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Case Report

Dense bone island in mandible with 8 years of follow-up examinations

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Abstract A case of dense bone island (DBI) in the mandible is presented. A 10-year-1-month-old (10Y1M) girl came to our clinic for dental caries treatment. Radiographic examinations incidentally found an isolated round mass with uniform radiopacity in the region below the mandibular left canine and first premolar, which was diagnosed as a DBI. The patient also had an anterior crossbite and was referred to an orthodontic specialist. Although the orthodontist anticipated that the DBI might cause some problems with tooth movement, there were no specific complications encountered and treatment was completed. Thereafter, periodical examinations were carried out for approximately 8 years from the first visit and there were no adverse condition seen in the affected area. Further, orthopantomographic examinations were conducted approximately every 3 years to monitor the size and radiodensity of the lesion. The lesion expanded by approximately 10% up to the age of 15Y2M, after which it was reduced in size at the age of 18Y3M to become approximately 10% smaller as compared to that at the first visit. Further, radiopacity increased from the first visit to the age of 12Y9M, and then was decreased at the ages of 15Y2M and 18Y3M.

Key words
Dense bone island,
Density,
Orthodontic treatment,
Radiopaque mass,
Size

Introduction

A dense bone island (DBI), also known enostosis, idiopathic osteosclerosis, and focal periapical osteopetrosis, is a localized, intrabony, and radiopaque lesion that is not a sequela of infection or systemic disease[1–6]. Most DBIs are asymptomatic and often found incidentally in the mandible, especially the molar or premolar region, during radiographic examinations conducted for other purposes[1,2,4,6,7]. DBIs have also been found outside of the jaws, with most of those occurring in the pelvis, femur, and other long bones[8].

Although there are no known causes for the emergence of a DBI and no specific treatment is generally indicated, differential diagnosis from other lesions, such as condensing osteitis, focal cemento-osseous dysplasia, cementoblastoma, osteoblastoma and osteoma, is important[2,6]. Therefore, even when a patient is diagnosed with a DBI, careful follow-up observations are necessary, since DBIs have been reported to expand in some cases[4].

Previously, we presented a case of a DBI identified in a 10-year-old girl, in which the lesion might have caused inclination of the adjacent teeth and also expanded by approximately 10% over 9 months[5]. Herein, the clinical course of this case during the 8-year follow-up period is presented.

Case Report

A young female at the age of 10 years 1 month (10Y1M) came to the Department of Pediatric Dentistry of Osaka University Dental Hospital with the chief complaint of multiple dental caries.

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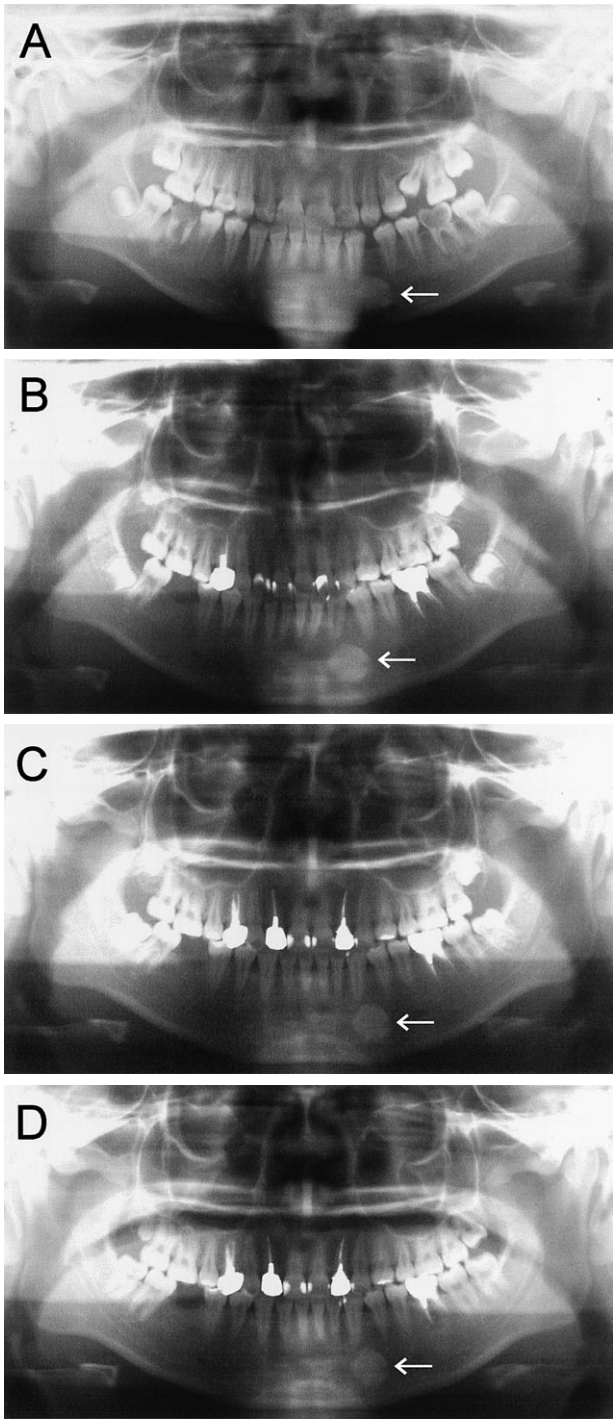

