Med. J. Cairo Univ., Vol. 90, No. 4, June: 1239-1246, 2022
www.medicaljournalofcairouniversity.net

Role of PET CT in Evaluation of Benign and Malignant Mediastinal Lesions

AMR A.H. GADALLA, M.D.*,[1]; NAHLA D. ELSAYED, M.D.**, [1]; MOHAMMED S. ELAZAB, M.D.*,[2] and TAKEYA A. TAYMOR, M.D.*,1

The Departments of Radiodiagnosis and Nuclear Medicine & Clinical Oncology**, Faculty of Medicine, Cairo University[1] and National Cancer Institute[2]*

Abstract

Background: The histological and radiological range of mediastinal malignancies is broad. Malignancies are more likely to occur in the anterior compartment, despite the fact that more than two-thirds of these tumors are benign. FDG PET/CT may be used in conjunction with other imaging techniques to assess mediastinal masses. In patients with non-avid or low avid FDG lesions, PET/CT may reduce the need for invasive diagnostic procedures. However, for a definitive diagnosis, confirmation tissue sample is required to confirm PET positive findings.

Aim of Study: The aim of the study is to investigate the ability of PET-CT in differentiation between benign and malignant mediastinal masses, which is subsequently reflected in the management of mediastinal masses in these patients.

Patients and Methods: This is a prospective study. After their kind was established by histological investigation, the PET scans of 30 lesions/malignant and benign tumors were analyzed in the mediastinum, taking into account the patients' age and gender as well as the tumor's specific position in the mediastinum. Patients were referred to private center for PET CT scan of the chest over a period of 12 months (July 2019 to June 2020).

Results: The patients were divided into groups based on their histological diagnosis. Lymphoma (26%) was the most common type of lesion, followed by Bronchogenic carcinoma (10%), metastatic lymph nodes (26%), thymic tumors (20%), germ cell tumours (3.3%), teratoma (3.3%), neuroendocrine tumors (3.3%), retrosternal thyroid lesions (3.3%), tracheal mass (3.3%), esophageal mass (3.3%), and sarcoidosis (6.6%).

Conclusions: For the evaluation of benign and malignant mediastinal masses, FDG PET/CT is a useful addition to traditional imaging approaches. In patients with non-avid or low avid FDG lesions, PET/CT decreases the need for invasive diagnostic procedures. However, for a definitive diagnosis, confirmation tissue sample is required to confirm PET positive findings.

Correspondence to: Dr. Amr A.H. Gadalla, The Department of Radiodiagnosis, Faculty of Medicine, Cairo University

Key Words: *PET/CT – Mediastinal masses – Benign – Malignant – Histopathology.*

Introduction

THE histological and radiological range of mediastinal malignancies is broad. Malignancies are more likely to occur in the anterior compartment, despite the fact that more than two-thirds of these tumors are benign. Thymoma, neurogenic tumors, and benign cysts are the most common lesions in the mediastinum, accounting for 60 percent of patients with mediastinal masses. 80 percent of children lesions are neurogenic tumors, germ cell neoplasms, and foregut cysts, whereas primary thymic neoplasm, thyroid masses, and lymphomas are the most prevalent in adulthood [1]. The pleural cavities laterally, the thoracic inlet superiorly, and the diaphragm inferiorly define the mediastinum. Many anatomists divide it further into anterior, middle, and posterior sections. Thymoma, teratoma, thyroid illness, and lymphoma are all examples of anterior mediastinal tumors, which account for half of all mediastinal masses. Congenital cysts in the middle mediastinum are common, although neurogenic tumors in the posterior mediastinum are more common [2]. Differentiating benign from malignant mediastinal tumors is critical for determining treatment options and evaluating prognosis. According to several investigations, mediastinal cancers show distinct CT and MRI features. FDG

Abbreviations:

18-FDG PET/CT: 18 Fluorodeoxyglucose.
BM : Bone marrow.
CT : Computed tomography.
MRI : Magnetic resonant images.
SUV max : Maximum standard uptake value.
mCi : Millicuries.
ROI : Region of interest.

positron emission tomography (PET) imaging is used to stage, restage, plan treatment, and monitor the progress of various solid cancers. The maximum standardized uptake value (SUVmax) of the primary tumor is one of the most common metrics in the examination of the prognostic capabilities of FDG-PET/CT. With the rapid spread of clinical PET/CT, more chances to evaluate mediastinal cancers by this approach are available. However, only a few studies have looked at the utility of FDG-PET/CT for assessing mediastinal cancers using SUVmax [3].

The primary goal of this study is to see how PET-CT will distinguish between benign and malignant mediastinal masses, and how that affects how these patients' mediastinal masses are treated.

