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Pathological Fracture Successfully Treated with Simple Orthodontic Appliance, Chin Cup after Cyst Removal

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Abstract

Dentigerous cysts are common odontogenic cysts associated with the crowns of unerupted teeth. Large dentigerous cysts rarely cause pathological fractures in the mandible. We describe the previously unreported treatment of pathological fracture derived from dentigerous cyst including an unerupted mandibular third molar, utilizing orthodontic appliance, chin cup as conservative therapy. This procedure can avoid the surgical open reduction and maxillomandibular fixation to reduce pathological fracture of mandible.

Key Words: Dentigerous cyst; Pathological fracture; Chin cup; Conservative therapy;

Introduction

Pathological fractures of the maxilla-mandibular region resulted from osteomyelitis, carcinoma and tumor are not rare, however, it is very interesting that developed large cysts associated with this area rarely cause fractures [1-4]. Standard procedures regarding pathological fractures are surgically Open Reduction and Internal Fixation (ORIF) or closed maxilla-mandibular rigid fixation for several weeks as conservative therapy [1-8]. However, these procedures are sometimes not acceptable for the patients, because of hospitalization needed and stressful procedures. We describe previously unreported case of a 40-year-old man with dentigerous cyst that was associated with an unerupted mandibular third molar and resulted in pathological mandibular fracture, 2 months after cyst removal performed. It was successfully treated with only chin cup used as orthodontic appliance. As a result, bony union was radiographically observed, 6 months later.

Case Description

PA 40-year-old man visited our hospital with a chief complaint of thorough examination from his dental clinic in August 2016. The patient visited his dental clinic for dental checkup and was pointed out an asymptomatic mandibular cystic lesion including tooth on radiograph. He had no pain, swelling, difficulty of mouth opening, palsy, and not even chewing or speech. Intraoral examination revealed no swelling, percussion pain of teeth, tenderness around second and third molar area. Panoramic radiograph and CT showed approximately 20x25mm, well-demarcated margin, monocular, round shaped radiolucent area in the mandibular angle including unerupted third molar, in the left side (Figure 1&2). This lesion extended from the second molar region to third molar area. It destroyed the bone from the alveolar crest to the inferior border of the mandible. Root resorption of the second molar was not noted. It was diagnosed as dentigerous cyst. Cyst removal and tooth extraction of the third molar were performed under general anesthesia in October, 2016. 2 months after surgery, the patient suddenly came to our hospital without an appointment because of dull pain and chewing pain. He has had their symptoms for a week around the mandibular angle since when he ate a hard food and felt unusual sound “Galli” in

Figure **1:** Panoramic radiograph showed approximately 20x25mm, round shaped radiolucent area in the mandibular angle including unerupted third molar in the left side.

Figure **2:** CT showed a cyst lesion expanding from the alveolar ridge, leaving the mandibular inferior border intact.

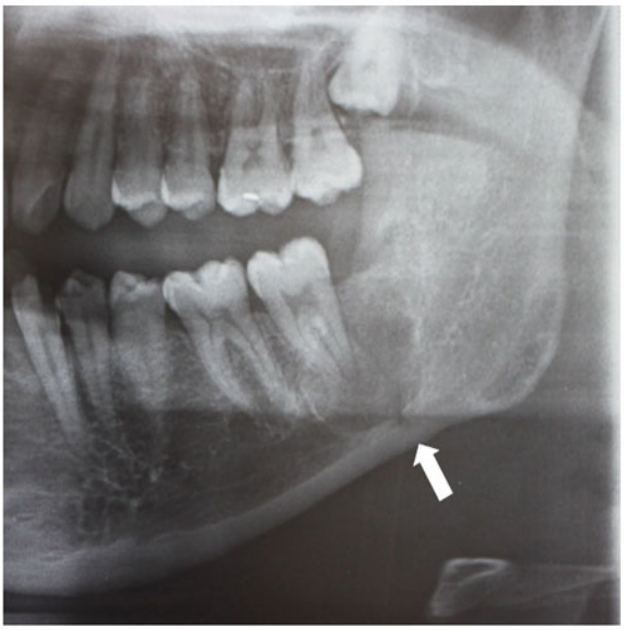

Figure **3:** Postoperative panoramic radiograph revealed an obvious bony fracture line from the alveolar crest to the inferior border of left mandible (arrow).

