

“Drop” Metastases from an Operated Case of Intracranial Anaplastic Ependymoma Identified on Fluoro-2-deoxyglucose Positron Emission Tomography/Computed Tomography

Abstract

The seeding of tumor through cerebrospinal fluid (CSF) from primary intracranial tumors is very rare, often goes undetected, and is usually identified only on autopsy. CSF cytology along with magnetic resonance imaging constitutes the standard approach of diagnosing this grave condition. Use of fluoro-2-deoxyglucose positron emission tomography/computed tomography (PET/CT) in identifying spinal metastases from primary intracranial malignancies is very limited and has been reported in patients with metastatic glioblastoma multiforme and medulloblastomas. We present a rare case of metastatic anaplastic ependymoma to show the potentially clinically utility of PET/CT in diagnosing leptomeningeal or the so-called “drop” metastases.

Keywords: Anaplastic, cerebrospinal fluid, ependymoma, fluoro-2-deoxyglucose, leptomeningeal, magnetic resonance, metastases, positron emission tomography/computed tomography, spinal

A 30-year-old male, an operated case of anaplastic ependymoma, involving the right cerebellar hemisphere 5 years ago, presented with bilateral lower limb weakness and urinary retention for 1 month. Fluoro-2-deoxyglucose positron emission tomography/computed tomography (FDG-PET/CT) was done for suspected spinal metastases and showed intense FDG uptake in the soft tissue mass eroding the upper sacrum, extending into presacral region and intraspinally up to L2–L3 disc level on maximum intensity projection and fused sagittal PET/CT images [Figure 1a and b], respectively. Postoperative changes were noted in the right cerebellar hemisphere with no evidence of any recurrent/residual disease in the posterior fossa. Correlative sagittal postcontrast magnetic resonance image (MRI) showed an enhancing soft tissue mass in the lumbosacral region [Figure 1c] with diffuse dural enhancement in the lower lumbar region. In addition, sagittal CT of the spine showed another minimally enhancing intramedullary lesion at D4–D5 level [Figure 2a], which shows low-grade FDG uptake on fused PET/CT images [Figure 2b]. This lesion was best

appreciated on the correlative MR spine [Figure 2c]. Biopsy of the sacral mass was positive for anaplastic ependymoma. The patient was treated with palliative chemotherapy and local radiotherapy.

Metastatic disease to spinal cord usually originates from carcinoma lung, carcinoma breast, melanoma, and renal cell carcinomas.^[1,2] Intramedullary metastases from primary central nervous tumors are rare, and often detected only on autopsy. Intracranial tumors which have a propensity of intraspinal metastases includes (in descending order of frequency) medulloblastoma, ependymoma, pinealoblastomas, astrocytoma, lymphomas, choroid plexus papillomas, and retinoblastomas.^[3]

Ependymomas in adults are rare, often misdiagnosed and comprises 3% of all the central nervous system tumors. The WHO classification categorizes ependymomas into Grade I, II, or III. Grade I and II are benign, slow growing tumors and often surgically resectable tumors. Grade III ependymomas, also known as anaplastic ependymomas, are characterized by a higher proliferative rate and a greater tendency to infiltrate

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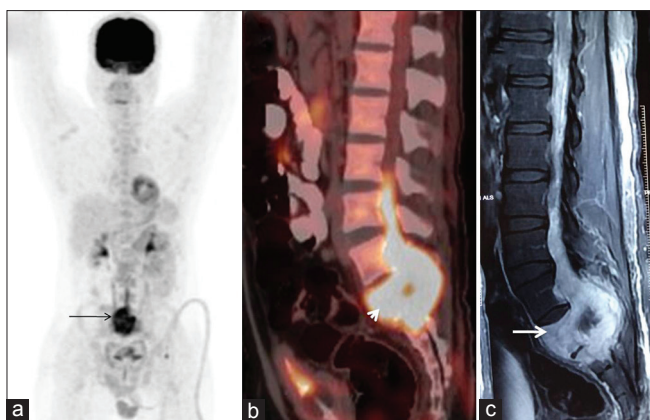