Patients and Methods

Before beginning this prospective investigation, institutional ethics approval was obtained. Patients' or their authorized representatives' consent was acquired. Thirty patients with a mediastinal mass found on CT were included in this study: 13 men and 17 women, ranging in age from 18 to 70 years, with a mean age of 51 years. Criteria for inclusion: Patients over the age of 18, both genders, and symptomatic patients with a positive CT finding for a mediastinal lesion are all eligible. Exclusion criteria: 1-patients under the age of 18, 2-patients who are pregnant, and 3-patients with uncontrolled diabetes mellitus.

A- Detailed patient history:

The referring clinician delivered patient's labs and imaging procedures based on clinical examination findings. Contrast enhanced CT of the chest was performed or repeated whenever available or if the previous one was more than a month old.

B- PET-CT:

PET imaging and analysis:

The 18-FDG was used to study thirty patients. FDG was synthesized utilizing an automated technique, and quality control tests were carried out. A bolus dose of FDG was administered intravenously after a transmission scan with a germanium-68/gallium-68 ring source for attenuation correction. FDG was given at a dose of 4.8+0.8 mCi (177.6+29.6 MBq). Depending on the patient's body weight Dynamic images were taken initially, followed by a 10-minute static image 45 minutes following FDG injection.

The PET pictures were rebuilt using attenuation, dead time, and decay correction factors that were all measured. Between the transmission and emission scans, there was no significant patient movement or mis-positioning. During the examination, the patient's markers and the scanner's laser pointers were used to confirm this. Before tissue biopsy or surgery, as well as histological diagnosis, data was analyzed. Static film pictures were analyzed and compared to CT scans. CT images were used to determine the anatomical orientation of the PET picture. Then, using the Region of Interest (ROI) approach, the tumor uptake was evaluated. On the static image, the tumor ROI was defined. The size of the tumor ROI changed based on the size of the tumor. To prevent contamination of the non-tumor area, the tumor ROIs were double-checked by superimposing them on transmission images as well as early post-injection photos that revealed vascular architecture. The average radioactivity per pixel within the tumor ROI was calculated and analyzed quantitatively (standardized uptake value, SUV).

C- SUV calculation:

SUV (voxel- or region-based standardized uptake value) (SUV peak, SUVmax, SUVIbm). FDG is a commonly used PET radiotracer and glucose analogue. Because of the increased glucose metabolism, it accumulates in (potentially) cancerous cells. The normalized uptake value is the most common parameter used to quantify tracer buildup in PET scans (SUV). In PET imaging, the SUV is a semi-quantitative measure of normalized radioactivity concentration.

D- Histopathological diagnosis:

Patients were scheduled for biopsy and histological diagnosis after PET-CT imaging. Patients had U/S or CT guided biopsies, which took into account both the accessibility of the lesion and the general health of the patients.

E- Statistical analysis:

Data were coded and entered using the statistical package for the Social Sciences (SPSS) version 26 (IBM Corp., Armonk, NY, USA). Data was summarized using mean, standard deviation, median, minimum and maximum in quantitative data and using frequency (count) and relative frequency (percentage) for categorical data. Comparisons between quantitative variables were done using the non-parametric Kruskal-Wallis and Mann-Whitney tests (Chan, 2003a). For comparing categorical data, Chi square (X^2) test was performed.

Exact test was used instead when the expected frequency is less than 5 (Chan, 2003b). ROC curve was constructed with area under curve analysis performed to detect best cutoff value of SUV for detection of malignancy. *p*-values less than 0.05 were considered as statistically significant.

