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Case report

^{18}F-FDG PET/CT in the diagnosis of an extranodal relapse of diffuse large B-cell lymphoma (DLBCL): a clinical case with a literature review

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Abstract

Extranodal lymphoma, secondary to or accompanying nodal disease is uncommon, but not unusual finding. 18-Fluorodeoxyglucose positron emission tomography (^{18}F-FDG PET/CT) imaging has an essential role in the staging of lymphoma, in treatment response monitoring, and in detection of recurrence. We present a case of a 52-year-old man with generalized diffuse large B-cell lymphoma (DLBCL) with multiple extranodal sites involvement detected by ^{18}F-FDG PET/CT. With this clinical case we demonstrate that ^{18}F-FDG PET-CT is a more effective technique than CE-CT for the evaluation of viable extranodal involvement of the diffuse large B-cell lymphoma (DLBCL) and should be combined in the monitoring of DLBCL.

KEY words: diffuse large B-cell lymphoma (DLBCL), extranodal relapse, 18-fluorodeoxyglucose positron emission tomography with computed tomography (^{18}F-FDG PET/CT)

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Background

Diffuse large B-cell lymphoma (DLBCL) is the most common form of NHL. It can arise in lymph nodes or outside of the lymphatic system, in the gastrointestinal tract, testes, thyroid, skin, breast, bone, or brain. The involvement of specific extranodal sites has shown a prognostic value in the rituximab era. The extranodal involvement of the lung/pleura, liver, lower urinary tract or bone marrow was a statistically significant poor prognostic factor. In multivariate analysis, specific extranodal sites had a stronger predictive value for poor prognosis, compared with the number of extranodal sites involved [1]. Lung/pleural involvement is a very rare condition among B-cell lymphomas since it mainly occurs in the setting of a generalized disease. Of 854 patients affected by B-cell lymphoma, 7.5% had lung/pleural disease, a secondary involvement was registered in 6.8%. Most of them were affected by DLBC (8%) followed by follicular lymphoma [2].

Renal parenchymal involvement is uncommon in DLBCL. In almost all cases, renal involvement appears to be a secondary process, either by direct extension from a retroperitoneal mass or via hematogenous spread in the setting of disseminated disease [3]. Retrospective cohort studies reveal that these patients tend to present with widespread disease and have a poor outcome in part due to a high rate of central nervous system (CNS) relapse. A recently published report from the British Columbia Cancer Agency showed that kidney involvement is an independent risk factor for CNS relapse in patients with DLBCL in both the pre- and post-rituximab treatment eras [4].

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Case report

We present a case of a 52-year-old man with generalized disease with multiple extranodal sites involvement. The patient was first admitted to the hospital in August 2011 with right chest

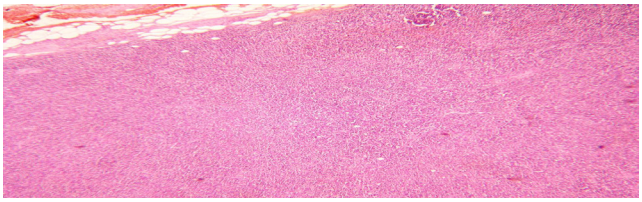

Figure 1. Lymph node, HE, 10 × 10, diffuse effacement of the architecture — lymphoma

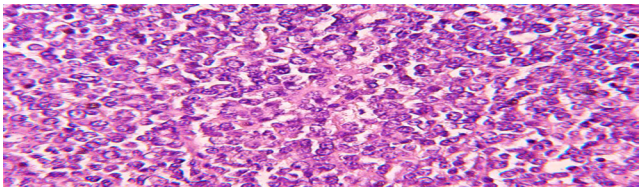

Figure 2. Lymph node, HE, 10 × 20, diffuse proliferation of atypical lymphocytes — lymphoma

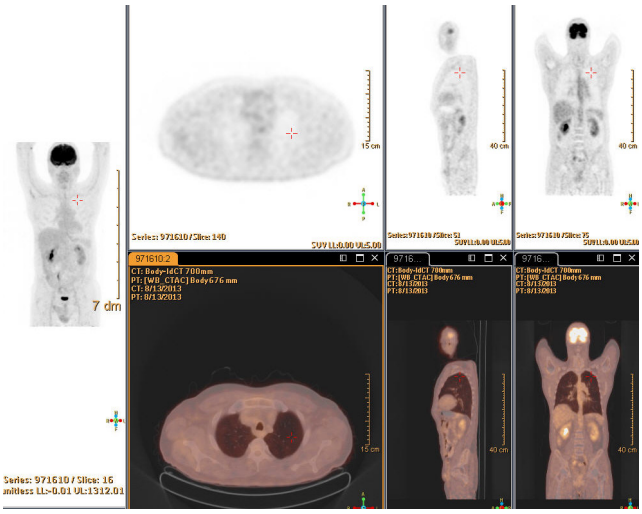

Figure 3. ^{18}F-FDG PET/CT reveals complete remission of the disease. There is no pathological hypermetabolic lesion throughout the patient's body

pain, dyspnea, night sweats. The physical examination and CT revealed a generalized lymphadenomegaly and pleural effusion. A biopsy of a supraclavicular lymph node revealed a follicular NHL (Figures 1, 2).