Fig. 1 Orthopantomographs taken at 10Y1M (A), 12Y9M (B), 15Y2M (C), and 18Y3M (D)

Arrows indicate the dense bone island identified in this case.

A radiographic examination incidentally found an isolated round mass with uniform radiopacity below the region of the mandibular left canine and first premolar, which we diagnosed as DBI (Fig. 1A). After completion of dental caries treatment, she was referred to an orthodontic specialist for treatment of anterior crossbite, who anticipated that the DBI might cause some problems during tooth arrangement. However, the orthodontic treatment was successfully finished at the age of 12Y9M without any complications.

Thereafter, the periodical examinations were performed 2 or 3 times a year for 8 years, with orthopantomographs taken to examine the DBI at approximately 3-year intervals. The lesion was asymptomatic during the 8-year follow-up period. Figure 1 shows orthopantomographs taken at the first visit (10Y1M), then at 12Y9M, 15Y2M, and 18Y3M of age, with a magnification of the lesion shown in Fig. 2. The DBI appeared to shift to a relatively lower position during the follow-up period, while its shape and density also changed.

The transitional changes in size of the DBI were measured and compared to the size of the adjacent canine, with the size of the canine on the orthopantomograph image set at a value of 1. The size of the DBI at 10Y1M and 10Y10M was 1.28 and 1.37, respectively, as noted in our previous report[5]. Thereafter, the size of the lesion expanded by approximately 10% until the age of 15Y2M, whereas it became smaller, with a reduction ratio of approximately 10% by the age of 18Y3M, as compared to the size at the first visit (Fig. 3).

Radiodensity findings of the DBI and interdental space between the lower left canine and first premolar on the orthopantomographs were determined randomly at 20 recording points (0.01 inch in diameter) using NIH image (version 1.61, Macintosh computer application, Scion, Maryland, USA). The value of radiodensity measured by this system increases when the image is darker, while a lower value shows that the lesion has become more calcified. The mean values of radiodensity at 10Y1M and 10Y10M were 0.956 and 0.890, respectively, as noted in our previous report[5]. Thereafter, radiopacity increased from the first visit to the age of 12Y9M, and then was decreased at the ages of 15Y2M and 18Y3M (Fig. 3).

Discussion

Our previous report compared clinical symptoms of the present patient at the first visit (10Y1M) with those seen at a follow-up examination at the age of 10Y10M[5]. Inclination of the adjacent teeth was

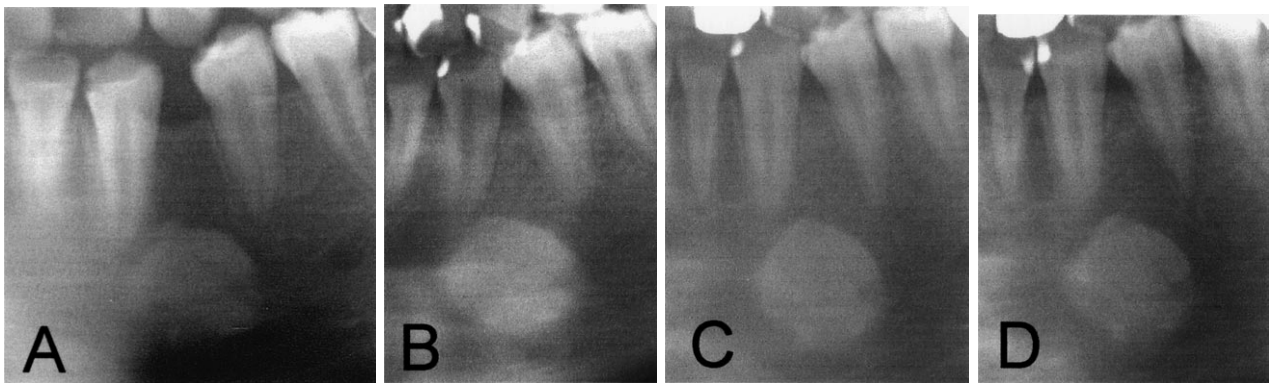

Fig. 2 Magnified images of the affected lesion at 10Y1M (A), 12Y9M (B), 15Y2M (C), and 18Y3M (D)

