CASE REPORT

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Acupuncture Therapy and Herbal Medicine Accelerating Temporal Space Abscess after Tooth Extraction: A Case Report

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Numerous oral and maxillofacial surgeons have found facial space infections after tooth extraction. Most of these infections can be managed easily, but some of them could be life-threatening. Among the facial infections, temporal space infections are rare. Most temporal space infections could be observed as secondary to maxillary third molar infections, maxillary sinusitis, and maxillary sinus fractures. Note, however, that there are insufficient studies on temporal space abscess due to mandibular second molars, especially with acupuncture. A 74-year-old female came to our hospital with severe trismus and facial swelling on the right temporal, buccal, posterior auricular, and cervical regions. The patient had undergone extraction of tooth #47 secondary to dental caries by a general dentist about a month ago. After the dental procedure, the patient had been treated with acupuncture therapy around the right temporomandibular joint area at the oriental medicine clinic. We performed emergency incision and drainage under general anesthesia and started antibiotic treatment with IV ampicillin/sulbactam 3 g every 24 hours and vancomycin 1 g every 24 hours for 5 days. The patient's symptoms subsided and ultimately disappeared. Temporal space abscess after mandibular molar extraction is quite rare. In this case, the spreading mechanism against gravity is considered to be acupuncture therapy.

Key Words: Acupuncture therapy; Dental focal infection; Temporal muscle; Tooth extraction

Introduction

Tooth extraction is the most frequently performed procedure by oral and maxillofacial surgeons. After tooth extraction, patients often get infections, especially facial space abscesses[1]. Most facial space infections can be managed by several antibiotics and surgical procedure such as incision and drainage.

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In some cases, however, facial space infections could be a life-threatening problem such as airway obstruction due to Ludwig angina and acute mediastinitis[2]. The spread of infection follows the path of least resistance, which could be influenced by gravity. Consequently, temporal space infections caused by the extraction of the mandibular molar are rare and uncommonly reported[3]. In this report, we present a case involving severe infection in the temporal area after the extraction of the right mandibular second molar and acupuncture therapy combined with oriental medicine.

Case Report

A 74-year-old female came to our hospital with severe trismus and facial pain and swelling on the right side of the face (April 18, 2013). According to the patient's medical history, the patient had hypertension history and received prescription from the local medical clinic. About a year ago, the patient heard that she had no specific condition based on the blood laboratory test particularly the liver function test. The patient underwent extraction of right mandibular second molar secondary to dental caries by a general dentist around the middle of March 2013. Afterward, the patient had been treated with gingival curettage on the extraction wound after the tooth extraction 3 times weekly because she felt discomfort around the extraction socket. Despite the treatment, the patient developed some swelling on the right side of the face and mild trismus. After the dental procedure, the patient visited an oriental medicine clinic on April 8, 2013 to manage the facial swelling and trismus. The patient was given acupuncture therapy around the right temporomandibular joint area daily from April 8 to April 15, 2013 combined with oriental herbal medicine for 10 days. During this period, the patient could neither eat food properly nor undergo medical inspection by a physician until the day she was referred by the local medical clinic. A physical examination of the patient's face revealed severe trismus with mouth opening of about 10 mm between the upper and lower incisal tips and severe facial swelling on the right temporal, buccal, posterior auricular, and cervical regions. Laboratory tests showed increased liver enzymes (aspartate aminotransferase, 137 IU/L; alanine aminotransferase, 107 IU/L; alkaline phosphatase, 1,913 IU/L, gamma glutamyltranspeptidase, 389 IU/L), C-reactive protein (CRP, 28.72 mg/

