Clinical Report

A Case of Infratemporal Fossa Abscess with Signs of Chronic Maxillary Osteomyelitis

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Abstract

The infratemporal fossa is bordered superiorly by the infratemporal surface of the greater wing of the sphenoid bone and part of the temporal bone; medially by the lateral plate of the pterygoid process of the sphenoid bone; and anteriorly by the posterior surface of the maxilla. As it is completely surrounded by bone, it is frequently difficult to determine whether an abscess is present by direct visual observation or palpation alone. We report an extremely rare case of an infratemporal fossa abscess arising from chronic maxillary osteomyelitis developing after extraction of a maxillary molar. Despite drainage during initial oral anti-inflammatory treatment, pus continued to drain from the wound over a long period of time. This drainage ended when the eroded bone of the maxillary tuberosity on the affected side was curetted in a secondary procedure. The harvested bone tissue exhibited histological findings of chronic osteomyelitis. This suggests that the route of infection involved acute transformation of maxillary osteomyelitis by odontogenic infection advancing posteriorly and superiorly.

Key words: Infratemporal fossa—Abscess—Chronic maxillary osteomyelitis—Black pigmented anaerobic Gram-negative bacilli (BP-GNB)—Anti-inflammatory treatment

Case Report

Initial examination: April 16, 20xx.
Principal complaint: Swelling and pain in left temporal region.

Previous medical history: Hypertension; was being treated with oral Amlodipine Besylate and Candesartan Cilexetil in tablet form.

Family history: Nothing of note.

History of current condition: On April 3, 20xx, the left maxillary second molar was extracted at a local dental clinic due to malocclusion. On April 13, 20xx, the patient attended another clinic complaining of difficulty in opening his mouth, for which he was given Minocycline. Signs of inflammation were observed, however, and he was subsequently referred to our department. He underwent an initial examination at this institution on April 16, 20xx.

Condition:

Systemic findings: Height, 164 cm; weight, 65 kg; body temperature, 36.6°C.

Facial findings (Fig. 1): Diffuse swelling was observed extending from the left temporal area to the left mandibular area, with tenderness of the temporal area and masseter. No pain was evident on swallowing. A strong and unpleasant smell was noticeable, even from outside the oral cavity.

Oral findings (Fig. 2): The patient could only open his mouth to the breadth of one finger. The gingiva around the socket left by extraction of the left maxillary molar and the left buccal mucosa were swollen and tender.

Clinical test results: Blood tests showed acute suppurative inflammation. White blood cell (WBC) count 13,100/μl; neutrophils, 85.0%; and C-reactive protein (CRP), 31.59 mg/dl.

Imaging findings:
Panoramic X-ray (Fig. 3): Horizontal bone
resorption of the alveolar bone was evident, and was attributed to marginal periodontitis.

Computed tomography (CT) (Fig. 4): Low-density regions associated with air bubbles were present in the left temporal fossa and left pterygopalatine fossa.

Treatment and course (Table 1): Rapid propagation of infection from the extraction wound into the infratemporal fossa was diagnosed on the basis of the clinical findings and CT images, and the patient was admitted for treatment.

<table>
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<tr>
<th>Date</th>
<th>April 16</th>
<th>19</th>
<th>22</th>
<th>26</th>
<th>30</th>
<th>May 7</th>
<th>13</th>
<th>27</th>
<th>July 2</th>
<th>6</th>
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<td>Treatment and medication</td>
<td>CLDM 600 mg/day</td>
<td>CAM 400 mg/day</td>
<td>FRPM 600 mg/day</td>
<td>CAM 400 mg/day</td>
<td>CFPM 2 g/day</td>
<td>CFPN-PI 500 mg/day</td>
<td>LVFX 500 mg/day</td>
<td>AMPC 750 mg/day</td>
<td>CEZ 4 g/day</td>
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<td>Oral anti-inflammatory treatment</td>
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<td>Discharge</td>
<td>CT</td>
<td>2nd curettage</td>
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<td>59</td>
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Operation 1
On April 16, 20xx, oral anti-inflammatory treatment was administered under local anesthesia. A yellow-brownish pus was obtained on an aspiration biopsy from the left maxillary molar gingivobuccal fold toward the infratemporal fossa (Fig. 5). An incision was made in the mucosa and Kelly forceps used for blunt dissection of the deep tissue toward the infratemporal fossa. This resulted in the discharge of large amounts of foul-smelling pus. Intravenous administration of cefepime and clindamycin was started the same day.

