Primary Conjunctival Mantle Cell Lymphoma on ^{18}F-FDG PET/CT Scan: A Case Report

Jehan Maher Mohamed Amin L. Abdelkawi, MD, MMHoA

Nuclear Medicine Section and PET/CT Center, Cardinal Santos Medical Center
E-mail address: jabdelkawi@gmail.com

ABSTRACT

^{18}F-Fluorodeoxyglucose (^{18}F-FDG) PET/CT scan is a vital imaging modality in the majority of oncologic situations. It is proven useful in staging, management and monitoring of lymphomas. Numerous subtypes of lymphomas exist; however, we present the first documented case of a 56-year-old, Filipino, male patient who is diagnosed with mantle cell lymphoma of the conjunctiva (MCL). MCL is an extremely rare type of extranodal non-Hodgkin lymphoma and has an aggressive nature with an estimated incidence of 2-4/1,000,000. This case highlights the critical role that PET/CT scans play in directing treatment decisions and monitoring the response of conjunctival MCL to therapy.

***Keywords**: case report; non-Hodgkin lymphoma; mantle cell conjunctival lymphoma; positron emission tomography; fluorodeoxyglucose*

INTRODUCTION

Conjunctival mantle cell lymphoma (MCL) is a rare type of non-Hodgkin lymphoma arising from the conjunctiva, accompanied by the abnormal and erratic growth of lymphocytes. Lymphocytes are seen abundantly in lymphoid tissues and proliferate in the presence of autoimmune diseases, infection and in malignancy. Lymphoma with extranodal involvement is mostly seen in the bone marrow, spleen, gastrointestinal tract, and Waldeyer's ring [1, 2, 3]. Other distant extranodal areas such as the breast, skin, and ocular adnexal region, is exceptionally uncommon [4].

The typical affected site of involvement in eye lymphomas are observed in the orbit (90%), followed by the lacrimal gland (50%) and the eyelids (50%) [5,6]. Conjunctival involvement in MCL is extremely infrequent with an estimated incidence of 2-4/1,000,000 worldwide.

MCL, regardless of subtype, presents in the fifth to seventh decade of life as a painless salmon-pink patch or growth in the bulbar conjunctiva. Other symptoms include redness, irritation, or tearing and may initially be misdiagnosed as conjunctivitis. It usually has a male predominance and is associated with stage III or IV disease. Given its obscurity, there is limited literature detailing the clinical presentation, diagnosis, and management of this condition. PET/CT imaging has shown promise in the staging and monitoring of various lymphomas, but its role in conjunctival mantle cell lymphoma remains less explored.

CASE DESCRIPTION

Patient Information

A 56-year-old, Filipino, male patient presented with eye dryness and foreign body sensation on both eyes which was not relieved with topical ointment for 3 months. He had no associated complaints of fever, night sweats, or weight loss >10% body weight over the last 6 months. On follow-up consult with an ophthalmologist, clinical examination with direct visualization using a slit-lamp revealed fleshy salmon-colored lesion in the conjunctivae of both eyes and no other suspicious findings.

Excision biopsy of the conjunctival masses was subsequently done, and a histopathological analysis confirmed the diagnosis of conjunctival mantle cell

lymphoma. Further immunohistochemical staining demonstrated positivity for CD5, CD19, and CD20. Then, a negative result came from fCD23, confirming the diagnosis of mantle cell lymphoma.

Patient underwent surveillance whole-body ^{18}F-FDG PET/CT Scan and bone marrow aspiration biopsy. The working diagnosis was stage III using Ann Arbor staging and stage T1N0M1a using the American Joint Committee on Cancer (AJCC) TNM-based orbital lymphoma staging system [11]. Patient received chemotherapy with targeted immunotherapy (3 cycles of Rituximab and Bendamustine) over a period of 6 weeks as part of the treatment regimen. A follow-up ^{18}F-FDG PET/CT scan for treatment evaluation after a 2-month interval showed favorable response to treatment; hence, the remaining cycle of combination chemotherapy and targeted immunotherapy was completed. Treatment was continued for 3 years with a 6-month interval of immunotherapy. Another ^{18}F-FDG PET/CT scan for disease monitoring was subsequently done 4 years since the commencement of treatment.

