Osteomyelitis of Mandibular Condyle : A Case Report in 9-year-old Child

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Osteomyelitis means inflammation of the bone marrow. It usually begins in the medullary cavity, involving the cancellous bone; then it extends and spreads to the cortical bone and eventually to the periosteum. The cause is usually thought to be microbiological. But there still are factors that predispose to produce a possible bone infection such as injuries, syphilis, actionomycosis, chronic kidney failure, alcoholism, malnutrition, radiotherapy, and chemotherapy.

Treatment of modalities have been directed toward eradicating microbes and improving circulation in the early stage. In the case presented, surgical debridement and IV antibiotics were the treatment of choice.

Osteomyelitis in children is mainly affected in the mandible. And in childhood, the mandibular condyle is regarded as an important center of mandibular growth. Therefore, in young patients, osteomyelitis involving this region may cause a restraint of mandibular development, resulting in facial asymmetry. So diagnosis in the early stage is important in child with osteomyelitis.

Recently, we have encountered an interesting case of osteomyelitis of the mandibular condyle in 9-year-old boy. So we present the case and review the literature about osteomyelitis.

Key words: Osteomyelitis, Mandibular condyle, Children

I. INTRODUCTION

Osteomyelitis means inflammation of the bone marrow. It usually begins in the medullary cavity, involving the cancellous bone; then it extends and spreads to the cortical bone and eventually to the periosteum. The cause is usually thought to be microbiological. After contemporary availability of antimicrobial therapy has contributed to the declining prevalence and the ultimate control of osteomyelitis.[1] But there still are factors that predispose to produce a possible bone infection such as injuries, syphilis, actinomycosis, chronic kidney failure, alcoholism, malnutrition, radiotherapy, and chemotherapy.[2]

Although the maxilla can also become involved in osteomyelitis, it does so rarely compared with the mandible.[1] Because the mandible is made up of a well-developed periosteum, a solid cortex, and extensive spongiosa in the subapical region of the body of the jaw. The spongiosa also extends into the

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ascending ramus and mental tuberance. The thick cortex is not easily penetrated by a suppurative process, but the infection spreads in the cancelleous part of the bone easily.[3)]

In the mandible, the tooth bearing segment was the major site of involvement.[4)] The parts of the mandible most commonly involved are the anterior region and the body from the mental foramen to the ascending ramus.[3)] The ramus is less frequently the seat of osteomyelitis. The condylar process may be infected by an abscess in the adjacent pterygo-mandibular space.[3)]

Cartilage covers the surface of the mandibular condyle at the temporomandibular joint. Hyperplasia, hypertrophy, and endochondral replacement do occur there although this cartilage is not like the cartilage at an epiphyseal plate or a synchondrosis. As a growth site, the chin is almost inactive. It is translated downward and forward, as the actual growth occurs at the mandibular condyle and along the posterior surface of the ramus. It becomes apparent that mandibular condyle is the principal site of growth of the mandible.[5)] And from an anatomical point of view, mandibular structure in childhood is complicated. Because it is also still developing and deciduous and permanent teeth germs come closed each other.[6)]

Therefore osteomyelitis in children is frequently fulminating and can be very serious[3)] and the involvement of the condyle and the mandibular joint may cause serious secondary deformities during the period of skeletal growth. The downward and forward growth of the jaw can be arrested on the affected side, causing asymmetry of the face.

Recently, we have encountered an interesting case of osteomyelitis of the mandibular condyle in 9-year-old boy, so present the case and review the literature about osteomyelitis of children.

Case Report

A 9-year-old boy visited our department of Oral Medicine on February 24, 2009. one week before his visit, he had had limitation of mouth opening because of left preauricular pain. His mother stated that his pain and limitation of mouth opening had became progressively worse. He stated that ball had hit on his left face slightly 2 week before but had no discomfort at that time.

Review of his history showed no significant medical problems.

The clinical examination showed tenderness and slightly diffuse swelling over the left temporomandibular joint area. Interincisal distance was 18mm with pain and there was deflection of the mandible to the right on mouth opening. But his teeth and gingiva appeared non-specific although there were treated teeth. Body temperature was 36.8°C.

At first visit, panoramic view was taken and demonstrated irregular bony destruction of the mandibular condyle on the left side(Fig. 1).