Table 1. The major laboratory values of the patient

	2012	18th April	19th April	20th April	21st April	22nd April	23rd April	24th April	26th April	29th April	1st May	6th May	13th May	27th May	10th June
Total bilirubin (mg/dl)		0.6	0.4	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.2	0.3	0.4		0.5
AST (IU/L)	22	137	151	117	71	56	46	40	41	37	32	20	21	20	20
ALT (IU/L)	19	107	113	109	77	67	56	52	50	43	36	17	12	12	12
ALP (IU/L)	74	1,913	1,198	1,456	919	795	711	604	587	552	446	393	366		330
GGT (IU/L)	37	389	251	246	180	171	146	143	151	129	102	63			
CRP (mg/dl)		28.72		20.08	14.05	11.18	8.75	6.52	6.77	4.56	3.43	1.58	0.49	0.13	0.06
BUN (mg/dl)	18.6	100	98	109	91	58	36	30	31	23	15	6	10	24	
Creatinine (mg/dl)	0.87	4.3	3.2	3.1	2.2	1.4	1.1	1.0	1.1	1.1	1.0	1.0	1.2	1.1	
WBC ($10^3/\mu l$)		53.40	35.90	33.50	24.10	19.70	16.90	16.70	14.40	8.20	6.40	4.80	6.20	6.50	6.00

AST: aspartate aminotransferase, ALT: alanine aminotransferase, ALP: alkaline phosphatase, GGT: gamma glutamyltranspeptidase, CRP: C-reactive protein, BUN: blood urea nitrogen, WBC: white blood cell.

Blank denotes non-inspected values.

The "2012" column is data from the clinic that referred the patient.

dl), renal markers (blood urea nitrogen, 100 mg/dl; creatinine, 4.3 mg/dl), and hyponatremia (123 mEq/L). Laboratory values showed highly elevated white blood cell count ($53.40\times10^3/\mu l$) and slightly low red blood cell count, hemoglobin, and hematocrit values. The major laboratory values of the patient through the follow-up period are presented in Table 1. The computed tomography (CT) scan obtained showed abscess formation at the right masticatory space extending to the right temporalis muscle area and subgaleal area of the right hemisphere (Fig. 1). We decided to admit the patient immediately to our hospital and consulted a nephrologist and a hepatologist. The patient was treated with intravenous ampicillin/sulbactam 3 g every 24 hours and vancomycin 1 g every 24 hours for 5 days.

The patient was taken to the operation room where incision and drainage with pus culture were performed from a preauricular approach on the

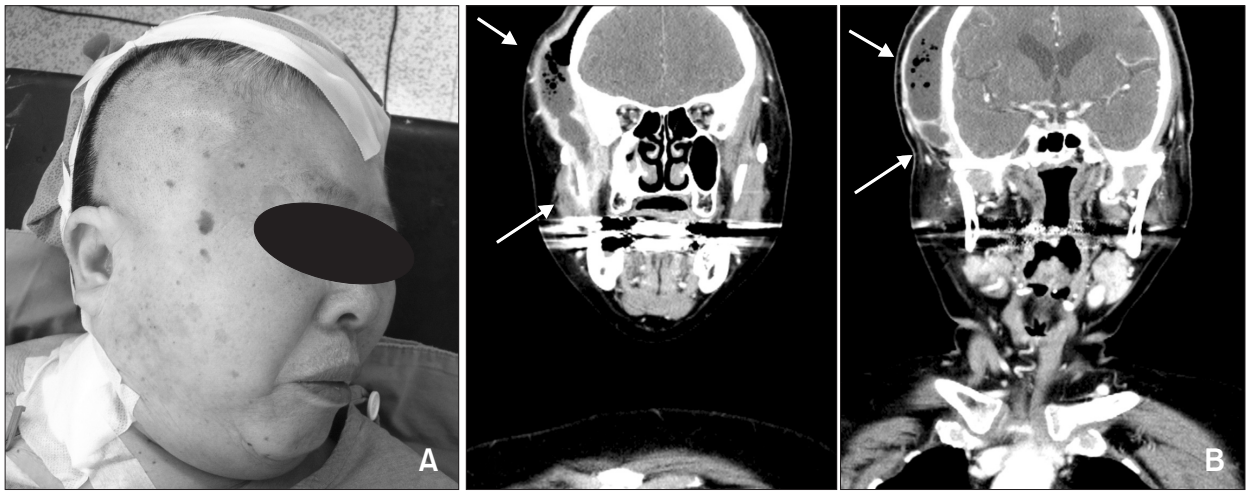

Fig. 1. Preoperative clinical photo (A) and computed tomography scan (B) showing abscess formation at the right masticatory space extending to the right temporalis muscle area and subgaleal area (arrows) of the right hemisphere.

