—Case Reports—

Pott's Puffy Tumor in an Adult: A Case Report and Review of Literature

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Pott's puffy tumor is a subperiosteal abscess of the frontal bone with osteomyelitis which has become rare because of the widespread use of antibiotics. Here, we report a case of Pott's puffy tumor in a 46-year-old man who visited the department of dermatology with painful swelling of the forehead. Despite open drainage and oral antibiotic therapy, the symptoms recurred twice in the following month. Computed tomography revealed a fistula of frontal bone. The eventual diagnosis was Pott's puffy tumor. The patient underwent endoscopic surgery at the department of otorhinolaryngology and achieved a complete recovery. (J Nippon Med Sch 2016; 83: 211–214)

Key words: Pott's puffy tumor, sinusitis, epidermal cyst, osteomyelitis

Introduction

Pott's puffy tumor (PPT) is a subperiosteal abscess of the frontal bone and is associated with osteomyelitis. This condition is usually observed in adolescents and is therefore considered rare in adults[1]. We present a case of PPT in an adult patient.

Case Report

A 46-year-old man presented to the department of dermatology of the Nippon Medical School Tama Nagayama Hospital with painful swelling of the forehead which had first appeared 6 months earlier and had occurred repeatedly in the same location. He had no history of trauma or surgery.

Physical examination revealed a 4 cm diameter, soft, tender, well-demarcated area of swelling with pulsation at the center of the forehead (**Fig. 1**). There were no neurological symptoms or symptoms, such as vomiting, indicating increased intracranial pressure.

Computed tomography (CT) examination of the head showed a subcutaneous cyst with fluid collection in the forehead (**Fig. 2**). Because an infection of an epidermal cyst was possible, incisional drainage was performed and resulted in a large amount of bloody pus being discharged. The swelling decreased after systemic administration of the antibiotic cefcapene pivoxil. Bacterial culture of pus revealed no organism. The swelling of the forehead recurred twice during the subsequent month and required incisional drainage again. Therefore, magnetic resonance imaging (MRI) of the head was performed to exclude disorders other than an epidermal cyst. A cystic lesion in the left ethmoid sinus showed low intensity in T1-weighted images and high intensity in T2-weighted images (**Fig. 3**).

Considering the possibility of inflammation in the left

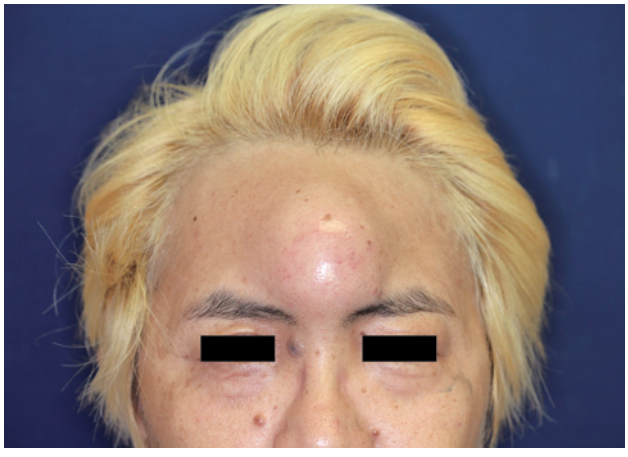

Fig. 1 Clinical image showing a soft, well-demarcated swelling protruding from the frontal lesion.

