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Mini Review

The Role of PET/CT Imaging in Pulmonary Sarcoidosis

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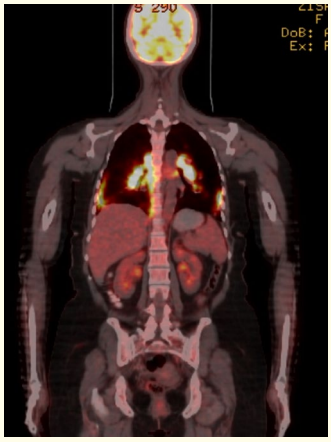
Sarcoidosis is a non- necrotising, noncaseating granulomatous disease. In many societies, the frequency and the course are different. The incidence is 15 - 40 per 100000 per year. It is mostly caused by respiratory symptoms except systemic symptoms such as weakness, weight loss, fever. Change of clinical course and prognosis; acute or chronic onset, number of organs involved, presence or absence of granulomas, and the origin of the patient and regional factors. Sarcoidosis is the most common skin and soft skin lesions in extrapulmonary involvement. Acute onset usually heals spontaneously, progressive fibrosis may be seen in the insidious disease. Corticosteroids are still the main treatment option.Its etiology is unknown and holds especially upper airways and intrathoracic organs. In the sarcoidosis primer stage, in the follow-up of patients, identification of diagnosis and treatment strategies chest X-ray, contrast-enhanced thorax CT and Ga-67 scintigraphy imaging studies have an important role Diagnosis of pulmonary sarcoidosis requires a compatible clinical picture supported by radiologic and pathologic data [1,2]. The serum level of angiotensin-converting enzyme (ACE) produced by sarcoid granulomas is commonly used for evaluation and planning of treatment. However, the ACE level is above the normal limits in only about 60% of patients with chronic sarcoidosis and unrelated to the disease severity, progression, clinical course, and response to therapy [3,4].

Diagnostic methods such as transbronchial lung, scalene lymph node, skin or peripheral lymph node biopsy, mediastinoscopy and open lung biopsy are used for diagnosis of sarcoidosis.Transbronchial biopsy is the most commonly used diagnostic method in suspected cases of sarcoidosis. But lymph node nodal excisional biopsy or mediastinoscopy is much more likely to be diagnosed [2-5].

It can hold many organs, most commonly the lungs. Positron emission tomography (PET/CT) is an imaging technique based on the principle of increased uptake and metabolism of glucose by malignant or inflammatory cells. In recent years, PET/CT has been used increasingly in the diagnosis of thoracic malignancies, staging, determination of distant organ proliferation and evaluation of response after chemotherapy. Lung cancer is at the beginning of PET/CT applications in terms of frequency. There are many studies that show the efficacy of PET/CT, both in terms of diagnosis and treatment planning [5]. However, Fluorodeoxyglucose (FDG) is not a cancer-specific agent, and false positive findings in benign diseases have been reported. Infectious diseases (mycobacterial, fungal, bacterial infection), sarcoidosis, radiation pneumonitis and post-operative surgical conditions have shown intense uptake on PET/CT scan [6]. There are no definitive laboratory tests showing active sarcoidosis in sarcoidosis patients. The most commonly used parameters in follow-up of disease progression in pulmonary involvement are FVC and DLCO. However, these parameters do not work in terms of follow-up and do not provide information on reversible granulomas or irreversible fibrotic nodules. High Resolution Computerized Tomography (HRCT) bilateral hilar in the lung provides detailed information on the structural changes in the lung, such as lymphadenopathy and parenchymal infiltration, and correlates with the pulmonary function test parameters. However, HRCT can not provide information on the underlying metabolic status. It has been shown to be useful in PET/CT with high inflammatory activity in sarcoidosis cases. In addition, inflammatory markers have been reported to correlate with increased FDG uptake [5-7]. It is tempting to speculate that the elevated FDG uptake in patients with fibrotic changes, including honeycombing, might be a reflection of increased fibroblast metabolism and not due to inflammatory activity. In contrast to IPF patients, the majority of the pulmonary PET-positive sarcoidosis patients with fibrosis on HRCT in our population showed extrathoracic PET-positive findings (82%) and increased serological inflammatory markers (73%). Furthermore, mean SUVmax [1,3,6,7]

in these patients was higher than reported by two studies with IPF patient [8,9]. The advantage of FDG-PET/CT is that it can visualize FDG accumulation in activated inflammatory cells and simultaneously provide whole-body PET and CT images. FDG accumulation is the result of increased glucose metabolism in the activated leukocytes. Activated leukocytes, macrophages, and CD4 T lymphocytes express glucose transporters, especially glucose transporters-1, which is mainly responsible for FDG transport and accumulation into the cell [10-12].

