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Clinical Records

Mucoepidermoid carcinoma arising from the eustachian tube and middle ear

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Abstract
We report a case of mucoepidermoid carcinoma (MEC) originating from the eustachian tube and middle ear. A 31-year-old male who presented with otorrhoea and methicillin-resistant *Staphylococcus aureus* (MRSA) in the right ear was admitted to hospital due to cerebral infarction and deep vein thrombosis. After recovery, biopsies from a granulomatous mass found in the middle ear during operation for chronic otitis media revealed intermediate-grade MEC and a nasopharyngeal mass identified after surgery also revealed the same result. He received combined radiation therapy and chemotherapy and no residual or recurrent tumour was detected after two years of follow-up.

Key words: Ear Neoplasms; Ear, Middle; Eustachian Tube; Carcinoma, Mucoepidermoid

Introduction

Mucoepidermoid carcinomas (MECs) are the most common malignant tumour in the parotid glands and the second most common malignancy of the submandibular glands and minor salivary glands. Primary MEC of the middle ear is very rare, with only one case previously reported.[1] MECs can be histologically differentiated into three grades of malignancy: low-grade, intermediate-grade, and high-grade and the prognosis of MECs is related to their grades of differentiation.[2]

Case report

On January 22, 1999, a 31-year-old man presented with right-sided otorrhoea, which had persisted for more than two months. He had no specific past history, but he had visited two different local ENT clinics before presentation and had been treated for acute otitis media for two months. Otoscopic examination revealed a small central perforation of the right tympanic membrane with a pulsatile serosanguineous discharge. Plain mastoid radiographs displayed a slight diploic type of mastoid pneumatization in the right mastoid cells with a normal left mastoid. Culture from the right ear discharge showed methicillin-resistant *Staphylococcus aureus* (MRSA), only sensitive to teicoplanin and chloramphenicol. Endoscopic examination of the nasopharynx showed a normal appearance. Pure tone audiogram revealed a mild air bone gap in the right ear (air conduction 20 dB/bone conduction 10 dB). Even though he had taken antibiotics (cefixime) for two weeks and then two weeks of oral chloramphenicol, the otorrhoea persisted and he was lost to follow up.

On July 30, 1999, he was admitted to the neurological department via the emergency room with a mild left-sided motor weakness and seizure. Brain magnetic resonance image (MRI) demonstrated infarction on the right frontoparietal cortex, cortical vein thrombosis and mastoiditis on the right ear (not shown). Deep vein thrombosis of both legs had also developed. After treatment of the infarction and deep vein thrombosis with heparin and warfarin, his motor weakness resolved completely. Discharge from the right middle ear was still present and MRSA grew repeatedly on culture. Temporal bone computed tomography (CT) scan revealed a total soft

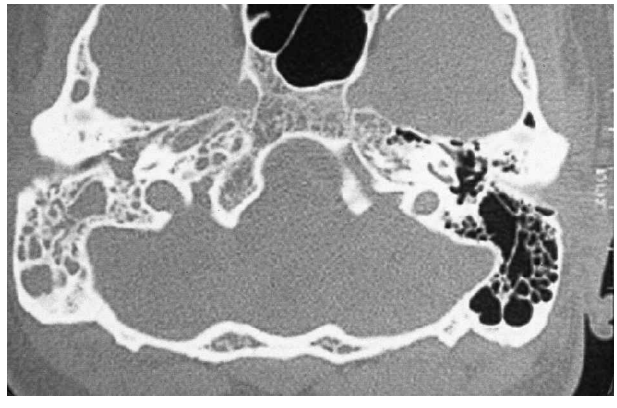

Fig. 1
Temporal bone CT scan showing a total soft tissue density in the region of the right mastoid and middle ear.

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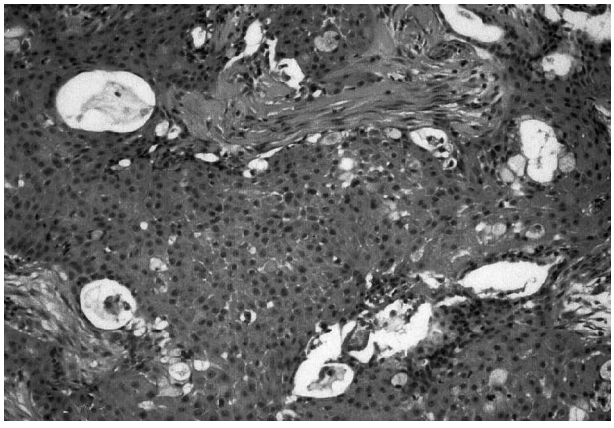