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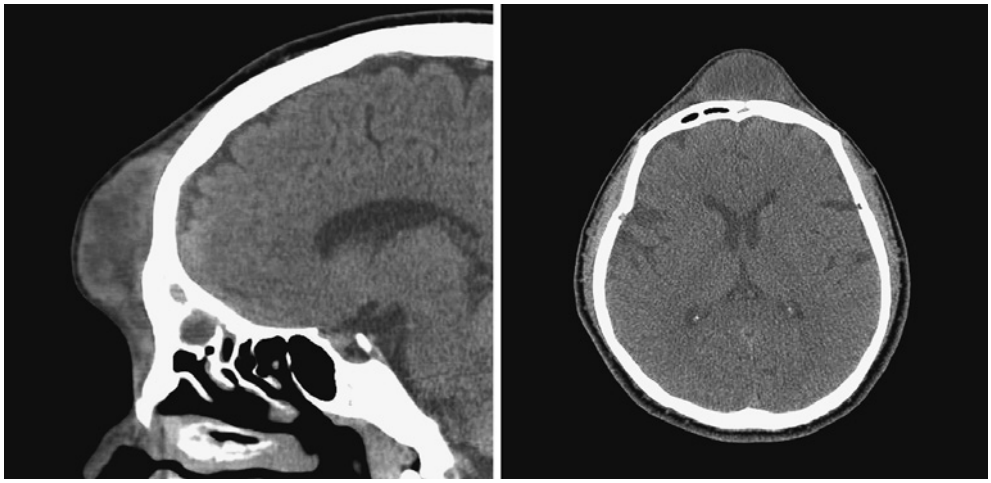

Fig. 2 Computed tomography images. Axial and sagittal slices showing a subcutaneous cyst with fluid collection in the forehead.

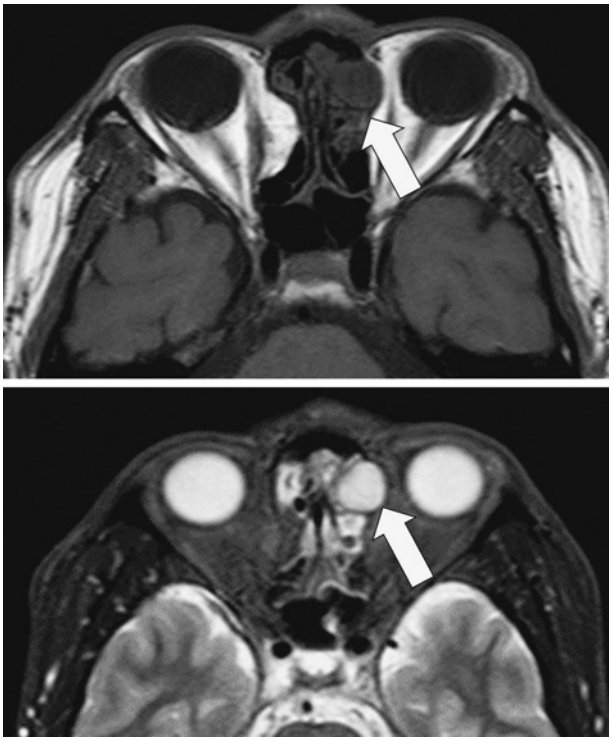

Fig. 3 Magnetic resonance imaging showing a cystic lesion in the left ethmoid sinus (**arrows**).

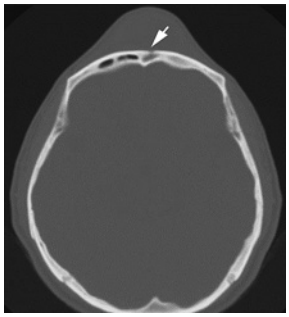

Fig. 4 Computed tomography image. A bone window, showing a bone defect in the anterior wall of the frontal sinus and fluid collection in the frontal sinus (**arrow**).

ethmoid sinus extending to the forehead, we reexamined the computed tomographic images of the head and found a hole bone defect in the anterior wall of the frontal sinus and a collection of fluid in the frontal sinus (**Fig. 4**). Thus, we assumed that the inflammation had spread to the subcutaneous tissue through a fistula in the frontal bone via the paranasal sinuses. On the basis on these findings, we consulted with the department of plastic surgery at our hospital and the department of otorhinolaryngology of the Nippon Medical School Musashi Kosugi Hospital, and diagnosed PPT. The patient underwent endoscopic sinus surgery at the department of otorhinolaryngology. He has had no recurrence of PPT thereafter.