Results

Detailed characteristics of our prospective study involved a total of 30 patients: 13 females (43.3%) & 17 males (56.7%) ranging in age from 20 to 75 years with a mean age 51 years. They all presented with a mediastinal mass identified on CT. Fused PET-CT images was done for all 30 patients followed by biopsy & histopathological assessment. 22 cases pathologically diagnosed with a malignant mediastinal lesions included in this study that accounts 73.3% and 8 cases pathologically diagnosed with a benign mediastinal lesions that accounts 26.7%. Lesions were located to one or more mediastinal compartment according to the cross sectional based mediastinal classification system recently published by ITMIG, 22 cases were found to be in the anterior mediastinal compartment which accounts 73.3%, 5 cases in the middle mediastinal compartment which accounts 16.7%, 3 cases in the posterior mediastinal compartment which accounts 10.0%. Relations between different compartmental locations at CT finding & there histopathology was done showing that there is no statistically significant relation between the site of mediastinal lesions and there histopathology, whereas 14 anterior mediastinal lesions accounts 63.6%, 5 were middle mediastinal accounts 22.7% and 3 posterior mediastinal accounts 13.6% as mentioned in (Table 1). Comparison of quantitative PET-CT indices in mediastinal lesions was shown in (Table 2), as the SUV max values was reported according to their activity, we found that SUVmax values of malignant lesions higher than benign lesions. Whereas; Malignant mediastinal lesions have Mean SUVmax 8.83±4.62 while benign mediastinal lesions have Mean SUVmax 3.40±1.17 with significant *p*-value=0.021. Comparison between quantitative PET-CT indices in mediastinal lesions (SUV max values) and the location of each mediastinal lesions was shown in Table (3), was found that there is no statistically significant relation between different mean SUV max values and the site of the mediastinal lesions (Table 3). The mediastinal lesions were distributed according to CT finding in correlation with histopathological results. Our study shows that; Among 30 patients, 22 cases have been proved to be pathologically malignant lesions as well as 8 cases proved to be a benign one. However our PET-CT results according to their SUVmax values (Figs. 1-4) has shown that 19 of 22 (86.4%) cases are considered as a true positive with high SUVmax values where its later pathologically classified into Lymphoma (n=8), bronchogenic carcinoma (n=3), metastatic lymph nodes (n=8), neuroendocrine tumor (n=1), thymic carcinoma (n=1), retrosternal thyroid lesions (n=2), tracheal mass (n=1), germ cell tumor (n=1) & oesophageal mass (n=1) while three of 22 (13.6%) malignant cases are considered as a false negative, 2 cases of them proved by histopathology to be low risk thymoma & the other was low grade lymphoma (MALT) while PET-CT was unable to detect them accurately as they shown low SUV max values, explaining this that, low level FDG-PET SUVmax (<3.4) could be a source of scan misinterpretation in these low-cellularity tumors as detected in MALT lymphoma & low-glucose metabolizing tumors as detected in low risk thymoma as they are less aggressiveness than high risk thymoma & resembles the normal functioning thymus. Whereas, 7 of 8 patients are considered as true negative (87.5%) with low or no SUV max values and later on is classified into thymic tumors (n=4), teratoma (n=1), retrosternal goitre (n=1) While one case only (12.5%) is considered as false positive with high SUVmax value (>3.4), later pathologically proved to be a case of sarcoidosis. Inflammatory cells including neutrophils, activated macrophages, and lymphocytes exhibit enhanced 18F-FDG absorption, resulting in significant tracer accumulation in inflammatory and infectious processes, according to the study.

As shown in (Table 4), we found that a cut-off value of 3.4 for SUVmax to discriminate benign lesions from malignant ones with a high sensitivity and specificity of 86.4%, and 87.5%, respectively, *p*<0.00.

Table (1): Illustrated the relation between the compartmental CT finding and their histopathology.

	Malignancy				X^2	*p*-value
	Malignant		Benign			
	Count	%	Count	%		
CT findings:						
Anterior mediastinal	14	63.6	8	100.0	3.967	0.246
Middle mediastinal	5	22.7	0	0.0		
Posterior mediastinal	3	13.6	0	0.0		

Table (2): Illustrates the SUVmax values According to their mediastinal masses activity with significant p-value=0.02 1.

	Malignancy										p-value
	Malignant					Benign					
	Mean	SD	Median	Minimum	Maximum	Mean	SD	Median	Minimum	Maximum	
SUV max	8.83	4.62	8.89	2.00	17.50	3.40	1.17	3.20	2.20	5.00	*0.021

Table (3): Demonstrates the relation between SUV max & the site of the mediastinal lesions.

	SUV max					p-value
	Mean	Standard Deviation	Median	Minimum	Maximum	
CT findings:						
Anterior mediastinal	7.50	4.44	6.95	2.20	17.50	0.429
Middle mediastinal	9.96	5.10	13.00	3.50	14.50	
Posterior mediastinal	7.70	6.65	6.10	2.00	15.00	

Table (4): ROC analysis showed that optimal cut off value in these patients was 3.4 for SUVmax (AUC 0.932, 95% CI 0.843-1.000, p<0.001).

Area under curve	p-value	95% Confidence Interval						
		Lower Bound	Upper Bound	Cutt off value	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
0.932	*<0.001	0.843	1.000	3.4	86.4	87.5	95	70

