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Intratentorial Lipomas with Meckel's Cave and Cerebellopontine Angle Extension

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Summary: An unusual case of bilateral intratentorial lipomas with extension into Meckel's caves and the cerebellopontine angle is described. Surgical and histopathologic correlation demonstrate that the lipoma encased the trigeminal nerve in Meckel's caves. The origin of the lipoma from the anteromedial margins of the tentorium is discussed and correlated with a recently proposed theory for the development of intracranial lipomas.

Index terms: Lipoma; Tentorium; Brain, neoplasms

Central nervous system lipomas are uncommon lesions most often found in the midline and associated with hypoplasia of the corpus callosum (1, 2). Additional intracranial locations in decreasing order of frequency include the interhemispheric fissure, quadrigeminal cistern, suprasellar cistern, cerebellopontine angle, and sylvian fissure (1–4). Uncommonly, posterior fossa lipomas extend into the intramedullary portion of the upper cervical cord (5).

An intracranial, intradural lipoma is unusual and rare. In one previous case involving the cerebellopontine angle, the patient presented with diplopia and trigeminal neuralgia because of unilateral extension of the lipoma into Meckel's cave (6). The current case report is unique because of the bilateral, noncontiguous extension of intratentorial lipomas into Meckel's caves with bony expansion of the foramina ovale and a unilateral cerebellopontine angle component.

Case Report

A 37-year-old woman had a 2-year history of worsening bifrontal headaches followed by bilateral blurring of vision requiring changes in prescription eyeglasses every 6 months. She was noted to have an enlarged left optic disk and evidence of right-sided Horner syndrome, mild right facial paresthesias, and palatal deviation to the left.

Initial computed tomographic (CT) evaluation of the orbits showed bilateral, noncontiguous hypodense lesions with fat attenuation that involved Meckel's caves and extended anteriorly into the foramina ovale and posteriorly into the region of the cerebellopontine angle. The hypodense lesion on the right was largest. There was marked enlargement of the foramina ovale (Fig 1A and E).

T1-weighted magnetic resonance (MR) images (Fig 1C and D) of the head showed a high-signal-intensity mass involving the base of the middle cranial fossa within the anterior portion of the tentorium extending along the lateral aspects of the cavernous sinuses within Meckel's caves and into the foramina ovale and rotundum bilaterally. T2-weighted, spin density-weighted, and fat-suppression images (not shown) yielded signal intensity characteristics of subcutaneous fat. Contrast-enhanced images (not shown) showed no enhancement of the mass.

Figure 1C and D shows that the lipid signal intensity lies within the anterior aspect of the right tentorial edge and encases the rootlets of the fifth cranial nerve as it exits the right side of the pons and courses through the edge of the anterior limiting membrane of the tentorium into an expanded Meckel's cave and continues through the foramen ovale. Less involvement of the left side is seen. Note that expansion of the foramina ovale is seen on the coronal image (Fig 1E) and substantiated by the appearance on CT images (Fig 1A and B).

An infratemporal, transzygomatic approach to the right Meckel's cave was performed. The lesion was identified between the leaves of the dura comprising the tentorial edge. The mass followed the course of the trigeminal nerve and invested the gasserian ganglion rootlets, thus prohibiting complete resection. Histopathologic evaluation of a biopsy specimen demonstrated septated adipose tissue with normal neural elements.

Discussion

We report an unusual case of bilateral intracranial lipomas within Meckel's caves that expand the foramina ovale and involve the cerebellopontine angle on one side. The MR and

