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CASE REPORT

EFFECTIVENESS OF PET/CT IN EVALUATION OF THE LYMPHOMA

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ABSTRACT

Aims: Prognosis and survival of Hodgkin lymphoma have been improved dramatically by the development of treatments as well as the sensitivity of evaluation tools. In this case report, we aimed to emphasize the importance of positron emission tomography with 2-deoxy-2-[fluorine-18] fluoro-D-glucose integrated with computed tomography in the initial staging of Hodgkin's lymphoma, evaluating the response to treatment, and to demonstrate residual tissue or recurrence. ***Case Report:*** A 25-year-old male patient presented to Trakya University Hospital with swelling in the right groin and was diagnosed with Hodgkin's lymphoma. Positron emission tomography with 2-deoxy-2-[fluorine-18] fluoro-D-glucose integrated with computed tomography scan was used for initial staging and assessment of response to treatment. ***Conclusion:*** Positron emission tomography is a feasible imaging modality for the evaluation of lymphomas. It is sensitive to detect minimal recurrence as well as alterations of lesions' metabolic activity. ***Keywords:*** Positron emission tomography, lymphoma, hodgkin disease

INTRODUCTION

Lymphoproliferative disorders are classified as Hodgkin's lymphoma (HL) and Non-Hodgkin's lymphoma (NHL) based on the histopathological as well as clinical features (1). Hodgkin's lymphoma generally originates from a single lymph node, especially cervical or mediastinal lymph nodes and it is expected to progress to adjacent lymph nodes in a localized fashion. The prevalence of HL is observed in two age groups, first, between the ages of 20-40 years and the second at 50 years and over (2). Histological feature of HL is characterized with featured cells which are called Reed-Sternberg cells on a background rich with inflammatory cells. The most common subtype is the nodular sclerosing type that contains fibrous bands within the involved lymph node (1).

The diagnosis of all lymphoproliferative disorders is based on the pathological assessment of the involved tissue, obtained preferably with excision of the whole lymph node (3). Pre-treatment staging is paramount due to the decision of the length of treatment and the evaluation of the response. The whole-body metabolic scan is the choice to treatment with advantages including the sensitivity of the metabolic status of the lesions as well as the lack of radio-contrast medium requirement (3). Positron Emission Tomography/Computed Tomography (PET/CT) can perfectly and sensitively estimate the whole-body tumor burden (4).

Staging is based on revised Ann Arbor system and it consists of 4 stages; stage 1 and 2 are considered as a limited disease and stage 3 and 4 are known as advanced disease. In stage 3, there was dissemination in both sides of the diaphragm and in stage 4, there was extranodal involvement including non-lymphoid tissues and bone marrow (5). Internationally accepted and suggested treatment of HL is a combination of 4 individual cytotoxic drugs, abbreviated as Adriamycin-Bleomycin-Vincristine-Dacarbazine (ABVD) regimen which has been proven to be effective in approximately 80% of patients regardless of the stage (5). As HL is a fluorodeoxyglucose (FDG)-avid lymphoma, PET/

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CT changed the staging up to 44% of the lymphomas and 62% of the first-line treatment (3, 6, 7). FDG/PET imaging has a value of showing both nodal and extranodal involvement, especially in the evaluation of liver, spleen and bone marrow. CT and Magnetic Resonance Imaging (MRI) have been replaced with the introduction of PET/CT (6, 8).

In advanced-stage patients, response evaluation is suggested after the completion of 2 cycles of treatment while in early stage patients, it is suggested to be performed after the completion of 4 cycles. Subocz et al. (9) reported that after two to three ABVD chemotherapy cycles, the sensitivity and specificity of transient PET were reported as 81% and 97%, respectively. Post-treatment follow-up is in the first 2 years, every 3 months; the next 3 years, every 6 months, then annually, but it may be longer if there is no clinical evidence of disease or absence of any complaints and may be performed with a physical examination alone to avoid further radiation exposure and left to clinician's discretion (2). Although routine PET/CT examination is not recommended during follow-up, PET/CT scanning can distinguish between active tumor and necrosis or fibrosis in residual masses (10). The negative predictive value of PET/CT, or the ability of a negative scan to exclude persistent disease or future relapse, averages 80 to 90 percent (11).

The aim of this case report is to present a 25-year-old male patient with HL and emphasize the role of PET/CT in both the staging and the treatment process.

