

## EXTRADURAL EPIDERMOID CYST OCCLUDING THE TRANSVERSE SINUS: A CASE REPORT

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**Abstract**—A case of an epidermoid cyst obstructing the transverse sinus is presented. The preoperative radiologic evaluation comprised CT, MR Imaging, and cerebral angiogram. The discussion includes the relative value of each test as part of the preoperative evaluation and the differential diagnosis of lateral sinus occlusion.

**Key Words:** Epidermoid cyst, Lateral sinus occlusion, CT, MR imaging, Cerebral angiography, Preoperative planning

An epidermoid cyst is a congenital tumor developing from the ectodermal tissue that becomes abnormally located during maturation. It is usually found as an intradural mass or extradural (diploic) epidermoid cyst (1-3). We report an epidural tumor of an unusual location for causing a lateral sinus occlusion.

### CASE REPORT

A 45-year-old female presented with a 3-month history of left ear fullness and mild hearing difficulty, which she described as ringing and echoing in her left ear, and occasional episodes of ear pain. Past history and physical examinations were normal. She was initially treated with antibiotics under the diagnosis of otitis media. Audiometric examination suggested neurosensory hearing loss on the left side, and auditory brainstem evoked potentials were abnormal with prolonged wave I-V on the left. Subsequent computed tomography (CT) of the head revealed an expansile mass in the temporal bone on the left, slightly superior and posterior to the mastoid (Fig. 1). This lesion was located in the diploic space of the temporal bone with thinning of the inner table and with slight medial protrusion. Marginal sclerosis was identified. Magnetic resonance (MR) imaging of the head at 1.5T demonstrated a mass in the temporal bone on the left. It showed low signal on T<sub>1</sub> weighted images sequences and high signal on T<sub>2</sub> weighted images (Fig. 2). The epicenter of the lesion appeared to be in the diploic space with the expansion of the lesion medially to

occlude the adjacent transverse sinus. This sinus occlusion was best demonstrated on T<sub>1</sub> weighted coronal images (Fig. 2a). To confirm this finding and also to rule out remote possibilities of vascular tumors such as paragangliomas, cerebral angiography was performed. It showed complete occlusion of the left transverse sinus (Fig. 3). No evidence of neovascularity or tumor stain was noted at the region of the mass with selective external and internal carotid arteriography. At surgical resection, a soft, fluffy, white-colored tumor was noted. It was adherent to the dura in the retromastoid region along the path of the transverse and sigmoid sinuses. The tumor did not extend into the mastoid air cells or venous sinuses or into the mastoid portion of the temporal bone. Pathologic examination of the surgical specimen disclosed considerable keratinaceous material and a number of small fragments of keratinizing squamous epithelium overlying fibrous tissue (Fig. 4). These findings were interpreted as consistent with an epidermoid cyst. The patient's postoperative course was uneventful, with the hearing abnormalities resolved at 1 month and not recurring at 10 1/2 months. A follow-up MR imaging at 10 months post operation showed complete resection of the tumor and a patent and uncompressed left lateral sinus, indicated by the flow void and normal size.

### DISCUSSION

Epidermoids result from incomplete cleavage of neural ectoderm from cutaneous ectoderm occurring between the 3rd and 5th week of embryogenesis (1). Microscopically, the cyst wall consists of an internal stratified squamous epithelium, which is covered by an external fibrous capsule. The cyst is filled by laminated keratinous material resulting from normal maturation of the keratinizing squamous epithelium (2, 3). Occasion-

