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A rare location for sarcoma metastasis: The temporal bone☆

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ABSTRACT

Skeletal sarcoma metastasis is relatively rare; moreover, for this type of metastasis, the temporal bone is also a rare location. The temporal bone appears to be affected by metastatic tumors in discrete histopathologic patterns, with characteristic clinical presentations. In this study, we analyzed the records of 6 patients with skeletal sarcoma metastasis to the temporal bone, with an emphasis on histopathologic sections of human temporal bones. The most common site of sarcoma metastasis in the temporal bone was petrous apex in our series. Physicians should keep in mind that a sarcoma patient may manifest with ear findings due to temporal bone metastasis.

1. Introduction

Skeletal sarcoma metastasis is relatively rare; moreover, for this type of metastasis, the temporal bone is also a rare location. The temporal bone appears to be affected by metastatic tumors in discrete histopathologic patterns, with characteristic clinical presentations. The incidence of skeletal sarcoma metastasis to the temporal bone seems to be increasing, given the generally increasing incidence of cancer as well as the increase in life expectancy.

More effective methods of radiochemotherapy have interrupted the course of sarcoma and allowed more time for metastasis [1,2]. The mechanism of temporal bone metastasis can be explained by 5 distinct patterns: (1) hematogenous spread of carcinoma, leading to seeding of the marrow spaces of the petrous bone; (2) access by tumor cells to the cerebrospinal fluid (CSF) and dissemination through the subarachnoid space into the internal auditory canal (IAC); (3) direct extension; (4) leptomeningeal extension from an intracranial primary tumor; and (5) leukemic or lymphomatous infiltration [1–5].

The 6 most common primary malignancies that metastasize to the temporal bone are breast, lung, kidney, stomach, bronchus, and prostate [4–6], and the 5 most common sites of metastasis within the temporal bone are the petrous apex, IAC, mastoid

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cavity, external auditory canal, and middle ear [4,5]. Because skeletal sarcoma metastasis to the temporal bone is very rare, only a few case reports have been published in the literature, rather than a large case series. Those case reports involved synovial sarcoma, angiosarcoma, histiocytic sarcoma, reticular cell sarcoma, liposarcoma, rhabdomyosarcoma, osteosarcoma, and hemangiopericytoma [7–11].

Occasionally, the temporal bone is the site of origin of a sarcoma. Several petrosal sarcomas have been found in children and in young adults. Such sarcomas infiltrate rapidly, produce multiple cranial nerve palsies, and usually result in death from intracranial extension.

In this study, we analyzed the records of 6 patients with skeletal sarcoma metastasis to the temporal bone, with an emphasis on histopathologic sections of human temporal bones (HTBs).

2. Materials and methods

This study was approved by the University of Minnesota institutional review board (0206M26181).

Using the University of Minnesota temporal bone collection, we analyzed the histopathologic sections of 11 HTBs from 6 patients with different types of skeletal sarcoma metastasis to the temporal bone. All of the HTB specimens were prepared per the standard technique of light microscopy, including fixation, decalcification, and serial 20-μm sectioning in the horizontal plane; they were then stained with hematoxylin and eosin (H&E). We evaluated each HTB under light microscopy for the presence of tumor cells and noted the site of involvement.

We reviewed the corresponding clinical records and autopsy reports. For each of the 6 patients, we retrieved demographic data and noted the clinical course, otologic and vestibular manifestations, site of primary malignant tumor, and histologic features. The histopathologic diagnoses of tumors metastasized to the ear included Ewing sarcoma (2 patients), rhabdomyosarcoma (1 patient), angiosarcoma (1 patient), liposarcoma (1 patient), and reticular cell sarcoma (1 patient). Of the 6 patients, 4 had bilateral temporal bone metastasis; 2, unilateral. For the patient with reticular cell sarcoma metastasis, the opposite ear was not available for evaluation. Patient characteristics and diagnoses are summarized in Table 1.

2.1. *Case 1 (rhabdomyosarcoma)*

A 45-year-old female patient who described a mass on her left tibia underwent a local excision; histopathologic examination revealed alveolar rhabdomyosarcoma. She then underwent a local block excision with skin grafting of the left tibial area.

After 11 months, she was admitted again, because of lower back pain. An open biopsy of the primary lesion detected local recurrence; a myelogram showed complete obstruction due to a large epidural mass on the anterior space of the body of lumbar vertebra 5 (L5). She underwent a mid-thigh amputation of the left leg, followed by radiation therapy (40 Gy) to the lumbar spine.

Then, 2 months after her most recent discharge, she was readmitted with paraplegia. A laminectomy detected metastatic intramedullary rhabdomyosarcoma. Three days after that operation, she became lethargic, with bilateral profound hearing loss, hoarseness, dysphagia, and left facial palsy. Neurologic examination including hearing test revealed complete palsy of the left VII, bilateral VIII, right IX, and right X cranial nerves, as well as stiffness on flexion of the neck.

Despite treatment with steroid and antibiotics, she experienced respiratory arrest and was pronounced dead 7 days after the laminectomy. At autopsy, intracranial examination revealed multiple brain metastases and tumor involvement of meninges at the basal region, especially at the basal cisterns.

2.1.1. *Histopathologic findings, left temporal bone*

The external auditory canal (EAC) and middle ear were normal, but tumor cells were detected in the labyrinthine segment of the fallopian canal. Serous labyrinthitis was observed in the membranous labyrinth. The organ of Corti was damaged in all sections of cochlea; hair cells were not seen. A few tumor cells were detected in the scala tympani. The stria vascularis was slightly atrophic. The VII and VIII cranial nerves were destroyed by tumor cells; the number of Scarpa's ganglion cells was decreased in the IAC (Fig. 1). The maculae of the utricle and saccule were infiltrated by white blood cells and slightly damaged by labyrinthitis. The cristae of the superior semicircular canal (SSC) and lateral semicircular canal (LSC) appeared normal; however, the crista of the posterior semicircular canal (PSC) was infiltrated by white blood cells and partially damaged by labyrinthitis.

Table 1 – Distribution of the histopathologic diagnosis and patient characteristic.

	Histopathologic diagnosis	Age	Sex	Site of the metastasis	Symptoms of ear
1	Rhabdomyosarcoma	45	F	Bilateral internal auditory canal	Bilateral hearing loss Left facial palsy
2	Ewing sarcoma	18	M	Left petrous apex Right mastoid cavity and right petrous apex	Bilateral decrease of hearing
3	Reticular cell sarcoma [a]	68	F	Right mastoid cavity	A nodule behind the right ear
4	Liposarcoma	74	M	Left petrous apex	–
5	Ewing sarcoma	23	F	Bilateral petrous apex	Bilateral decrease of hearing and tinnitus
6	Angiosarcoma	31	F	Bilateral petrous apex	–

M: male, F: female.
[a] Only right ear was available for analysis.