Medical and Research Publications
International Open Access

Review Article **Journal of MAR Oncology (Volume 4 Issue 3)**

Pathological Pulmonary Uptake by Pet/Ct After Covid Vaccination: Literature Review on The Purpose of a Case

Milagros Rodriguez Zavaleta* [1]. Wuilbert rodríguez Pantigoso [2]. Rossana Elvira Morales Guzmán-Barrón [3]

1 MD Radiation Oncologist. Peruvian Institute of Oncology and Radiotherapy. Master of Science in Cayetano Heredia University.

2. PhD Medical Oncologist. Peruvian Institute of Oncology and Radiotherapy.

3.PhD Nuclear Radiologist. National Institute of Neoplastic Diseases. Professor in Universidad Cayetano Heredia.

Corresponding Author: Milagros Rodriguez Zavaleta, MD Radiation Oncologist. Peruvian Institute of Oncology and Radiotherapy. Master of Science in Cayetano Heredia University.

Received Date: July 08, 2022

Published Date: August 01, 2022

Abstract

A massive vaccination due to the COVID 19 pandemic introduced a new challenge for oncological diagnosis. We present a clinical case associated with SARS-COV2 vaccination, a 71-year-old man with a history of heavy smoking who presented a lung lesion with difficult access to biopsy. Due to its radiological and PET/CT characteristics, the possibility of lung cancer was considered as the first option. The patient underwent open thoracotomy and surgical resection. The pathology study was negative for neoplasia. Retrospectively, in the clinical history, vaccination for COVID 19 is reported 5 weeks before the acquisition of the exam.

Key words*: COVID vaccine, PET/CT, lung cancer, chest CT*

Introduction

The SARS-COV-2 virus pandemic, which began at the end of 2019, led to a global mass vaccination with emergency authorization by the FDA (Food and Drug Administration) and the EMA (European Medical Agency). Vaccines associated with the virus's messenger RNA and DNA copied from the virus were approved.

Inflammatory reactions have been described at the level of the ipsilateral lymph regions to this vaccine, reporting that they could occur in 0.3% of the exposed population and with greater probability in vaccines based on viral RNA **[**1**]**. Despite this, several reports could indicate that the incidence of hypermetabolic lymphadenopathies by PET/CT of vaccinated patients could be much higher.

As part of the disease monitoring of cancer patients, it is routine to use F-18 fluorodeoxyglucose Positron Emission Computed Tomography (FDG PET/CT), which facilitates early detection and progression in most oncological pathologies. Despite this, it is also sensitive to other causes of cell hyperproliferation such as infections, inflammatory processes and acute autoimmune responses **[**2**]**. In the PET/CT study, the causes of false positives, such as vaccination by COVID 19, must be taken into account.

Description of the Clinical Case

A 71-year-old male patient from Lima - Perú, with a history of heavy smoking (60 cigarettes/day) for 40 years, high blood pressure, bronchial asthma, and hypothyroidism. He presents with respiratory symptoms

of progressive appearance, which is why auxiliary tests are carried out. Multislice axial tomography of the chest with intravenous contrast was acquired, showing at the level of the right upper lobe, towards the medial rim of the anterior apical segment, the presence of an expansive lesion with a neoformative appearance, solid, necrotic, measuring 46 x 31 x 65 mm, showing spiculated borders and contact and loss of interface with mediastinal pleura. No significant adenopathies. Serum tumor markers are requested: CYFRA 21 and NSE with results of 1.06 ng/ml and 8.48 ng/ml, respectively. An attempt was made to acquire a biopsy by fiberoptic bronchoscopy, but the procedure was reported as unsuccessful due to poor respiratory dynamics and desaturation, for which PET/CT was indicated. As findings, a cavitated hypermetabolic paramediastinal lesion is reported in the upper lobe of the right lung, with maximum SUV of 5.0, suggestive of active neoformative disease. In addition, mediastinal lymph nodes with increased metabolism at the lower right subaortic paratracheal level and in the right pulmonary hilum, with a maximum SUV of up to 2.6, findings suspected of corresponding to secondary disease. Rest without alterations. (Fig. 1 and 2).

