

Perineural Spread of Mucoepidermoid Carcinoma of Parotid Gland Involving V, VI, and VII Cranial Nerves Demonstrated on Positron Emission Tomography/Computed Tomography

Abstract

Perineural spread (PNS) in head and neck malignancies has been associated with extremely poor prognosis. Through this interesting case, we demonstrate the PNS of a mucoepidermoid carcinoma of parotid gland with simultaneous involvement of V, VI, and VII cranial nerves identified on positron emission tomography/computed tomography.

Keywords: Cranial, mucoepidermoid, nerves, parotid, perineural, positron emission tomography/computed tomography, spread

A 60-year-old female presented with history of gradually worsening right facial palsy for 1 year and right hemifacial pain for 2 months. Sequential postcontrast transaxial magnetic resonance imaging (MRI) images [blue bold arrows, Figure 1a-c] showed diffuse homogeneous enhancement in the right parotid gland extending along the thickened mandibular nerve in the masticator space, then widening of foramen ovale and extending intracranially involving medial aspect of the floor of the right middle cranial fossa (MCF), cavernous sinus, Meckel's cave, and prepontine cistern. Thickening of the intraparotid segment of the VII nerve was also noted (not shown here). 2-fluoro-deoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) was done for initial staging and identification of distant metastasis. Sequential transaxial fused PET/MR images [bold white arrows Figure 1d-f] showed increased FDG uptake in the well-defined nodular lesion in the right parotid with contiguous curvilinear FDG uptake noted along the thickened mandibular nerve, extending up to the mass lesion in the MCF. Sagittal MR [bold orange arrow Figure 2a] showed hypointense signal in the lesion extending from the MCF along the V nerve, with sagittal FDG-PET [black

arrow, Figure 2b] and fused PET/MRI [white arrow Figure 2c] showing increased curvilinear FDG uptake in the lesion. Coronal MR [bold orange arrow, Figure 2d], coronal FDG-PET [black arrow, Figure 2e], and fused PET/MR image [white arrow, Figure 2f] showed the contiguous perineural spread (PNS) of the lesion from the right parotid up to the right paracavernous region. Indirect evidence of PNS on PET/CT was seen as asymmetric decreased FDG uptake in the atrophied right lateral rectus muscle [Figure 3a], which is supplied by VI nerve and right orbicularis oculi/orbicularis oris muscle [white arrow heads, Figure 3b and c] which is supplied by VII nerve. Asymmetric decreased FDG uptake was also noted in the right mylohyoid muscle [yellow arrow, Figure 3c] (supplied by the nerve to mylohyoid, branch of V nerve), secondary to PNS along inferior division of mandibular nerve with erosion of the right mandibular foramen [dashed white arrow, Figure 3d]. No evidence of any locoregional cervical lymphadenopathy or distant metastasis was identified on whole-body PET/CT. Fine-needle aspiration from the right parotid gland confirmed high-grade mucoepidermoid carcinoma.

Histologically, perineural invasion (PNI) means a tumor within any of the three

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Access this article online

Website: www.ijnm.in

DOI: 10.4103/ijnm.IJNM_39_17

Quick Response Code:



How to cite this article: Chandra P, Nath S. Perineural spread of mucoepidermoid carcinoma of parotid gland involving V, VI, and VII cranial nerves demonstrated on positron emission tomography/computed tomography. Indian J Nucl Med 2017;32:245-6.

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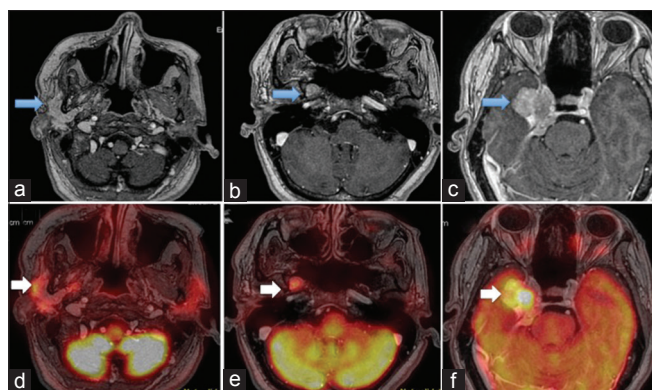