his mandible. The clinical examination revealed occlusal pain and chewing discomfort without malocclusion, and no palsy in mental area and difficulty of mouth opening. There was not an intraoral fistula with pus discharge in the left mandibular third molar region. He had no significant past medical and dental history. Panoramic radiograph and Computed Tomography (CT) revealed an obvious bony fracture line from the alveolar crest to the inferior border of left mandible, maintained the continuity of the inferior border (Figure 3&4). A pathological mandibular fracture after cyst removal was definitely diagnosed. Due to necessity of rigid maxillomandibular fixation, conservative closed reduction therapy or surgical open reduction of the mandibular fracture was recommended to patient, but he refused it. Because both therapy need hospitalization to treat it and to take a heavy burden on the patient. The patient required conservative therapy in outpatient clinic which he can work at his workplace and normally does his daily life every day. The orthodontic appliance, only chin cup wearing for 24 hours except for eating the meal was performed for 4 weeks (Figure 5). Additional procedure was not given to the patient at all. Since then, the patient has had no dull pain, chewing pain and further complaints. Finally, bony union could be radiographically achieved with normal occlusion. Panoramic radiograph and CT revealed bony union and increasing bony density in the fracture area (Figure 6&7).

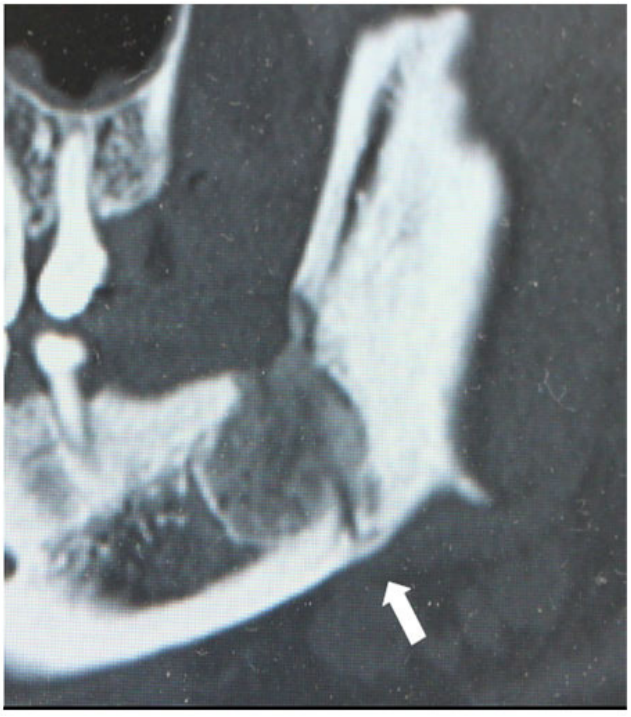

Figure **4:** An obvious fracture line seen on postoperative CT (arrow).

Discussion

Dentigerous cysts are the common lesion of developmental odontogenic cysts. In addition, this cyst is the second most common odontogenic cyst following radicular cyst. By definition, dentigerous cyst is attached to the cementoenamel junction of

