Original Article

Evaluation of the Frequency and Characteristics of Hypercementosis in the Turkish Population with Cone-beam Computed Tomography

Y Eren, O Erdal[1], B Serdar[2], KO Emin[1], G Enes

Departments of Dentomaxillofacial Radiology and [1]Endodontic and [2]Restorative Dentistry, Kirikkale University, 71450 Yahşihan, Kırıkkale, Turkey

Abstract

Aims: The aim of this study was to evaluate the frequency and characteristics of hypercementosis in the Turkish population using cone-beam computed tomography (CBCT). **Settings and Design:** A retrospective study was performed using CBCT (I-CAT Vision TM Imaging Science International) in 1263 patients admitted to the Faculty of Dentistry at the University of Dicle (Diyarbakir, Turkey) between January 2013 and January 2015. **Subjects and Methods:** A total of 1152 patient and 29,606 teeth were evaluated with CBCT. The age, gender, location (left vs. right side, maxillary vs. mandibular teeth, incisors, premolars, and molars), and missing teeth were recorded for all patients. **Statistical Analysis Used:** The Pearson Chi-squared test was used to determine the potential differences. **Results:** Hypercementosis was observed with a frequency of 2.4%. Of these, 18 of 28 (64.3%) had only 1 tooth with hypercementosis and 10 (35.7%) had more than 1 tooth. It was identified in 42 of the 29,606 teeth examined (0.14%). The lesion was found in 2.47% (n = 14) of females and 2.38% (n = 14) of males. The lesion was detected in 28 molars and 14 premolars, but hypercementosis was not detected in incisors. Of the 42 teeth, 12 (28.6%) maxillary and 30 (71.4%) mandibular teeth were associated with hypercementosis. Of the 28 cases, 20 (59.0%) were unilateral and 8 (41.0%) were bilateral. Of the 20 unilateral cases, 12 (69.6%) were on the right and 8 (30.4%) were on the left side. **Conclusions:** In our study, the prevalence of hypercementosis has been found 2.4% in the Turkish population. Besides, the lesion has been found more in the mandible than the maxilla, in the molars than the premolars and in the unilateral distribution than the bilateral distribution.

Keywords: *Cone-beam computed tomography, hypercementosis, Turkish*

Date of Acceptance:
18-Jan-2016

Introduction

Ectomesenchymal cells, including cementoblasts, cementocytes, and fibroblasts, are responsible for cementogenesis, which continues throughout life.[1] Hypercementosis was first defined by Gardner and Goldstein as a nonneoplastic condition characterized by excessive deposition of radicular cementum beyond the physiological limits of the tooth.[2,3] This condition may involve a single tooth, several teeth, generalized dentition, or nonerupted teeth. Any tooth in the maxillary and mandibular arch may be affected, but premolars and molars are most commonly affected.[2] Hypercementosis is asymptomatic and does not require treatment. Problems may arise, however, when endodontic treatment or extraction of the affected teeth is necessary.[4]

Hypercementosis is an idiopathic, age-related phenomenon, associated with several local factors including periapical inflammation, trauma, developmental disorders and systemic factors, including thyroid disease, rheumatic fever, arthritis, acromegaly, calcinosis, Paget's disease of bone, and possibly Vitamin A deficiency.[5-9] Radiographic images show an altered, abnormal,

Address for correspondence: Dr. Y Eren, Department of Dentomaxillofacial Radiology, Faculty of Dentistry, Kirikkale University, Kirikkale, Turkey.
E-mail: dt.eren@hotmail.com

Access this article online

Quick Response Code:

Website: www.njcponline.com

DOI: 10.4103/1119-3077.183254

How to cite this article: Eren Y, Erdal O, Serdar B, Emin KO, Enes G. Evaluation of the frequency and characteristics of hypercementosis in the Turkish population with cone-beam computed tomography. Niger J Clin Pract 2017;20:724-8.

round-shaped thickness of the apex.[10] Periodontal ligament and lamina dura are contained within the boundaries of the root.[10] Teeth with hypercementosis can be identified using conventional dental radiographs such as orthopantomograph and periapical radiograph. However, the lesion can be missed, especially if it is located in the maxillary region, or it may not be distinguishable from other lesions that produce similar images, due to superposition. Teeth with hypercementosis can be seen in three-dimensions (3D) and without superposition, using cone-beam computed tomography (CBCT). In addition, CBCT carries a much lower radiation dose than computed tomography.

The incidence of hypercementosis according to race or population group is not well established. Available incidence data ranges from 1.3% to 84% in the current literature.[1,8] To the best of our knowledge, no previous study has evaluated the prevalence of hypercementosis using CBCT. In the present study, we used CBCT to evaluate the frequency and characteristics of hypercementosis in the Turkish population.

