Cervical Nerve Root Neurolymphomatosis Detected on F-18 FDG PET/CT

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A 65-year-old woman was treated with chemotherapy for diffuse large B-cell lymphoma (DLBCL) after presenting with sharp pain of the left arm. She had complete remission of the DLBCL, and symptoms disappeared. One year after treatment, she developed sharp pain in the first through third fingers that extended to the left arm. F-18 FDG PET/CT showed linear increased FDG uptake along the cervical nerve roots and plexus at the C4–C7 levels, suggesting neurolymphomatosis. Gadolinium-enhanced MRI showed enhancement and enlargement of the cervical nerve root and plexus. Fine needle aspiration biopsy of the left cervical nerve confirmed DLBCL.

Key Words : Cervical nerve, FDG, Lymphoma, Neurolymphomatosis, PET

Introduction

Neurolymphomatosis (NL) is a rare entity which is defined as an infiltration of cranial or peripheral nerves, nerve roots or nervous plexuses by haematological malignancy. It is known, that non-Hodgkin lymphoma may rarely cause peripheral neuropathies, mainly through direct infiltration of peripheral nerves or nerve roots (neurolymphomatosis). The differential diagnosis comprises different indirect local and remote effects of lymphoma such as compression of neural structures, viral infections, autoimmune reactions, vasculitis, nerve infarction, drug toxicity, cryoglobulinemia, paraproteinemia, or amyloidosis [1,2]. NL is occasionally difficult to diagnose using conventional imaging modalities. Although nerve biopsy is the main method for histological diagnosis, a blind nerve biopsy may not be
diagnostic since the involvement may be patchy [3].

Since the NL is a rare entity, physicians often do not think about the opportunity of it being behind the complaints of the patient, therefore it remains often undiagnosed until becoming obvious. Also, morphologic imaging modalities such as magnetic resonance imaging (MRI) or computed tomography (CT) may suffer from a limited sensitivity for the detection of nerve infiltration. F-18 fluoro-deoxy-glucose (FDG) positron emission tomography combined with computed tomography (PET/CT) is increasingly being applied for the diagnosis, staging and assessing of the response to treatment in lymphoma. Up to the present only few papers, mainly case reports, have been published in the literature demonstrating the utility of F-18 FDG PET/CT in NL [4-7]. Here, I present a rare case of recurrent NL diagnosed by F-18 FDG PET/CT.

**Case Report**

A 65-year-old woman developed a left supraclavicular mass and presented with sharp pain of the left arm. She was diagnosed with diffuse large B-cell lymphoma (DLBCL) and was treated with rituximab plus cyclophosphamide, doxorubicin, vincristine, and prednisone. She had complete remission of the DLBCL, and the symptoms disappeared. One year after treatment, she developed sharp pain in the first through third fingers that became progressively worse and extended to most of the left arm. F-18 FDG PET/CT was performed after a normal blood glucose level was ensured. The patient fasted for at least 6 hours prior to PET/CT examination. The patient received an intravenous injection of 370 MBq of FDG, and then rested for approximately 60 minutes before image acquisition. Image acquisition was performed with an integrated PET/CT device (Discovery STE-16, GE Healthcare, Milwaukee, WI, USA). Seven table positions were used for adequate coverage from head to pelvic floor with an acquisition time of 5 minutes per table position. PET image data were reconstructed iteratively by using an ordered set expectation maximization algorithm. CT data were used for attenuation correction. F-18 FDG PET/CT scan suggested NL (Fig. 1). It shows linear increased FDG uptake along the cervical nerve roots and plexus at the C4-C7 levels with SUVmax of 7.6. Gadolinium-enhanced MRI of the C-spine provided a presumptive diagnosis of NL (Fig. 2). MRI shows enhancement and enlargement of the cervical nerve roots and plexus at the C4-C7 levels. Fine needle aspiration biopsy of the left cervical nerve revealed malignant cells, characterized as DLBCL.

**Discussion**

NL is a rare manifestation of lymphoma characterized by infiltration of the peripheral nerves by malignant cells, leading to neuropathy at multiple sites [1]. NL may occur in various structures in the central and peripheral nervous system, including the cervicobrachial plexuses, the brachial nerves, the sacral plexuses, sciatic nerves, and trigeminal nerve roots [8-11]. The clinical and radiologic diagnosis of NL is challenging. Approximately 60% of patients with NL have abnormal cerebrospinal fluid findings that typically include an elevated protein level and cell count [2]. While MRI is clinically useful for evaluating nerve or root involvement, MRI findings are not specific for NL [12].

F-18 FDG PET is widely used with proven accuracy for staging and restaging many non-Hodgkin’s lymphoma [13]. It utilizes the
accelerated glucose metabolism of tumor cells that take up more F-18 FDG compared with normal cells. PET/CT further improves the accuracy of staging and response assessment over that of CT alone. In the above case, F-18 FDG PET/CT demonstrated linear increased FDG uptake along the cervical nerve roots and plexus with pathologic confirmation of NL. F-18 FDG PET/CT can be useful to guide biopsy of accessible sites with the most intense metabolic activity in order to reduce the rate of false negative results. This is similar in the way that PET complements bone marrow biopsy and identifies sites of focal involvement that would otherwise not be sampled by 'blind' bone

Fig. 1. F-18 FDG PET/CT image in a patient with cervical nerve root neurolymphomatosis. Maximum intensity projection (A), coronal (B), and axial (C) PET/CT images show linear increased FDG uptake along the cervical nerve roots and plexus at the C4–C7 levels with SUVmax of 7.6.
marrow biopsy [14]. A few reports have suggested that F-18 FDG PET/CT may assist in diagnosing NL, defining a target for biopsy, monitoring progression, and evaluating response to treatment [4,6,15-17]. Here, we present a case of recurrent NL diagnosed by F-18 FDG PET/CT, which would be useful for monitoring lymphoma recurrence in patients with complete remission after chemotherapy.

References

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