Fig. 4  CT image from initial examination
Left side of infratemporal fossa is shadowed, with air bubbles also present.
On April 26, 20xx, blood tests showed that acute inflammation had improved: WBC count, 5,900/μl; neutrophils, 64.8%; and CRP, 0.61 mg/dl. The patient was therefore discharged from hospital.

Bacterial tests: Black pigmented anaerobic Gram-negative bacilli (BP-GNB) were found in the pus from the abscess.

Monitoring under outpatient treatment: Cleaning of the oral incision and administration of oral antibiotics were continued. Following sensitivity testing, antibiotics to which BP-GNB are usually sensitive were administered sequentially. Although blood tests showed no obvious signs of inflammation, pus continued to drain from the wound for 2 months after treatment. Periodic bacterial testing was continued, but insufficient anaerobic pus was obtained and identification of the specific causative microbe proved impossible. A CT scan on May 24, 20xx, revealed no obvious signs of abscess formation.

### Operation 2

On July 2, 20xx, curettage was performed again under intravenous sedation. An incision was made in the left maxillary molar gingivo-buccal fold and dissection performed. Because the bone of the left maxillary tuberosity was eroded, a bone curette was used to perform curettage of this area as far as possible and a Penrose drain inserted. Harvested bone tissue was submitted for histopathological analysis.

No pus drainage was evident on July 6, 20xx, and the Penrose drain was therefore removed.

The patient was subsequently monitored as an outpatient. No further drainage of pus
was observed after the second curettage. The wound closed approximately 3 weeks later (Figs. 6, 7, and 8).

Pathological findings (Fig. 9): Chronic osteomyelitis.

Discussion

The infratemporal fossa is an area that corresponds to the nasopharyngeal masticator space of the masticatory space. It is bound
superiorly by the infratemporal surface of the greater wing of the sphenoid bone and part of the temporal bone; medially by the lateral plate of the pterygoid process of the sphenoid bone; and anteriorly by the posterior surface of the maxilla (Fig. 10)\(^\text{2,20}\). This region contains the medial and lateral pterygoid muscles, temporalis muscle, mandibular nerve, maxillary artery, and pterygoid venous plexus, and is filled with loose connective tissue and fat\(^\text{20}\).

Reports of infratemporal fossa abscesses developing from odontogenic suppurative inflammation are comparatively rare in Japan\(^\text{6,12,15,18,20}\). Moreover, in most cases, the tooth responsible was a mandibular molar\(^\text{10,13,15}\). Kamijyo suggested that this was because the routes whereby inflammation propagates into this area include microbial invasion as a result of insufficient disinfection during mandibular foramen nerve block; periodontitis of the mandibular wisdom teeth; and extraction of an inflamed mandibular molar; all of which would cause suppurative inflammation to spread within the pterygomandibular space and move upward\(^\text{10}\). Infratemporal fossa abscesses thus extend superiorly, and only cause visible swelling once they reach the temporal fossa. This means that determining severity on the basis of visual inspection and palpation alone is frequently difficult\(^\text{1}\). These lesions are also difficult to spot on plain radiography. Computed tomography and magnetic resonance imaging (MRI), however, have been reported to be effective in providing visual evidence for a diagnosis\(^\text{1,3–5,17,19,21}\). In the present case, CT proved extremely useful in arriving at a diagnosis and deciding the course of treatment. An infratemporal fossa abscess should therefore be suspected if difficulty opening
the mouth and painful tenderness in the temporal area are present on initial examination and WBC count, neutrophils, and CRP levels are high, even in the absence of pronounced localized swelling. It is recommended that CT and MRI should be performed in such cases.

