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Lymphomatous Involvement of the Trigeminal Nerve and Meckel Cave: CT and MR Appearance

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The evaluation of the anatomy and disease processes involving the trigeminal nerve and Meckel cave by CT and MR have been described [1–4]. This case report details the CT and MR appearance of isolated macroscopic lymphoma metastasis involving the cisternal segment of the trigeminal nerve root and gasserian ganglion via CSF seeding. To our knowledge, this has not been previously reported.

Case Report

A 49-year-old woman presented with a 3-week history of headaches and numbness of the face, mouth, and ear on the left side. Her medical history was significant for diffuse large cell lymphoma, first diagnosed 6 years previously. She was in her third remission and had been free of disease for 2 years. A contrast-enhanced CT scan showed an enhancing mass in the anterior aspect of the cerebellopontine cistern on the left, extending into Meckel cave, which was thought to represent a trigeminal neurinoma or meningioma (Fig. 1A). Bone windows showed the foramen ovale to be normal in size and appearance. On MR, the T1-weighted images showed an isointense dumbbell-like appearance of the left trigeminal nerve in its cisternal segment extending into Meckel cave (Figs. 1B and 1C). On T2-weighted images, the lesion appeared hyperintense, and abnormal signal was seen in the left foramen ovale (Fig. 1D). Since the bones appeared normal, CSF cytology was suggested to rule out leptomeningeal metastasis. This revealed abnormal lymphocytes suggestive of lymphoma. An open biopsy of the proximal portion of the mandibular branch of the trigeminal nerve (V_3) at the gasserian ganglion was performed, and perineural diffuse large cell lymphomatous involvement of the mandibular branch of the trigeminal nerve was confirmed (Fig. 1E). After intrathecal chemotherapy via an Omaya reservoir, the trigeminal symptoms improved but did not completely resolve. Post-treatment T1-weighted images showed a normal-appearing cisternal segment of the trigeminal nerve (Fig. 1F).

Discussion

Involvement of the CNS by either primary or secondary lymphoma is uncommon, although the latter is generally considered to be more common [5–7]. Several reports have observed an increase in the incidence of secondary involvement of the CNS by lymphoma [8–10]. This has been attributed to improved chemotherapy resulting in more sustained remissions and improved survival in patients with systemic lymphoma [6–8]. Leptomeningeal disease is the most common type of lymphomatous CNS metastases, and cranial nerve palsies are the single most common presenting sign (especially involvement of the facial, occulomotor, and abducens nerves) [5, 8–11]. However, cranial nerve involvement is rarely shown by imaging methods [12–14]. The typical contrast-enhanced CT findings of diffuse leptomeningeal disease have been previously described, including cisternal-sulcal enhancement, ependymal-subependymal enhancement, irregular tentorial enhancement, and hydrocephalus [15]. Occasionally, focal, macroscopic lymphomatous deposits are found on imaging [16]. Five such cases of lymphoma occurring at the cerebellopontine angle have been described [17]. Additionally, a retrospective analysis of 28 cancer patients with leptomeningeal metastases at our institution revealed four patients with focal masses involving the cranial nerves (Lee YY, unpublished data). To our knowledge, demonstration of focal involvement of the trigeminal nerve by lymphomatous metastases has never been reported in the radiologic literature.

Patients with a diffuse pattern of lymphoma, bone marrow involvement, and advanced stages of disease are at risk for developing CNS metastasis [8, 9, 12, 18]. Often, the CNS is the first site of relapse in patients who are in complete clinical remission. Since the prognosis of these patients depends on early treatment, a sensitive noninvasive method of diagnosis is needed to screen patients for lumbar puncture.

The utility of both CT and MR in imaging Meckel cave and the trigeminal nerve has been described in the literature [1–4]. Our case illustrates that MR has several advantages over CT. The inherent soft-tissue contrast resolution of MR is superior to CT even without the administration of contrast material. This allows visualization of the cisternal segment of the trigeminal nerve as it enters the trigeminal cistern or Meckel cave via the porus trigeminus. The anatomic detail of this region is superior with MR because the beam-hardening artifacts seen in the middle and posterior cranial fossa on CT

