Role of Positron Emission Tomography Scan in Complicated Ear Infection

Abstract

Introduction: Malignant otitis externa (MOE) can be a potentially life threatening condition. The patient typically presents with pain in the ear with minimal clinical signs. Cranial neuropathies may be present depending upon the extent of the disease. A high index of suspicion is required to diagnose and treat MOE. MOE can be suspected clinically but is often confirmed on investigations including CT scan of temporal bone.

Objective: We describe an atypical case of malignant otitis externa (MOE). Clinical and standard CT scan findings were regarded inadequate to make a definitive diagnosis. We discuss the complementary but important role of PET CT to confirm the diagnosis in the presence of equivocal finding on standard skull base CT scan.

Methodology: Case report with literature review.

Results: A 76 year old male presented with deep seated otalgia. Clinical findings were equivocal. He had ipsilateral hypoglossal nerve palsy. The CT scan showed opacification of the middle ear cleft. The differential included middle ear neoplasm, skull base osteomyelitis and malignant otitis externa. The PET CT showed widespread uptake of the ipsilateral skull base which led to the diagnosis of MOE. Patient was treated with 10 days of intravenous ciprofloxacin followed by oral treatment totalling 10 weeks. The pain improved with IV treatment and a review at 8 weeks revealed complete resolution of pain and hypoglossal nerve palsy.

Conclusion: Standard clinical or radiological parameters may not always be adequate to make a definitive diagnosis of MOE. In such setting, we advocate the use of PET CT scan as a complementary investigation to clinch the diagnosis.

Keywords: Malignant; Otitis externa; PET scan; Investigations; Ear canal; CT scan; Microsuction; Infection; Soft tissues; Diagnosis; Otolaryngology; Hearing loss; Mastoidectomy; Infratemporal fossa ; Tympanomeatal flap

Case Report

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Abbreviations: MOE: Malignant Otitis Externa; PET: Positron Emission Tomography; CT: Computerized Tomography; EUA: Examination Under Anaesthesia; FDG: Fluoro Deoxy Glucose

Introduction

Malignant Otitis Externa (MOE) is a potentially life threatening infection of the external ear canal, skull base and surrounding soft tissues. The common presenting symptoms of this condition are otalgia, otorrhoea and subjective hearing loss in an older and or diabetic patient [1]. As with many conditions in Otolaryngology Malignant Otitis Externa can present atypically [2] and a high index of clinical suspicion is required to diagnose some cases despite modern imaging techniques [3,4]. The presence of cranial nerve palsies may help the diagnosis as these have been shown to occur in just under half of patients with Malignant Otitis Externa [1,5,6]. We describe an atypical case of malignant otitis externa. Clinical and standard CT scan findings were regarded inadequate to make a definitive diagnosis. We discuss the complementary but important role of PET CT to confirm the diagnosis in the presence of equivocal finding on standard skull base CT scan.

Case Report

A 76 year old Caucasian man presented with a 5 weeks history of right ear pain associated with foul smelling discharge. The patient had severe conductive hearing loss. The patient was not diabetic but suffered from epilepsy and hypertension. On examination the ear canal was swollen and an inflammatory poly was seen in the ear canal. After gentle microsuction, a wick was inserted into the ear canal and the patient was treated with topical as well as oral ciprofloxacin antibiotics. Subsequently, the patient was followed up in the clinic and as the ear canal swelling failed to settle down completely after 3 months, a computed tomogram (CT) scan was carried out which revealed complete opacification and sclerosis of the right mastoid air cells with soft tissue extending through the aditus to fill the middle ear cavity and indeed the external auditory canal. Two days after the scan the patient was admitted to the ward as he was unable to bear the pain and required intravenous morphine to control his right ear pain. The patient underwent examination under anaesthesia (EUA) and was found to have polyps arising from the anterior half of the tympanic membrane but the tympanic membrane