Discussion

The subperiosteal abscess known as PPT is formed by inflammation in the frontal sinus via a fistula in the frontal bone[1]. Sir Percivall Pott first reported this disorder in 1,768 as "a subperiosteal abscess in the forehead resulting from a trauma." He subsequently reported that this disorder resulted from frontal sinusitis[2].

Worsening of frontal sinusitis is believed to cause osteomyelitis of the frontal bone, resulting in a fistula, through which inflammation spreads under the skin[3]. Intracranial complications such as epidural, subdural and brain abscess may accompany PPT[4].

Because PPT commonly occurs in young people, it is considered to result from (1) an anatomically undeveloped frontal sinus and (2) increased blood flow in the diploic veins in adolescence[1,5]. The diploic veins are distributed between the external and internal tables of the calvaria. Because the veins in the frontal sinus mucosa run to the dural venous plexus via the diploic veins, they are believed to be a pathway for intracranial infection[4]. In addition, PPT is more common in male, and the male : female ratio has been reported to be approximately 3 : 1[6]. However, the reasons for this difference are unclear[6].

The differential diagnosis of PPT includes hematoma, skin and soft-tissue infections, and soft-tissue tumors[7]. Common causative bacteria are staphylococci, such as *Staphylococcus aureus* and *Staphylococcus epidermis*. Anaerobic bacteria are occasionally detected in cases of exacerbation from a carious tooth[8].

In most patients PPT is treated with a systemic antibiotic agent effective against the causative bacteria and with percutaneous or transnasal drainage[1]. Debridement is performed if an artificial substance or a sequestrum is present in the wound. Craniotomy might be required if PPT is accompanied by an intracranial lesion, such as brain and epidural abscess[9].

Cases of PPT in adults are rarely reported. Literature searches with PubMed, Ichushi Web by the Japan Medical Abstracts Society, and Google Scholar found a total of 54 adult patients with PPT, including the present patient, reported on in Japanese or English to date until 2015[1,4,10–29]. These adult patients were 42 men and 12 women (male : female ratio, 3.5 : 1), ranged in age from 20 to 83 years, and had a mean age of 44.9 years. The percentage of all patients with intracranial complications, such as a brain abscess, was 27.8%, which was less than the 60% to 85% in previous studies including children[8]. The underlying diseases included conditions associated with increased susceptibility to infection, such as diabetes mellitus, receiving dialysis, and aplastic anemia[1]. In addition, PPT in adults have been associated with intranasal cocaine or methamphetamine abuse[1,11]. Cocaine is believed to increase the susceptibility of local tissues to infection[30]. Although some patients had a history of open skull fracture due to traffic accidents, several other patients had PPT resulting from a minor trauma caused by an insect bite or the forehead hitting a door[1]. Old trauma also requires attention. One adult patient had undergone craniotomy in his youth, been infected with human immunodeficiency virus 13 years later, and became susceptible to infection, resulting in PPT[26].

The present patient had no noteworthy history, including a history of trauma. The CT and MRI images showed a cystic lesion in the ethmoid sinus; therefore, we considered two possible processes by which PPT developed: (1) progression to PPT because of exacerbation of ethmoidal sinusitis and (2) repeated minor traumas, such as scratching associated with frequently wearing a helmet as a construction worker.

Because we initially suspected that the present patient had a secondary infection of an epidermal cyst, we did not make a confirmed diagnosis of PPT until approximately 4 months later. Early diagnosis is desirable, because intracranial complications can be fatal[4]. Patients first examined by an otorhinolaryngologist have been reported to more often receive a correct diagnosis of PPT and to less often have intracranial complications than do patients first examined by physicians of other departments, including dermatology[1]. We examined the present adult patient and, because of our lack of correct background knowledge, were unable to correctly diagnosis PPT at an early stage. Although PPT is rare, clinicians should quickly work with other departments and consider the possibility of PPT if swelling repeatedly occurs in a patient's forehead.

Conflict of Interest: The authors declare no conflict of interet.

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