DIAGNOSTIC ASSESSMENT

A whole body ^{18}F-FDG PET/CT scan was performed 6 days following tumor excision to determine the extent of disease involvement. The scan revealed soft tissue thickening in the left preseptal region with a maximal thickness of 0.6 cm on CT and FDG uptake with a maximum Standardized Uptake Value (SUVmax) of 3.7 on PET (Figure 1).

The right preseptal region also exhibited increased FDG uptake with an SUVmax of 4.1 but with no associated gross lesion on CT scan (Figure 2). These findings were consistent with conjunctival mantle cell lymphoma.

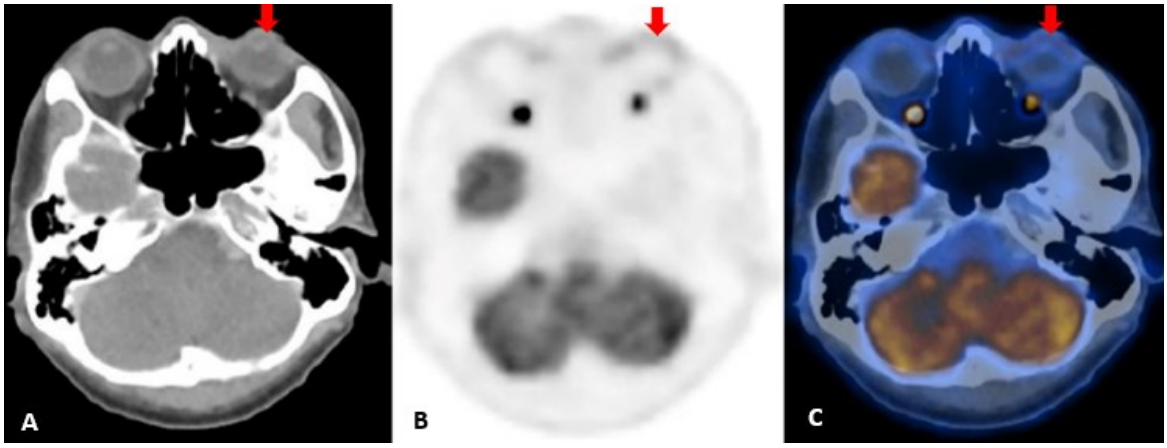

FIGURE 1. Axial view of the orbit showing the (A) CT, (B) PET, and (C) Fused PET/CT images of the patient's first whole-body PET/CT scan with emphasis on the left preseptal region (red arrows).

