

# IMAGING GAMUT

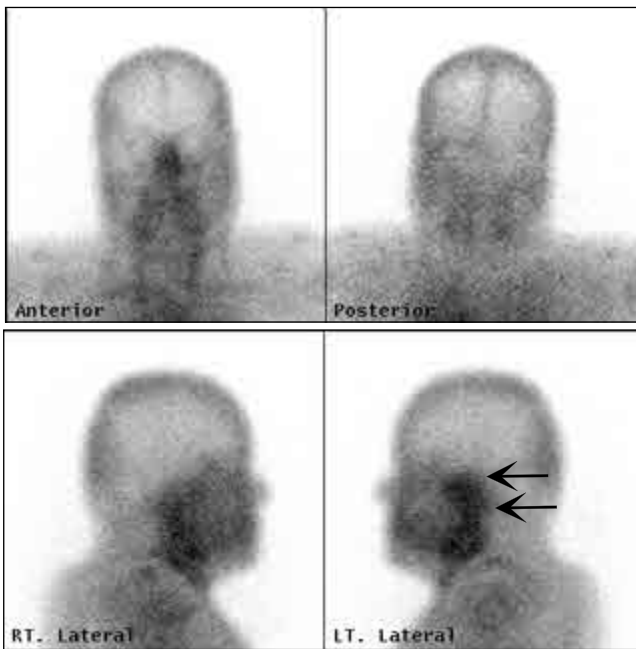
## SPECT-CT diagnosis of temporomandibular joint infection secondary to otitis externa

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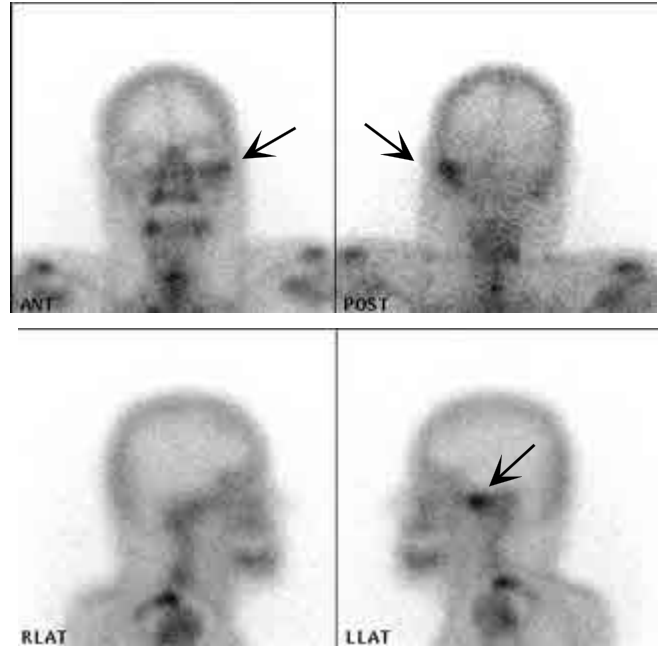
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**Figure 1** Bone scan blood pool images showing a comma-shaped area of increased uptake on the left (arrows)



**Figure 2** Planar bone scan images showing increased uptake in the left mastoid region (arrow)

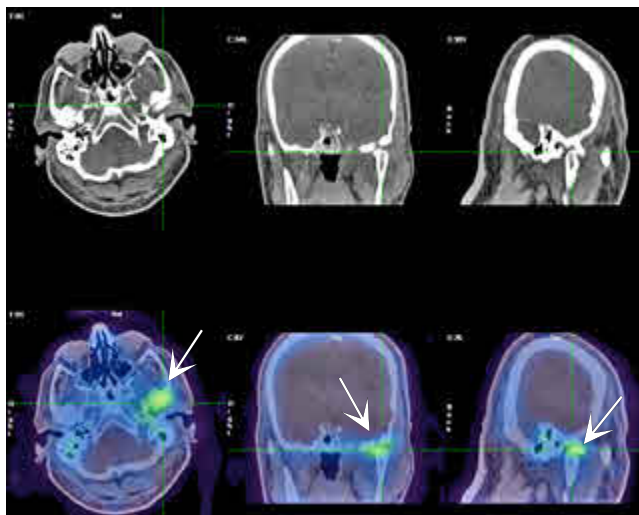
**Key words:** Temporomandibular joint infection, bone scan, Gallium-67 scan