CASE REPORT

A 25-year-old male patient presented with a non-tender and painless growth in the right groin which he incidentally noticed. He did not report any previous medical illness and his physical examination showed generalized lymphadenomegalia in the cervical, axillary and inguinal regions. Ultrasonographic evaluation of lymphatic stations demonstrated lymphadenomegalias with obliterated fatty hilum and thickened cortex.

The whole-body CT was performed. Bilateral cervical, mediastinal, abdominal and inguinal lymphadenomegalies and sclerotic lesions in right iliac bone were observed. A hypodense lesion in the spleen with a diameter of 4.5 cm and a nodular lesion in the liver with a diameter of 3.5 cm were observed (Figure 1). Excisional biopsy was performed and the patient was diagnosed with nodular sclerosing type Hodgkin lymphoma.

The staging was performed with 18F-FDG PET/CT. The largest lymph node was 2.3 cm with SUVMax (PET/CT Standardized Uptake Values) of 13.7 gr/ml.

Increased diffuse metabolic activity was observed in the entire vertebral column, bilateral proximal head of humerus and femur, and bilateral iliac crest. A single focal uptake in the left patella was regarded as a benign process. The patient was classified as Stage IV ES (extranodal splenic involvement) according to the revised Ann Arbor system. ABVD treatment was commenced.

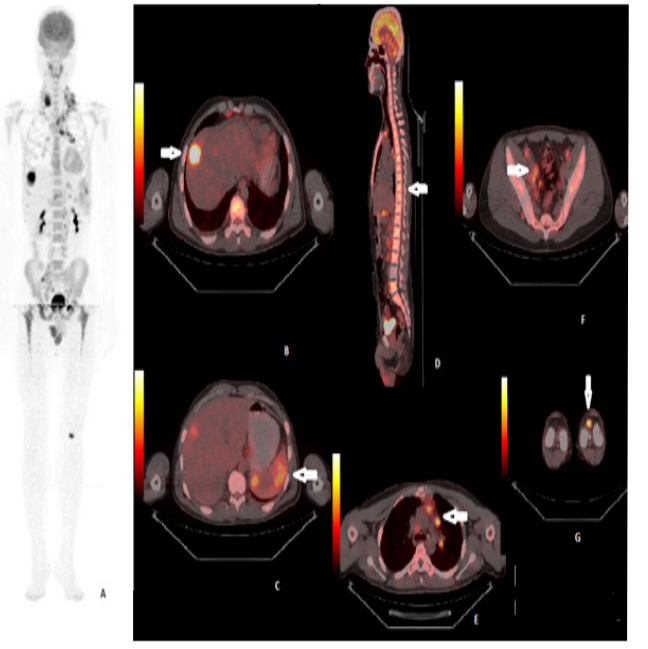

Figure 1: The whole-body PET/CT: A) Maximum intensity projection (MIP) images, B) liver lesion, C) splenic lesion, D) vertebral colon uptake, E) mediastinal lymph node involvement, F) pelvic lymph nodes, G) focal patellar uptake (white arrows).

After 2 cycles of treatment, the patient was re-staged with interim 18F-FDG PET/CT and bilateral supraclavicular, pretracheal lymph nodal involvement and nodular lesion with a substantial metabolic activity within the spleen were observed (Figure 2). This response was regarded as a partial response to the first-line treatment.

After the completion of the 6th ABVD cycle, the patient was re-evaluated. Increased metabolic activity was observed in the right antero-cervical and supraclavicular lymph nodes with bilateral paratracheal lymph nodes (Figure 3). The patients was accepted as non-responsive, and salvage treatment with cisplatin, high dose Ara-C and dexamethasone (DHAP) for 2 cycles was commenced.