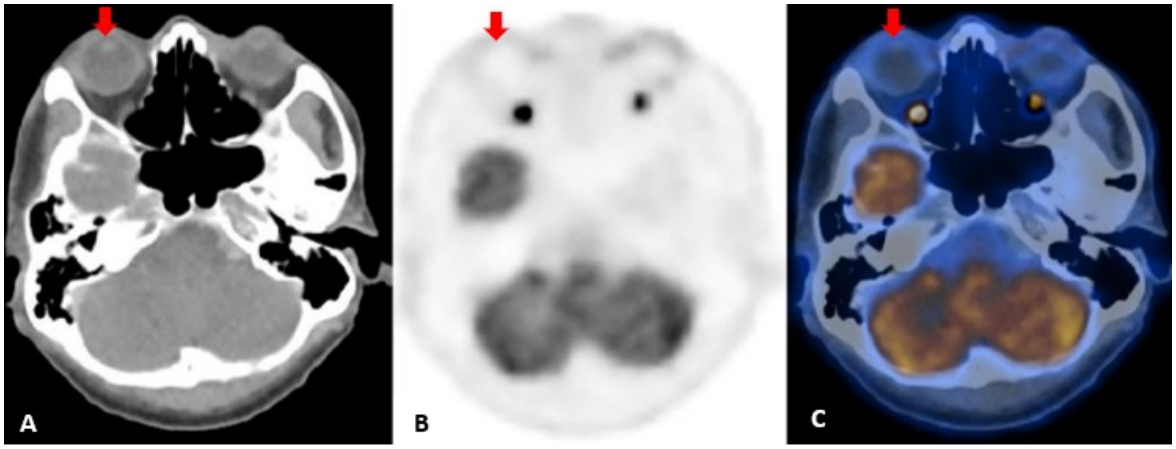

FIGURE 2. Axial view of the orbit showing the (A) CT, (B) PET, and (C) Fused PET/CT images of the patient's first whole-body PET/CT scan with emphasis on the right preseptal region (red arrows).

Below is the maximum intensity projection (MIP) image, which showed no pathological FDG uptake in the lymph nodes within the neck, chest, abdomen, inguinal and popliteal regions (Figure 3).

A thorough systemic evaluation showed splenomegaly with an index of 899 and physiologic FDG activity. No hepatomegaly seen (Figure 4).

THERAPEUTIC INTERVENTION:

The patient was started on targeted immunotherapy consisting of Rituximab 100mg/vial. Regular follow-up was planned to assess treatment response and monitor for any adverse effects. A follow-up whole-body PET/CT scan was done 2 weeks after the last cycle of Rituximab for restaging and evaluation of treatment response. Complete gross resolution of the soft tissue thickening in the left preseptal region and interval decrease in FDG-avidity of both preseptal regions (Figure 5).

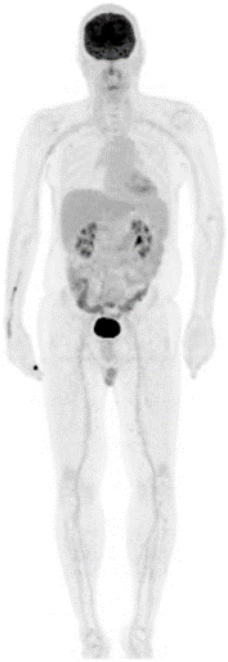

FIGURE 3. Maximum intensity projection (MIP) image of the first whole-body PET/CT scan.