Fig. 2. The drainage scar is formed on the preauricular incision site. (A) The patient's symptoms had subsided, and swelling disappeared on the right temporal muscle region at 26 days postoperation. (B) A follow-up computed tomography scan 26 days after surgery showed significant decrease of abscess in the subgaleal space (arrows) along the temporalis muscle.

patient's right temporal space. Pus drainage was achieved. Silastic drains were placed, and suturing was done using nylon sutures. After the surgery, the patient was transferred to the intensive care unit because of post-infectious glomerulonephritis. Five days later, the patient's kidney function recovered, and the patient was transferred to an infectious disease specialist to control the patient's antibiotics. Vancomycin was discontinued.

Twenty-two days after surgery, the silastic drains were removed. Twenty-five days after surgery, the serum CRP level was 0.49 mg/dl, and the patient had slight pain upon pressure in the region where swelling remained. The patient's mouth opening was 30 mm, and pus drainage had stopped. The culture showed *Staphylococcus epidermidis*. The acid-fast bacillus stain and culture, fungus culture, and blood culture showed neither bacteria nor growth after 3 weeks. A follow-up CT scan 26 days after surgery revealed significant decrease of abscess in the subgaleal space along the temporalis muscle (Fig. 2B). The patient's symptoms had subsided (Fig. 2A).

We recieved permission to use photos of the patient.

Discussion

Oral and maxillofacial regions have potential spaces bound by muscles and fascias where odontogenic infections can spread[4]. The temporal space is located posterior to the maxilla, between the lateral pterygoid plate of the sphenoid bone medially and by the base of skull superiorly[4]. Infections of the temporal space are rare. Note, however, that they can be significant, since it is possible for infection to spread via emissary veins from the pterygoid plexus to the cavernous sinus, which may result in cavernous sinus thrombosis[5]. In temporal space infections, the most causative tooth is the maxillary third molar[6]. Infections spread from the mandibular third molar to temporal space are very rare because gravity influences infection extension to a downward direction[3]. According to Schuknecht et al.[7], the submasseteric pathway provides an explanation for abscess extension against gravity exerted by masticatory forces. de Oliveira Neto et al.[3] noted that the spread mechanism of ascension must be involved with the virulence of microorganisms.

In this case, we suggest three possible explanations of abscess extension against gravity. First, acupuncture therapy on the right temporomandibular joint region may stimulate submasseteric abscess spread to the temporal space. After an acupuncture procedure, infrared radiation heat therapy is routinely performed to reduce needling pain. The localized heat transduction may boost the spread of abscess from the submasseteric space to the temporal space. Second, direct needle insertion can cause skin infection and seed skin bacteria in deep muscular portions. There are 2 cases of facial abscess caused by acupuncture to relieve toothache[8]. Zhang et al.[8] reported buccal space abscess caused by acupuncture wherein the acupoint was the buccal region and temporal space abscess caused by acupuncture where the acupoint was also the buccal region. The results from the pus culture found *S. epidermidis*, which is the most common species found in laboratory tests due to contamination[9]. We think that, during the transdermal penetration from acupuncture, *S. epidermidis* was probably seeded into the infratemporal space. Third, oriental herbal medicine can cause acute toxic hepatitis[10] and post-infectious glomerulonephritis[11]; thus, the systemic condition of the patient had collapsed, and infection rapidly diffused to nearby spaces such as the temporal space.

Taken together, the exact cause of the spread of infection from mandibular to temporal space is unknown, but a combination of the three aforesaid possible causes can be an explanation. Moreover, surgeons should know that post-extraction

acupuncture procedure could give rise to minor inflammation to space abscess and should warn patients to follow post-extraction precautions, especially elderly patients who tend to place their faith in oriental medicine in Far East nations.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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