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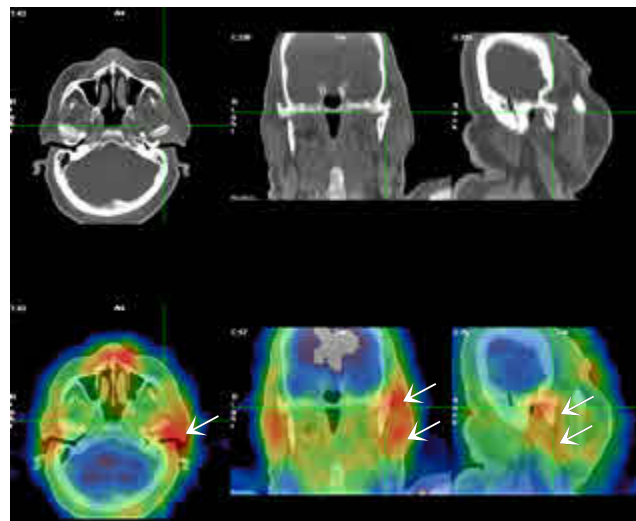
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**Background** A 61-year-old man presented with a history of persistent pain in the left ear for the last 6 months. He was clinically suspected with malignant otitis externa (MOE) and was therefore referred to the nuclear medicine department for bone and gallium scans to establish the diagnosis.

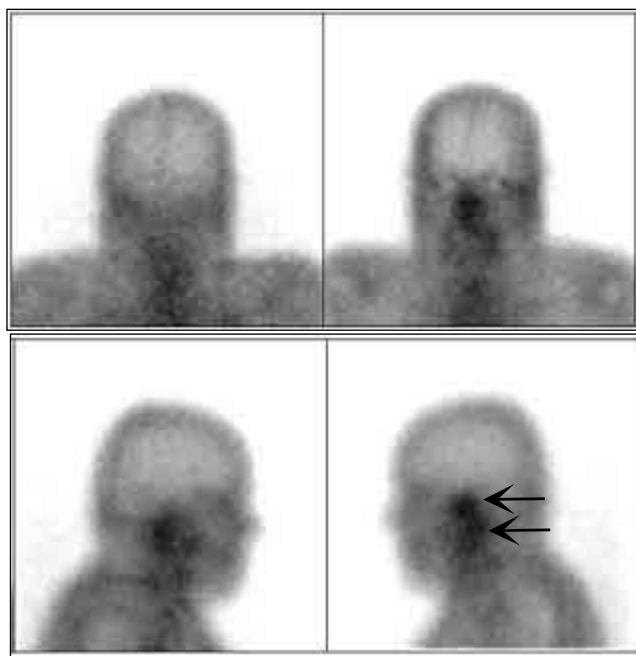
**Procedure** A 2-phase bone scan of the head including planar blood pool imaging in the



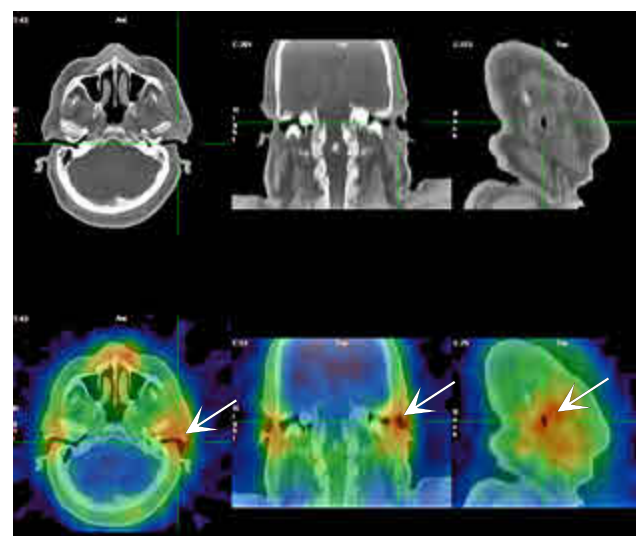
**Figure 3** CT (top row) and fused SPECT-CT MDP bone scan images showing discrete increased uptake in the left temporomandibular joint (arrows)