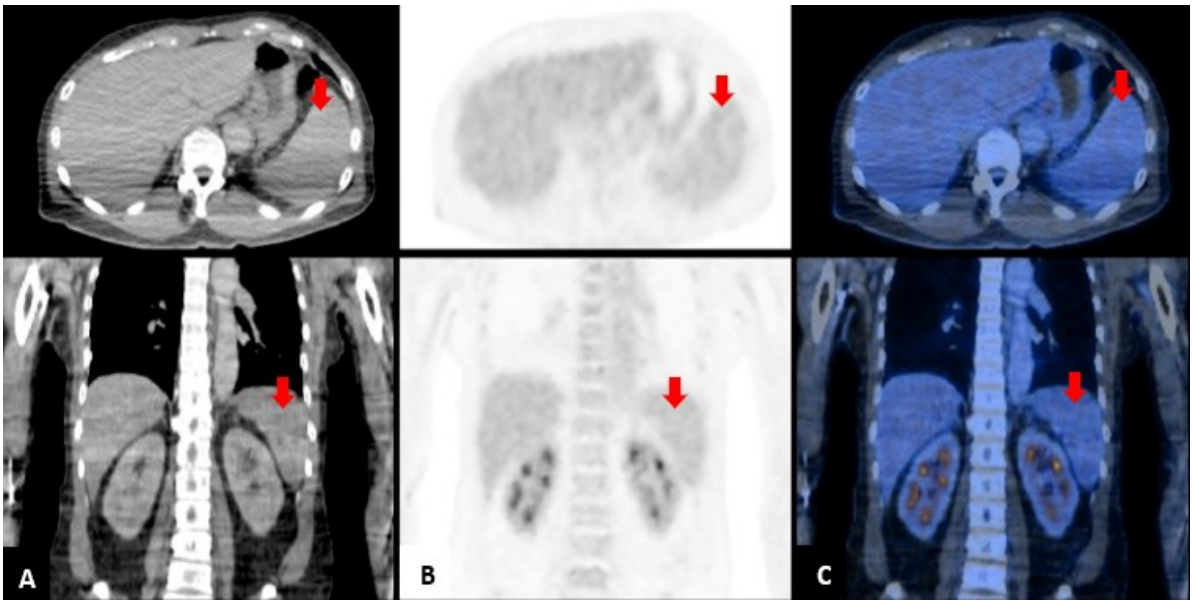

FIGURE 4. Axial and coronal view showing the (A) CT, (B) PET, and (C) fused PET/CT images of the patient's first whole-body PET/CT scan with emphasis on the liver and spleen (red arrows).

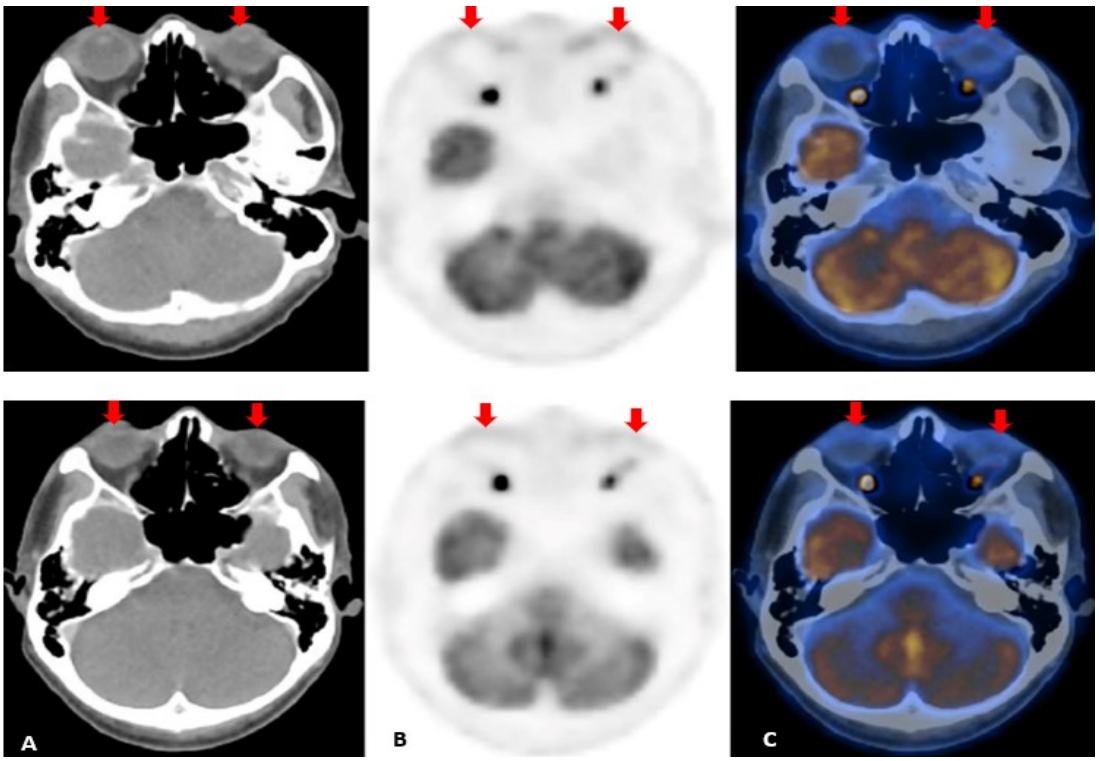

FIGURE 5. Axial view of the orbit showing the (A) CT, (B) PET, and (C) fused PET/CT images of the follow-up whole-body PET/CT scan with emphasis on the preseptal regions (red arrows). First PET/CT scan (1st row) and follow-up PET/CT scan (2nd row).

The spleen still exhibited physiologic FDG activity but was normal in size with an index of 445 (Figure 6).