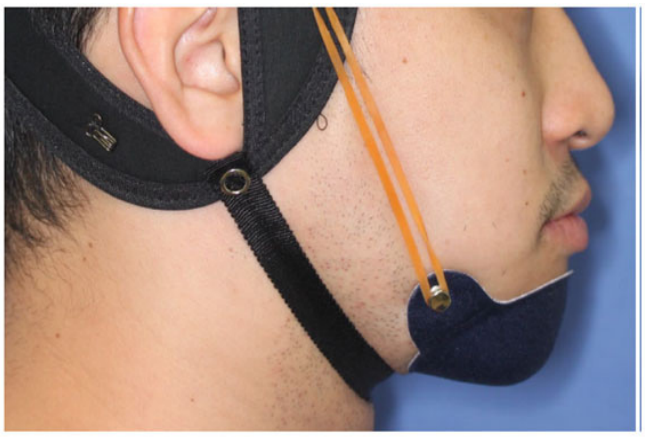

Figure **5:** Chin cup worn for 24 hours except for eating the meal.

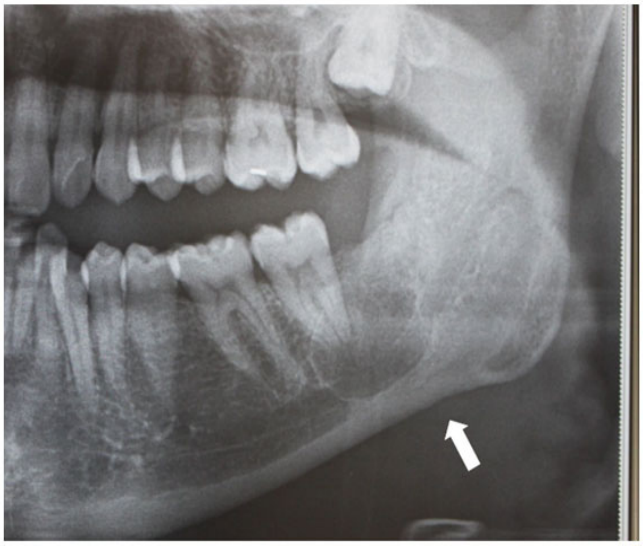

Figure **6:** Bony union seen, 6 months later on panoramic radiograph (arrow).

the tooth cervix and encloses the crown of the unerupted tooth, most commonly third molars and maxillary canines. This cyst sometimes may developed large size in the jaw, but hardly causes pathological fracture of the jaw [1-4].

Pathological fractures of the jaws may result from severe atrophy of edentulous alveolar bones, osteomyelitis, osteoradionecrosis, bisphosphonate-related osteonecrosis, benign and malignant tumors, metastatic neoplasms or cysts [3, 4]. Additionally, its occurrence is facilitated by any specific reasons from their lesions. However, pathological fractures associated with cysts have been very rarely reported up to now [1-3]. Frequency occurrence of pathological mandibular fractures is few, accounting for less than 2% of all fractures of the mandible. They could be occurred in regions where bone has been weakened by an underlying pathological lesion [1]. On the other hand,

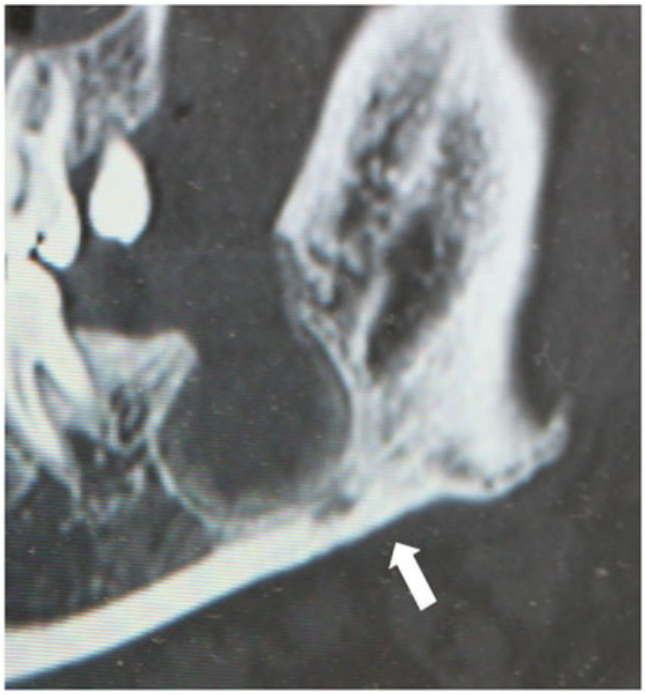

Figure **7:** Bony union seen, 6 months later on CT. Fracture line disappeared (arrow).