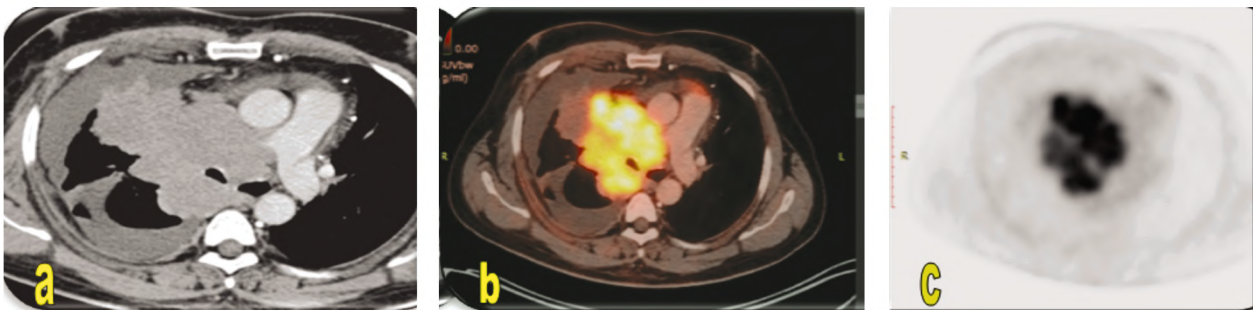

Fig. (1): PET CT study for a male patient 50 year old presented with chest pain, cough and respiratory distress. Axial CT Chest with fused PET images (A,B,C) showing large lobulated anterior mediastinal soft tissue mass lesion seen encasing the carina & attenuating the right pulmonary artery with increased FDG Uptake SUVmax=9.9 associated with low grade right pleural and pericardial effusion. PET/CT Diagnosis: Malignant looking lesion. Pathology revealed: High grade poorly differentiated Neuroendocrine carcinoma.

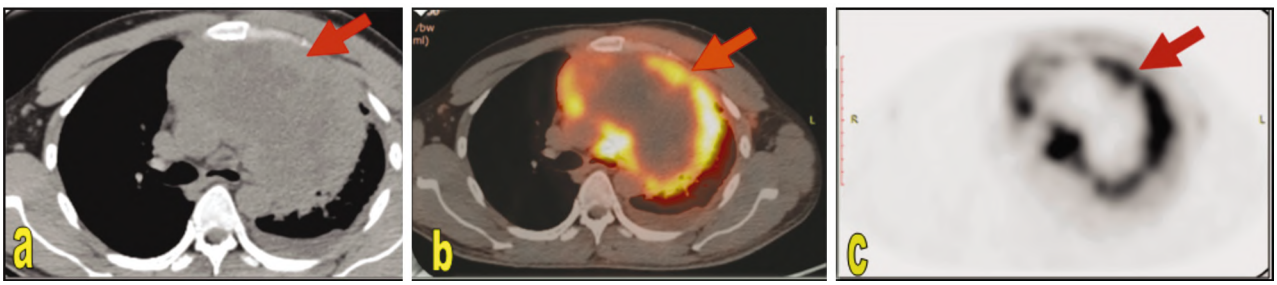

Fig. (2): PET CT study for Male patient 30 year old presented with Dyspnea, persistent fatigue & unexplained weight loss. Axial CT Chest with fused PET images (A,B,C) showing large well defined heterogeneous soft tissue mass lesion seen implicating the anterior mediastinum more at the left side with increase FDG Uptake SUVmax=14.5 (Arrowed). It is inseparable from the mediastinal structures with large central photopenic area of necrosis. PET/CTDiagnosis:malignant looking lesion. Pathology revealed: B-cell lymphoma.

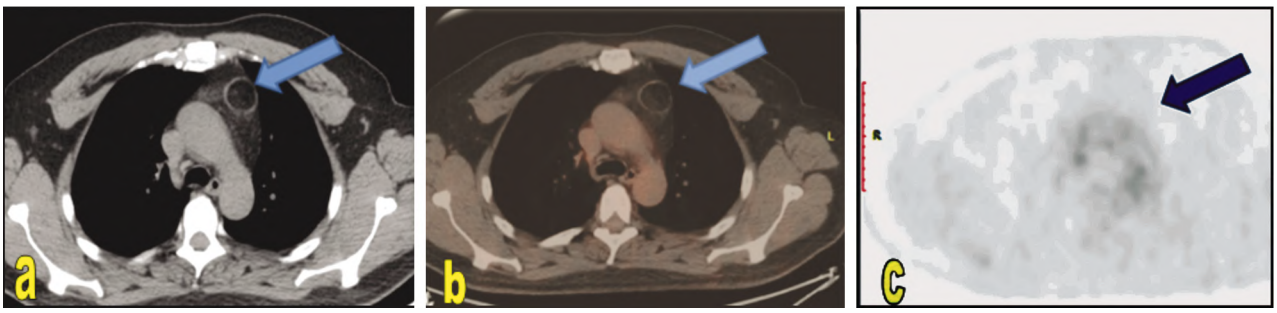

Fig. (3): PET CT study for a male patient 48 year old presented with chest tightness. Axial CT Chest with fused PET images (A,B,C) showing left anterior mediastinal lesion with internal calcification & fatty areas seen within, No FDG Uptake (Arrowed). PET/CT Diagnosis: Benign looking lesion, most likely teratoma. Pathology revealed: Mature Benign Teratoma.

