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Pulmonary Carcinoma Metastasis to the Internal Auditory Canal

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Introduction

Pulmonary adenocarcinoma, which accounts for 35.3% of pulmonary carcinoma, causes brain metastases up to 28% in clinical setting (1,2). Leptomeningeal carcinomatosis occurs in approximately 0.7% of lung cancer patients (3). The patterns for spread of secondary temporal bone malignancies could be summarized as: isolated metastasis, diffuse metastatic leptomeningeal carcinomatosis, and direct extension. In this study, a case of metastatic tumor of the internal auditory canal from leptomeningeal carcinomatosis of pulmonary adenocarcinoma will be reported.

Case Report

Clinical Information

A 35-year-old Caucasian man underwent mediastinoscopy and thoracotomy. He was diagnosed with adenocarcinoma in the left lower lobe of the lung and treated with chemotherapy (adriamycin, cyclophosphamide, lomustine, and methotrexate) for two courses. Two months later, he had dizziness, tinnitus, headaches, generalized myalgias, frequent fevers, and rapidly progressive weakness. He was diagnosed with carcinomatous meningitis. His condition rapidly deteriorated and he died. Autopsy findings were adenocarcinoma of the lung with metastatic spread to the liver, kidney, fourth lumbar vertebrae, and meninges.

Histopathologic Findings

Right Temporal Bone

The external auditory canal, tympanic membrane, ossicles, and middle ear cleft appeared to be normal. The mastoid air cells appeared normal and were not invaded by cancer cells. The facial, cochlear, superior, and inferior vestibular nerves in the internal auditory canal were invaded by cancer cells (Fig. 1a). The fallopian canal and other portions of the facial nerve appeared to be normal. Diffuse cancer cell infiltration was seen in the perineural and endoneural sheaths of the facial, cochlear, and vestibular nerve (Fig. 1b). There were no degenerative findings in these nerves, and no bone destruction of the internal auditory canal was observed. The inner ear and petrous apex were not involved.

Left Temporal Bone

Findings were similar to those on the right side. Diffuse cancer cell infiltration was seen in the perineural and endoneural sheaths of the facial, cochlear, and vestibular nerve in the internal auditory canal (Fig. 2).

Discussion

Metastases to the internal auditory canal are relatively rare. The most common primary sites from which tumors metastasize to the temporal bones are reportedly breast, lung, kidney, and stomach (4). The symptoms of metastasis to the bilateral internal auditory canal are facial paralysis in 100% of cases, sudden hearing loss in 21.4% of cases, and progressive tinnitus in 57.1% of cases (4). In this case, the involvement of the internal auditory canal might be caused by leptomeningeal carcinomatosis because he had adenocarcinoma metastasis to the cerebrospinal fluid. Our patient had experienced dizziness and tinnitus that were most likely due to the metastasis to the vestibular and cochlear nerves in the internal auditory canals. Surprisingly, the patient did not have facial paralysis even though there was facial nerve infiltration in the internal auditory canal on both sides.

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Fig. 1.

Fig. 1a. Histopathologic section of the right ear showing the invasion of cancer cells in the inferior vestibular and cochlear nerve. C, cochlear nerve; V, inferior vestibular nerve (hematoxylin and eosin; original magnification, $\times 40$).

Fig. 1b. Histopathologic section of the right ear showing the diffuse cancer cells infiltration seen in the endoneurial sheaths of the inferior vestibular nerve (hematoxylin and eosin; original magnification, $\times 200$).

Fig. 2. Histopathologic section of the left ear showing the invasion of cancer cells in the superior vestibular and facial nerve. F, facial nerve; V, inferior vestibular nerve (hematoxylin and eosin; original magnification, $\times 40$).