was otherwise intact. Using post-auricular approach, the tympanomeatal flap was elevated and the middle ear was found normal. Cortical mastoidectomy was performed and polyps were seen in the mastoid antrum but no evidence of cholesteatoma was found. The pathology confirmed the inflammatory nature of these polyps. The patient was discharged home. However, 4 weeks later the patient was readmitted because of increasing deep seated pain in the right ear associated with right hypoglossal nerve palsy. Urgent EUA revealed oedematous ear canal with some polypoidal changes on the tympanic membrane which was otherwise intact. The biopsy from the tympanic membrane polyp was confirmed as inflammatory in nature. The patient underwent CT scan which revealed patchy bone destruction of the walls of the external auditory canal. The middle ear cavity was completely opacified and small breaches were seen in the tegmen tympani as well as in the anterior wall and floor of the middle ear cavity with communication to the temporomandibular joint. Medially, there was extensive bone destruction involving the carotid canal. No extradural collection was noted. The magnetic resonance imaging scan confirmed extensive enhancing soft tissue involving the right petrous temporal bone with extension into the skull base and the right infratemporal fossa. Because of the extent of the soft tissue involving the external auditory canal, mastoid antrum, middle ear, petrous bone, skull base and infratemporal fossa, the malignancy was strongly suspected, though biopsy twice carried out failed to confirm any malignancy. The patient underwent PET CT scan and it showed intense FDG accumulation in relation to the right petrous bone, which was partially destroyed, right infratemporal fossa and extending laterally posterior to the right temporomandibular joint (Figure 1). No other sites of abnormal FDG uptake were identified.

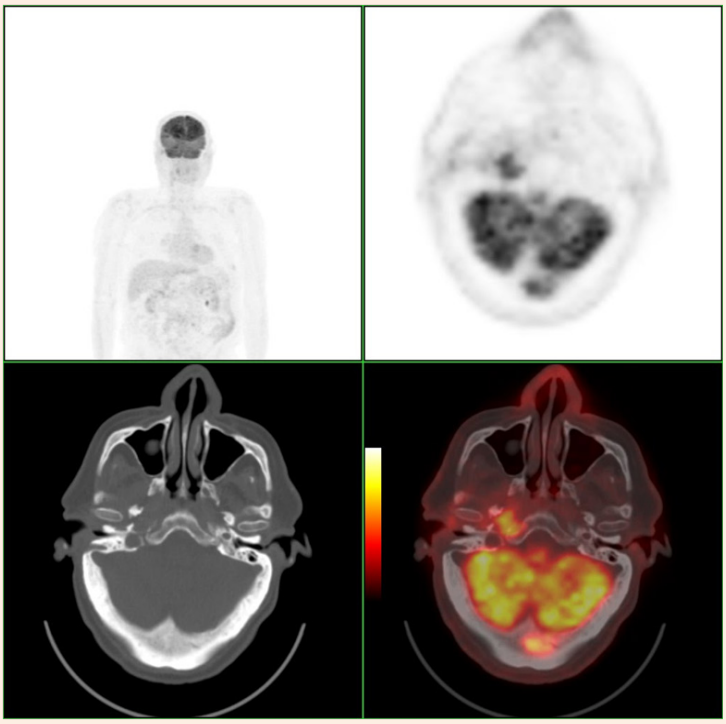

Figure 1: PET scan of the temporal bones.

This patient was diagnosed with MOE and treated with 10 days of intravenous ciprofloxacin followed by oral treatment totalling 10 weeks. The pain improved with IV antibiotics and on review at 8 weeks he had complete resolution of pain and hypoglossal nerve palsy. The patient was symptom free at 4 months follow up and was discharged from the clinic.

Discussion

The CT, MRI and isotope scanning all have a role in the diagnosis of malignant otitis externa although the imaging findings in the early stages of disease are subtle and even in advanced cases may go unrecognised unless there is already a clinical suspicion [4]. In our patient the differential diagnosis included middle ear neoplasm, skull base osteomyelitis and malignant otitis externa. The PET CT showed widespread uptake of the ipsilateral skull base consistent with inflammation which led to the diagnosis of MOE. We feel this case highlights the use of PET scanning in diagnosing a case of MOE presenting atypically and in demonstrating the extent of skull base involvement. In addition there does not appear to be a way in which to predict the clinical outcome of patients with MOE as neither the presence of cranial nerve palsies or CT findings correlate with clinical outcome [5,7]. Research would be needed to determine whether PET scan findings could be used as predictor of treatment outcome.

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Conclusion

Standard clinical or radiological parameters may not always be adequate to make a definitive diagnosis of malignant otitis externa. In such a situation we advocate use of PET CT as a complementary investigation to clinch the diagnosis.

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