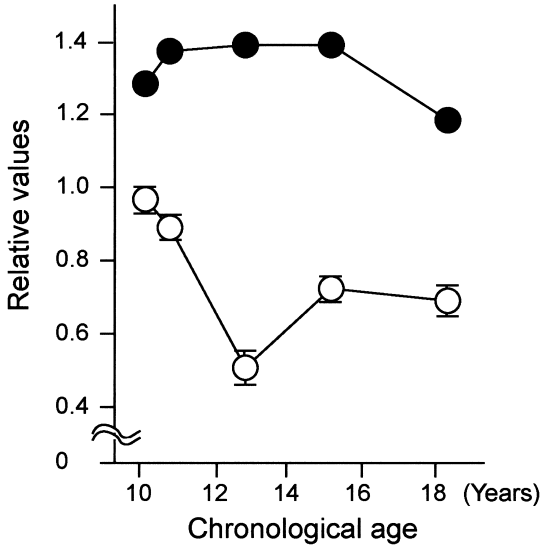

Fig. 3 Longitudinal evaluation of size and density of the dense bone island

Relative values of size (●) and density (○) at each examination are plotted. The relative values of density are shown as the mean results of 20 recording points, with the standard deviations at each examination included.

a problem at that time and we were concerned about a potential increase of inclination if the DBI were to expand. Since the patient was complicated with crossbite, she was referred to an orthodontic specialist, though we considered that there might be several problems encountered during the orthodontic treatment. However, that treatment was successfully completed at the age of 12Y9M without any complications and, according to the orthodontist, movement of the tooth adjacent to the lesion occurred in a usual manner. Since the upper part of the DBI was located above the root apex of the affected teeth at the first visit (10Y1M), and then later changed to below the root apex, it is possible that one of the reasons for the successful orthodontic treatment is that the mass moved to a relatively lower position as a result of growth of the patient, similar to the phenomenon of ankylosed teeth.

Several studies have indicated a possible predilection for DBIs in Japanese, Chinese, Indo-Chinese, and African individuals[1,2,6]. As for the incidence in Japan, analysis of panoramic radiographs of 1,047 subjects showed that the average detection rate was 6.1% and that a DBI was most frequently detected in individuals in their 20s (8.4%), followed by those in their 30s (6.9%), 40s (6.8%), and 50s (5.6%), while in those aged 10–19 years old it was 5.0% and in those older than 60 years old 4.3%[7]. On the other hand, a study that analyzed the frequency and distribution of DBIs in 1,921 subjects conducted in the United States reported a detection rate of 5.4%, with a statistically significant higher incidence in African American individuals[1]. Another survey conducted in Canada studied 2,991 patients (age range 5 to 35 years old) and reported a detection rate of 2.3%, with the youngest patient 9.4 years of age[4]. As for other ethnic groups, a survey in Israel analyzed 889 patients and showed that the detection frequency of DBI was 1.7%[9]. Due to the limited number of published studies regarding DBI incidence, the hypothesis that DBI is more often found in Japanese individuals remains to be elucidated.

Gigantic DBIs (greater than 2 cm in diameter) have been identified in Japanese patients, with diameters ranging between 2.5 and 3.5 cm, of whom 5 of 21 patients were aged 10 to 19 years old[3]. The size of the lesion in the present case was 1.25 cm in diameter, which expanded by approximately 10%

until the age of 15Y2M and then decreased to 10% smaller than the original size at 18Y3M (Fig. 3). A longitudinal assessment of DBI size showed that 43% those identified in children and adolescents had enlarged, while 17% of DBIs in the same age group became diminished in size[4]. That report also noted that those lesions identified in children and adolescents group were unstable, as compared with those seen in adults. The size of the present DBI expanded by only 10% and then decreased in the late adolescent period. In addition, the radiodensity of the lesion showed it to become thicker from the first visit to the age of 12Y9M, while it had become thinner at 15Y2M and 18Y3M (Fig. 3). These findings led us to conclude that it is an extremely low possibility that the size and density of the DBI in the present patient will increase with age. The patient had been thoroughly informed of the lesion and transitional clinical findings and instructed to immediately visit our clinic again when she senses an abnormality in that region.

Acknowledgments

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