FIG. 2

Microscopy of the mass around the right middle ear and eustachian tube shows a mixture of malignant squamous cells infiltrating the stroma and mucin-secreting cells. There are many cystic spaces containing mucin. The mass around the pharyngeal orifice of the eustachian tube also showed the same morphology (H &E; ×150).

tissue density on the right-sided mastoid air cells and the middle ear, suggesting chronic otitis media with mastoiditis (Figure 1). To eradicate a source of MRSA infection, intact bridge mastoidectomy (IBM) and tympanoplasty type I were performed on August 23, 1999. During middle-ear surgery, some friable granulation tissue in the tympanic portion of the eustachian tube and middle ear was removed, and its pathology revealed an intermediate-grade MEC (Figure 2). After surgery, an overall evaluation of adjacent structures around the eustachian tube and middle ear was performed. Nasopharyngeal endoscopy showed a protruding mass around the pharyngeal orifice of the eustachian tube (Figure 3). A punch biopsy of the mass revealed the same type of MEC. Pharyngeal CT scan confirmed a soft tissue mass in the region of the right eustachian tube (Figure 4).

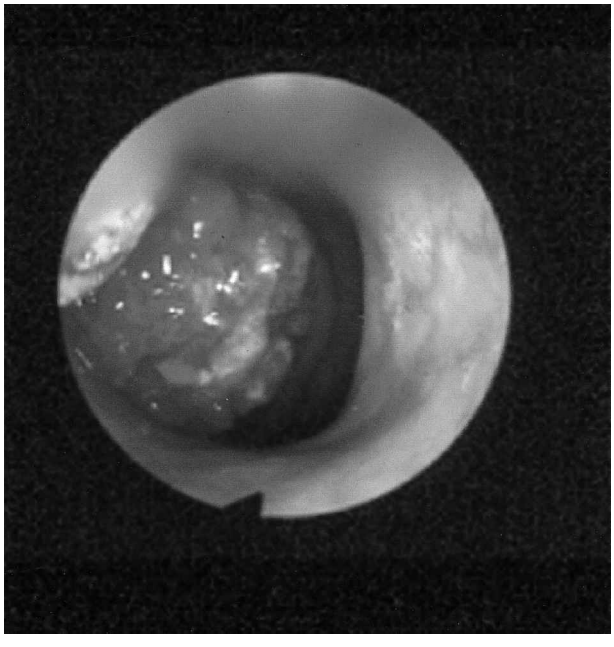

FIG. 3

Nasopharyngeal endoscopy revealing a protruding mass around the pharyngeal orifice of eustachian tube.

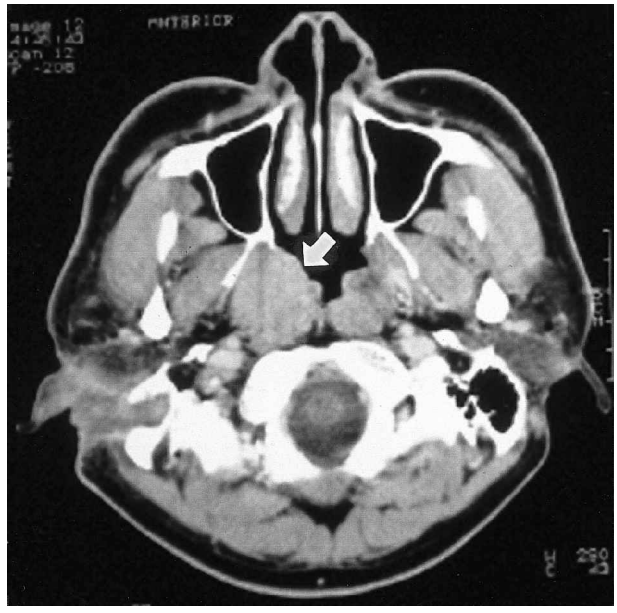

FIG. 4

Nasopharyngeal CT demonstrated bulging of the lateral nasopharyngeal wall with a soft tissue mass (block arrow) in the region of the eustachian tube.

