

PET - MRI FUSION - NEW HORIZON IN HEAD & NECK ONCOIMAGING



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The head and neck region have unique challenges for diagnostic imaging because of its anatomic complexity and associated functional processes.

Recently, PET-CT is being used widely for evaluation of head and neck malignancies – especially for metastasis of unknown primary, advanced head and neck cancers and in post treatment response assessment evaluation.

In recent times, fusion imaging (hybrid imaging) has evolved for more accurate diagnosis of cancers. PET-CT is often supplemented by MRI contrast imaging due to excellent soft tissue contrast resolution and aid of assessing cellular density by diffusion weighted imaging.

PET-MRI fusion is the current & latest hybrid imaging modality with a strong potential to provide added value over PET-CT or MRI alone.

Contrast enhanced PET-MRI imaging has higher diagnostic confidence for accurate lesion conspicuity (especially in the nasopharynx, oral cavity, larynx), infiltration of adjacent structures, recurrence, post treatment changes and importantly in evaluation of metastatic perineural spread.

The purpose of this case report is to provide comprehensive review of retrospective PET-CT with MRI fusion & its clinical implications in treatment planning as well as prognostication.

A 43 year old gentleman came to our hospital with ulcer in left buccal mucosa, biopsy showed moderately differentiated squamous cell carcinoma of left buccal mucosa.

His CT was performed outside which showed left highly suspicious malignant buccal lesion with left cheek edema.(Fig 1& 2)

Figure 1 & 2 –contrast enhanced coronal CT scan & coronal PET-CT showed malignant lesion in left buccal mucosa (Arrowhead and long arrow)

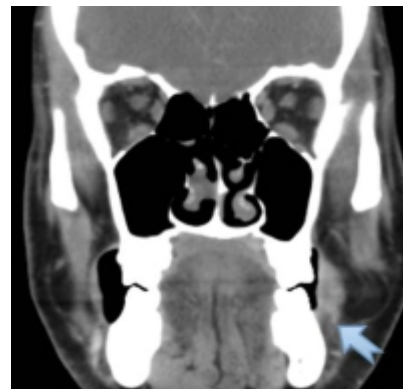


Figure 1

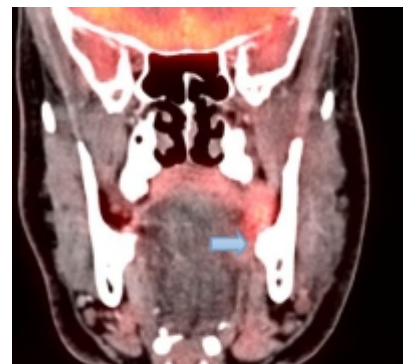


Figure 2

He was referred to our department for further evaluation with PET-CT with MRI fusion.

PET-MRI fusion showed metabolically active malignant lesion involving left posterior buccal mucosa, left posterior upper and lower GB sulci with low grade FDG avid abnormal thickening and enhancement of left inferior alveolar nerve in left mandibular canal and enhancing anterior V3 division of left trigeminal nerve suggest metastatic perineural spread with changes of acute denervation oedema of muscles of masticator space.(Fig 3 & 4)

Figure 3 & 4 PET-MRI coronal images malignant lesion of left buccal mucosa (arrow) and metastatic perineural spread along inferior alveolar nerve and in V3 division (arrow)

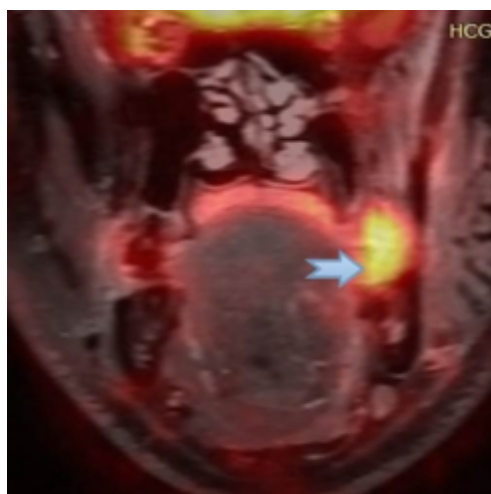


Figure 3

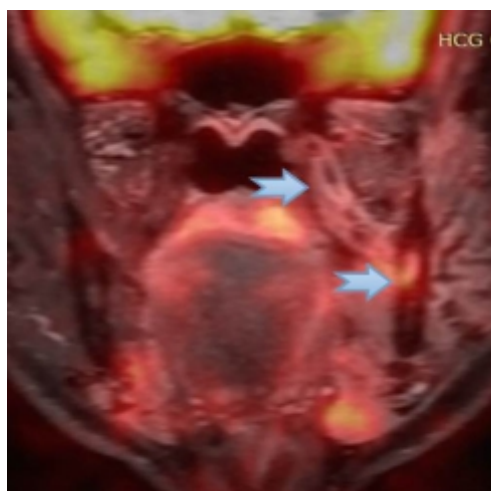


Figure 4

He was given 3 cycles of neo adjuvant chemotherapy due to diagnosis of metastatic perineural spread and follow up PET-MRI fusion showed residual small malignant lesion in left buccal mucosa (fig 5) and metastatic perineural spread along V3 division of left trigeminal nerve which showed regression in metabolic activity. Thus, he was subjected to concurrent CT & RT.

Retrospective fusion of PET-MRI is beneficial and very specific in case of perineural metastatic spread in oral cancers which changes the pre-treatment staging, treatment and prognosis.

Although integration of PET and MRI is a challenge technically because of use of different scanners, this new hybrid imaging modality holds promise because it can combine morphological, functional and molecular information at the same time.

Figure 5- post 3 cycles of neo-adjuvant chemotherapy coronal PET-MRI shows regression in left buccal mucosa malignant lesion

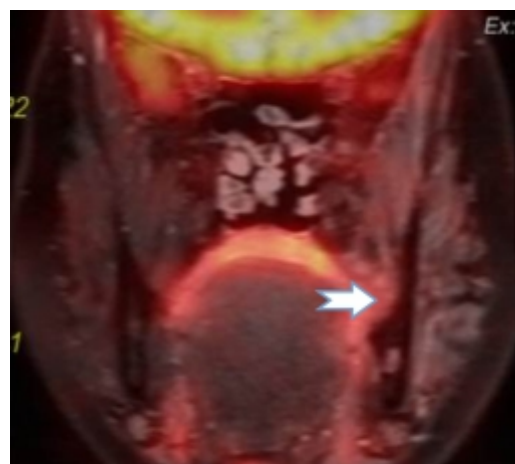


Figure 5