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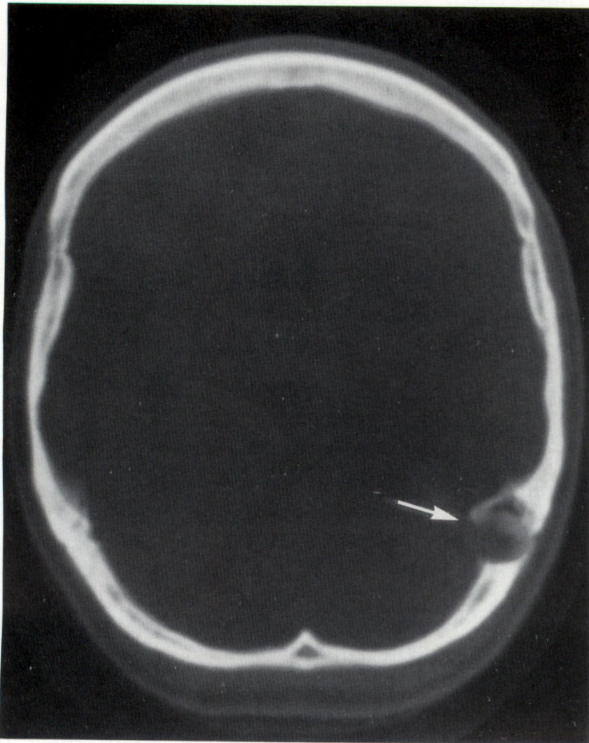
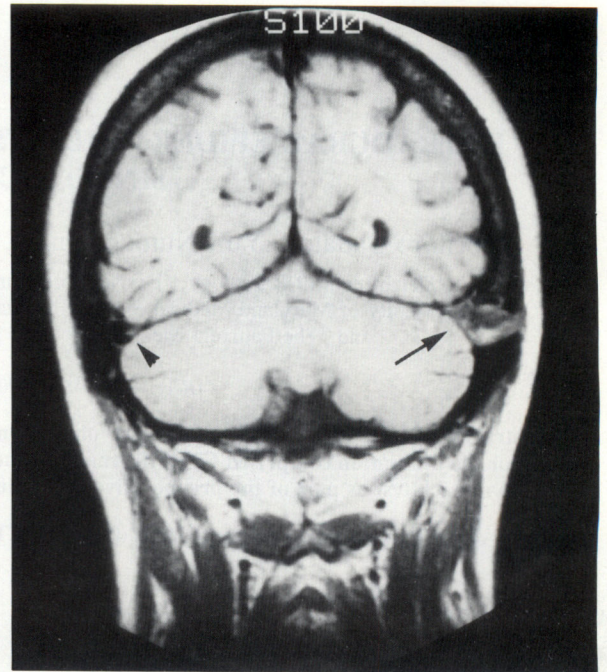
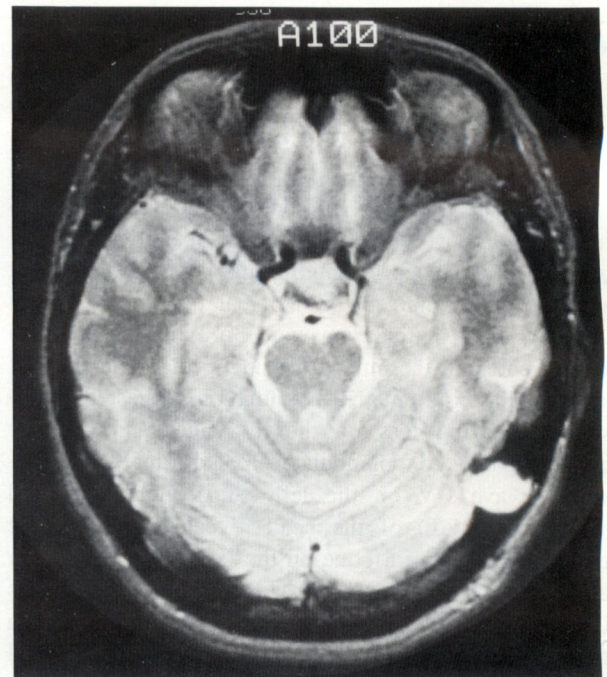


Fig. 1. CT of the head with bone window setting shows an expansile mass lesion in the left temporal bone (arrow). The epicenter of this lesion is located in the diploic space with thinning of the inner table and with slight medial protrusion.

ally one may find cholesterol crystals. In reported series of cranial epidermoids, the majority are found intradurally (75%), and the extradural diploic epidermoids comprise only about 25% (1). Most of the extradural epidermoids are found, incidentally, as painless masses which thinned or eroded both inner and outer tables of the skull, and they usually produce no symptoms (4). However, they may produce symptoms by virtue of their location, by interference with cerebrospinal fluid or vascular pathways, or by cyst rupture into the subarachnoid space or ventricular system (5). The cyst may infrequently erode through the inner table and may compress the intracranial structures. Because of the slow expansion of the cyst, neurologic deficits are usually minimal (4). The reason that our patients' hearing difficulty resolved itself after surgery is unknown because the lesion was not directly related to the auditory meatus or cochlear region. Radiographically, extradural intradiploic epidermoids characteristically present a sharply marginated lucent defect with a sclerotic, sometimes scalloped edge (1). On MR imaging, signal intensities of epidermoids vary but usually show low signal on T1- and high on T2-weighted images, presumably due to the solid state



(a)



(b)

Fig. 2. (a) T1-weighted coronal image (TR/TE = 700/20) shows low signal intensity mass lesion in the left temporal bone with its epicenter in the diploic space (solid arrow). This lesion compresses the left transverse sinus with complete obstruction, as evidenced by mass compression and the lack of flow void. Compare normal flow void on the right (arrowhead). (b) T2-weighted (TR/TE = 2800/80) axial image shows the tumor with high signal intensity.