Subjects and Methods

A retrospective study was performed using CBCT (I-CAT Vision TM Imaging Science International, Hatfield, USA, 2008; 120 kVp, 18.54 mA with an exposure time of 9 s) in 1263 patients admitted to the Faculty of Dentistry at the University of Dicle (Diyarbakir, Turkey) between January 2013 and January 2015. Patients under 18 years of age and the resolution of images did not allow the regions in the scope of the study to be examined, were excluded. The final sample included 1152 patients (566 women and 586 men, from 18 to 84 years, mean age; 39.7 ± 14.9 years).

Axial and sagittal images were used, with 2 mm thickness and 2 mm slice distance for reconstructions. Images were examined on a digital imaging workstation. Hypercementosis was diagnosed by the radiographic appearance of a thickened cementum layer as well as a bulbus or drumstick shape around the root apex that could be in the vestibulo-lingual/palatinal, mesiodistal or apical direction in the CBCT sections.

The CBCT images were examined by two dentomaxillofacial radiologists (authors). Initially, each radiograph was evaluated by each radiologist separately, but a final examination was performed together, to determine if a tooth had hypercementosis. In addition, the same examiner reevaluated 10% of the remaining radiographs twice, randomly, 6 weeks after the first evaluation. Intraexaminer reproducibility was 92% and 94%, respectively.

A total of 29,606 teeth, including third molars, were examined (Maxillary; 5471 molars, 3021 premolars, 7257 incisors and mandibular; 5012 molars, 3320 premolars, 5525 incisors). The age, gender, location (right-left side, maxillary-mandibular teeth, incisors, premolars, and molars), and missing teeth were recorded for all of the patients.

Statistical analysis of all data was performed using the Predictive Analytics Software Statistics 18 (SPSS Inc., Chicago, Illinois, USA). Analysis of the potential differences in the distribution of lesions when stratified by age, gender, and the location of the anomaly were evaluated using the statistical Chi-square test. A significance level of $P < 0.05$ was accepted as statistically significant.

Results

Hypercementosis was observed in 111 of 1152 subjects, with a frequency of 2.4%. Of these, 18 of 28 (64.3%) had only one tooth with hypercementosis and

Table 1: The distribution of the teeth with hypercementosis

Tooth type	Number of teeth examined	Number of teeth with hypercementosis	Prevalence (%)
Maxillary			
Incisors	7257	0	0
Premolars	3021	0	0
Molars	5471	12	0.04
Subtotal	15,749	12	0.04
Mandibular			
Incisors	5525	0	0
Premolars	3320	14	0.05
Molars	5012	16	0.05
Subtotal	13,857	30	0.1
Total	29,606	42	0.14

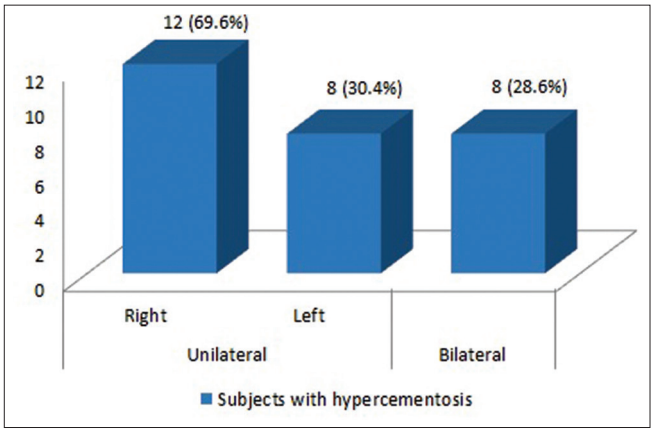

Figure 1: Distribution of subjects with hypercementosis in terms of laterality

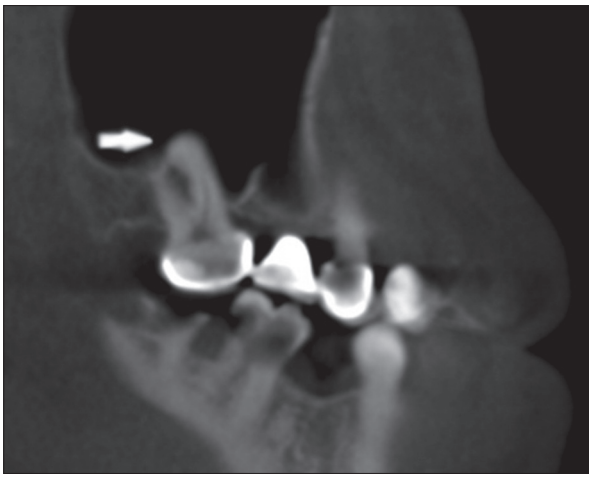

Figure 2: Hypercementosis in the mesiobuccal root of the maxillary second molar in sagittal slice