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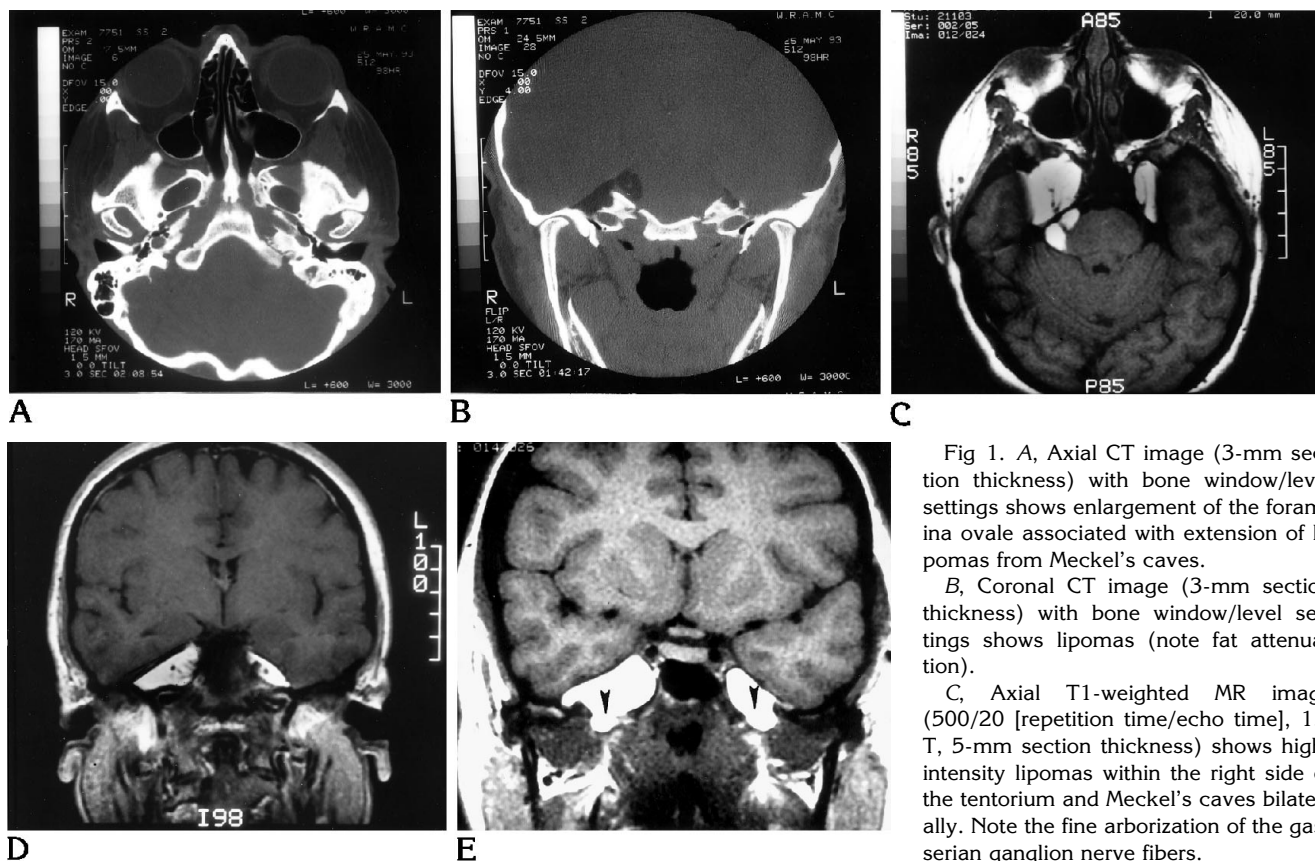


Fig 1. A, Axial CT image (3-mm section thickness) with bone window/level settings shows enlargement of the foramina ovale associated with extension of lipomas from Meckel's caves.

B, Coronal CT image (3-mm section thickness) with bone window/level settings shows lipomas (note fat attenuation).

C, Axial T1-weighted MR image (500/20 [repetition time/echo time], 1.5 T, 5-mm section thickness) shows high-intensity lipomas within the right side of the tentorium and Meckel's caves bilaterally. Note the fine arborization of the gasserian ganglion nerve fibers.

D, Coronal T1-weighted MR image (723/20, 1.5 T, 5-mm section thickness) shows high-intensity lipomas and ramifying branches of the trigeminal nerve within Meckel's caves bilaterally.

E, Coronal T1-weighted MR image (550/20, 1.5 T, 5-mm section thickness) shows lipomas extending through and expanding the foramina ovale (arrowheads).

CT images show that the medial aspect of the anterior portion of the tentorium cerebelli is filled with lipomas that expand the dural leaflets and extend into Meckel's caves, filling the root sleeves of the fifth cranial nerve bilaterally.

The presence of bony erosion, which is more commonly seen in trigeminal schwannomas, is distinctly unusual for lipomas. Although lipoma was suggested by CT findings and corroborated with MR, lipomatous meningioma, lipomatous degeneration of a schwannoma, and, less likely, an atypical epidermoid were of clinical concern. Therefore, the patient had surgery for histopathologic diagnosis.

Unlike our case, the Meckel's cave lipoma reported by Beck and Menezes (6) was unilateral, did not show fine arborization of the gasserian ganglion nerve branches, and did not extend into and expand the foramina ovale.

In a recent review of intracranial lipomas, a unifying theory of development proposes that lipoma formation might result from abnormal

persistence and maldifferentiation of the meninx primitiva into lipomatous elements (1). On the basis of this theory, intracranial lipomas are considered congenital malformations. This concept is used to explain intracranial lipomas that occur within specific and characteristic locations within the subarachnoid cisterns. The lipomas are considered derivatives of the leptomeningeal component of the meninx primitiva. This theory is consistent with the embryologic origin of the tentorium.

The formation of the tentorium involves two separate regions, a large lateral portion arising from the pachymeninges, which develops into the dura, and a small medial portion arising from the leptomeninges, which develops into the arachnoid and is the site of origin of the meninx primitiva (7). The lipoma in our case was located along the anteromedial margins of the tentorium, that is, within the expected location of the leptomeningeal component (meninx primitiva), which is well documented to be the

origin of previously described intracranial lipomas (1-4).

An attractive possibility that could explain the extensive bilateral nature of the lipomas is that the lipomatous elements, which formed in the anteromedial anlage of the meninx primitiva, subsequently proliferated and migrated with the developing cranial nerve elements as they extended anteriorly through the dural expansions of the tentorium into Meckel's caves. The possibility that the lipomas arose within Meckel's caves and extended to the tentorial edge is an alternative possibility. The anteromedial location of the lipomas in our case is significant to this argument and might resolve the apparent discrepancy of the origin of the lipomas within what is generally considered a pachymeningeal derivative, that is, the lipomas were formed from the same element that is proposed to be

the origin of previously described intracranial lipomas, the leptomeninges.

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