Eruption sequestrum: x-ray microanalysis and microscopic findings

Maki K.* / Ansai T.** / Nishida I.***/ Zhang M.**** / Kojima Y.***** / Takehara T.****** / Kimura M.*******

A 12 year-old girl with eruption sequestrum of the mandibular left second molars is reported. Intra-oral findings revealed that a small hard tissue fragment white in color and with bone-like hardness on the occlusal surface of the mandibular second molar which was erupting. Histopathologically, the fragments consisted of necrotized cortical bone. Chronic inflammatory alterations were also observed in the gingiva in the area of contact with the osseous tissue. X-ray microanalyzer findings revealed the percentages of calcium and phosphorous (by weight) as 78.41% and 21.59%, respectively, for a calcium to phosphorous ratio of 3.63, which was higher than that seen in normal osseous tissue.
J Clin Pediatr Dent 29(3): 245-247, 2005

INTRODUCTION

Eruption sequestrum occasionally occurs at the time of eruption of the permanent molars. Starkey *et al*.[1] were the first to report the presence of small fragments of calcified tissue overlying the crowns of erupting molar teeth. Generally, these pieces directly overlay the central occlusal fossa, while remaining within the soft tissue and, as the molar tooth erupts through the bone, a small osseous fragment is lost. Eruption sequestrum frequently exists without manifesting symptoms, though some affected children complain of pain during mastication.10 Some histopathological studies have been made of this condition,[7-9] but no x-ray microanalyzer studies have been done. Previous case reports are scarce.[2-4,7,9] We encountered eruption sequestrum in a patient that occurred in the left second molar of the mandible and made a detailed study, primarily using histopathological and x-ray microanalyzer findings.

CASE REPORT

The present patient was a 12-year old Japanese girl who visited the outpatient clinic of the Department of Pediatric Dentistry at Kyushu Dental College, with "Pain behind my back bottom teeth", of one-week duration. Intra oral findings revealed that a small tissue fragment white in color and on the occlusal surface of the mandibular left second molar which was erupting (Figure1) The tissue was bone-like hardness, with an area of inflammation distal to the second molars. The tissue was excised under local anesthesia. The extracted fragments formed an oblique quadrangle measuring about 5mm in width and 2mm thick (Figure 2). The tissue was submitted for microscopic examination with a differential diagnosis of hyperkeratinized operculum or eruption sequestrum. After decalcification histopathological specimens were prepared using the usual method and observed. The small fragments of hard tissue were found to consist of necrotized cortical bone, while the bone vacuole was vacant (Figure 3). This finding is consistent with a diagnosis of eruption sequestrum. Further, gingival tissue attached to the bone showed a proliferation of granulation tissue and chronic inflammatory alterations, which mainly consisted of diffuse small round cell infiltration (Figure 4). The specimens were also prepared for investigation with an x-ray microanalyzer (JED-2001, Nihon Koudenshi Company) by butyl drying. The analysis revealed that the percentages of

* Kenshi Maki is associate professor, Department of Pediatric Dentistry Kyushu Dental College, Kitakyushu, Japan.
** Toshihiro Ansai is associate professor, Department of Preventive Dentistry Kyushu Dental College, Kitakyushu, Japan.
*** Ikuko Nishida is lecturer, Department of Pediatric Dentistry Kyushu Dental College, Kitakyushu, Japan.
**** Min Zhang is assistant professor, Department of Oral Pathology Kyushu Dental College, Kitakyushu, Japan.
***** Yukimi Kojima is assistant professor, Department of Pediatric Dentistry Kyushu Dental College, Kitakyushu, Japan.
****** Tadamichi Takehara is professor, Department of Preventive Dentistry Kyushu Dental College, Kitakyushu, Japan.
******* Mitsutaka Kimura is professor, Department of Pediatric Dentistry Kyushu Dental College, Kitakyushu, Japan.

Send all correspondence to Dr. Maki at k-maki@kyu-dent.ac.jp

Figure 1. The clinical appearance of the mandibular left second molars.

