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【 CASE REPORT 】

A Rare Case of Idiopathic Temporal Muscle Abscess in a Nine-month-old Infant

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Abstract:
Temporal muscle abscess in children usually occurs from acute otitis media, and rapid progression and concomitant infectious disease often make it easy to diagnose. We report a rare case of a nine-month-old infant who showed right temporal mass with no evidence of infection. Computed tomography showed an osteolytic round mass, and magnetic resonance imaging revealed heterogenous enhancement with a high apparent diffusion coefficient. Malignant tumor was first suspected, but an open biopsy revealed the swelling to be temporal muscle abscess. It should be noted that temporal abscess may mimic the features of a malignant tumor, and multiple examinations should be performed for an accurate diagnosis.

Key words: temporal muscle abscess, infant, malignant tumor

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Introduction

Temporal muscle abscesses usually originate either from an odontogenic infection (in adults) or acute otitis media (in children). The progression of this disease is quite rapid, and it generally takes only a few days to develop into a painful swelling and mass located in the temporal region. As such, it is often easy to diagnose, especially due to the presence of concomitant diseases, such as dental and/or head and neck infection (1, 2).

We herein report an interesting case of slow-growing, osteolytic temporal muscle abscess in a nine-month-old infant with no clear evidence of dental or head and neck infection. The mass was first noticed three months prior to admission. The osteolytic heterogeneously enhanced mass was originally considered to be a malignant tumor. The authors will discuss the possible mechanisms of this rare presentation and the radiological methods to be used for an accurate diagnosis.

Case Report

A nine-month-old male infant was referred to our hospital from the local pediatric clinic for the further examination and treatment of a slow-growing right temporal mass. His mother noticed the mass for the first time when he was five months old but noted no signs of a fever, poor intake, or irritability, so she decided to observe the progress. The mass gradually grew, and the child was taken to the local pediatrician at eight months of age. The primary doctor first suspected the mass to be a malignant tumor because it was osteolytic, slow-growing, and showed no signs of dental or head and neck infection. The patient was then referred to our hospital for further investigation and treatment.

At the time of admission, the patient was alert and comfortable. A physical examination revealed a temporal mass measuring 3.1×2.9 cm, without any sign of flare, a fever, or tenderness. The child had been delivered by a normal vaginal route and was in good health. There was no significant medical history of trauma to the head or recurrent infections. The child was not being given any regular medication and did not have any known drug allergies. There was no significant history of recurrent infection among the family members. A general physical examination revealed no other abnormal findings. Laboratory investigations revealed a slight elevation in the leukocyte count (13,000 cells/μL) with a moderate segmented neutrophil component (44.0%) and an

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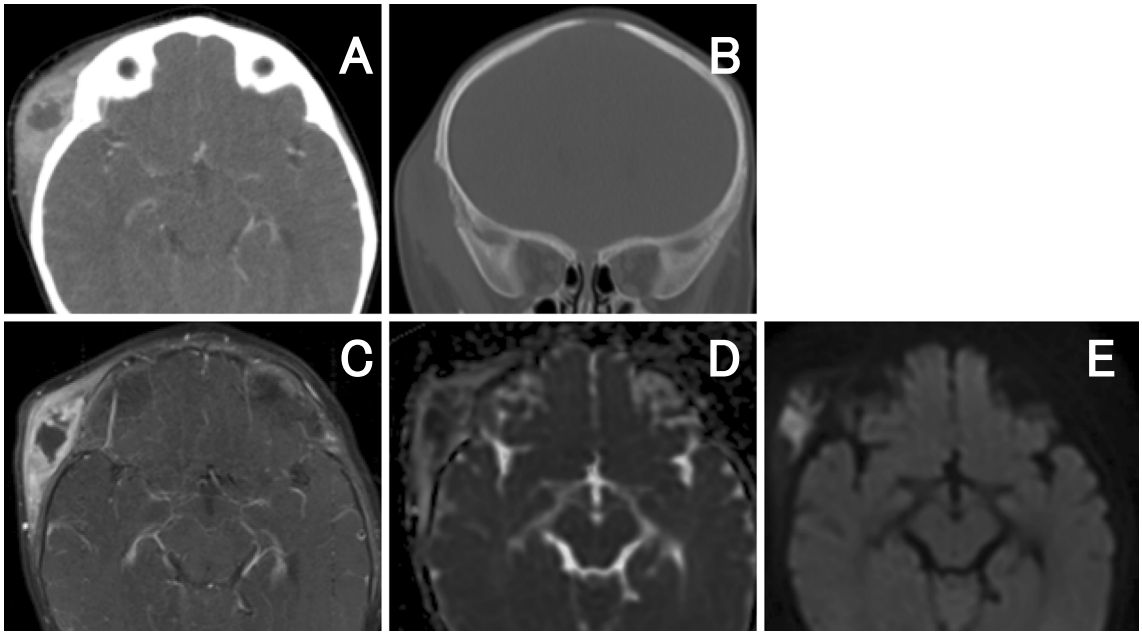

