CASE REPORT

Two cases of temporal bone metastases as presenting sign of lung cancer

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Introduction

Cancer metastases are usually located in the lungs, liver or bone. The temporal bone is rarely the site of metastases [1]. The discovery of an osteolytic lesion of the temporal bone should raise the suspicion of metastasis, even in the absence of a known primary. The authors report two cases of mastoid metastases and discuss the clinical presentation and imaging of osteolytic lesions of the temporal bone.

Case reports

Case one

Mr C., 74-years-old, presented with a three-month history of headache, hearing loss, tinnitus and dysphonia. He presented right laryngeal nerve palsy and right abducens nerve palsy. Otoscopic examination was normal and audiometry demonstrated profound right hearing loss.
Two cases of temporal bone metastases as presenting sign of lung cancer

Figure 1  Case one. A. CT of right petrous temporal bone, axial scan. Osteolytic lesion of the right petrous apex with cortical defects and peripheral osteosclerosis. B. Postgadolinium head and neck MRI, axial T1-weighted sequence, showing a gadolinium-enhanced mass invading the clivus and petrous apex. C. Chest CT, axial scan. Dense mass of the right apical segment with pleural extension. D. PET-CT: increased uptake in the hilum and right apical segment and multiple sites of increased bone uptake.

In this context of ipsilateral right abducens, vestibulocochlear, and vagus nerve lesions, computed tomography (CT) of the petrous temporal bones and head and neck magnetic resonance imaging (MRI) were performed. CT showed an irregular osteolytic lesion of the right petrous apex, 4.5 cm in diameter (Fig. 1A). MRI revealed this gadolinium-enhanced osteolytic lesion of the right petrous apex invading the clivus (Fig. 1B). Plasma protein electrophoresis did not reveal a monoclonal peak.

Chest, abdomen and pelvis CT demonstrated a mass of the apical segment of the right lower lobe of the lung, measuring 43 × 36 × 34 mm, adherent to the fissure (Fig. 1C). Bronchoscopy was normal, but biopsies taken from various sites revealed mucus-secreting adenocarcinoma. Positron emission tomography (PET-CT) showed increased uptake in the right apical segment, right hilum, and bone uptake (spine, right clavicle, right ilium, skull base) (Fig. 1D).

Palliative care comprising radiotherapy (spine and temporal bone) and chemotherapy (carboplatin-taxotere) was proposed. The patient died after a follow-up of 5 months.

Case two

Mr L., 76-years-old, a former smoker, presented with a two-month history of right retroauricular swelling and right hearing loss. The right retroauricular swelling was inflammatory, soft and tender. Otoscopic examination revealed a right retrotympanic effusion and audiometry demonstrated right conductive hearing loss.

CT of the petrous temporal bones showed an osteolytic lesion of the right mastoid, 3 cm in diameter (Fig. 2A). MRI visualized this heterogeneous mass with an isosignal on T1-weighted sequences and a high-intensity signal on T2-weighted sequences extending to the lateral sinus with peripheral gadolinium enhancement (Fig. 2B), together with a right thalamic lesion. Biopsy of the retroauricular mass allowed histological diagnosis of squamous cell carcinoma. Plasma protein electrophoresis did not reveal a monoclonal peak.

Staging was performed looking for a primary tumour. Chest, abdomen and pelvis CT showed a perihilar mass of the left upper lobe, measuring 77 × 77 × 49 mm, in contact
Figure 2  Case two. A. CT of right petrous temporal bone, axial scan. Osteolytic lesion of the right mastoid bone with central calcifications. B. Head and neck MRI, axial T2-weighted sequence. Regular, round, well-demarcated, heterogeneous mass with cystic and solid components. C. Chest and abdomen CT, axial scan. Tumour of the left upper lobe with left pleural effusion. D. PET-CT: increased uptake in the right mastoid, left thorax and fourth right rib.

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MRI: magnetic resonance imaging; CT: computed tomography.
with the pleura (Fig. 2C), associated with para-aortic and left hilar lymphadenopathy. Bronchosopic biopsy of a mass obstructing the two segmental orifices of the lingula was performed, revealing an identical histology to that of the retroauricular mass. PET-CT (Fig. 2D) revealed left retroauricular, left upper lobe and fourth right rib uptake.

Palliative care comprising chemotherapy (carboplatin-taxotere) and external beam radiotherapy (brain and mastoid) was proposed. The patient died after a follow-up of 31/2 months.

**Discussion**

Temporal bone metastases can be observed in the course of breast, lung, liver, kidney, stomach or prostate cancers [1,2], but these metastases are rarely the presenting signs of an unknown primary.

The preferential site of metastases in the temporal bone is the petrous apex [1], due to invasion of the bone marrow of the petrous apex, supplied by a slow-flow capillary network, by haematogenous spread of tumour emboli [3], hence the possibility of contralateral mastoid metastasis. The other pathways of dissemination are meningeal, perineural and lymphatic [4].

Clinical features are nonspecific and predominantly consist of hearing loss, vertigo, facial palsy, tinnitus, headache, otalgia or otorrhoea [1]. Clinical examination may reveal retroauricular swelling or swelling in the external auditory canal, or even otitis media with effusion with or without tympanic perforation if the tympanum is involved [5]. In one study based on a series of 76 cases, 36% of patients were asymptomatic [1]. Isolated invasion of the petrous apex is asymptomatic. The presence of clinical symptoms suggests local extension, with invasion of the cochleovestibular apparatus, intrapetrous facial nerve or internal auditory canal, associated with a poor prognosis [2]. Gradeningo’s syndrome (lesion of the trigeminal ad abducens nerves) may be observed when the apex of the petrous temporal bone is involved.

Depending on the clinical setting, an osteolytic lesion of the petrous apex should raise the suspicion of multiple myeloma or temporal bone metastasis in an elderly patient. In a young patient, such a lesion is suggestive of sarcoma, Langerhans histiocytosis or lymphoma. An endolymphatic sac tumour is also possible [6,7]. If CT of the petrous temporal bones reveals an osteolytic lesion of the temporal bone, MRI can visualize invasion of the internal auditory canal, cochleovestibular apparatus, intrapetrous facial nerve and meninges [2,8]. Table 1 presents the main aetiologies of osteolytic lesion of the temporal bone according to the imaging findings. When a doubt persists between metastasis and multiple myeloma after the imaging assessment, protein electrophoresis should be performed looking for a monoclonal peak suggestive of multiple myeloma. When a temporal bone metastasis with unknown primary is suspected, PET-CT or Technetium bone scan should be performed to identify the primary cancer and other metastatic sites.

The treatment of mastoid metastases is often palliative based on a combination of localized external beam radiotherapy [9] and chemotherapy. Surgical decompression by petrectomy can be considered for palliative purposes or as curative treatment depending on the extension and the presence of other metastatic sites. This procedure appears to achieve good short-term results when followed by radiotherapy [8].

**Conclusion**

The discovery of an osteolytic lesion confined to the temporal bone in an elderly patient must raise the suspicion of metastasis, after excluding the diagnosis of multiple myeloma. The neoplasm most frequently responsible is breast cancer, but lung cancer must also be considered in smoking patients. These metastases are visualized as osteolytic lesions on imaging (CT and MRI), mainly localized to the petrous apex. PET-CT is useful to identify an unknown primary and other metastatic sites. Treatment is often palliative, comprising radiotherapy and chemotherapy.

**Disclosure of interest**

The authors declare that they have no conflicts of interest concerning this article.

**References**