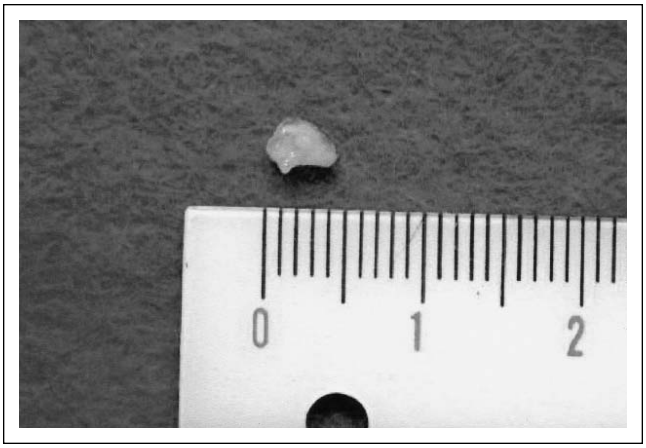

Figure 2. The appearance of extracted small fragments.

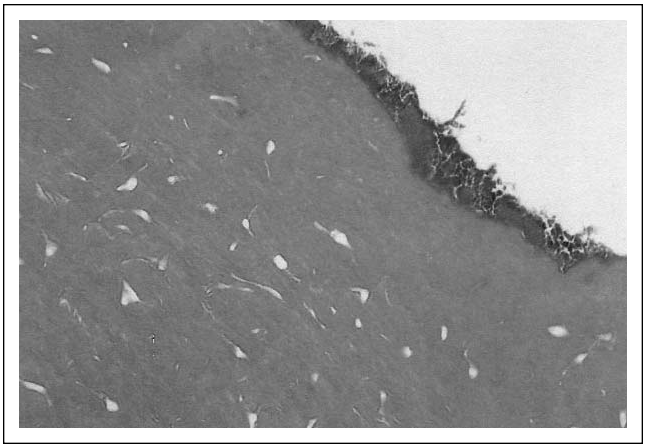

Figure 3. Photomicrograph demonstrating showing non-vital compact bone samples. There were no osteocyte within the lacunae and each samples was surrounded bacterial aggregates (X33).

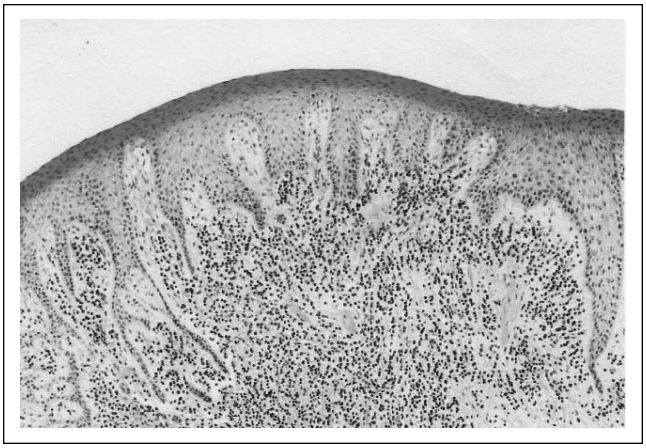

Figure 4. Gingival tissue attached to the bone showed a proliferation of granulation tissue and chronic inflammatory alternations, which mainly consisted of infiltration by diffuse small round cells (X 25).

calcium and phosphorous (by weight) to be 78.41% and 21.59%, respectively (Figure 5).

DISCUSSION

Starkey[1] and Shafer[2] suggested the mechanism of eruption sequestrum to be as follows: Small fragments of the cortical bone in contact with the occlusal surface in some cases may become isolated from the surrounding bone of the molar as it erupts through the alveolar bone. In most cases, the small bone fragments are absorbed completely prior to eruption of the molar. However, when the fragments are large or the eruption speed is slow, small bone fragments on the occlusal surface remain unresorbed and exposed to the gingiva prior to molar eruption, which forms eruption sequestrum.