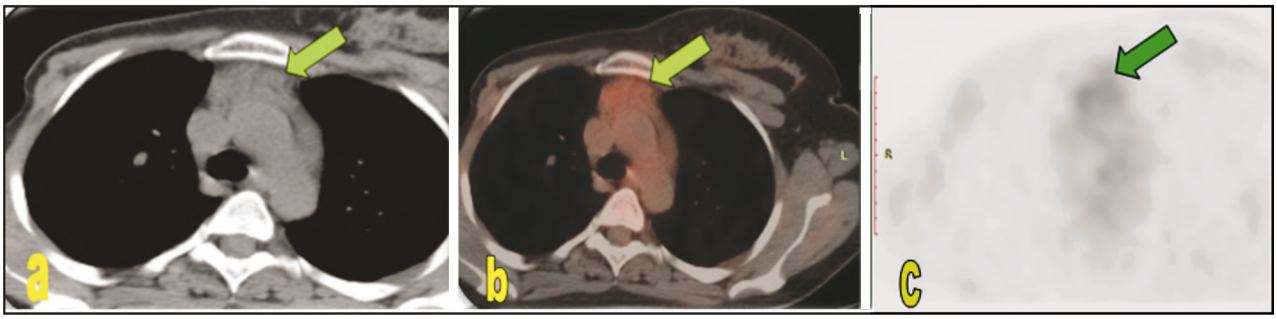

Fig. (4): PET CT study for Female patient 39 year old presented with palpable supra-sternal swelling & discomfort. Axial CT Chest with fused PET images (A,B,C) showing fairly defined anterior mediastinal soft tissue lesion with low grade metabolic activity, SUVmax=3.3 (Arrowed). PET/CT Diagnosis: Benign looking lesion. Pathology revealed: Thymic hyperplasia.

Discussion

The histological andradiological range of mediastinal lesions is broad. Both anatomical information and internal characteristics are required to develop a differential diagnosis of a mass in the mediastinum and, as a result, to determine therapeutic alternatives, which are influenced by the ever-changing non-invasive patient management strategy. Investigators proved the diagnostic ability of PET-CT images and SUVmax values in the era of functional imaging to differentiate between benign and malignant tumors, particularly those of the mediastinum. As a result, it acts as a virtual biopsy, avoiding unnecessary diagnostic intervention in some circumstances.

The lymphoma, thymic mass, germ cell tumor, and ectopic thyroid tissue are the most prevalent differential diagnoses for a mediastinal mass, with primary thymic neoplasm, thyroid masses, and lymphomas being the most typically diagnosed in the adult population. The morphologic and radiologic characteristics of each process aid in the diagnosis and differentiation of the mediastinal mass. A postero-anterior and lateral chest radiograph is often the first-line imaging when a mediastinal mass is suspected. Although this basic modality only allows for limited tissue characterization, it can provide for mass localization, which can help narrow the differential diagnosis. CT scans are a useful technique for evaluating a mediastinal mass and are usually performed following chest radiography. CT imaging can characterize the mass further depending on its location, degree of soft-tissue vascularization, and air, fat, water, and calcium attenuation. These criteria are frequently enough to make a diagnosis **[4]**.

PET, or positron emission tomography, is a well-established nuclear imaging technique that has proven particularly beneficial in oncology. PET images biochemical or physiologic events, as opposed to computed tomography (CT), which shows anatomic detail. As a result, PET has significant advantages in oncologic imaging over anatomic imaging modalities. When CT and MRI fail to discriminate between benign and malignant tumors, PET can often help. CT has long been the gold standard in oncologic imaging, but it lacks the potential to reveal important physiologic distinctions. PET has unrivalled ability to determine

tissue metabolic activity, but it requires higher-resolution anatomic information, which it cannot offer. The most straightforward and highest-resolution tomographic modality to incorporate into PET imaging is CT. The combination of the two results in a data set that combines the best of worlds, improving diagnostic accuracy and localization of many lesions. Apart from the shorter scan time, PET/CT has a number of clinical advantages, including better localization of activity to normal vs. abnormal structures, better identification of inflammatory lesions, CT visualization of PET-negative lesions (especially bone lesions), discovery of serendipitous abnormalities, confirmation of unusual or abnormal sites, and improved localization for biopsy or radiotherapy [5].

The primary goal of this prospective study was to see if PET-CT could be used to characterize malignant and benign mediastinal lesions based on their SUVmax values.

On CT, a mediastinal mass was seen, which was then PET-scanned and histopathologically confirmed as a benign or malignant mediastinal lesion. The patients were divided into groups based on their histological diagnosis. Lymphoma (n=8), bronchogenic carcinoma (n=3), metastatic lymph nodes (n=8), thymic tumors (n=6), germ cell tumors (n=1), teratoma (n=1), neuroendocrine tumor (n=1), retrosternal thyroid lesions (n=3), tracheal mass (n=1), esophageal mass (n=1), sarcoidosis (n=2) were the most. They were later sorted into groups based on their similarities.