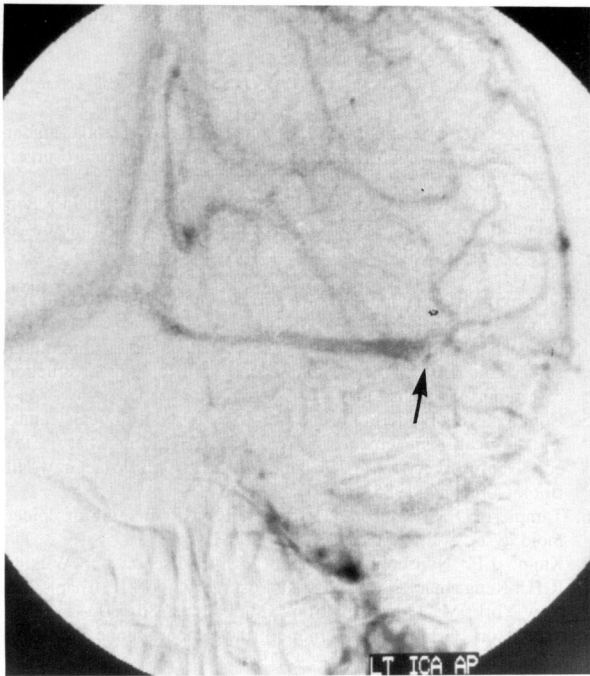


Fig. 3. Venous phase of left internal carotid angiography. On the anteroposterior view, complete obstruction of the left transverse sinus is noted (arrow). No tumor staining is identified.

of cholesterol or to their content of cerebrospinal fluid (6). On angiography, they are avascular structures.

Intradiploic epidermoids occur in all flat calvarial

bone. Their frequency of occurrence is evenly distributed on the frontal, parietal, temporal, and occipital bones roughly proportionate to the surface area (7). An epidermoid can occur within the jugular fossa and clinically mimic a lesion of the venous sinus such as glomus jugulare tumor (8). To our knowledge, only one case of large intradiploic epidermoid adjacent to the sinus is reported in the literature (4). This case had caused occlusion of the confluence of the sinuses and compression of the brainstem.

The case study reported here is unique because of the cyst's location and proximity to the adjacent venous sinus. This diploic epidermoid compressed and occluded the lateral sinus and was well demonstrated by MR image. Lesions localized in the area of the major dural sinuses are of special concern because of the potential major bleeding problems that can occur during surgical exploration (5).

Transverse sinus occlusion or thrombosis can result from either infection or from a noninfectious mechanism. The direct spread of the infection from the mastoid region or from thrombophlebitis of the small veins of the mastoid can result in transverse sinus infection, causing occlusion (9). In a review of 45 cases of lateral sinus thrombosis due to infection, Samuel and Fernandes (9) reported that all patients presented with retroauricular swelling and history of discharge from the ears. Neither of these symptoms was present in this patient.

Noninfectious cerebral venous occlusion can result



Fig. 4. Light micrograph shows that the cyst wall consists of keratinizing squamous epithelium resting directly on fibrous tissue. Abundant keratinaceous debris (upper left) filled the cyst. (H&E, X200.)

from meningiomas, glomus jugulare tumor or hyperplasia of the pacchionian granulation, malignant primary or metastatic tumors of the scalp and skull, and metastasis of the lesion to a sinus (7). Occlusion of the transverse sinus usually produces no neurologic deficit unless the contralateral transverse sinus is hypoplastic or does not drain in the confluence of the sinuses (7).

Because the tumor in this patient had its epicenter in the diploic space, the differential diagnosis included eosinophilic granuloma, fibrous dysplasia, osteomyelitis, and metastasis in addition to epidermoid cyst (10). Eosinophilic granuloma is a lytic lesion that destroys the adjacent inner and outer tables of the skull with minimal or no reactive sclerosis. A piece of intact bone in the center of the destructive lesion, termed "button sequestration," may be seen. A localized area of fibrous dysplasia generally has an irregularly dense margin but rarely protrudes into the inner table. Osteomyelitis tends to develop in the diploic space, destroying both tables of the calvarium with adjacent sclerosis. Metastasis generally results in multiple lesions that are ill defined, mainly located in the diploic space (10). For these reasons, an epidermoid cyst was the most likely diagnosis as determined from evaluation of the preoperative studies.

In this case, the preoperative evaluation with CT, MR imaging, and angiography facilitated preoperative surgical planning and provided the correct diagnosis of an epidermoid tumor despite its unusual location.

### SUMMARY

A case of an epidermoid cyst causing obstruction of the transverse sinus was reported. CT, MR imaging, and cerebral angiography played important roles in diagnosing the nature of the tumor and in preoperative planning.

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