ROLE OF PET/CT IN LIVER MALIGNANCY

Essay

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By

Mohamed Salah Metwally
M.B., B.Ch.
Ain Shams University

Supervised By

Prof. Dr. Sameh M.Abd El-Wahab
Professor of Radiodiagnosis
Faculty of Medicine
Ain Shams University

Dr. Mohamed El-Gharib Abou El-Maaty
Lecturer of Radiodiagnosis
Faculty of Medicine
Ain Shams University

Faculty of Medicine
Ain Shams University

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LIST OF ABBREVIATIONS

^{18}F-FDG	: ^{18}Florine labeled 2 fluro 2 deoxy glucose
AFP	: Alfa-fetoprotein
CA	: Carbohydrate antigen
CC	: Cholangiocarcinoma
CEA	: Carcinoembryonic antigen
CT	: Computed tomography
GLUT	: Glucose transporters
H^+	: Hydrogen ion
HCC	: Hepatocellular carcinoma
IV	: Intravenous
IVC	: Inferior vena cava
KeV	: Kilo electron volt
MDCT	: Multi detector computed tomography
MeV	: Milli electron volt
MRI	: Magnetic resonant imaging
PEI	: Percutaneous ethanol injection
PET	: Position emission tomography
PET/CT	:Position emission tomography with computed tomography
PMTs	: Photomultiplier tubes
RFA	: Radiofrequency ablation
SMA	: Superior mesenteric artery
SMV	: Superior mesenteric vein
SUV	: Standardized uptake value
TACE	: Transarterial chemoembolization
Z	: Atomic number

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ROLE OF PET/CT IN LIVER MALIGNANCY

Abstract:

Dr/ Mohamed Salah Metwally

PET/CT is superior to PET and CT alone and/or magnetic resonance imaging (MRI), in the diagnosis and treatment of various primary or metastatic cancers. It has advantages over other imaging methods; it can differentiate benign from malignant lesions, staging and restaging tumors, detect functional changes before there is any change in clinical or radiological size of a mass, better in identify cancer that has spread, making up treatment plane and monitoring tumor response, detect tumor recurrence early and distinguish viable metabolically active tissue from scars.

18F-FDG PET has advantages over conventional imaging techniques in designing and evaluating managements of hepatic malignancies. PET/CT is more and more widely applied in clinical practice. It is more sensitive and specific than PET, with a lower false positive and false negative rate.

The ability of PET/CT with 18F-FDG to enhance the patients suffering from hepatic metastases, HCC and CC by more accurate diagnosis, staging restaging and further evaluation of their biologic characteristics.

Whole body positron emission tomography with (18) F-fluoro-deoxy-glucose (FDG) in combination with CT scanning (PET/CT) represents one of the most sensitive imaging modalities for the detection of hepatic metastases and extra hepatic tumor manifestations. For the staging and follow up of colorectal cancer, FDG-PET/CT represents a standard imaging modality.

18 F-FDG PET/CT is useful in the evaluation of HCC metastasis, although its role in the diagnosis of primary HCC is more limited. Dual tracer PET/CT had an incremental value and complementary advantage when compared with signal tracer imaging in the evaluation of HCC metastasis and lymph node.

The ability of FDG-PET quantitatively to estimate metabolic rates makes it an important tool for monitoring. With increasingly broad indications for FDG-PET imaging, it is expected that FDG-PET (and PET/CT) of the liver will play a growing and increasingly important role in detecting and monitoring treatment of tumors involving the liver.

Conventional imaging modalities have limitations in discriminating portal vein tumor thrombus.

18F-FDG PET/CT was more sensitive than conventional CT and MRI in detecting suspected vein tumor thrombus in patients with HCC. Tumor thrombus differentiates it self from blood thrombus by its intense uptake of 18F-FDG as a result of high metabolic neoplastic activity.

PET and PET/CT is very important in patients with unexplained high levels of tumor markers.

Ultimately PET/CT provides a new horizon in diagnosis and follow up of treatment of various tumour that needs more researches.

INTRODUCTION

Cancer is one of the leading causes of morbidity and mortality even in the developed countries. Complex clinical decisions for treatment of tumors are largely guided by imaging findings. Most radiological procedures map the anatomy and morphology of tumors with little or no information about their metabolism ***(Kapper et al., 2004).***

Because of the importance of the liver as it is one of the most common locales for spread of the malignant diseases. It is the abdominal organ of greatest interest for the use of imaging studies **(*Semelka et al., 2005).***

Modern cross sectional structural imaging techniques like ultrasonography, computed tomography (CT) and magnetic resonance imaging (MRI) provide high resolution images that aid in accurate detection, delineation and anatomic localization of liver malignancies. However, characterization of lesions into benign and malignant etiologies is often not possible from structural imaging techniques alone. Although functional imaging techniques like positron emission tomography (PET) with radio labeled ^{18}F labeled 2-fluoro-2-deoxy-glucose (^{18}F-FDG) often provide critical information pertaining to a benign or malignant etiology **(*Wahl, 2004).***

The CT portion of PET/CT provides valuable anatomic and pathologic information to functional information provided

by PET and help improve the overall accuracy of the combined study **(*Kamel et al., 2004).***

Positron emission tomography (PET) is a functional imaging modality that has been documented to be useful in patient care. Oncologic PET imaging is used for a wide variety of neoplasms. Mainly for staging and follow up, differentiation of equivocal morphologic findings, therapy stratification and monitoring ***(Rosenbaum et al., 2006).***

Because PET imaging is based on the physiologically mediated distribution of the administrated tracer but not on anatomic information, the addition of computed tomography (CT) to (PET) may improve the interpretation of PET. Combined PET and CT offers several potential advantages over PET alone that may influence the clinical routine ***(Rosenbaum et al., 2006).***

Advances in imaging technology have improved our ability to detect, characterize and stage metastatic liver disease. PET/CT therefore possibly proved superior to CT alone when assessing liver cancer **(*Veit et al., 2006*).**

AIM OF THE WORK

The aim of this work is to evaluate the role of PET/CT in liver imaging regarding the advantages over conventional techniques in designing and evaluating managements of hepatic malignancies.