Figure 1

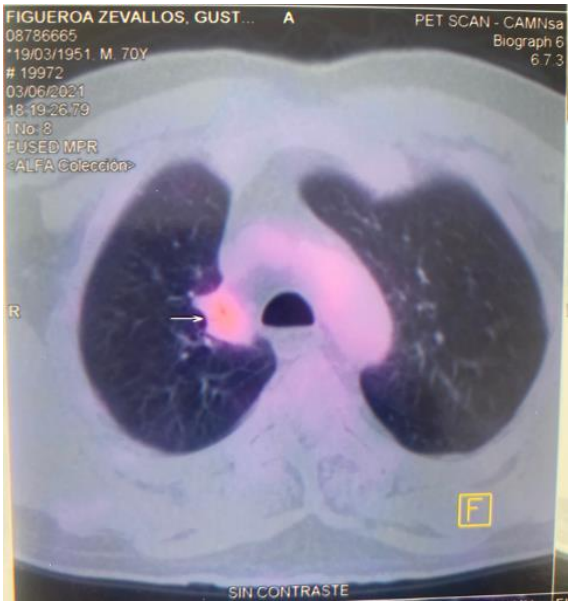

Figure 2

Discussion

Time is still needed to show the full impact that COVID 19 vaccines could have on PET/CT exams, however, the historical evolution of vaccines indicates that there is a stimulation of the immune system that could suggest false positives. **[**3**]**

In addition, these lymphatic reactions have been evidenced in all subtypes of vaccines against COVID 19 (both RNA and DNA). With the use of the Moderna and Pfizer vaccines, it was reported to have about 11% of patients with ipsilateral lymphadenopathy and to last up to 4 days later. This event was also reported to be less common in adults older than 65 years.**[**4**]**

Vaccines can biologically cause inflammation of the lymph nodes, which results in an accumulation of macrophages, which increases the metabolism captured in PET/CT. Inflammatory responses in different patterns have been described after influenza vaccines and even during the H1N1 pandemic.

There have been reports of PET/CT uptake in the spleen, evidenced not only by FDG but also by F-choline, Ga-DOTATE, and C-choline.**[**5**]**

The keys to determining the positivity of a PET/CT versus an inflammatory reaction lie in not only considering the size or morphology of the capturing lesion, but also including the clinical history and vaccination history, recommending postponing the study for 2 to 4 weeks. **[**3**]**

One study evaluated cancer patients recently exposed to a vaccine 14 days before PET/CT acquisition and concluded that we could observe false positives in up to 20% of patients with this history **[**2**]**.

Cohen et al. reported the follow-up of a cohort of 951 patients where positive PET/CT results were compared between vaccinated and non-vaccinated patients in different tumor types. As a result, it was obtained that 46% of vaccinated patients had hypermetabolic uptake by PET/CT, of which 17% were classified as malignant uptake and 15% as doubtful. Furthermore, this frequency increased with booster placement where it was statistically higher compared to after the first dose. They used the CHAID algorithm to conclude and propose that the highest incidence of false positives occurs between day 6 to day 12 after vaccination and the lowest incidence in the first 5 days of vaccination and after week 3 where only the 7% could have high uptake on PET/CT **[**6**]**

Conclusions

Multiple efforts have been reported to understand and generate strategic clinical guidelines that allow an adequate interpretation of the impact that the vaccine against COVID 19 would have and how it could alter some clinical tests in patients, especially in vulnerable ones such as cancer patients. Vaccination for this group of patients serves to protect this subgroup, however, the history of vaccination must be taken into account to properly interpret the tests. It is proposed, whenever possible, to take into account postponing the examination 6 weeks after vaccination, considering this clinical case. Despite this, false positives may occur that will require a multidisciplinary team to be able to reach an adequate conclusion and a good diagnosis of the patient.

References

1. Landete E, Gómez-Fernández I, González-Gascón-y-Marín I, et al (2021) Hypermetabolic abdominal and cervical lymph nodes micking Hodgkin lymphoma relapse on FDG PET/CT after adenovirus-vectored COVID-19 vaccine. Human Vaccines and Immunotherapeutics 17:5129–5132

2. Schapiro R, Moncayo VM, Meisel JL (2021) Case report of lymph node activation mimicking cancer progression: A false positive F18 FDG PET CT after COVID-19 vaccination. Current Problems in Cancer: Case Reports 4:100092

3. Shah S, Wagner T, Nathan M, Szyszko T (2021) COVID-19 vaccine-related lymph node activation-patterns of uptake on PET-CT. London

4. McIntosh LJ, Bankier AA, Vijayaraghavan GR, Licho R, Rosen MP (2021) COVID-19 vaccination-related uptake on FDG PET/CT: An emerging dilemma and suggestions for management. American Journal of Roentgenology 217:975–983

5. Minamimoto R, Kiyomatsu T (2021) Effects of COVID-19 vaccination on FDG-PET/CT imaging: A literature review. Global Health & Medicine 3:129–133

6. Cohen D, Krauthammer SH, Wolf I, Even-Sapir E (2021) Hypermetabolic lymphadenopathy following administration of BNT162b2 mRNA Covid-19 vaccine: incidence assessed by [18 F]FDG PET-CT and relevance to study interpretation. European journal of Nuclear medicine and Molecular Imaging 48:1854–1863