Adult Traumatic Leptomeningeal Cyst
—Case Report—

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Abstract

A 60-year-old man presented with a traumatic leptomeningeal cyst manifesting as local tenderness in the right parietal region and local headache 2 years after head injury. Magnetic resonance imaging showed a small arachnoid cyst under bone defect. Dural and bone plasty were performed. Intraoperative examination found small and round defects of the dura and bone. Progressive headache was relieved after the surgery. This rare case of adult posttraumatic leptomeningeal cyst occurred within an unusually short period after trauma, and was associated with a small and round bone defect and small dural defect usually characteristic of congenital arachnoid cyst.

Key words: traumatic leptomeningeal cyst, intradiploic pseudomeningocele, intradiploic leptomeningeal cyst, intradiploic arachnoid cyst

Introduction

Posttraumatic leptomeningeal cysts occur as a rare complication of pediatric cranial fracture, developing in only 0.05% to 0.6% of all cranial fractures.1) This entity typically manifests as an enlarging scalp mass several weeks or months following head trauma.2) Traumatic leptomeningeal cyst in the adult population is extremely rare, with only 9 reported cases.1–3,5–10) We describe an adult case of posttraumatic leptomeningeal cyst manifesting as local headache 2 years after head injury.

Case Report

A 60-year-old man presented with local tenderness in the right parietal region. He had suffered head trauma in the parietal region when hit by a falling tree 2 years previously, but had not visited a hospital at that time. The tenderness was slowly progressive. Slight tactile stimulation induced sharp pain in the region, and head elevation on getting up in the morning also induced pain. He was referred to our department. Neurological examination revealed no neurological deficit. The surface of the parietal lesion was flattened, nonerosive, and nonpulsatile. Skull radiography showed a round 2-cm diameter circumscribed osteolytic defect without a sclerotic margin (Fig. 1A). Computed tomography showed a single circumscribed osteolytic defect involving both the inner and outer tables of the skull in the right parietal region (Fig. 1B, C). Magnetic resonance (MR) imaging revealed fluid collection in the bone defect but the adjacent brain tissue was normal, suggesting leptomeningeal cyst (Fig. 2). T1-weighted MR imaging with gadolinium showed no remarkable enhancement and diffusion-weighted imaging detected no high intensity in the lesion.

The skin flap over the flattened parietal lesion was dissected from the galea. The lesion covered with the galea was pulsatile. The galeal layer was dissected from the cyst, exposing a brown cystic membrane protruding out of the bone defect, containing clear fluid (Fig. 3A). The bone around the defect was removed, and both the inner and outer tables were smoothly eroded to 2 cm in diameter. The cystic sac protruded out of the round small dural defect and adhered to the dural rim (Fig. 3B). The dural defect was 5 mm in diameter. The cystic membrane and the attached dura were removed. A small scar was observed on the cortical surface adhering to the cystic membrane, but no vascular lesion was observed under the cyst. The dura around the defect was thin and fragile. The dural defect was closed with artificial dura, and the bone defect was covered with bone cement. The tenderness disappeared after surgery.
Fig. 1 A: Lateral skull radiograph showing a round lucent area 2 cm in diameter without a sclerotic rim in the right parietal bone. B, C: Brain (B) and bone window (C) computed tomography scans revealing a defect of the inner and outer tables in the right parietal bone.

Fig. 2 A: T$_1$-weighted magnetic resonance (MR) images with gadolinium showing no enhanced lesion on the right cortical surface. B: T$_2$-weighted MR images revealing a high intensity lesion, suggesting a cystic mass on the parietal surface under the bone defect.

The bone defect was small and round, with an eroded surface not reaching sclerotic thickness (Fig. 4A). The cystic membrane consisted of collagenous fibers showing reactive thickness from the arachnoid membranous component (Fig. 4B). The cystic membrane covered the surface of the bone defect and expanded into the erosive bone defect.

Discussion

Osteolytic lesion of the skull occurs due to various causes, such as benign and malignant tumor, infection, trauma, and granuloma. Clinical manifestations usually appear in the form of a nontender, nonpulsatile, subcutaneous mass, accompanied by progressive neurological deficit and seizures. In our case, we suspected non-traumatic skull lesion and, based on the radiography findings, the differential diagnosis included myeloma, intradiploic meningioma, metastasis, epidermoid cyst, and eosinophilic granuloma. The absence of enhancement and high intensity on diffusion-weighted MR imaging were helpful in the diagnosis. The lesion was diagnosed as a traumatic leptomeningeal cyst for the following reasons: 1) the swelling lesion was not shown before the head trauma, and 2) the patient remembered the past history of head trauma well and the limited injured lesion was accord with the limited painful lesion.