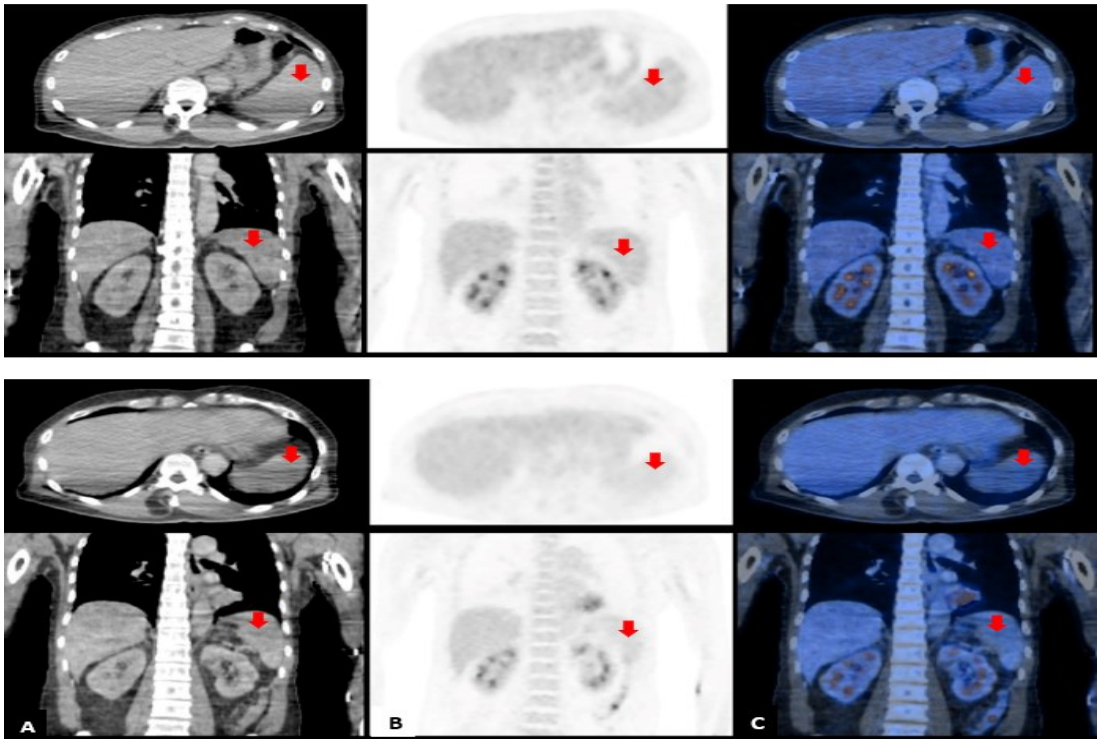

FIGURE 6. Axial and coronal view showing the (A) CT, (B) PET, and (C) fused PET/CT images of the patient's second whole-body PET/CT scan with emphasis on the spleen (red arrows). First PET/CT scan (1st row) and follow-up PET/CT scan (2nd row).

FOLLOW-UP AND OUTCOMES:

Rituximab was continued with an interval of 6 months as part of the treatment regimen. After a 4-year interval, a follow-up PET/CT scan showed significant decrease in the left preseptal soft tissue thickening. Both preseptal regions showed symmetric FDG activity with a SUVmax of 2.4 and no nodal or extranodal organ involvement, indicating a favorable treatment response (Figure 7).

DISCUSSION

The ^{18}F-FDG PET/CT scan played a crucial role in determining the disease stage, guiding treatment decisions, and monitoring treatment response in this case of conjunctival MCL. The main advantage of PET scans over anatomical imaging techniques, such as CT, is its ability to detect metabolic changes in the areas involved with malignant lymphoma before the structural changes become visible [12]. Hence, it provides information aids in assessing the extent of disease involvement and evaluating treatment efficacy.