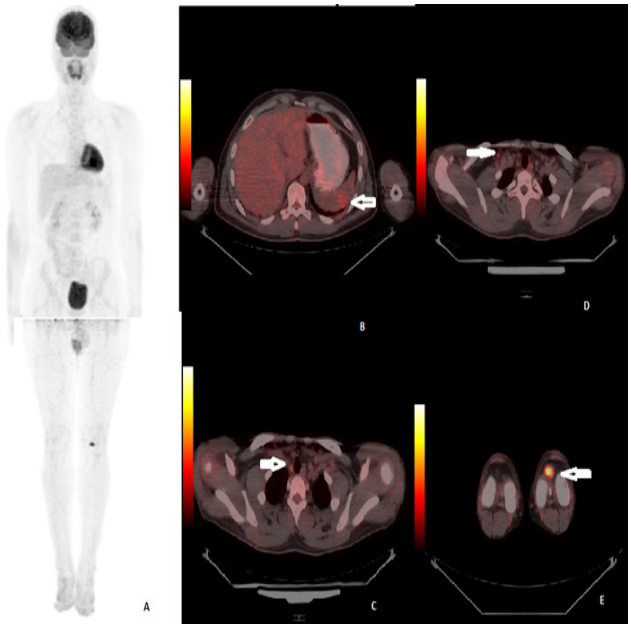

Figure 2: Interim PET/CT scans after 2 cycles of first-line treatment: A) MIP images, B) splenic lesion, C-D) lymph nodes, E) focal patellar uptake (white arrows).

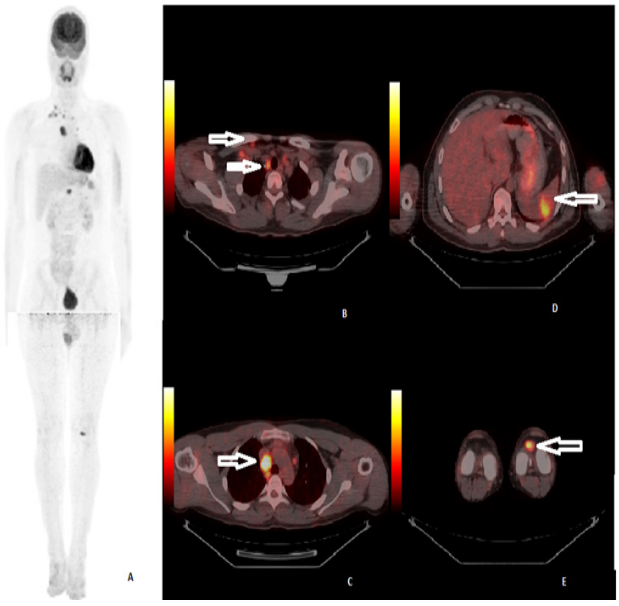

Figure 3: 18 FDG PET/CT after 6 cycles of ABVD treatment A) MIP images, B-C) multiple lymph node involvement, D) splenic lesion, E) focal patellar uptake (white arrows).

After salvage treatment, a remaining lesion in the spleen was observed and regarded as a partial response to gemcitabine-irinotecan and sequential 2 cycles of brentuximab vedotin treatment was selected for bridging to autologous stem cell transplantation (Figure 4).

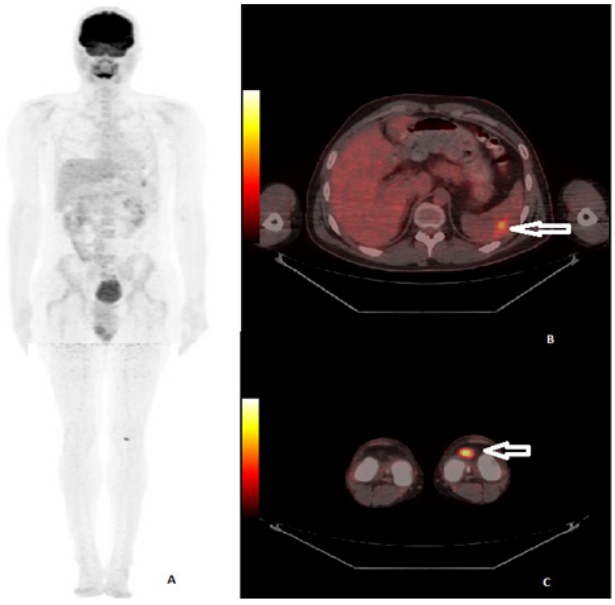

Figure 4: 18F-FDG PET/CT scan after gemcitabine-irinotecan treatment A) MIP images, B) splenic lesion (white arrows).

The patient was re-evaluated with 18F-FDG PET/CT after autologous stem cell transplantation and complete remission status was observed.

Two years later, the patient was re-scanned with 18F-FDG PET/CT for the newly developed lymphadenomegalies detected during follow up examination. Subtle metabolic activity was observed in the cervical region, suggesting an inflammatory condition (Figure 5).