Figure 1: (a-c) Sequential postcontrast transaxial magnetic resonance imaging (MRI) images showing diffuse homogeneous enhancement from the right parotid gland extending along the thickened mandibular nerve upto the right middle cranial fossa (MCF) and prepontine cistern. (d-f) Sequential transaxial fused PET/MR images showing increased FDG uptake in the well-defined nodular lesion in the right parotid with contiguous curvilinear FDG uptake noted along the thickened mandibular nerve, extending up to the mass lesion in the MCF

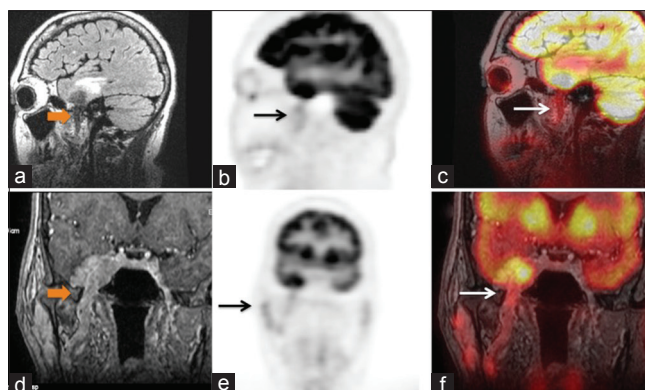


Figure 2: Sagittal MR [bold orange arrow (a)] showed hypointense signal in the lesion extending from the MCF along the V nerve, with sagittal FDG-PET (b) and fused PET/MRI (c) showing increased curvilinear FDG uptake in the lesion. Coronal MR (d), coronal FDG-PET (e), and fused PET/MR image (f) showed the contiguous perineural spread (PNS) of the lesion from the right parotid up to the right paracavernous region

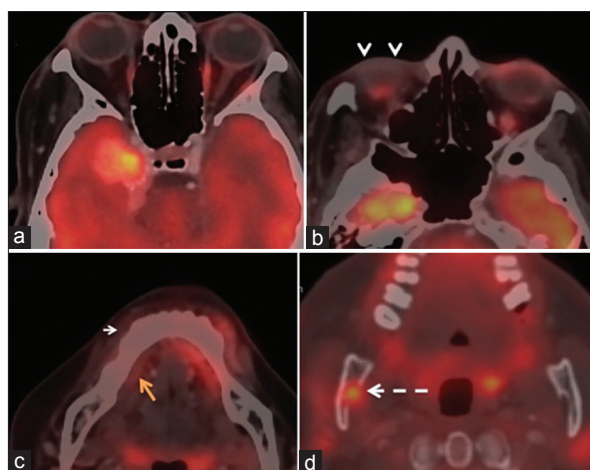


Figure 3: Indirect evidence of PNS on PET/CT seen as asymmetric decreased FDG uptake in the atrophied right lateral rectus muscle (a) and right orbicularis oculi/orbicularis oris muscle (b and c) which is supplied by VII nerve. Asymmetric decreased FDG uptake was also noted in the right mylohyoid muscle (c), secondary to PNS along inferior division of mandibular nerve with erosion of the right mandibular foramen [dashed white arrow, (d)]

layers of the nerve fiber, or encasing the 33% from the nerve circumference from outside.^[1] Mucoepidermoid carcinoma (MEC), the most frequently diagnosed malignant tumor of the parotid glands, has a predilection for PNI, histopathologically identified in as much as 23% of patients. PNI is of strong prognostic significance in MEC and has been linked with lower overall survival.^[2,3] PNS (contrast to PNI which is a histopathological term) is a more appropriate terminology used when it is clinically/radiologically evident. Multiple case reports/case series have demonstrated the promising clinical utility of PET/

CT in detecting and contributing toward early diagnosis of PNS in head/neck region.^[4,5] However, PET/CT cannot replace MRI for the detection of PNS and MRI remains the current gold standard for diagnosis of asymptomatic PNS of head/neck cancers due to its excellent spatial resolution and multiplanar capabilities. The true incremental value of FDG PET/CT in cases of PNS is identifying locoregional/distant spread of the disease and for subsequent response evaluation to chemotherapy/radiotherapy.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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