Figure. **Computed tomography showing a ring-enhanced mass in the right temporal muscle (A) and right temporal bone destruction at the outer side (B). Axial contrast-enhanced T1-weighted fat-suppressed imaging shows a ring-enhanced mass involving the right temporal muscle (C). Diffusion-weighted imaging (DWI) shows a high-intensity mass (D), and the apparent diffusion coefficient (ADC) map also shows high value (1.50×10^{-3} mm^2/s) (E).**

elevated CRP (1.25 mg/dL). Other markers were within their normal range. Computed tomography (CT) of the head showed a round, osteolytic mass lesion in the right temporal muscle. Enhanced CT showed a heterogeneously enhanced mass with low density in the center, suggesting a necrotic or cystic component (Figure A and B). Magnetic resonance imaging (MRI) showed a round mass lesion with an area of low enhancement within the cavity, suggesting a necrotic or cystic component (Figure C). In addition, part of the temporal muscle and temporal bone were enhanced. The apparent diffusion coefficient (ADC) calculated for the enhanced lesion was high (1.50×10^{-3} mm^2/s) (Figure D). The area of low enhancement on T1-weighted imaging showed a high-intensity signal on diffusion-weighted imaging (DWI) (Figure E).

The patient was referred to the pediatric department for a further evaluation. No signs of odontogenic or oral/pharyngeal inflammation were found; immune deficiency diseases, including chronic granulomatous disease, were also ruled out.

The preoperative diagnosis was a malignant tumor, such as sarcoma. However, the DWI result also allowed for abscess as a differential diagnosis. In order to obtain a definite diagnosis, the decision was made to perform an open biopsy. A needle biopsy was not favored because a malignant tumor might be highly vascular, making it difficult to achieve hemostasis; there was also a risk of dissemination through the needle tract. The temporal fascia was opened in the course of the biopsy and pus was released from the temporal muscle. The pus was subjected to a microbiological investigation. A Gram stain examination revealed the organism to be a Gram-positive coccus; culture and sensitivity further identified the organism as methicillin-sensitive *Staphylococcus aureus* (MSSA). A diagnosis of temporal muscle abscess with temporal bone osteomyelitis was made, and antibiotic treatment was initiated. The swelling gradually reduced in size, and the patient was discharged on the 14th postoperative day. Antibiotics were continued for 75 days, until complete recovery was confirmed by follow-up MRI.