ACCP (American College of Chest Physicians) recommends PET, for undiagnosed solitary pulmonary nodules larger than 8 mm in diameter with low to moderate expectations of malignancy. F-18 FDG PET imaging is a safe method for the evaluation of lung lesions, with high-sensitivity, good spatial and contrast resolution [13]. Nevertheless, sarcoidosis, Wegener granulomatosis, aspergilosis and tuberculosis can mimic malignancies with their SUVmax higher than 2,5. Sarcoidosis and lymphomas both effect the lymphoid system and have nonspecific PET features which complicates the differential diagnosis of these two diseases. Similarly, sarcoidosis can mimic pulmonary malignancies because of parenchymal lesions and concomitant lymphadenopathies with high SUVmax values (Figure 1) [14]. PET/CT, a molecular functional imaging technique, has become the most important nuclear medicine imaging modality in the field of malignancies. Sarcoidosis can be a pitfall in PET/CT imaging, and may lead to false-positive results of malignancy. Not every PET-positive lesion represents malignancy, and a tissue biopsy is mandatory to confirm the diagnosis. A high standardized uptake value on PET could be misconstrued as indicative of malignancy, and clinical factors, patterns of FDG uptake, and newer PET radiotracers such as 18-fluoromethyltyrosine (18F-FMT) may aid in distinguishing this benign disease from malignant tumor [15,16].



Conclusion

The PET/CT, if the lymph node SUV-max values are high or involvement in the lung parenchyma is involved, it can be predicted that the disease may be progressive and treatment can be planned accordingly for sarcoidosis. Caution should be exercised in distinguishing malignant lesions of the PET/CT positive lesions in this chronic multisystem disease. But, this problem can be reduced to the worst with some new and up-to-date imaging techniques.

Bibliography

1. Ramachandraiah V., *et al*. "Pulmonary sarcoidosis: an update". *Postgraduate Medical* 129.1 (2017): 149-158.

2. Raju S., *et al*. "Chest CT Signs in Pulmonary Disease: A Pictorial Review". *Chest* 151.6 (2017): 1356-1374.

3. Hunninghake GW, *et al*. "ATS/ERS/ WASOG statement on sarcoidosis. American Thoracic Society/European Respiratory Society/ World Association of sarcoidosis and other granulomatous disorders". *Sarcoidosis, Vasculitis and Diffuse Lung Diseases* 16.2 (1999): 149-173.

4. McGrath DS, *et al*. "Ace gene I/D polymorphism and sarcoidosis pulmonary disease severity". *American Journal of Respiratory and Critical Care Medicine* 164.2 (2001): 197-201.

5. YooIe R., *et al*. "Prognostic value of SUVmax and metabolic tumor volume on 18F-FDG PET/CT in early stagen on-small cell lung cancer patients without LN metastasis". *Bio-Medical Materials and Engineering* 24.6 (2014): 3091-3103.

6. Kostakoglu L., *et al*. "Clinical role of FDG PET in evalutaion of cancer patients". RadioGraphics 23 (2003): 315-340.

7. Re´my LM., *et al*. "Severity of pulmonary involvement and 18F-FDG PET activity in sarcoidosis". *Respiratory Medicine* 107.3 (2013): 439-447.

8. Umeda Y., *et al*. "Dual-time-point 18F-FDG PET imaging for diagnosis of disease type and disease activity in patients with idiopathic interstitial pneumonia". *European Journal of Nuclear Medicine and Molecular Imaging* 36.7 (2009): 1121-1130.

9. Groves AM., *et al*. "Idiopathic pulmonary fibrosis and diffuse parenchymal lung disease: implications from initial experience with 18F-FDG PET/CT". *Journal of Nuclear Medicine* 50.4 (2009): 538-545.

10. Mochizuk T., *et al*. "FDG uptake and glucose transporter subtype expressions in experimental tumor and inflammation models". *Journal of Nuclear Medicine* 42.10 (2001): 1551-1555.

11. Rosen Y. "Pathology of sarcoidosis". *Seminars in Respiratory and Critical Care Medicine* 28.1 (2007): 36-52.

12. Keijsers RGM., *et al*. "Imaging the inflammatory activity of sarcoidosis". *European Respiratory Journal* 41.3 (2013): 743-751.

13. Basu S., *et al*. "Clinical Utility of FDG-PET and PET/CT in Non-malignant Thoracic Disorders". *Molecular Imaging and Biology* 13.6 (2011): 1051-1060.

14. Krüger S., *et al*. "Use of integrated FDG-PET/CT in sarcoidosis". *Clinical Imaging* 32.4 (2008): 269-273.

15. Jerusalem G., *et al*. "Positron emission tomography imaging for lymphoma". *Current Opinion in Oncology* 17.5 (2005): 441-445.

16. Alavi A., *et al*. "Positron emission tomography imaging in nonmalignant thoracic disorders". *Seminars in Nuclear Medicine* 32.4 (2002): 293-321.

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