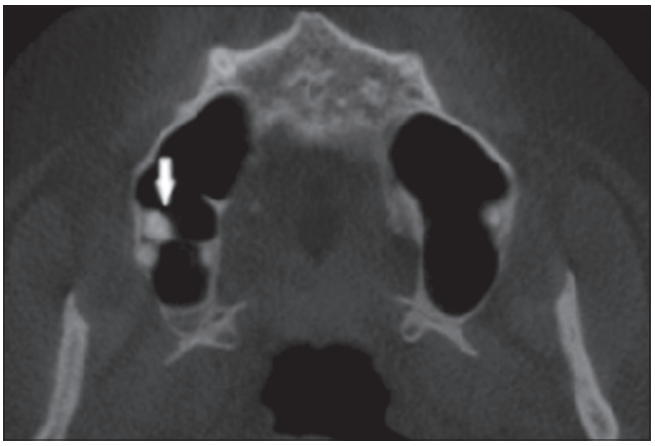

Figure 3: Hypercementosis in the mesiobuccal root of the maxillary second molar in axial slice

Figure 4: Hypercementosis in the mandibular first premolar in sagittal slice

ten (35.7%) had more. Hypercementosis was identified in 42 of the 29,606 teeth examined (0.14%). Lesions were found in 2.47% (n = 14) male subjects compared to 2.38% (n = 14) female. Nevertheless, this difference was not statistically significant ($P > 0.05$) [Table 1]. The distribution of the teeth with hypercementosis is presented in Table 2. Lesions were identified in 28 molars and 14 premolars, but hypercementosis was not determined in incisors. Of the 42 teeth, 12 (28.6%) maxillary (12 molars) and thirty (71.4%) mandibular teeth (16 molars and 14 premolars) were associated with hypercementosis. Of the 28 cases, twenty (71.4%) were unilateral and eight (28.6%) were bilateral. Of the twenty unilateral cases, 12 (69.6%) were on the right and eight (30.4%) were on the left side [Figure 1]. The results of the Chi-squared test showed significant differences regarding unilateral-bilateral ($P < 0.001$) and maxillary-mandible occurrence of affected teeth ($P = 0.03$) but no significant difference was found regarding right-left side ($P = 0.502$). Figures 2-4 show examples of the hypercementosis in CBCT images.

Table 2: The distribution of the subjects with hypercementosis

Gender	Number of subjects examined	Subjects with hypercementosis	Prevalence (%)	*P*
Male	586	14	2.38	0.926
Female	566	14	2.47	
Total	1152	28	2.43	

Discussion

Hypercementosis cases are rare. There are several case studies on teeth with hypercementosis, but only one study has been performed investigating its prevalence.[1,4] To the best of our knowledge, this is the first study investigating the prevalence of hypercementosis using CBCT. The prevalence ranges from 1.3% to 84%, according to available data.[1,8] Bürklein *et al*. found that the prevalence of hypercementosis was 1.3% in a study which they conducted on the German population.[1] Moreover, they reported that the lesion was most commonly observed on premolar teeth and was double in the mandible compared to the maxilla. However, they reported that lesions were often seen bilaterally. In the present study, the prevalence of hypercementosis was 2.4% in the Turkish population. In addition, hypercementosis was double in molars compared to premolars, and in the mandible compared to the maxilla; however, the unilateral lesions were greater. The difference between our results and those of Bürklein *et al*. may result from differences in the patient population. Our study was conducted with Turkish (South-East Anatolia) population, whereas the study by Bürklein *et al*. was conducted with a German population. Differences may

also result from the methods. We studied 1152 subjects using CBCT, whereas they studied 800 patients and used periapical radiographs. Conventional techniques such as orthopantomograph and periapical radiograph allow for two-dimensional (2D) imaging. The effects of hypercementosis on the mesiodistal direction at the apex can be evaluated with these techniques. However, evaluation of lesions in the direction of the vestibulo-lingual/palatal is not possible. Superpositions are also found in 2D radiographs. Consequently, lesions may be missed, especially those in the direction of the vestibulo-lingual/palatal. Moreover, it is difficult to distinguish hypercementosis from other lesions that produce similar images. The lesions can be evaluated in 3D and without superposition using CBCT.

Bürklein *et al*. reported that the prevalence of hypercementosis was ~10 times higher in women compared to men.[1] In the present study, the lesions were seen a little more in women than men (2.47% and 2.38%, respectively), but this difference was not statistically significant. Therefore, the distribution of hypercementosis according to gender was similar.