Cone beam CT(Fig. 2a, 2b) and computed tomography(Fig. 3a, 3b) were obtained for further evaluation. They showed osteolysis and bone destruction on the mandibular condyle. Bone scan showed reactive bone lesion in head of the mandibular condyle on the left side(Fig. 4). Based on these findings, osteomyelitis of the mandibular condyle was suspected.

And 3 days after his first visit, he was referred to the department of Pediatrics for hospitalization and antibiotic therapy. But his symptom and sign did not subside. Then he was referred to the department of Oral Maxillofacial Surgery for bony curettage and biopsy of left condylar head on March 5, 2009. Biopsy and bony curettage from the diseased area was performed under general anesthesia.

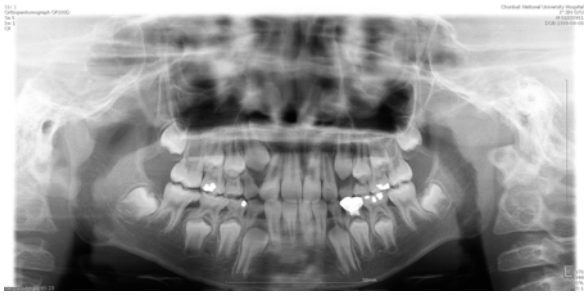

Fig. 1. Panoramic view at first visit

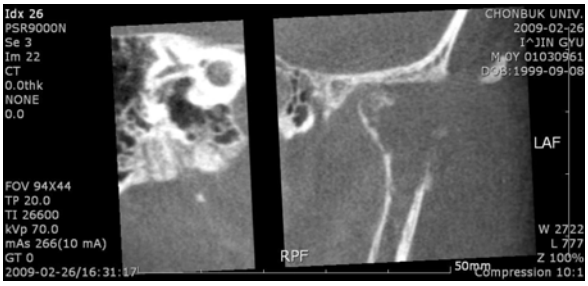

Fig. 2a. Coronal view of left mandibular condyle by cone beam CT.

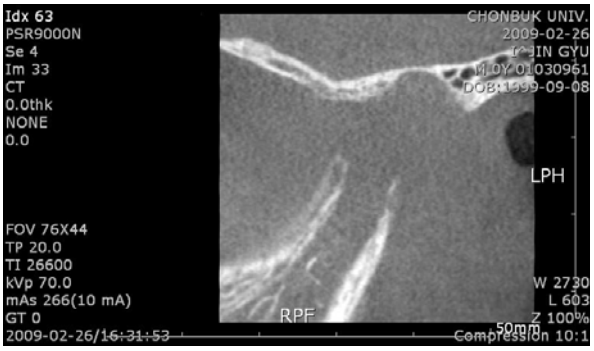

Fig. 2b. Sagittal view of left mandibular condyle by cone beam CT.

Histological examination revealed chronic osteomyelitis with foreign body reaction and acute suppurative inflammation with granulation tissue formation(Fig. 5a, 5b, 5c). Microbiologic culture of bone fragments was negative.

For 20 days after biopsy and curettage, antibiotics therapy was performed during hospitalization. He was discharged on March 27, 2009. Oral examination showed slightly openbite at the anterior teeth and right posterior teeth. So he was referred to the department of Orthodontics and is being under orthodontic treatment.

At 4 month after discharge, cone beam CT were obtained. It demonstrated bony formation at the left mandibular condyle without the relapsing symptom of disease(Fig. 6a, 6b).

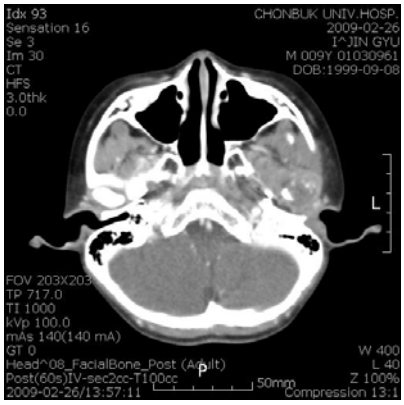

Fig. 3a. Horizontal view of CT

Fig. 3b. Coronal view of CT

Fig. 4. Bone scintigraphy view

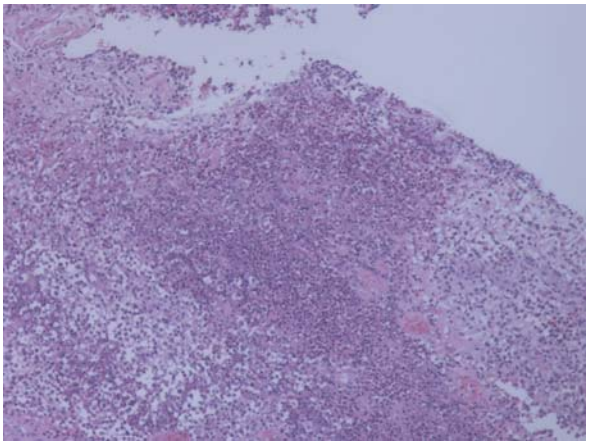

Fig. 5a. Microscopic view shows infiltration of inflammatory cells(x10, H& E stain).