The use of fluorine 18 FDG PET/CT in the diagnosis of a variety of mediastinal disorders is still debatable. PET/CT has been used in several studies to see if it can distinguish between benign and malignant mediastinal lesions, as well as between different forms of malignant primary mediastinal neoplasm. When a maximum standardized uptake value (SUVmax) equivalent value of 3.5 was utilized as a criterion in numerous investigations, malignant neoplasm showed much higher FDG uptake than benign lesions. SUVmax equivalent value of 3.4 is consistent with our current study research findings.

Another study, conducted by Tatci et al., looked at the efficiency of FDG PET/CT in distinguishing between malignant and benign mediastinaltumours. In the detection of malignancy, the sensitivity, specificity, accuracy, positive predictive value (PPV), and negative predictive value (NPV) were 90%, 55.17%, 67%, 50.94%, and 91.43%, respectively, and SUVmax was higher in malignant cases (p0.05) [6]. The sensitivity, specificity, positive predictive value (PPV)), and negative predictive value (NPV) in the detection of malignancy were 86.4, 87.5, 95 and 70% respectively, and SUVmax was higher in malignant patients (p0.001), which is agreed with our study.

In this study, the mean SUVmax of malignant mediastinal lesions was 8.83 ±4.62mL and 3.40± 1.17mL for benign mediastinal lesions. As a result, the mean SUVmax of malignant mediastinal tumors was substantially higher than that of benign tumors, according to our data, which is matching with Morita et al., [7].

Increased uptake in the thymus can potentially be caused by a primary thymic malignancy like a thymoma or thymic carcinoma, according to our findings. This is also supported by previous research (Guermazi et al.). Understanding the look of physiologic thymic uptake on PET, as well as the appearance of thymic malignancy and the potential distinctions between the two, is crucial [8].

Kargi et al., revealed that there are no unique features to discriminate sarcoidosis from lymphomas by PET-CT, which is consistent with our findings. Because PET-CT can be positive in both sarcoidosis and malignancy, the SUV max levels cannot distinguish between the two. However, lymph node involvement patterns, as well as spleen and bone marrow invasion, can aid in differential diagnosis and biopsy process definition. In cases of involvement of cervical, axillary, and abdominal lymph nodes, spleen, and BM by PET-CT, the pathological result is more likely to be consistent with lymphoma rather than sarcoidosis; nevertheless, aberrant pulmonary parenchymal findings are in favor of sarcoidosis diagnosis [9].

According to our findings, central bronchogenic carcinoma (35.7%) was the most common cancer in adults, followed by lymphoma (21.4%), both of which had a male propensity. This is consistent with the fact that, according to De Groot & Munden, lung cancer is the most frequent cancer worldwide and the leading cause of new cancer diagnoses. They claim that no instances are diagnosed in patients under the age of 20 and that men are more likely than women to develop lung cancer [10].

In line with our findings, Juanpere et al., and Thacker et al. found that lymphoma (20%) and thymoma (20%) were the most prevalent malignant mediastinal lesions in the adult population [4,11].

We found that PET/CT is the noninvasive imaging method for an appropriate diagnosis of T-

staging, in agreement with many research findings, because it gives critical data on mediastinal invasion, chest wall infiltration, and differentiation between peri-tumoral atelectasis and tumor.

Yu et al., indicated that there are a substantial number of false-positive and false-negative PET/CT findings in the evaluation of primary tumours, which is consistent with our current literature findings. Lymph node involvement by underlying inflammatory processes such as reaction to the presence of a lung tumour, obstructive pneumonia, anthracosis, or granulomatous inflammation are the most common causes of false-positive lymph nodes [12]. The most common cause of false positive varies by region. Histoplasmosis infection was the most common source of false positives in an Alabama research. In a German investigation, silicasis was discovered to be a cause of false positives. Sarcoidosis patients were frequently misdiagnosed as malignant lesions among the false-positive cases in our study.

Infections and other non-neoplastic disease processes such as thymic hyperplasia and fibrosing mediastinitis resulting in mediastinal inflammation may show increased FDG uptake and result in false positive interpretation, which is one of the most severe limitations of FDG PET/CT.

Other restrictions include the fact that the radioactive material has a very limited half-life, therefore appointments must be kept on time.

PET scans are a high-cost imaging technique that isn't widely available. In order to be diagnostically useful, they are frequently used in conjunction with other scans such as CT and MRI.

To establish whether the lesion is benign or malignant, a combination of clinical history, focality of FDG uptake on PET/CT, and morphologic characteristics on CT is required.