Figure 1: Maximum intensity projection images of fluoro-2-deoxyglucose positron emission tomography/computed tomography (a) shows intense tracer uptake in the midline in the lumbosacral region (black arrow). Sagittal fused positron emission tomography computed tomography (b) images shows intense fluoro-2-deoxyglucose uptake in the large enhancing soft tissue mass involving the upper sacrum and extending intraspinally upto the level of L3-L4 disc space (white arrow head). Postcontrast magnetic resonance sagittal sequence (c) shows intensely enhancing soft tissue mass in the lumbosacral region extending intraspinally along with diffuse enhancement of the dural (white arrow)

surrounding brain or disseminate into the cerebrospinal fluid (CSF) causing drop metastases.^[4,5] In a large study of patients with ependymoma, cytologic evidence of CSF spread of disease was seen in 12%, with a lower incidence (<5%) of symptomatic leptomeningeal disease.^[6,7] The incidence of CSF spread is, however, less common compared to medulloblastoma and astrocytoma.^[6] MRI is the gold standard for detection of leptomeningeal spread of ependymomas and has better accuracy than CT myelography and CSF cytology. Imaging manifestations are variable and include smooth enhancement along the surface of the spinal cord, enhancing foci in the extramedullary intradural or, occasionally, intramedullary space. The lumbosacral region, especially the most caudal aspect of the thecal sac, is the most common location for “drop” metastases suggesting there could be an association of gravity and seeding of tumor along CSF.^[1,8]

FDG PET/CT is useful in diagnosis and characterization of the central nervous system tumors and the uptake intensity correlates with the type of tumor, histological grade, and survival outcomes.^[9] The utility of FDG PET/CT in evaluation of metastatic tumors of spinal cord from primary intracranial malignancies has been demonstrated in few case studies in patients with medulloblastomas and high-grade astrocytoma.^[10,11] Quantitative analysis of intramedullary spinal lesions using FDG PET/CT have shown good correlation between the tumor maximum standardized uptake value and the proliferation index in five patients with high-grade spinal malignancy like anaplastic astrocytoma/ependymoma.^[12] Primary ependymomas typically show low-grade FDG concentration with relatively high FDG uptakes seen in anaplastic, tanycytic, and cellular histological subtype than myxopapillary subtype.^[13] The above case re-demonstrates the potential utility

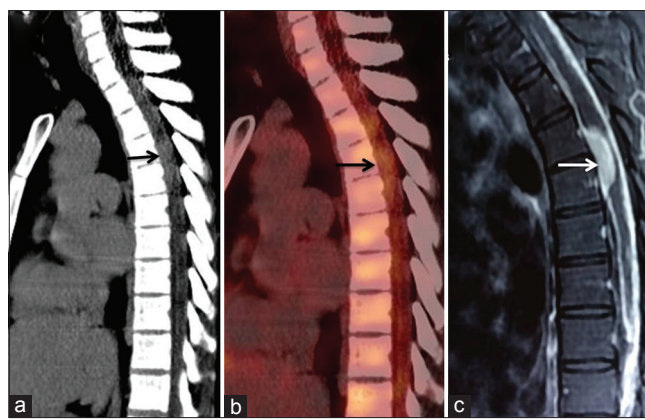


Figure 2: Intramedullary metastatic lesion at the level of D3-D4 which shows minimal enhancement and faint/low-grade fluoro-2-deoxyglucose uptake (black arrows) on sagittal computed tomography (a) and fused positron emission tomography/computed tomography (b) images, respectively. This lesion was best appreciated on the sagittal magnetic resonance postcontrast sequences (c), as focal intramedullary enhancing lesion (white arrow)

of PET/CT for diagnosing leptomeningeal spread from primary intracranial tumors and highlights the significance of correlative imaging in evaluating spinal cord tumors.

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Conflicts of interest

There are no conflicts of interest.

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