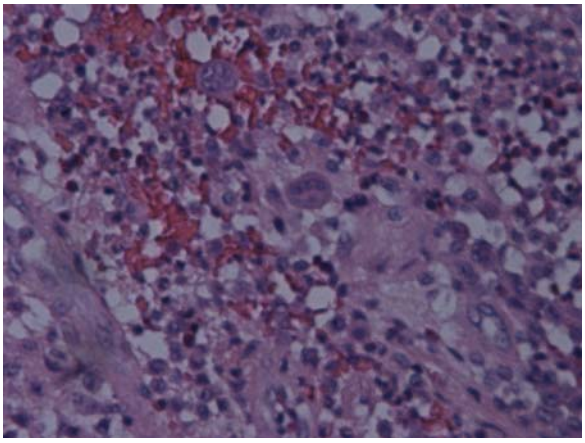

Fig. 5b. Microscopic view shows infiltration consisting of multiple macrohages, lymphocytes with embedded giant cells(x40, H& E stain).

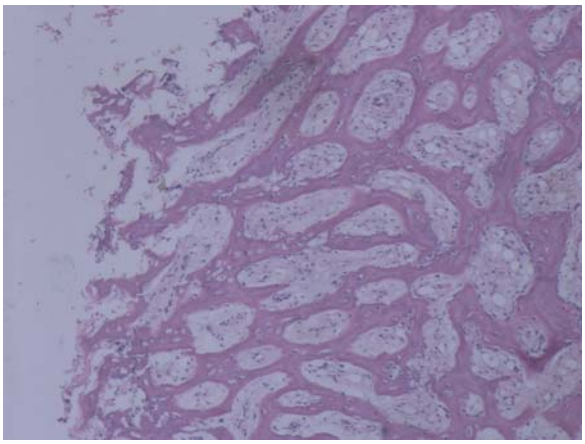

Fig. 5c. Microscopic view shows reactive bony response(x10, H& E stain).

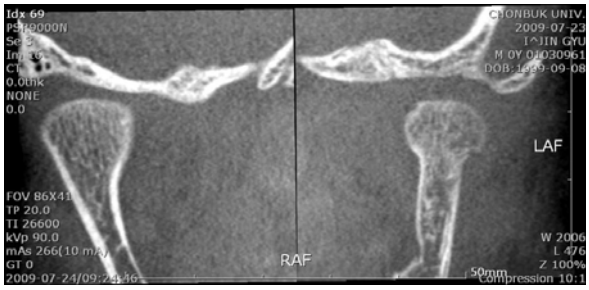

Fig. 6a. Coronal view of left mandibular condyle at 4 month after discharge by cone beam CT.

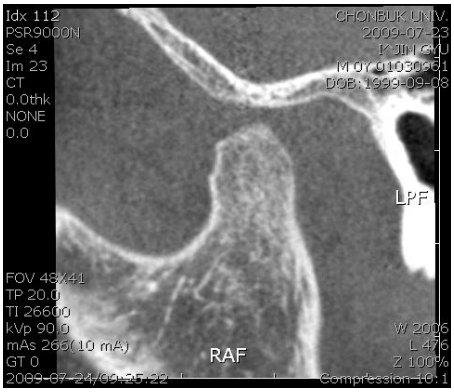

Fig. 6b. Sagittal view of left mandibular condyle at 4 month after discharge by cone beam CT.