**Figure 5** CT (top row) and fused SPECT-CT 24-hour Gallium-67 scan images showing increased uptake in the soft-tissue overlying the left temporomandibular joint (arrows)



**Figure 4** Planar Gallium scan images at 24-hour postinjection showing increased activity on the left (arrows)



**Figure 6** CT (top row) and fused SPECT-CT 24-hour Gallium-67 scan images showing increased soft-tissue uptake in the region of the left auditory canal (arrows) consistent with otitis externa

anterior, posterior, right lateral and left lateral projections was acquired immediately following injection of 876 MBq of <sup>99m</sup>Tc-methylene diphosphonate (MDP). Planar delayed bone scan images were acquired in

the same projections followed by a SPECT-CT of the skull. A Gallium-67 scan was additionally performed with planar imaging at 24-hour and 48-hour postinjection together with a SPECT-CT at 24-hour.

**Findings** The blood pool images of the head showed a "comma-shaped" area of increased activity on the left side extending downwards from the region of the ear (Figure 1). The delayed bone scan spot views (Figure 2) showed focal uptake in the region of the left temporal bone, which on SPECT-CT was seen to correspond the left temporomandibular joint (Figure 3). Gallium-67 planar images (Figure 4) showed an area of increased tracer uptake on the left side of the head, which on SPECT-CT was seen to correspond to the soft-tissue overlying the left temporomandibular joint (Figure 5). The SPECT-CT images did not show any uptake in the temporal bone either on the bone or on the Gallium scan.

**Conclusions** The concordant increased activity seen on the bone scan blood pool images and the planar Gallium-67 scan images was indicative of left otitis externa together with soft-tissue infection/inflammation. However, the bone SPECT-CT precisely localised the increased bone uptake to the left temporomandibular joint (TMJ). There was however no evidence of increased bone uptake seen in the left mastoid region or the petrous temporal region to indicate MOE on the bone scan. The Gallium-67 SPECT-CT scan showed increased soft-tissue activity overlying the left TMJ along with increased uptake in the external auditory canal (Figure 6) without evidence of significant increased TMJ uptake or any evidence of skull base osteomyelitis.

**Comments** The 2-phase bone scan with SPECT is the modality of choice for an accurate and sensitive diagnosis of MOE and is considered the first-line imaging modality. Bone scintigraphy should precede infection imaging for the initial diagnosis of MOE, since a negative result obviates the need for infection imaging [1].

In investigation of MOE, CT is valuable in delineating the associated structural changes although technique is relatively insensitive in the absence of structural change and may be false-negative and is also not suitable for follow-up [1]. Nonetheless, dual modality SPECT-CT imaging provides a superior diagnostic yield than single modality imaging

alone and should be the first modality of choice in institutions where diagnostic SPECT-CT is available on site.

Gallium and bone scans are both sensitive in the follow-up of the cases. The sensitivity of the bone scan however is higher than gallium but the latter is preferable since increased osseous activity may persist on a bone scan despite resolution of active infection [1]. The gallium scan also better delineates the extent of soft-tissue infection as demonstrated in this case.

Cellulitis, abscess, MOE and TMJ infection are some of the complications of otitis externa. Although the involvement of TMJ in non-malignant otitis externa is very rare but few cases are reported in literature [2, 3]. This case underscores the importance of combined structural and functional SPECT-CT imaging for an optimum diagnostic yield as soft-tissue involvement is best delineated by combined CT and infection imaging and bone and joint involvement by combined CT and bone scintigraphy. Both the presence of otitis as well as the adjacent soft-tissue spread of infection are accurately depicted on a Gallium SPECT-CT scan.

## References

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