The stage was determined IVB because of bone marrow involvement. The patient was considered intermediate risk according to Follicular Lymphoma International Prognostic Index (FLIPI). From September 2011 the patient received 4 courses of R-CHOP. Because of disease progression a biopsy was performed and revealed transformation into DLBCL. Untill July 2013 the patient received 5 courses of R-MINE, 4 courses of FMD, and 6 R-ESHAP. In July 2013 a complete response was achieved determined by PET/CT (Figure 3).

A year later the patient presented with a back pain and night sweats. MRI was performed (protocol SAG T1, SAG STIR, COR T2, AX T2). It revealed a huge, isointense parenchymal lesion,

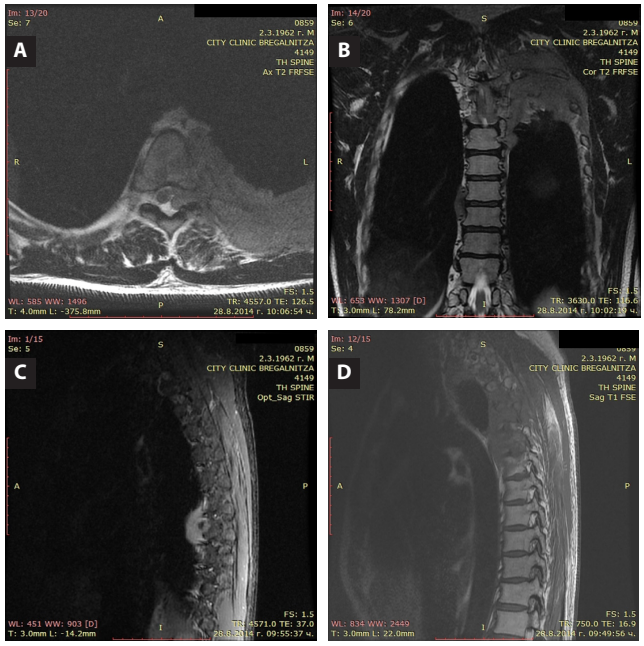

Figure 4A. Axial T2 WI demonstrates the mass projecting through the neuroforamina; **B.** COR T2 WI shows the left apical mass and the smaller right-sided paravertebral lesion; **C.** SAG STIR — the paravertebral mass with hyperintensity; **D.** SAG T1 WI — the lesion is depicted as a hypointense and infiltration of the soft tissues

adjacent to the chest wall in the left apical region. Cranially, the lesion infiltrated the soft tissues between the ribs and the apical fatty tissue. Medially, there was also infiltration of the neuroforamina at the level of Th5–Th6, and the mass was projecting into the spinal channel. A second, smaller lesion was fond on the right, paravertebral (Figure 4). Biological clarification of the lesions' activity was needed.

The ^{18}F-FDG PET/CT (performed as a low-dose CT from vertex to mid-thigh and PET with a corresponding field, on a Phillips Gemini TF PET/CT after intravenous administration of 0.13 mCi/kg FDG PET and 60-minute uptake period) revealed a huge parenchymal lesion, adjacent to the chest wall in the left apical region with increased uptake of ^{18}F-FDG with SUV_{max} 8.6 (Figure 5A). Another soft tissue lesion at the upper pole of the right kidney was seen with increase SUV_{max} 4.1 as well as PET positive common iliac lymph nodes at the right side with SUV_{max} 6.0 (Figure 5B), solitary inguinal lymph node at the left side with SUV_{max} 4.4 and bone marrow involvement of Th8 and Th9 with SUV_{max} 3.0. PET hypermetabolic lesions in lung and in right kidney were verified histopathologically as a true positive extranodal relapse of diffuse large B-cell lymphoma after the true cut biopsy (Figure 6).