On screening for evidence of metastasis, plain radiographs of the chest were normal and no other tumours or lymph node involvement were discovered in careful searches including a whole body bone scan, abdominal sonogram and renal scan. Combined radiotherapy and chemotherapy were recommended at a multidisciplinary tumour board. Hyperfractionated irradiation (daily 240 Gy b.i.d., total 7440 Gy/62f) was performed to the right ear and eustachian tube from October 18, 1999 to November 30, 1999 and chemotherapy consisting of bleomycin, epirubicin, cisplatin (BEC) was administered to the patient three times at intervals of two weeks.

On January 18, 2002, follow-up nasopharyngeal computed tomography (CT) revealed no soft tissue lesions in the region of the nasopharynx and eustachian tube and there was no evidence of recurrence or metastasis within two years' follow-up after the completion of all treatments.

Discussion

MECs comprise between three and nine per cent of all salivary gland tumours. The parotid gland is most commonly involved and the palate is the most frequent site among the minor salivary glands.[3] MECs occurring in other locations except for the major and minor salivary glands are very rare and have been reported in the tracheo-bronchial tree,[4] larynx and hypopharynx,[5] oesophagus,[6,7] mandible,[8,9] skin,[10–13] liver,[14] and anal canal.[15,16] One case of MEC arising from the middle ear that extended from the oropharynx to the right temporal lobe has been reported.[1]

Several theories have been advanced to account for the glandular or mixed tumour occurring in the middle-ear cleft: 1) metaplastic and functional alterations of the mucosal epithelium, 2) chronic middle-ear irritation causing squamous metaplasia, 3) implantation of seromucous and minor salivary glands in the middle ear during embryogenesis, 4) secondary invasion from a tumour in adjacent sites.[1] Our case of MEC arose in an unusual location and we considered the possibility of a minor salivary gland neoplasm arising in the cartilaginous portion of the eustachian tube, spreading superiorly to the middle

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ear and inferiorly to the nasopharynx. The eustachian tube has been reported to contain mucosal acinar cells, found predominantly in infants; and serous acinar cells, found predominantly in adults.[17] Further evidence supporting origin from the eustachian tube is that primary tumours arising from the middle-ear cavity may invade surrounding structures, including preferentially the temporal bone and external canal; but tumours arising from the eustachian tube, as in this case, may primarily extend into the middle-ear cavity or protrude into the nasopharynx. Although ascending invasion by tumour from a primary origin in the nasopharynx may be considered, spread into the eustachian tube is known to be limited by its cartilaginous portion and the pharyngobasilar fascia.[18]

MECs can be histopathologically classified into low-grade, intermediate-grade, and high-grade, based on the relative proportion of cell types. High-grade MECs manifest considerable anaplasia and exhibit considerable local aggressiveness, resulting in a poor prognosis; while low-grade MECs have a favourable prognosis. Intermediate-grade MECs have a less prominent mucin-secreting component of columnar cells and greater tendency to form larger, more irregular squamous nests than low grade MECs. They have a lesser degree of nuclear atypia and mitotic activity than high grade MECs and a more prominent intermediate cell population with a small infiltrative component.[19] Microscopically, this case showed a tumour composed mainly of intermediate cells, with several cystic spaces lined by mucoid cells in the soft tissue of the tympanic portion of the eustachian tube and middle ear. The cystic spaces were filled with eosinophilic secretions.

Prognosis of MECs depends on the histological grade, clinical staging and adequacy of surgery.[2,20–22] It has been also reported that 15 per cent of low-grade, 30 per cent of intermediate-grade, and 60 per cent of high-grade mucoepidermoid carcinomas recur.[23,24]

The treatment of choice for MECs is complete extirpation of the lesion but radiation or chemotherapy can be considered as a supplementary or single treatment. In this case, since the eustachian tube and the nasopharynx as well as the middle ear were involved, en bloc surgical removal was impracticable. Therefore we considered radiation-chemotherapy but, as there was no involvement of major or minor salivary glands and lymph nodes, parotidectomy and neck dissection were not considered.

This patient experienced cerebral infarction with cortical vein thrombosis and deep vein thrombosis, that were supposed to be the complications caused from cancer-related hypercoagulability, not from metastasis. Fortunately his symptoms resolved with heparin and warfarin treatment. We seemed to miss the lesion of the nasopharynx at the incipient stage of the evaluation and thorough examinations including biopsy or radiography should be performed to exclude the possibility of other conditions in cases of intractable inflammation of the middle ear.

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