Editorial, PET/CT.

Does PET-CT has Added Value in Diagnosis of Multiple Myeloma

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ABSTRACT:

Multiple myeloma is considered the most common hematological malignancy affecting bones with an increased incidence in the few last decades. Treatment of multiple myeloma is challenging and witnessed significant advancement and introduction of new lines of therapy aiming for attainment of complete remission or achieving minimal residual disease. Early detection of treatment response, either by disease regression or progression remains the main goal to pursue. Fluorine-18-fluorodeoxyglucose positron emission tomography (FDG-PET) has emerged as a powerful imaging tool in the initial staging and therapy evaluation. PET-CT shows comparative results to other imaging modalities. PET-CT also proved to the modality of choice in the detection of extra-medullary lesions. PET-CT is now a preferable diagnostic modality for the assessment of therapy response by change in FDG avidity in myelomatous lesions and can also detect minimal residual disease. PET-CT shows early negative myelomatous lesions after induction of chemotherapy indicates better survival and lesser rate of relapse. SUV max and number of focal lesions can have a predictive value and can be correlated to disease aggressiveness. Conclusion: PET/ CT is promising technique in diagnosis of Multiple Myeloma and detection of early relapse and can have a predictive value which is correlated with disease aggressiveness

Key words: Multiple Myeloma- PET/ CT- treatment response.

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INTRODUCTION:

Multiple Myeloma (MM) is classified as the second most common hematological malignancy, constituting 10-15% of all blood malignancy and 1-2% of all diagnosed malignancy [1][2]. Based on Global Cancer Observatory statistics, MM represented 0.9% of cancer diagnosis in 2018, with global increase in its incidence by 126 % from 1990 to 2016 [3]**.** Death from MM represents 1.1 % of cases present with localized disease [1].

Role of nuclear medicine in multiple myeloma:

$^{99\text{-}m}$Tc-labelled Sestamibi scan:

$^{99\text{-}m}$Tc 2 methoxy-isobutyl-isonitrile (^{99m}Tc-MIBI), is a technetium bound tracer that is localized in the abnormal plasma cells and shows high sensitivity (up to 90 %) and high specificity (up to 83%) [4]. It was found that MIBI can detected more lesions than WBXR. Compared to MRI; it shows lower sensitivity in detecting spinal lesions [5]. In a study done on 21 patients with multiple myeloma, MIBI scan detected 14 patients out of 21 with active disease [6].

PET-CT imaging in multiple myeloma:

Fluorine-18-fluorodeoxyglucose positron emission tomography (FDG-PET) has emerged as a powerful imaging tool in the initial staging and therapy evaluation [7]. PET-CT shows high sensitivity compared to WBXR and MRI expect for lesions in the spine that were better detected by MRI. PET- CT also proved to be the modality of choice in the detection of extra-medullary lesions. In a study done by **Nanni et al**, PET-CT detected more lytic lesions than WBXR in 16 patients out of 28. When compared to MRI, PET-CT detected more lytic lesions in 7 patients [8].

PET-CT can detect early treatment response and minimal residual disease [9]. **Dimitrakopoulou-Strauss et al.** have investigated the value of follow up PET-CT after the first cycle of chemotherapy in 19 patients with MM. It was concluded in this study that short term follow up PET-CT is recommended as a powerful prognostic tool [10]. In a study done by **Basha et al**, 56 patients were enrolled for pre and post-therapy assessment where both MRI and PET-CT were done. WB-MRI showed higher sensitivity than PET-CT in initial assessment (94% Vs75%), while in post-therapy assessment PET-CT showed higher specificity (86% Vs 43%) compared to MRI [11].

The value of FDG uptake represented by SUV max is found to be correlated with prognosis and therapy response [12]. **Patriarca et al** in a study to evaluate pre and post bone marrow transplant in 54 patients. SUV max was higher than cut off point of 4.1 in 39%. Follow up PET-CT confirmed poor survival for patient failed to achieve negative pre-transplant PET-CT [13]. It was also proved that number of focal lesions can be correlated to disease aggressiveness at proved by **Park et al** in a study included 59 patients with MM. No significant difference was found in patients with SUV max >4 or less, however sigfnicant difference was found in those with more than 3 focal lesions [14].