The role of ^{18}F-FDG PET/CT scans in rarer histological subtypes of lymphomas such as mantle cell lymphoma (MCL) is less well-defined. The majority of patients present with advanced-stage disease and extra-nodal sites of involvement such as the gastrointestinal (GI) tract and bone marrow. The documented case reports of patients who initially present with primary conjunctival MCL at the time of diagnosis following ocular complaints vary in terms of systemic dissemination and tumor presentation.

Literature shows a significant intra-individual and inter-individual heterogeneity with FDG uptake in MCL patients. It also supports the use of SUVmax measurement to assess tumor cell aggressiveness in MCL. A low SUVmax value is related to less aggressive MCL cells while high SUVmax values reflects a more aggressive behavior or a more advanced disease. This in turn, provides important prognostic information. Another study conducted, LyMa-PET project, showed that the sensitivity of 18F-FDG PET was only 42% in extranodal MCL and that heterogeneous FDG-avidity, SUVmax, varied greatly from one patient to another. Hence in this particular case, there was a high suspicion of lymphoma in the bilateral conjunctivae, regardless of symmetry in FDG activity. The presence of residual tumor in the left preseptal region was also used as reference in determining disease staging during the initial PET/CT scan [13].

The long-term outcome of localized or primary extranodal mantle cell lymphoma is unknown. The variation in rates of local and systemic relapse among treated patients suggests that critical factors affecting outcomes are not fully understood. There is no standard of care for primary conjunctival MCL at this time, there is no existing written guideline and evidence related to the outcome of the recommended chemotherapy, immunotherapy, or radiotherapy for initial treatment is insufficient due to the limited number of cases. Treatment of primary conjunctival MCL is based on patient's clinical presentation under the close guidance of a medical oncologist and with the guidance of existing modalities, including whole body ^{18}F-FDG PET/CT scans which can provide findings that may have otherwise been missed.

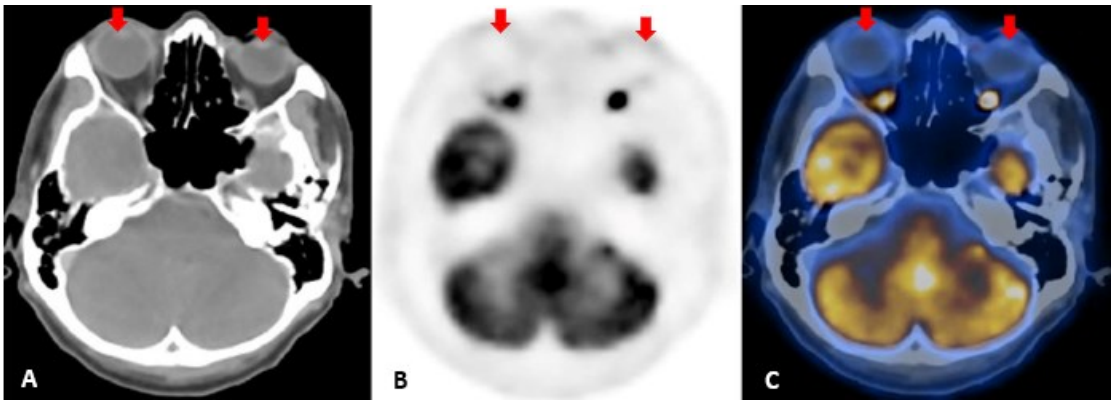

FIGURE 7. Axial view of the orbit showing the (A) CT, (B) PET, and (C) fused PET/CT images of the third whole-body PET/CT scan with emphasis on the preseptal regions (red arrows).

CONCLUSION:

Conjunctival mantle cell lymphoma is a rare entity that requires a multidisciplinary approach for accurate diagnosis and effective management. Early identification and prompt treatment are essential for optimal patient outcomes. This case underscores the value of PET/CT imaging in the comprehensive management of conjunctival mantle cell lymphoma. The information provided by PET/CT scans can guide treatment planning, assess therapeutic response, and aid in long-term disease monitoring. Continued research efforts are essential to define the optimal role of PET/CT in this rare ocular malignancy.

INFORMED CONSENT:

Informed consent for publishing this case report and accompanying images was obtained from the patient.

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