Discussion

To our knowledge, this is the first report of a slow-growing, infantile temporal muscle abscess without any apparent evidence of infectious origin. An early and accurate diagnosis of lesions in the masticator space is essential for determining an effective therapeutic strategy. In most cases, it is not difficult to differentiate between malignant tumors and abscesses using MRI and CT (3, 4). Hariya et al. proposed that malignant tumors tend to demonstrate permeative bone destruction and cortical bone expansion; both the masseter muscle and medial pterygoid muscle are enlarged in cases of malignant tumors. In contrast, patients with osteomyelitis with bone destruction tend to present with osteosclerosis and periosteal reaction; the masseter muscle is more frequently enlarged than the medial pterygoid muscle (4). MRI is also an effective tool for differentiating malignant tumors from other diseases. Despite the fact that both malignant tumors and abscesses can show ring-like en-

Table. Radiographical Characteristics of Diseases Causing Pediatric Facial Swelling.

	CT	T1	T2	Gd	DWI	ADC	time course
present	ring enhancement	Hypointense	Hyperintense	ring enhancement	high	high	slowly progressive selling
capillaryhemangioma	strong enhancement	slightly hypointese	highly hyperintense	homogeneous enhancement	low	high	slowly progressive selling
hemolymphaangioma	Hyperattenuating Septal enhancement	Hypointense	Highly hyperintense	Septal enhancement	n/a	n/a	slowly progressive swelling
abscess	ring enhancement	Hypointense	Hyperintense	ring enhancement	high	high	acute swelling
osteosarcoma	Lytic lesion Calcification	n/a	n/a	Heterogeneous enhancement	n/a	n/a	acute swelling
chondrosarcoma	Lytic lesion Calcification Variable enhancement	n/a	Hyperintense	Variable enhancement	low	high	acute swelling
Ewing sarcoma		n/a	n/a	avidly enhancement	n/a	n/a	acute swelling
rhabdomyosarcoma	Homogeneously enhancement Bone lysis	isointensity	hyperintense	Heterogeneous enhancement	high	low	acute swelling
langerhans cellhistiocytosis	Bone lysis	low-iso intensity	hyperintensie	Heterogeneou senhancement	high	low	acute swelling

CT: computed tomography, Gd: gadlinium-T1 weighted imaging, DWI: diffusion weighted imaging, ADC: apparent diffusion coefficient, n/a: not available

hancement, ADC has been successfully used to differentiate inflammation from neoplasms at the skull base, paranasal sinuses, and other head and neck regions (5, 6). Wang et al. reported that the ADC values of benign tumors and inflammatory lesions are significantly higher than those of malignant tumors, and an ADC of $\leq 1.40\times10^{-3}$ mm^2/s has been suggested as a threshold for differentiating malignant tumors from benign tumors and inflammatory lesions in the masticator space (1). Razek et al. showed the mean ADC value of malignancy to be $0.91\pm0.21\times10^{-3}$ mm^2/s and that of infection to be $1.59\pm0.32\times10^{-3}$ mm^2/s (7). The fact that inflammation increases the extracellular water content might explain the high ADC value seen in this condition. According to the ADC value, our case met the criteria for non-malignant disease.

However, such entities are often seen in elderly patients with an apparent infectious origin, and slow-growing masses in pediatric patients with no apparent infectious symptoms are difficult to distinguish as either a malignant tumor or infectious disease. The presurgical examination in the present case showed heterogeneous results. While a slow-growing mass lacking an infectious origin, pain, and swelling and bone destruction without osteosclerosis may seem to be a malignant tumor, a high ADC value and DWI signal suggest infectious disease.

Table summarizes the typical causes of pediatric facial swelling (8, 9). According to these results, no single method is entirely reliable, so a comprehensive approach should be adopted in order to reach an accurate diagnosis. We recommend an open biopsy, as hemostasis can be difficult to achieve following a needle biopsy in cases of vascular-rich malignant tumors, and hemorrhaging in the temporal region in infants can easily cause airway obstruction.

In the present report, we described a rare case of a pediatric slow-growing temporal mass mimicking a malignant tumor. It should be always considered that a slow-growing temporal mass in pediatric patients without apparent infection around the head and neck may be an abscess.

The authors state that they have no Conflict of Interest (COI).

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