CONCLUSIONS:

PET/ CT can be used in diagnosis of Multiple Myeloma**.** Also it is helpful in assessment of response to chemotherapy.

REFERENCES:

1- Padala SA, Barsouk A, Barsouk A, et al. Epidemiology, Staging, and Management of Multiple Myeloma. Med Sci (Basel).;9(1):3. 2021. 20. doi:10.3390/medsci9010003 **2021**.

2**- Charliński G, and Jurczyszyn A.** Non-secretory multiple myeloma: Diagnosis and management. Adv. Clin. Exp.Med.;31(1):95-100. doi:10.17219/acem/141455, **2022**.

3- **Bray F, Ferlay J, Soerjomataram I. et al.** Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries [published correction appears in CA. Cancer J. Clin. 2020 Jul;70(4):313]. CACancerJ.Clin.;68(6):394 -424. doi:10.3322/caac.21492, **2018**.

4- **Balleari E, Villa G, Garrè S, et al**. Technetium-99m-sestamibi scintigraphy in multiple myeloma and related gammopathies: a useful tool for the identification and follow-up of myeloma bone disease. Haematologica.;86(1):78-84, **2001**.

5- **Mirzaei S, Filipits M, Keck A, et al.** Comparison of Technetium-99m-MIBI imaging with MRI for detection of spine involvement in patients with multiple myeloma. BMC Nucl. Med. ;3(1):2., 2003 Dec 11. doi:10.1186/1471-2385-3-2, **2003.**

6- **Tirovola E, Biassoni, L, Britton, K. et al.** The use of 99mTc-MIBI scanning in multiple myeloma. Br J Cancer 74, 1815–1820.

https://doi.org/10.1038/bjc.1996.636, **1996**.

7- **Caldarella C, Treglia G, Isgrò MA. et al.** The role of fluorine-18-fluorodeoxyglucose positron emission tomography in evaluating the response to treatment in patients with multiplemyeloma. Int.J.Mol. Imaging, doi:10.1155/2012/175803.

8- Nanni C, Zamagni E, Farsad M, et al. Role of 18F-FDG PET/CT in the assessment of bone involvement in newly diagnosed multiple myeloma: preliminary results. Eur. J. Nucl. Med. Mol.Imaging.;33(5):525-531. doi:10.1007/s00259-005-0004-3 **2006**.

9- **Cavo M, Terpos E, Nanni C, et al.** Role of 18F-FDG PET/CT in the diagnosis and management of multiple myeloma and other plasma cell disorders: a consensus statement by the International Myeloma Working Group. Lancet Oncol.;18(4):e206-**e2017**. doi:10.1016/S1470-2045(17)30189-4 **2017**.

10- **Dimitrakopoulou- Strauss A, Hoffmann M, Bergner R. et al.** Prediction of progression-free survival in patients with multiple myeloma following anthracycline-based chemotherapy based on dynamic FDG-PET. Clin. Nucl. Med. ;34(9):576-58, 2009.doi:10.1097/RLU.0b013e3181b06bc5 **2009**.

11- **Basha MAA, Hamed MAG, Refaat R, et al.** Diagnostic performance of 18F-FDG PET/CT and whole-body MRI before and early after treatment of multiple myeloma: a prospective comparative study. Jpn. J. Radiol.;36(6):382-393, doi:10.1007/s11604-018-0738-z **2018**.

12- **Beksac M, Gunduz M, Ozen M, et al.** Impact of PET-CT response on survival parameters following autologous stem cell transplantation among patients with multiple myeloma: comparison of two cut-off values. Blood.;124(21):3983, **2014**.

13- **Patriarca F, Carobolante F, Zamagni E, et al.** The role of positron emission tomography with 18F-fluorodeoxyglucose integrated with computed tomography in the evaluation of patients with multiple myeloma undergoing allogeneic stem cell transplantation. Biol. Blood Marrow Transplant.;21(6):1068-1073,2015 doi:10.1016/j.bbmt.2015.03.001 **2015**.

14- Park S, Lee SJ, Chang WJ, et al. Positive correlation between baseline PET or PET/CT findings and clinical parameters in multiple myeloma patients. Acta Haematol.;131(4):193-199, 2014. doi:10.1159/000354839 **2014.**