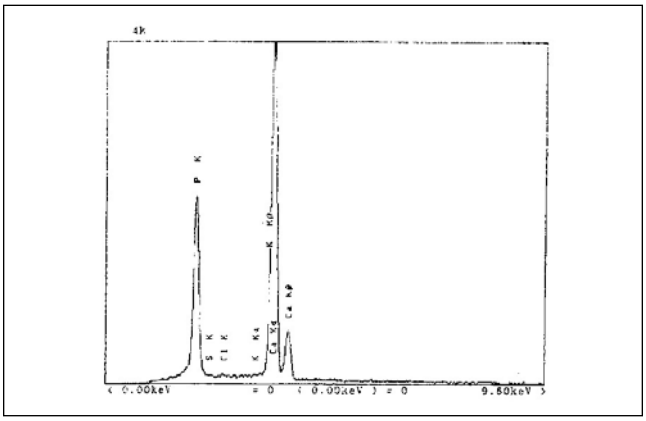

Figure 5. Xray microanalyzer spectrum of the specimen showing strong, and characteristic peaks for calcium and phosphorus, however, there were peaks from other elements interfering with calcium or phosphorus.

In the present patient, eruption sequestrum was confirmed in the second molar of the mandible, while most previously reported cases were also manifested in a mandible molar. In comparison to the maxilla, eruption direction and speed in the mandible as well as the relationship with the alveolar bone might provide a more susceptible environment for this condition. There have been few histopathological reports on eruption sequestrum, as Starkey[1] and Schuler[3] noted only that eruption sequestrum samples consisted of necrotized cortical bone. In the present case, we confirmed the same findings.

However, Onishi *et al.*[7] found odontogenic calcified masses that were relatively small, opaque, white, with smooth texture. Histopathological findings revealed that they contained osteodentin, cementum, and pulp-like components, but no odontogenic epithelial cells or enameloid. They proposed to categorize this odontogenic mass as a new variety of hamartoma, eruption mesenchymal calcified hamartoma.

Strackey[1] and Shafer[2] and McDonald[5] state that eruption sequestrum is of no clinical significance. But we observed chronic inflammatory alterations in the part of the gingiva that contacted bone. It is considered that eruption sequestrum is likely to induce gingivitis and pericoronal inflammation, thus clinicians should be concerned about interrupting inflammation and keeping the area clean. In x-ray microanalyzer findings, the weight percentages of calcium (Ca) and phosphorous (P) were 78.41% and 21.59%, respectively, thus the ratio of Ca to P was 3.63, which is in contrast to normal osseous tissue that has a Ca to P ratio of 2.33.[6] The mechanism of bone metabolism is very effected by a decrease of blood supply in the sequestrum. There is no known report that studied the sequestrum using an X-ray microanalyser, thus further investigation is required.

REFERENCES

1. Starkey, PE, Shafer WG. Eruption sequestra in children. J Dent Child 30: 84-86,1963.
2. Shafer WG, Hine MK, Levy BM. A textbook of oral pathology, 4th ed., Philadelphia, W B Saunders, 1983.
3. Sculer JL, Camm JH, Houston G. Bilareral erupotion sequestrum: report of case. J Dent Child 59: 70-72, 1992.
4. Watkins JJ. An unusual eruption sequestrum. A case report. Br Dent J 138: 395-396,1975.
5. McDonald, RE. Dentistry for the Child and Adolescent. Mosby, St Louis, 1969.
6. Lazzari EP. CRC Handbook of experimental aspect of oral biochemistry. CRC Press, 1983.
7. Onishi T, Sakashita S, Ogawa T, Ooshima T. Histopathological characteristics of eruption mesenchymal calcified hamartoma: two case reports. J Oral Pathol Med 32: 246-9, 2003.
8. Priddy RW, Price C. The so-called eruption sequestrum. Oral Surg Oral Med Orall Pathol 58: 321-6, 1984.
9. Takeda Y, Kuroda M, Amari E. Eruption sequestrum: report of a case with histopathological observation. Shoni Shikagaku Zasshi 26: 196-8, 1988.
10. Schuler JL, Camm JH, Houston G. Bilateral eruption sequestra: report of case. J Dent Child 59: 70-2, 1992.