Hypertrophic Pachymeningitis Presenting as “Eyebrows” Sign on 18F FDG PET/CT

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Case Report

A 68-year-old male patient presented to our department with a chief complaint of headache associated with diplopia for the last 3 months. Magnetic resonance imaging (MRI) brain examination reveals homogenously enhancing smooth thickening of pachymeninges overlying the frontal bone (► Fig. 1A; solid arrows), dura mater of the falx cerebri (► Fig. 1G; dashed arrows) along with inflammation of the meninges surrounding the intracanalicular segment of bilateral optic nerves (► Fig. 1D; dotted arrow). F-18 fluorodeoxyglucose positron emission tomography/computed tomography (PET/CT) findings of pachymeningitis are rarely reported in literature. We describe the PET/CT findings of a patient with hypertrophic pachymeningitis involving the bilateral supraorbital regions depicting as “eyebrows” on brain maximum intensity projection image.

Abstract

Hypertrophic pachymeningitis refers to linear or nodular thickening of the dura mater covering the brain and spinal cord following various inflammatory/infective processes. Usually, magnetic resonance imaging brain shows uniform thickening with enhancement of involved meninges. Fluorodeoxyglucose positron emission tomography/computed tomography (PET/CT) findings of pachymeningitis are rarely reported in literature. We describe the PET/CT findings of a patient with hypertrophic pachymeningitis involving the bilateral supraorbital regions depicting as “eyebrows” on brain maximum intensity projection image.

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Pachymeningitis refers to focal or diffuse thickening of dura mater surrounding the brain parenchyma and spinal cord with or without associated inflammation.\textsuperscript{1,2}

Discussion

Even though a significant proportion of patients has idiopathic form of disease,\textsuperscript{3} other frequently reported causes include autoimmune etiology (immunoglobulin G4-related, neurosarcoidosis, antineutrophil cytoplasmic antibody-related, Sjögren’s syndrome, rheumatoid arthritis),\textsuperscript{4–6} infectious etiology (mycobacterium tuberculosis, fungal infection, syphilis),\textsuperscript{7} and rarely malignancy (dural carcinomatosis).\textsuperscript{8} Regardless of etiology, most of the patients typically present with chronic headache associated with focal neurologic defect related to compression of cranial nerve by the thickened inflamed dura mater.\textsuperscript{3} Diplopia seen in our patient is most likely due to compression of bilateral optic nerves by inflamed meninges at the level of optic canal. Tubercular pachymeningitis is a relatively less common compared with other forms of intracranial tubercular disease manifesting as pachy-meningeal thickening of basal meninges and cerebral convexities, although less commonly it involves falciune region as seen in our case.\textsuperscript{2} Definitive diagnosis was based on the histological evidence of granulomatous disease with

\textbf{Fig. 1} Axial and coronal magnetic resonance imaging (gadolinium-enhanced T1-weighted imaging sequence), positron emission tomography, and fused positron emission tomography-computed tomography images show metabolically active thickening with enhancement involving the supraorbital pachymeninges (maximum standardized uptake value $[SUV_{\text{max}}]$-4; A–C), bilateral optic sheaths ($SUV_{\text{max}}$-4.5; D–F), and dura mater of falx cerebri (G–I).

\textbf{Fig. 2} Static fluorodeoxyglucose positron emission tomography brain (maximum intensity projection) image shows linear increased tracer uptake along bilateral supraorbital regions depicting as eyebrows.
caseous necrosis and tubercular bacilli on dural biopsy. Less commonly, CSF evidence of tubercular DNA on PCR along with symptomatic resolution on antitubercular treatment can be presumptive of tubercular pachymeningitis. FDG PET/CT helps to correlate the distribution and extent of active dural inflammation with patient symptoms and MRI findings apart from excluding active infective or inflammatory disease process in rest of the whole body. Recently, Wong et al reported the image findings of pachymeningitis involving the dura surrounding the venous sinus on Ga-67 single-photon emission computed tomography/computed tomography.\(^9\) Ga-67 scintigraphy can be more sensitive than FDG PET/CT in identifying meningeval inflammation due to lack of physiological uptake in the brain parenchyma; however, limited availability and high radiation exposure remain matter of concern.\(^{10}\) Furthermore, FDG PET co-registered with MRI can be used for optimally targeting the site of dural biopsy in patients with negative serology, culture, and CSF examination. FDG PET/CT image findings of pachymeningitis are rarely reported in literature and nuclear medicine physician should be familiar with these subtle findings while interpreting various infective and inflammatory pathologies involving the cranial vault.

**Patient’s Consent**
The authors certify that appropriate patient consent was obtained from the patient for publishing the images and clinical information in the journal without revealing patient identity.

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**Conflict of Interest**
None declared.

**References**