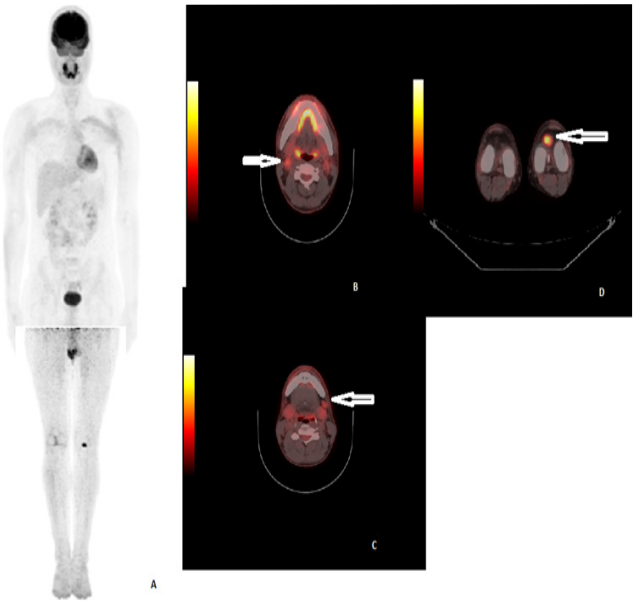

Figure 5: 18F-FDG PET/CT scan 2 years after transplantation A) MIP images, B) right deep jugular lymph node, C) left submandibular lymph node, D) focal patellar uptake (white arrows).

In 2016, the patient was re-scanned with 18F-FDG PET/CT. FDG uptake in the bilateral jugular, left submandibular, right posterior triangle lymph nodes and bilateral external–internal iliac lymph nodes were observed and regarded as inflammatory (Figure 6).

He was followed up frequently with physical examinations, biochemistry tests, and ultrasonography; considering he was on remission.

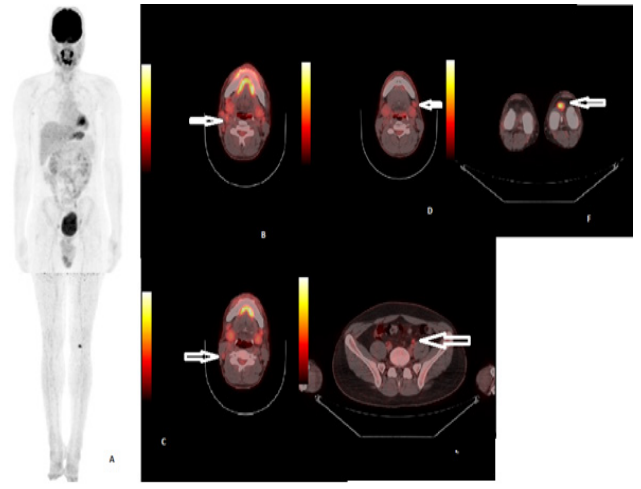

Figure 6: Latest 18F-FDG PET/CT scan A) MIP images, B-C-D-E) multiple lymph nodes, F) focal patellar uptake (white arrows).

DISCUSSION

This case is an example of the utility of PET/CT in HL. In this case, we showed that PET/CT is a highly sensitive evaluation tool in HL combined with clinical assessment.

In our case, post-treatment PET/CT showed that the patient did not response to the first-line therapy. After that the patient has gone under second-line therapy and autologous stem cell transplantation. The patient was re-evaluated with 18 F-FDG PET/CT and complete remission status was observed. As we know from the Hodgkin Lymphoma Diagnosis and Treatment Guide, Turkish Hematology Association; PET/CT leads us to choose the appropriate therapy regimen (2).

PET/CT is widely used for treatment evaluation, detecting recurrence and relapses (10). It can also be used for the follow-up period, if there is any suspicion of the recurrence.

The importance of PET/CT in the assesment of lymphoma has increased significantly. Clinicians should acknowledge the advancement of PET/CT and its value in the assesment of lymphoma.

Ethics Committee Approval: N/A

Informed Consent: Informed consents was obtained from the patient for this study.

Conflict of Interest: The authors declared no conflict of interest.

Author contributions: Concept: GDA, Supervision: BÖ, Materials: GDA, Data collection and/or processing: BÖ, Analysis and/or Interpretation: GA, Literature Search: GA, Writing Manuscript: BÖ, Critical Review: GA.

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