Conclusions

Extranodal lymphoma, secondary to or accompanying nodal disease is uncommon, but not unusual finding. ^{18}F-FDG PET/CT imaging has an essential role in the staging of lymphoma, in treatment response monitoring and in detection of recurrence. ^{18}F-FDG PET-CT is a more effective technique than CE-CT for the evaluation of extranodal involvement in Hodgkin and non-Hodgkin lymphoma

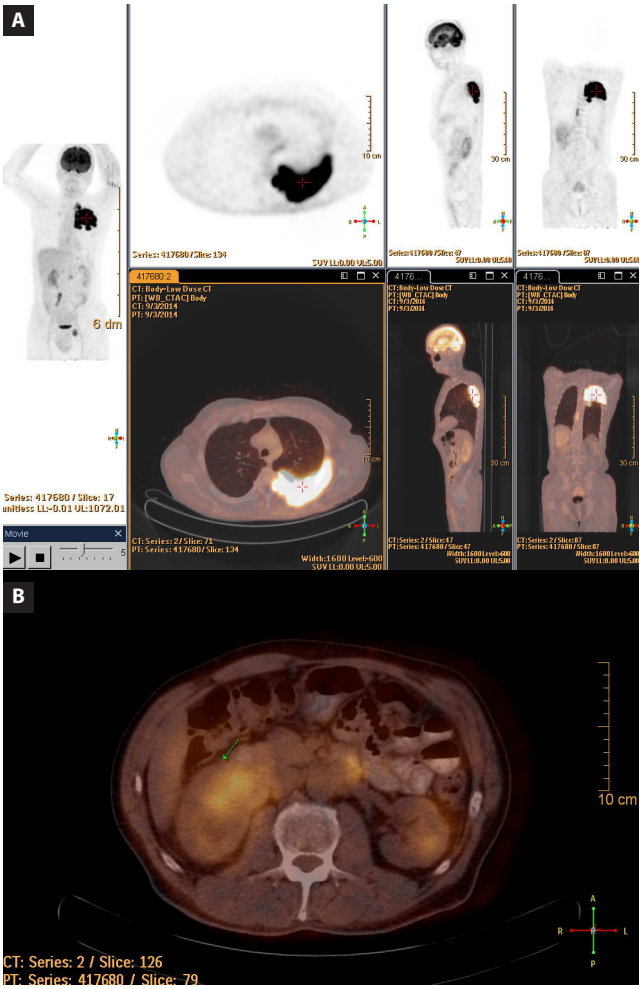

Figure 5A. Coronal, sagittal and transaxial ^{18}F-FDG PET/CT scans reveals a huge isointense parenchymal lesion, adjacent to the chest wall in the left apical region (SUV $_{max}$ 8.6); **B.** ^{18}F-FDG PET/CT scan with a hypermetabolic, parenchymal lesion in the right kidney confirmed as an extranodal relapse of DLBCL

patients. PET-CT has a significant advantage for the diagnosis of diffusely infiltrating organs without mass lesions or contrast enhancement compared to CE-CT [5]. As a hybrid imaging modality it allows accurate localization of disease and may be beneficial for the detection of unexpected extranodal sites of disease or exclusion of disease in the presence of nonspecific or equivocal extranodal CT findings.

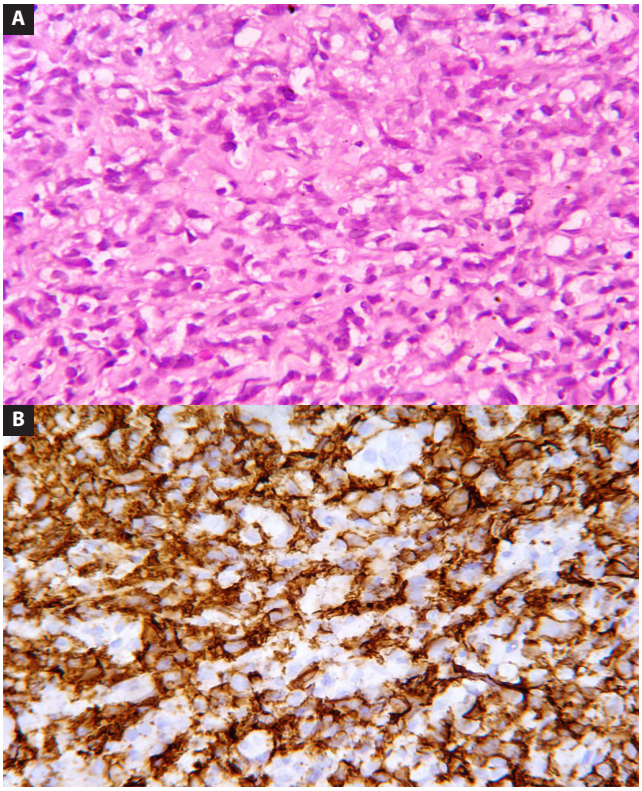

Figure 6A. True cut biopsy from lung, HE, 10 × 20, diffuse infiltration of atypical cells; **B.** True cut biopsy from lung, IHC,10 × 20, membrane expression of CD20

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