In addition, PET scans are less reliable in the following situations:

1- Tumors that are slow-growing and less aggressive may not absorb as much tracer.

2- Tumors that are less than 7mm in diameter may not be detectable.

3- High blood sugar levels can cause cells to absorb normal sugar rather than the radioactive sugar injected. To reduce the possibilities of this happening, patients are routinely fasted for 4 hours before a PET scan and their blood sugar levels are checked.

Furthermore, because SUV is influenced by a variety of biological and technical factors (e.g., body weight, serum glucose level, reconstruction methods, and noise), the SUV cut-off value should be taken with caution.

Finally, FDG PET/CT can be used in addition to traditional imaging approaches to assess benign and malignant mediastinal tumors. In patients with non-avid or low avid FDG lesions, PET/CT decreases the need for invasive diagnostic procedures. However, for a definitive diagnosis, confirmation tissue sample is required to confirm PET positive findings.

Conclusions:

FDG PET/CT is a complementary to conventional imaging methods for the evaluation of benign and malignant mediastinal masses. PET/CT reduces unnecessary invasive investigations for diagnosis in patients with non-avid or low avid FDG lesions. However confirmatory tissue sampling is required to confirm PET positive findings for the definite diagnosis.

References

1- LAURENT F., et al.: Mediastinal masses: Diagnostic approach. Eur. Radiol., 8 (7): 1148-59, 1998.

2- DUWE B.V., STERMAN D.H. and MUSANI A.I.: Tumors of the mediastinum. Chest, 128 (4): 2893-2909, 2005.

3- TAKAHIRO MORITA, et al.: Assessment of Mediastinal Tumors Using SUVmax and Volumetric Parameters on FDG-PET/CT. Asia Ocean J. Nucl. Med. Biol. Winter, 5 (1): 22-29, 2017.

4- JUANPERE S., CAÑETE N., ORTUÑO P., MARTÍNEZ S., SANCHEZ G. and BERNADO L.: A diagnostic approach to the mediastinal masses. Insights into Imaging, 4 (1): 29-52, 2013.

5- GRIFFETH L.K.: Use of PET/CT scanning in cancer patients: technical and practical considerations. Proceedings (Baylor University. Medical Center), 18 (4): 321-330. https://doi.org/10.1080/08998280.2005 . 11928089, 2005.

6- EBRU TATCI, et al.: The role of FDG PET/CT in evaluation of mediastinal masses and neurogenic tumors of chest wall. Int. J. Clin. Exp. Med., 8 (7): 11146-11152, 2015.

7- MORITA T., TATSUMI M., ISHIBASHI M., ISOHASHI K., KATO H., HONDA O. and HATAZAWA J.: Assessment of Mediastinal Tumors Using SUV(max) and Volumetric Parameters on FDG-PET/CT. Asia Oceania Journal of Nuclear Medicine & Biology, 5 (1): 22-29. https://doi.org/10.22038/aojnmb.2016.7996, 2017.

8- GUERMAZI A., BRICE P., DE KERVILER E., FERMÉ C., HENNEQUIN C., MEIGNIN V. and FRIJA J.: Extranodal Hodgkin Disease: Spectrum of Disease. RadioGraphics, 21 (1): 161-179. https://doi.org/10.1148/radiographics . 21.1.g01ja02161, 2001.

9- AHMET BÜLENT KARGI, et al.: The differential diagnostic role of PET-CT in sarcoidosis and lymphoma. The differential diagnostic role of PET-CT in sarcoidosis and lymphoma. Current Thoracic Surgery, 3 (1): 1-6, 2018.

10- DE GROOT P. and MUNDEN R.F.: Lung cancer epidemiology, risk factors, and prevention. Radiologic Clinics, 50 (5): 863-876, 2012.

11- THACKER P.G., MAHANI M.G., HEIDER A. & LEE E.Y.: Imaging evaluation of mediastinal masses in children and adults. Journal of Thoracic Imaging, 30 (4): 247-267, 2015.

12- YU C., XIA X., QIN C., SUN X., ZHANG Y. and LAN X.: Is SUVmax Helpful in the Differential Diagnosis of Enlarged Mediastinal Lymph Nodes? A Pilot Study. Contrast Media & Molecular Imaging, 2018, 3417190. https://doi.org/10.1155/2018/3417190, 2018.

دور التصوير الطبقى بالوزتيرون المنبعث المدمج مع الأشعة المقطعية فى تقييم آفات المنصف الحميدة والخبيثة

أثبت الباحثون أنه يمكن التفرقة بين آفات الحيزوم الحميدة والخبيثة بإستخدام التصوير الطبقى بالبوزتيرون المنبعث المدمج مع الأشعة المقطعية. فقد وجدوا أن التصوير الطبقى بالبوزتيرون المنبعث يتمتع بقدرات لا تضاهى لتحديد النشاط الأيضى للأنسجة ولكنها تحتاج إلى مساعدة معلومات تشريحية عالية الدقة لا تستطيع توفيرها لذلك تم دمجه مع الأشعة المقطعية.