Ⅱ. DISCUSSION AND CONCLUSION

1. Pathogenesis

The term osteomyelitis literally means inflammation of the bone marrow. It usually begins in the medullary cavity, involving the cancellous bone; then it extends and spreads to the cortical bone and eventually to the periosteum.[1,7)]

The cause is usually thought to be microbiological.[1)] In the jaws, pyogenic organisms that reach the bone marrow from abscessed teeth or postsurgical infection usually cause osteomyelitis.[8)] Recent carefully performed investigations in the microbiolgy of osteomyelitis have adequately demonstrated that the primary bacteria of concern are similar to those causing odontogenic infections,

that is, streptoccocci, anaerobic cocci such as *peptostrepto cocclus* spp., and gram-negative rods such as those of the genera *Fusobacterium* and *Prevotella*.[7]

However, in some case of osteomyelitis, no clear bacteria was found.[9] It is thought because of previous antibiotic therapy or inadequate methods of bacterial isolation.[8]

The major predisposing risk factors sustaining the presence and persistence of osteomyelitis are compromised vascualr intergrity and perfusion in the host at the local, regional, or systemic level.[7] The factors are injuries, syphilis, actionomycosis, chronic kidney failure, alcoholism, malnutrition, radiotherapy, and chemotherapy.[2] Non healing fractures of the mandible may be the causative agent in producing an osteomyelitis.[10-12]

In this case, ball hit him on his left face slightly. So It may be doubt that cause of osteomyelitis is the injury by ball. But It is not clear whether fracture was or not. And no prevoius sign has been presented that a dental infection was clearly the true causative factor for the development of the disease. Microbiologic culture of bone fragments was negative. In this case, the pathological process could not be explained by the factors commonly involved with osteomyelitis.

Loveman[13] reported a number of cases of mandibular subperiosteal swellings in children where no periapcial pathology was found. The only feature in common with the case reported here was the presence of an erupting permanent molar. Eyrich reported that 10 cases of 11case of children with chronic osteomyelits presented no dental infection. So it is necessary that we should find the possible causes in children with osteomyelitis through further studies.

2. Classification

Due in part to the long-standing existence of osteomyelitis as a entity, a variety of classifications of the various forms of the disease process have evolved. Various classification form of osteomyelitis is being in the controversy but classification by Hudson have advantage of simplicity in clinical diagnosis. The arbitrary time limit of 1 month is used to identify acute from chronic osteomyelitis.[14]

1) Acute osteomyelitis
   ① Contiguous focus osteomyeltis
   ② Progressive osteomyelitis
   ③ Hematogenous osteomyelitis
2) Chronic osteomyelitis
   ① Recurrent multifocal osteomyelitis
   ② Garre's osteomyelitis
   ③ Suppurative or non-suppurative osteomyelitis
   ④ Sclerosing osteomyelitis

In this case, diagnosis by clinical course of the disease is acute form but histological examination revealed chronic osteomyelitis and acute suppurative inflammation with granulation tissue formation. Diagnosis of this case can not be classified by Hudson classification.

3. Symptoms

Acute osteomyelitis may well have the appearance of a typical odontogenic infection, including fever, trismus, malaise, pain, purulence, and facial cellulitis, except that there is predominantly confined to the periosteal envelope and its contents. Chronic osteomyelitis may present with all the associated findings of acute osteomyelitis except fever and chronic draining fistulae.[12] From an anatomical point of view, mandibular structure in childhood is complicated, because it is also still developing and deciduous and permanent teeth germs come closed each other.[6] Therefore, if an inflammation extends to the canal, it could spread along the canal and reach the ascending ramus. Thus, osteomyelitis in children is more aggressive and incurable than in adults.[6]

But in this case, we could not found clearly cause factors presenting dental infection. we wonder why bony destruction was aggressive without presenting dental infection.

4. Histologic features

Generation of biopsy material from patients with acute osteomyelitis is not common because of the predominantly liquid content and lack of a soft tissue component. When submitted, the material consists predominantly of necrotic bone. The bone shows a loss of the osteocytes from their lacunae, peripheral resorption and bacterial colonization. The periphery of the bone and the haversian canals contain necrotic debris and an acute inflammatory infiltrate consisting of polymorphonuclear leukocytes.[15] Biopsy material from patient with chronic osteomyelitis demonstrated significant soft tissue component that consists of chronically or subacutely inflamed fibrous connective tissue filling the intertrabecular areas of the bone. Scattered sequestra and pockets of abscess formation are common.[15]

In this case, microsopic view showed reactive bony response and infiltration consisting of inflammatory cells with embedded giant cells. There are a few of giant cells doubting foreign body reaction but we could not find the factor of foreign body in this case. We are not sure why a few of giant cells appeared.