The term ‘intradiploic pseudomeningocele’ is
used for similar herniation of an arachnoid cyst and must be distinguished from leptomeningeal cyst, which is of traumatic origin, or arachnoid cyst and epidermoid cyst, which are of congenital origin.9) The characteristic features of posttraumatic leptomeningeal cysts differ from non-traumatic arachnoid cysts. First, the dural defect is not round and not small. Traumatic cases sometimes contain a growing fracture, and the dural defect is linear and has a long axis parallel to the skull fracture.6) Second, brain tissue damage is present adjacent to the posttraumatic leptomeningeal cyst. In our case, no linear fracture or growing fracture was observed. The bone defect was round, small, and smoothly circumscribed, and the dural defect was round and only 5 mm in diameter. These findings are characteristics of non-traumatic arachnoid cyst rather than traumatic cyst, suggesting that the dural laceration caused by head trauma was small, and the herniation of the arachnoid sac was similar to the congenital diverticulum of the arachnoid membrane through the congenital dural defect of non-traumatic cyst. Continuous pulsation of the herniated arachnoid membrane through the defect might erode the inner and outer tables in both traumatic and non-traumatic cases, indicating that the size of the dural defect caused by trauma or congenital factors may be important in the development of the cyst.

Posttraumatic leptomeningeal cyst is usually identified within a few months after the onset of head trauma in infant cases.11) Traumatic onset occurred in childhood in some adult cases, and the interval from onset was almost always more than 10 years in previous cases (Table 1). In our case, the interval from trauma to diagnosis was 2 years. The tenderness was severe and progressively worsened. The small dural defect may have resulted in strong tension of the dura and perioisteum around the herniated cyst, resulting in progressive deterioration. The cystic membrane was attached to the bone defect only in the present case. The cystic membrane was tough collagenous fiber and had expanded into the

**Fig. 3** A: Intraoperative photograph showing a small round bone defect with a cystic sac. B: Intraoperative photograph after removal of the bone showing a small dural defect 5 mm in diameter with a cystic membrane.

**Fig. 4** A: Photograph showing that the inside of the bone defect was erosive and almost 2 cm in diameter. B: Photomicrograph of the cystic membrane and the attachment to the bone defect. The cystic membrane consisted of collagenous fibers with reactive thickness from the arachnoid membranous component. The cystic membrane covered the surface of the bone defect and expanded into the erosive bone defect (arrow). Hematoxylin and eosin stain, original magnification ×40.
Table 1 Clinical features of the nine reported and the present cases of adult traumatic leptomeningeal cyst

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Age (yrs)/Sex</th>
<th>Initial symptom</th>
<th>Time interval from trauma</th>
<th>Bone defect (cm)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soule and Whitecomb (1946)[10]</td>
<td>28/M</td>
<td>swelling</td>
<td>18 mos</td>
<td>not specified</td>
<td>rt middle cranial fossa</td>
</tr>
<tr>
<td>Halliday et al. (1990)[3]</td>
<td>34/M</td>
<td>swelling</td>
<td>6 mos</td>
<td>7</td>
<td>rt frontoparietal</td>
</tr>
<tr>
<td>Lunardi et al. (1991)[8]</td>
<td>35/M</td>
<td>painful swelling</td>
<td>5 yrs</td>
<td>3</td>
<td>lt parietal</td>
</tr>
<tr>
<td>Britz et al. (1998)[7]</td>
<td>53/M</td>
<td>lump</td>
<td>about 40 yrs</td>
<td>4</td>
<td>rt parietal</td>
</tr>
<tr>
<td>Açikgöz and Tekkük (2002)[1]</td>
<td>59/M</td>
<td>ataxia</td>
<td>50 yrs</td>
<td>4</td>
<td>lt occipital</td>
</tr>
<tr>
<td>Menkü et al. (2004)[9]</td>
<td>30/F</td>
<td>swelling</td>
<td>5 yrs</td>
<td>3</td>
<td>rt parietal</td>
</tr>
<tr>
<td>Kurosu et al. (2004)[7]</td>
<td>53/F</td>
<td>dizziness</td>
<td>50 yrs</td>
<td>4</td>
<td>lt frontal</td>
</tr>
<tr>
<td>Houra et al. (2006)[5]</td>
<td>24/M</td>
<td>seizures</td>
<td>23 yrs</td>
<td>3.4</td>
<td>rt parietal</td>
</tr>
<tr>
<td>Iplikcioğlu et al. (2006)[6]</td>
<td>31/M</td>
<td>headache</td>
<td>12 yrs</td>
<td>3.5</td>
<td>rt parietal</td>
</tr>
<tr>
<td>Present case</td>
<td>60/M</td>
<td>tenderness</td>
<td>2 yrs</td>
<td>2</td>
<td>rt parietal</td>
</tr>
</tbody>
</table>

bone defect, suggesting strong tension of the cystic membrane with a small bone defect.

The present adult case of posttraumatic leptomeningeal cyst was characterized by a small dural defect and a short interval of 2 years from head trauma to diagnosis. Such rare clinical presentations should be kept in mind in cases of adult head trauma.

References


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