pathological fractures occasionally may occur, following surgical interventions such as third molar removal or implant placement, in which associated with osteomyelitis, osteoradionecrosis, and bisphosphonate-related osteonecrosis of the jaw. Maryam et al. reported, only 12 cases of pathologic fractures associated with odontogenic cysts have been reported in the literatures [1]. They could find only 2 cases of large dentigerous cysts resulting in pathologic fracture, in which they reduced it with ORIF [1].

Generally, the frequency occurrence site of the mandibular fracture is high in the mandibular angle. The mandibular angle is common site for fractures, because impacted the third molar decreases bone quantity and stability, in addition, the bony structure of this area is different from other dentate sites, because of being the third molar [8, 9]. Biomechanical reasons also contribute to the fact that the mandibular angle is common site for mandibular fractures. As a result, a majority of mandibular fractures is located at the mandibular angle, as many studies have been found [9].

Treatment of pathological mandibular fractures must be challenging because of their different etiology and general conditions often requiring a more rigid fixation. In patients with poor medical conditions, simple and more limited treatment options may be required [5]. At present case, as the patient was healthy 40-year-old man, we considered the patient sustained pathological fracture derived from a large dentigerous cyst because the mandibular lower border was very thin after cyst removal. To date, various methods have been reported to treat the pathological fracture [3, 4]. Open reduction and internal

fixation via an extraoral or intraoral approach is the most frequently, followed by conservative maxillomandibular fixation management with nasogastric tube feeding [4]. Its treatment is individualized and chosen on a case-by-case basis. Osteosynthesis is surgically performed with plates and screws for immobilization of the fractured segmental bones. These treatments are necessary to hospitalization. Ogasawara et al. reported that pathological facture of the mandible resulting from osteomyelitis that was successfully treated with only intermaxillary elastic without hospitalization [7]. In that case, closed reduction with rigid intermaxillary fixation was initially indicated, but the patient refused this for reasons of his work.

Abdelnaby et al. reported they advocated the use of the orthopedic force, chin cup appliance in the clinical management of young patients with skeletal mandibular prognathism [10]. Chin cup is typical orthodontic appliance for the management of Class III malocclusion. Therefore, Shionoya et al. reported this provides a suitable clinical management to elderly patients with the mandibular fracture [11]. Because it has advantage of simple, easy to use and no surgical damage, in addition, it allows to restrict their mouth opening and to stabilize the fractured mandible in a desirable direction. As the postoperative course is generally uneventful in the most cases of a large dentigerous cyst, the patients seldom have the pathological fracture after removal of the cyst without wearing chin cup. At present case, the patient coincidently had the pathological fracture and used to chin cup for only 4 weeks, resulting in bony union on radiograph 6 months later. Satisfactory results could be achieved through this simple procedure. To our knowledge, they have been no reported regarding to chin cup treatment for the patients with pathological fracture of the mandible after cyst removal.

We believe that this is one of alternatives for the patients who need to undergo the conservative closed reduction therapy or surgical open reduction of the pathological mandibular fracture. Further study is necessary to clarify and elucidate the long term stability of occlusion including healing process after chin cup treatment.

Conclusion

Chin cup treatment can avoid the surgical open reduction and maxillomandibular fixation to reduce pathological fracture of mandible for the patient with pathological fracture after cyst removal.

Declearation

We have no conflicts of interest. We obtained written consent for publication of the photograph. No ethical approval was required.

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