There is still no conclusion as to whether hypercementosis is physiological or pathological.[11-13] In endodontic clinics, although root canal treatment applied to teeth with hypercementosis is included in routine operations, the prognosis and optimal procedures for such treatment have not been determined.[14] It was reported in studies using scanning electron microscopy that the location and length of the apical foramen may change in teeth with hypercementosis; the apical foramen can be completely or partially occluded; multiple apical foramen can be found as triple apical, and the location of the accessory channels may change.[15,16] The systems, such as the apex locator that helps to determine the apical foramen, are not understood sufficiently to give results for teeth with hypercementosis. This situation makes it difficult to calculate the clinical and radiographic working length in teeth with hypercementosis and to perform ideal root canal treatment.[15,16] All of these issues reveal the need for additional studies related to teeth with hypercementosis.

Moreover, care must be taken because problems may be encountered during extraction of these teeth. For example, complications can occur during extraction due to the accumulated multiple cement at the root.[17,18] Teeth with hypercementosis can cause significant problems with respect to orthodontic treatment; histological studies have reported that the teeth can cause movement difficulty against orthodontic forces. In addition, partial ankylosis is often found in teeth with hypercementosis.[17,18]

The present study had some limitations that indicate the need for further research studies. First, it would be useful to see well-designed studies performed on more subjects because of the low prevalence of hypercementosis. Second, studies in which 3D systems are compared to conventional methods would be useful so that the diagnostic values of techniques in determining hypercementosis, such as periapical radiography and orthopantomograph, can be evaluated.

Conclusions

This research was the first study to examine the frequency and characteristics of hypercementosis in the Turkish population and is one of the rare studies to use CBCT. The prevalence of hypercementosis was 2.4% in the Turkish population. Moreover, the lesion was more prevalent in the mandible than the maxilla, in the molars than the premolars, and in unilateral compared to bilateral distribution.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Bürklein S, Jansen S, Schäfer E. Occurrence of hypercementosis in a German population. J Endod 2012;38:1610-2.
2. Zhou J, Zhao Y, Xia C, Jiang L. Periodontitis with hypercementosis: Report of a case and discussion of possible aetiologic factors. Aust Dent J 2012;57:511-4.
3. Leider AS, Garbarino VE. Generalized hypercementosis. Oral Surg Oral Med Oral Pathol 1987;63:375-80.
4. Basdra EK, Stellzig A, Komposch G. Generalized hypercementosis in a young female patient. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1997;83:418-9.
5. Thoma KH, Goldman HM. The pathology of dental cementum. J Am Dent Assoc 1939;26:1943-53.
6. Comuzzie AG, Steele DG. Enlarged occlusal surfaces on first molars due to severe attrition and hypercementosis: Examples from prehistoric coastal populations of Texas. Am J Phys Anthropol 1989;78:9-15.
7. Gardner BS, Goldstein H. The significance of hypercementosis. Dent Cosm 1931;73:1065-9.
8. Corruccini RS, Jacobi KP, Handler JS, Aufderheide AC. Implications of tooth root hypercementosis in a Barbados slave skeletal collection. Am J Phys Anthropol 1987;74:179-84.
9. Dewey KW. Normal and pathological cementum formation. Dent Cosm 1926;68:560-85.
10. Noonan VL, Gallagher G, Kabani S, Kemp S. Hypercementosis. J Mass Dent Soc 2008;56:45.
11. Gonçalves PF, Gurgel BC, Pimentel SP, Sallum EA, Sallum AW, Casati MZ, *et al.* Root cementum modulates periodontal regeneration in Class III furcation defects treated by the guided tissue regeneration technique: A histometric study in dogs. J Periodontol 2006;77:976-82.

12. Zemesky JL. Hypercementosis in relation to unerupted and malposed teeth: A preliminary report. J Dent Res 1931;11:159.
13. Gonçalves PF, Lima LL, Sallum EA, Casati MZ, Nociti FH Jr. Root cementum may modulate gene expression during periodontal regeneration: A preliminary study in humans. J Periodontol 2008;79:323-31.
14. Weınberger A. The clinical significance of hypercementosis. Oral Surg Oral Med Oral Pathol 1954;7:79-87.
15. Pinheiro BC, Pinheiro TN, Capelozza AL, Consolaro A. A scanning electron microscopic study of hypercementosis. J Appl Oral Sci 2008;16:380-4.
16. Ponce EH, Vilar Fernández JA. The cemento-dentino-canal junction, the apical foramen, and the apical constriction: Evaluation by optical microscopy. J Endod 2003;29:214-9.
17. Humerfelt A, Reitan K. Effects of hypercementosis on the movability of teeth during orthodontic treatment. Angle Orthod 1966;36:179-89.
18. Suter VG, Reichart PA, Bosshardt DD, Bornstein MM. Atypical hard tissue formation around multiple teeth. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2011;111:138-45.