment of disease status and evaluation of the efficacy of different treatment modalities. While computed tomography remains the cornerstone of imaging for the assessment of disease status, it provides no understanding of the metabolic or functional parameters of the disease. Nuclear medicine techniques permit the evaluation of functional status, and nuclear medicine is likely to have its greatest impact in the detection of viable tumour in persistent masses. Nuclear imaging can be conducted using single photon agents, such as 67 Ga-citrate with SPECT (single photon emission computed tomography), or with positron emitters, such as 18 F-Fluorodeoxyglucose (FDG) with PET (positron emission tomography). ***(Divgi , 2005)***

PET is a non-invasive, 3-dimensional, metabolic imaging technique that uses radiopharmaceutical to target a specific physiologic process. The most widely used pharmaceutical is the radio-labelled glucose analogue fluorine-18-deoxyglucose (FDG). PET reveals aspects of tumour function and allows metabolic measurements. Subtle findings at FDG PET that might otherwise be disregarded or interpreted as physiologic variants may lead to detection

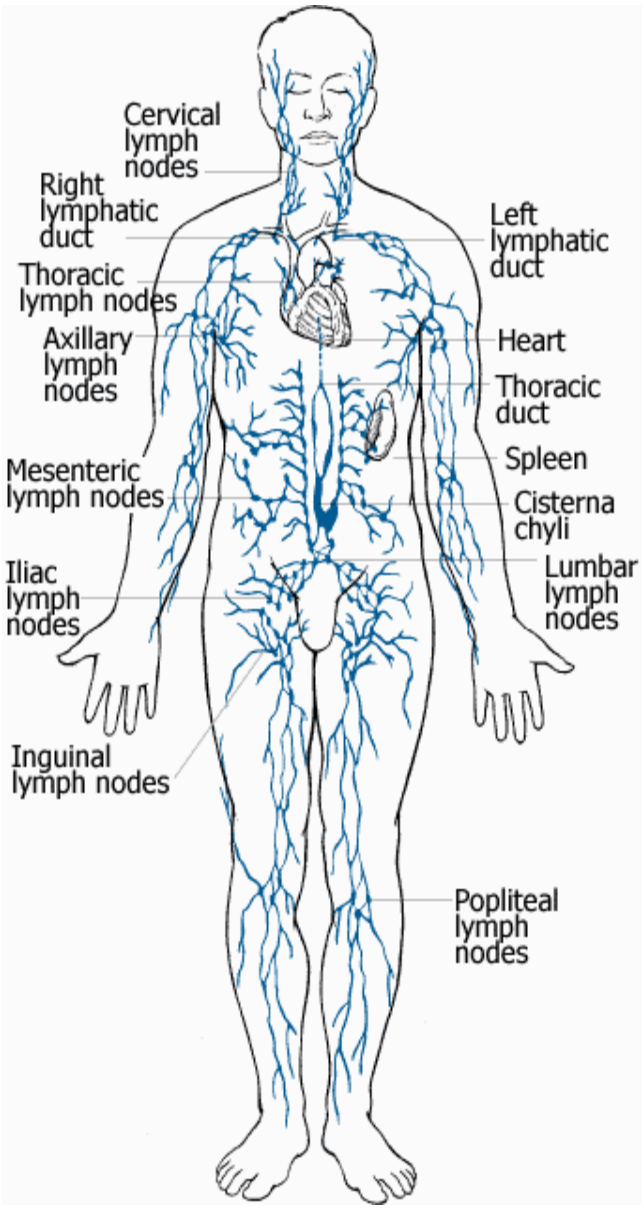
of a malignant process. Accurate interpretation of FDG PET scans requires a thorough knowledge of the normal physiologic distribution of FDG and of normal variants that may reduce the accuracy of PET studies ***(Seam et al., 2007).***

PET/CT scanners allow enhanced localization of fluorinated deoxyglucose uptake, improving both sensitivity and specificity and making current PET/CT scanners highly accurate providing helpful guidance for the management of lymphoma at several points in the patient's overall assessment and treatment, including staging, monitoring disease response during treatment, and determining completeness of treatment response at the end of the planned intervention. PET/CT scanning may also provide useful information concerning prognosis both during primary treatment and during secondary treatment for relapsed or refractory disease **(*Connors, 2011*)**.

Aim of Work

The aim of this work is to highlight the role of nuclear imaging in Lymphoma namely the initial diagnosis and precise staging; identification of suitable sites for biopsy; assessment of response to therapy and identification of recurrent diseas

CT Anatomical Consideration of Lymphatic System



1-Lymph and Lymph Vessels

What is lymph?

Lymph is Excess interstitial fluid and solutes are returned to the bloodstream through a series of lymphatic vessels. When the combination of interstitial fluid, solutes and sometimes foreign material enters the lymph vessels, the liquid mixture is called lymph.

The network of increasingly larger vessels responsible for transporting lymph back to the venous circulation is composed of the following (from the smallest to largest in diameter): capillaries, lymphatic vessels, lymphatic trunks and lymphatic ducts. ***(Mckinley and O'Loughlin, 2006). (Fig(1.1)).***