وقد أثبتت بعد ذلك أن الحد الأقصى لقيمة الإمتصاص القياسية للأورام الجيزومية الخبيثة أكثر بشكل كبير من الحد الأقصى لقيمة الإمتصاص القياسية للأورام الحميدة وتم تحديد قيم محددة للتفرقة بينهما. ومن هنا فقد تم إعتبار أن الحد الأقصى لقيمة الإمتصاص القياسية وحدة قياس تصويرية واعدة لتقييم وتشخيص الأورام الحيزومية.

لما سبق من أبحاث فقد كان الهدف الأساسى من بحثنا هذا هو إختبار قدرة التصوير الطبقى بالبوزتيرون المنبعث المدمج مع الأشعة المقطعية وذلك بإستخدام الحد الأقصى لقيمة الإمتصاص القياسية كوحدة قياس للتفرقة بين الأنواع المختلفة من آفات الحيزوم الخبيثة والحميدة.

تم تقييم صور التصوير الطبقى البوزتيرونى الخاصة بثلاثين آفة/ورم خبيث وحميد بالحيزوم وذلك بعد أن ثبت نو عهم بتحليل الأنسجة وقد أخذ بالإعتبار كلا من سن ونوع المريض وموقع الورم بالحيزوم تحديداً.

تم تصنيف الحالات نسبة لنتيجة تحليل الأنسجة إلى المجمو عات الآتية : ليمفوما ٢٦٪، سرطان رئوى ١٠٪، ثانويات بالغدد الليمفاوية بالحيزوم ٢٦٪، أورام الغدة الزعترية ٢٠٪، أورام الخلية الجرثومية ٣.٣٪، أورام الغدد الصم العصبية ٣.٣٪ والورم المسخى ٣.٣٪ وأورام الغدة الدرقية خلف القص ٣.٣٪، أورام القصبة الهوائية ٣.٣٪، أورام البلعوم ٣.٣ والساركويد ٦.٦٪.

ومع ذلك، أظهرت نتائج الخاصة بالتصوير الطبقى البوزتيرونى وفقاً لقيم الإمتصاص القياسية للأورام أن ١٩ من حالة (٨٦.٤٪) تعتبر إيجابية حقيقية مع قيم الإمتصاص القياسية للأورام عالية بينما تعتبر ثلاث من ٢٢ (١٣.٦٪) حالات خبيثة سلبية كاذبة، ثبت أن حالاتين منهم من خلال التشريح المرضى هى ورم ثيم منخفض الخطورة والآخر كان ورم الغدد الليمفاوية منخفض الدرجة وكذلك لم يتمكن التصوير الطبقى البوزتيرونى من إكتشافها بدقة حيث أظهروا قيماً منخفضة للإمتصاص القياسية للأورام، موضحين ذلك، إنخفاض مستوى التصوير الطبقى البوزتيرونى لقيمة الإمتصاص القياسية أقل من ٣.٤ يمكن أن يكون مصدراً للتفسير الخاطئ للمسح فى هذه الأورام منخفضة الخلية كما تم إكتشافها فى سرطان الغدد الليمفاوية منخفض الدرجة وأورام التمثيل الغذائى منخفضة الجلو كوز كما تم إكتشافها فى الغدة الزعترية منخفضة المخاطر لأنها أقل عدوانية من الغدة الزعترية عالية الخطورة وتشبه الغدة الزعترية الطبيعية.

فى حين أن ٧ من ٨ مرضى يعتبرون سلبيين حقيقيين (٨٧.٥٪) مع قيم منخفضة أو معدومة منخفضة للإمتصاص القياسية للأورام بينما حالة واحدة فقط (١٢.٥٪) تعتبر إيجابية كاذبة مع قيمة قصوى عالية للإمتصاص القياسية للأورام أكثر من ٣.٤، وثبت لاحقاً أنها مرضية حالة من الساركويد. موضحاً أن الخلايا الالتهابية مثل العدلات والضامة المنشطة والخلايا الليمفاوية زادت من امتصاص مادة FDG، مما تسبب فى تراكم المادة المشعة فى العمليات الالتهابية والمعدية.

وبناءا على ما سبق نوصى بالقيام بأبحاث مكملة فى المستقبل على أن تضمن عدد حالات أكبر مع التركيز على نوعيات معينة من آفات الحيزوم الخبيثة والحميدة وذلك الثبات ما وصلنا اليه أو نفيه.