Infratemporal fossa abscesses not only pose a tough problem for diagnosis, but in some cases the anatomical characteristics also make it difficult to secure a drainage route for pus. Surgical approaches to the infratemporal fossa include: 1) advancing from the temporal fossa; 2) advancing from inside the mouth, such as from the canine fossa or palate; 3) advancing from the medial side of the parotid gland; 4) advancing via the maxillary sinus; and 5) cutting through the mandible and making an entry incision in the pharynx.

In the present case, factors such as the facts that the abscess had not spread very far into the temporal fossa and that the responsible tooth was a maxillary tooth meant that the oral approach enabled the abscess to be released with comparatively low invasiveness. With respect to the advantages and disadvantages of an oral incision as the sole way of securing a route for pus drainage, Schwimmer et al. and Sakoda et al. both maintain that the oral approach alone can be applied if inflammation has not reached the temporal fossa, but instead remains localized to the infratemporal fossa. Obtaining a clear field of view in this procedure is extremely difficult, however. Therefore, it is necessary to take great care to avoid damaging the pterygoid venous plexus and neurovascular bundle when making the incision.

Few reports have described infratemporal fossa abscesses due to an infection from a maxillary molar anterior to the wisdom teeth, as in the present case. In one report of an infratemporal fossa abscess following extraction of a maxillary wisdom tooth, the propagation route extended from the medial side of the masseter to the tip of the coronoid process, and was conjectured to have expanded from the pterygomandibular space on the medial side of the pterygoid muscle into the infratemporal fossa on the medial side of the temporalis muscle. In the present case, the abscess developed after extraction of the maxillary second molar, which is anterior to the wisdom tooth. Despite efforts at drainage in the initial oral anti-inflammatory treatment, pus continued to drain from the wound over a long period of time. This ended when the eroded bone of the maxillary tuberosity on the affected side was curetted in a secondary procedure, and the harvested bone tissue exhibited histological findings of chronic osteomyelitis. This suggests that the route of infection involved acute transformation of maxillary osteomyelitis by odontogenic infection advancing posteriorly and superiorly. Although a few scattered reports have described infratemporal fossa abscesses developing in the mandible from osteomyelitis of the jaw, cases such as the present, with abscess development in the maxilla, are extremely rare. This is why maxillary osteomyelitis was not envisaged when initial oral anti-inflammatory treatment was given. Evidence of local accumulation of technetium on bone scintigraphy is reportedly useful in diagnosing infratemporal fossa abscesses from mandibular osteoarthritis. The possibility of osteomyelitis must be borne in mind in cases of infratemporal fossa abscesses believed to be caused by inflammation of a maxillary tooth, and in addition to CT and MRI, it may be important to perform bone scintigraphy in such cases.

Suzuki et al. pointed out that anaerobic bacteria are common causative organisms in deep infections such as infratemporal fossa abscesses. Indeed, in the present case, BP-GNB were detected from pus samples obtained during oral anti-inflammatory treatment. Computed tomography at the time of the initial examination also showed air bubbles in the infratemporal fossa, suggesting the formation of gas-producing pus. Microorganisms causing gas-producing pus can be broadly divided into anaerobic bacteria in the genus Clostridium (the so-called “gas gangrene bacilli”) and non-Clostridium anaerobic bacteria, with the former tending to cause the development of more serious conditions.
Almost all microorganisms causing infections in the head and neck area are non-
*Clostridium* anaerobic bacteria, and mixed infections with aerobic bacteria are reportedly strongly pathogenic. In the present case, no *Clostridium* spp. was detected, and no obvious signs of myonecrosis or other soft tissue destruction were observed. Despite sequential administration of antibiotics considered sensitive according to drug sensitivity tests, however, pus continued to drain from the wound for more than 2 months after initial treatment. This suggests that if odontogenic deep infection is suspected, the presence of latent lesions in the jawbone due to conditions such as osteomyelitis should be considered. Rapid diagnosis is important in providing appropriate treatment before infection becomes serious.

**Conclusion**

We treated a patient with an infratemporal fossa abscess developing after extraction of a maxillary molar, with spread of infection posteriorly and superiorly.

Following oral anti-inflammatory treatment, pus continued to drain from the wound for a long time, but ended on curettage of inflamed bone tissue following tooth extraction. This suggests that the cause was acute transformation of osteomyelitis resulting from odontogenic infection.

**References**


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