5. Radiographic features

The radiograph of acute osteomyelitis may be unremarkable or may demonstrate an ill-defined radiolucency.[15] Because 10 to 12 days are required for lost bone to be detectable radiographically.[7]

Portions of cortical bone may be resorbed. An inflammatory exudate can lift the periosteum and stimulate bone formation. Radiogrphically, this appears as a thin, faint, radiopaque line adjacent to and almost parallel or slightly convex to the surface of the bone.[8]

Chronic osteomyelitis is suspected from the clinical examination.[8] It usually demonstrates bony destruction in the area of infection.[7] Radiographs reveal a patchy, ragged, and ill-defined radiolucency that often contains central radiopaque known as sequestra.[17] Computed Tomography, with the ability to demonstrate sequestra and periosteal new bone, is important for a correct diagnosis and allows accurate staging of the disease.[8] In long-standing chronic osteomyelitis, there may be an area of increased radiodensity surrounding the area of radiolucency.[7]

6. Treatment

The goal of definitive therapy is to attenuate and eradicate the proliferating pathogenic microorganisms and to support healing. This is accomplished by removing pathogenic supportive debris, providing regional skeletal stability as necessary, and disrupting pathophysiologic barriers.[14] The treatment with the most effective narrow-spectrum antibiotics to which the organisms are susceptible is pertinent. Surgical treatment such as drain, irrigation, debridement is also needed.[14]

For treatment of osteomyelitis in childhood, drainage for pus discharge and a high dosage of antibioitics must be given at the acute stage.[16] If an acute condition changes to the chronic, a sufficient resection of the infectious lesion must be performed as soon as possible by such methods as saucerization, decortication, etc.[17] However, some cases with asymmetry of the face due to acquired disease have been reported,[18] therefore surgical treatment for infants and children must be performed more carefully, with respect to dentitional and maxillofacial growth and development.

The involvement of the condyle and the mandibular joint may cause serious secondary deformities during the period of skeletal growth. The downward and forward growth of the jaw can be arrested on the affected side, causing asymmetry of the face. Therefore, in growing young children, precise diagnosis and effective therapy in early stage must be performed and required.

Ⅲ. CONCLUSION

Osteomyelitis of the mandibular condyle is an

uncommon disease. Because of the anatomic location of condyle, it is often not easy to obtain enough diagnostic information from plain radiography. The mandibular condyle is regarded as an important center of mandibular growth. Therefore, for young patients, osteomyelitis involving this region may cause a restraint of mandibular development, resulting in facial asymmetry. Probable, diagnosis and treatment in early stage must be performed and required in growing patient with osteomyelitis.

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국문요약

9세 소아에서 발생한 하악과두의 골수염

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이경은 · 최순정 · 서봉직

골수염은 골수의 염증을 의미하며 임상적으로는 골을 구성하고 있는 조직등의 염증을 포함한다. 일반적으로 골수에서 시작되어 수질내로 확장되며 피질골, 골막등에 이환되어 골 전반에 걸친 골괴사를 야기시킨다. 원인은 일반적으로 세균에 의한 감염으로 여겨지며 항생제의 발달로 그 유병율이 감소하였으나 여전히 외상, 매독, 만성 신질환, 알코올 중독, 영양결핍, 방사선 조사나 화학적 항암요법은 골의 감염을 위험하는 인자로 알려져 있다. 골수염의 치료는 비교적 까다로우며 난치성으로 진행될 가능성이 있다. 특히 소아에서는 하악구조가 성숙이 덜되어 있어 염증이 쉽고 빠르게 퍼진다. 따라서 소아에서는 골수염을 조기에 발견하고 치료하는 것이 중요하다. 또한 소아는 성장중이므로 악골의 성장 또한 고려해야 하므로 조기발견이 더욱 중요하다고 볼 수 있다. 특히 하악골중에서 하악과두는 하악골 성장의 중요한 곳으로 하악과두의 질환발생시 하악성장율감소, 안면비대칭과 같은 큰 문제를 야기할 수 있어 주의가 요구된다. 하악과두의 골수염은 대부분 치성감염이나 하악골절후의 감염으로 발생한다. 단, 소아의 경우에는 특별한 감염원인 없이 하악의 골수염이 발생했다는 보고도 있다. 이에 저자는 9세의 소아에서 뚜렷한 원인을 찾기 어려운 하악과두의 골수염을 경험하였기에 증례보고와 함께 문헌고찰을 하고자 한다.

주제어: 골수염, 하악과두, 소아