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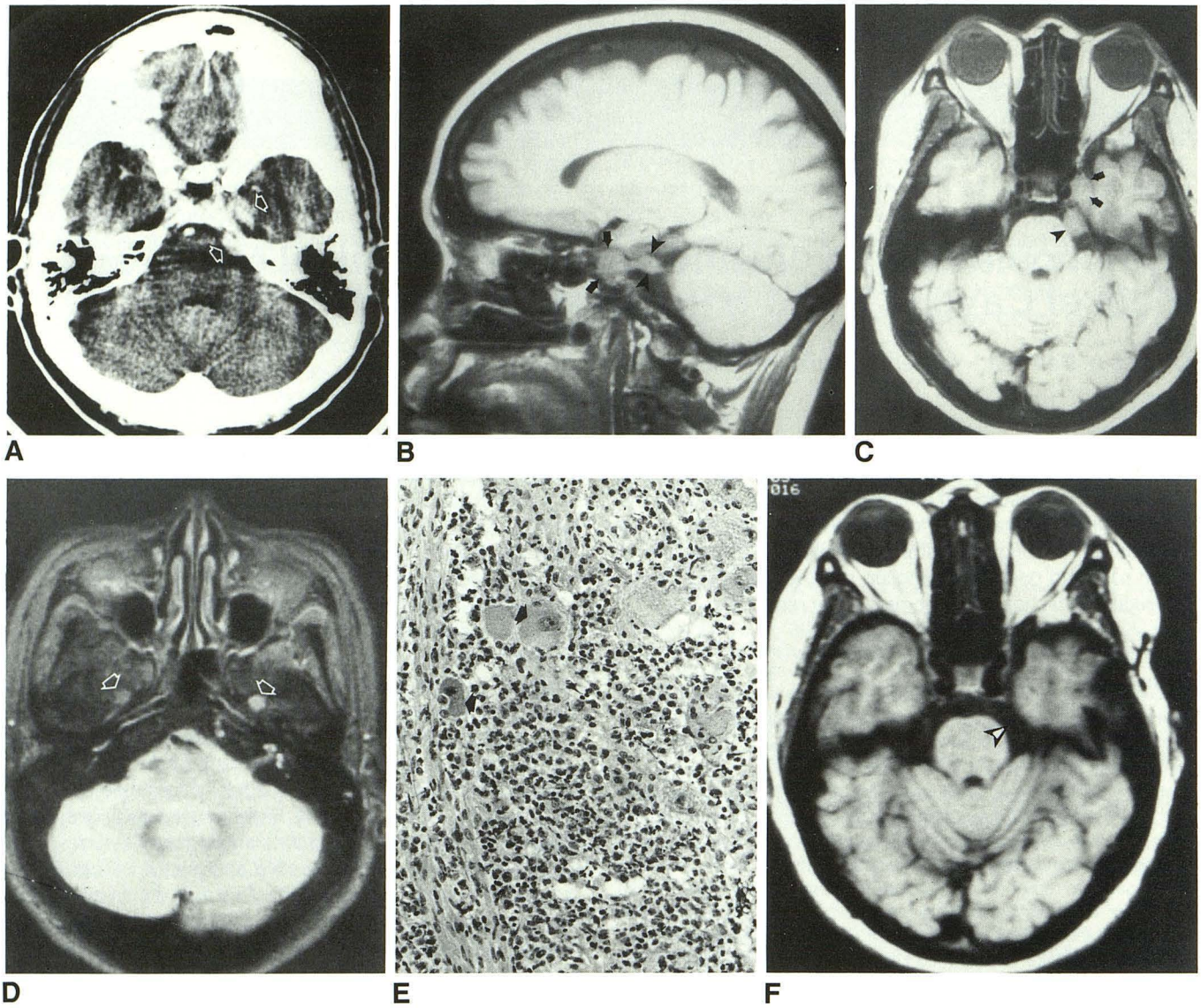

Fig. 1.—*A*, Contrast-enhanced CT shows areas of enhancement in anterior cerebellopontine cistern and Meckel cave (*arrows*). Note considerable beam-hardening artifact.

B and *C*, Sagittal (*B*) and axial (*C*) T1-weighted images (600/25) show dumbbell-like trigeminal nerve. Involvement of cisternal segment (*arrowheads*) and Meckel cave (*arrows*) are seen clearly.

D, Axial T2-weighted image (2000/80) shows hyperintense signal within left foramen ovale compared with right side (*arrows*).

E, Histologic section displays perineural lymphoma cells infiltrating ganglion. *Arrowheads* indicate nerve cells. Frozen section. (H and E, ×600)

F, Postchemotherapy T1-weighted (600/25) MR image shows normal-appearing anterior cerebellopontine cistern on the axial view (*arrowhead*). Compare with *C*.

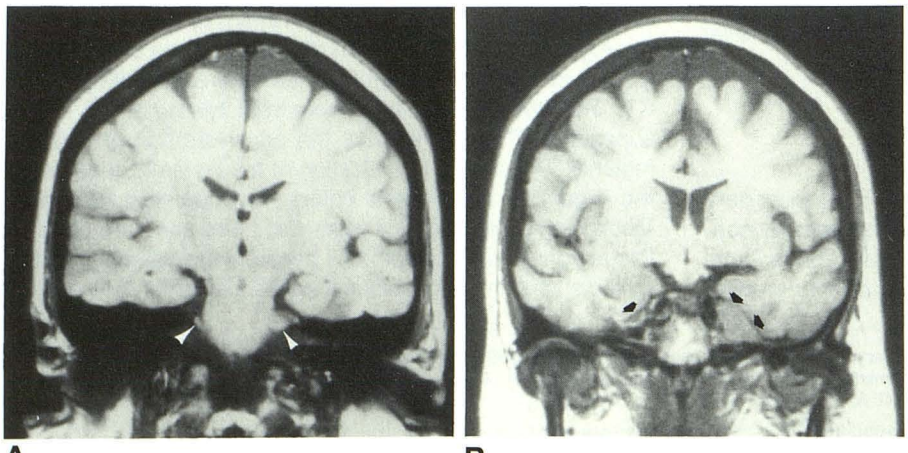

Fig. 2.—*A* and *B*, T1-weighted (600/25) pre-treatment coronal images display asymmetry of trigeminal nerves (*arrowheads*) and Meckel caves (*arrows*).

(Fig. 1A) are absent on MR. Multiplanar coronal imaging is particularly useful in making side-to-side comparisons of the trigeminal nerves and showing extension of disease into Meckel cave (Fig. 2). Although T1-weighted images provide the most anatomic information, T2-weighted images may show abnormalities not seen on T1-weighted or CT images. In our case, the absence of bone changes or foraminal enlargement made the diagnosis of meningioma and neurinoma less likely (although still possible).

This case report confirms previous reports supporting the effectiveness of MR in evaluating the trigeminal nerve. This report also expands the differential diagnosis of secondary tumors that can involve the trigeminal nerve and Meckel cave, and it identifies a patient population in which MR is the imaging method of choice.

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