

Orthodontic Tooth Movement in a Patient with Cemental Dysplasia (Hypercementosis): A Rare Case Report

S Chetan Kumar^{1*} Venkatagiri Indugu² Ravivarma M³ Swathi CH⁴ Vijayabhaskarareddy Myla⁵
Aduri Dhambika Sri⁶

¹Professor, Department of Orthodontics and Dentofacial Orthopedics, Malla Reddy Institute of Dental Sciences, Hyderabad, Telangana, India.

²Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, St. Joseph Dental College, Eluru, Andhra Pradesh, India.

³Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, Vishnu Dental College, Bhimavaram, Andhra Pradesh, India.

⁴Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, St. Joseph Dental College, Eluru, Andhra Pradesh, India.

⁵Reader, Department of Orthodontics and Dentofacial Orthopedics, St. Joseph Dental College, Eluru, Andhra Pradesh, India.

⁶Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, St. Joseph Dental College, Eluru, Andhra Pradesh, India.

ABSTRACT

Background: Hypercementosis refers to a prominent thickening of the cementum. It is most commonly an age-related phenomenon and occurs in adult teeth. The distribution of acellular and cellular cementum is affected by physical conditions such as ageing and pathological conditions like inflammation and hyper occlusal pressure, causing hypercementosis. During orthodontic tooth movement, pressure and tension are exerted on the periodontal ligament fiber bundles. The tension is on the periodontal fiber bundles, and excessive cementum is deposited on the tension side. Spike, like the type of hypercementosis, is generally observed in cases associated with orthodontic tooth movement. Movement of teeth with hypercementosis is not possible according to previous studies, yet due to severity in both skeletal and dental condition of the patient, the case was planned to be treated orthodontically for any changes as there is not much literature in recent years regarding patients with hypercementosis. Minor alveolar remodelling could be observed at the extraction site. But on the whole, there was no orthodontic tooth movement.

Keywords: Cementum, cemental dysplasia, hypercementosis, tooth movement, alveolar remodelling.

INTRODUCTION

The term cementum is derived from the Latin word, which means the stone particles used to make mortar, ideally describing its role.¹ Hypercementosis is a non-neoplastic condition characterized by excessive deposition of cementum on the roots of teeth. The condition may involve multiple teeth or may show up as a generalized process. The condition is asymptomatic and is detected on radiographic examination, where most cases are idiopathic. Several local and systemic factors are linked to this condition.²

Local factors encompass functional stress due to occlusion forces, periapical pathosis, and continuous dental eruption. Systemic factors

comprise Paget's disease of bone, atherosclerosis, rheumatic fever, acromegaly, deforming arthritis, calcinosis, hypertrophic arthritis, thyroid diseases and possibly Vitamin A deficiency. In spite of the confederacy with a number of disorders, most localized cases of hypercementosis are not analogous to any systemic disturbance. A hereditary ingredient is usually suspected when hypercementosis is seen affecting younger patients. In a substantial majority of cases, hypercementosis is proclaimed to be affecting vital teeth.⁴ Information about the orthodontic movement of teeth with hypercementosis is scarce in the literature. This case report gives information regarding the possibility of any orthodontic tooth

Received: Feb. 13, 2021; Accepted: Apr. 12, 2021

*Correspondence Dr. S Chetan Kumar.

Department of Orthodontics and Dentofacial Orthopedics, Malla Reddy Institute of Dental Sciences, Hyderabad, Telangana, India.

Email: drchetan@outlook.com

movement in a generalized hypercementosis patient.

CASE REPORT

A 20-year-old male patient visited the department of orthodontics with a chief complaint of irregularly arranged teeth and difficulty in chewing. The patient's past medical history has not quite relevant, and he was apparently healthy. Upon clinical and radiographic examination, he has got prognathic mandible and retrognathic maxilla with a tendency towards horizontal growth pattern. A case of severe skeletal class III with proclined upper & lower anterior with increased reverse overjet (-10mm), reverse overbite (-8mm) (Fig.6), increased freeway space (20mm) with severe crowding is seen in relation to both arches. Maxilla contained within the mandible with crossbites in relation to all teeth from 16 to 25 (Fig. 1) and narrow maxillary arch (Fig. 4) is possibly due to early closure of mid palatal suture. There is a decreased lower anterior facial height (by 58mm) (Fig. 7 to 11). Palatally placed 14 and 24, and infra erupted teeth in relation to 33 and 43 were also observed (Fig. 1 to 6). There is a generalized periapical hypercementosis which is circumscribed in the lower arch and diffused in the upper arch is observed. On extraoral examination, there is mesoprosopic facial form (Fig.6). Fig. 6 and Fig. 7 represent frontal photographs at rest and smile, respectively, while Fig. 8 & Fig. 9 represent oblique photographs at rest and smile, respectively. Fig. 10 represents the profile of the rest photographs. The patient has competent lips (Fig. 6), visibility of incisors upon smile is 4mm (Fig. 7), and smile arch is reverse smile arch (Fig. 7 and Fig. 9), anterior facial divergence and concave profile (Fig. 10).



Fig 1: Frontal view.



Fig 2: Right molar relation.



Fig 3: Left molar relation.



Fig 4: Maxillary arch occlusal view.



Fig 5: Mandibular arch occlusal view.



Fig 6: Frontal at rest.



Fig 9: Oblique at smile.



Fig 7: Frontal at smile.



Fig 10: Profile view.



Fig 8: Oblique at rest.

Possible etiology of hypercementosis: A functional adaptation and repair process of cementum due to excessive pressure exerted by surrounding musculature created by over closure of mandible.

Radiographic Examination:

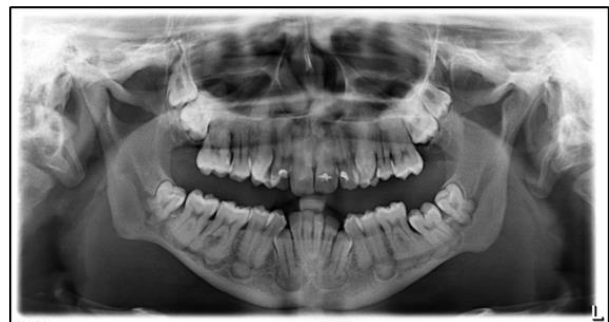


Fig 11: OPG.



Fig 12: Lateral Cephalogram.

Upon radiographic examination (Fig. 11 and 12), there is generalized multiple well-defined radiopacities evident in the periapical region of all teeth. Examination of the lesion in specific: The radiopacities observed to be well defined and are associated with the periapical region of the tooth and are in contact with the root surface of the cemental lesions are surrounded by well-defined uniform radiolucency, which in turn is surrounded by a sclerotic border of the bone. This presentation is more prominent in the anterior tooth region involving 33, 35, 43, and 45. The roots of 46, 47, 48, 36, 37 and 38 appear bulbous and club-shaped with a well-defined radiolucency surrounding the borders of the roots. Orthopantomogram(OPG) (Fig. 11) reveals impacted teeth in relation to 17, 27.

Differential diagnosis: Lesion might be multiple periapical cementoosseous dysplasia, florid cementoosseous dysplasia, multiple cementoma. Radiographic diagnosis: multiple hypercemental lesions.

Histopathologic Examination:

Upper left 1st premolar (24) was extracted due to gross decay. Ground section of extracted tooth (figure: 13) at root area was observed with Olympus trinocular research microscope under 10X magnification revealed that there is normal-appearing dentin, thick tomes granular layer with cellular cementum extending through the whole length of the root. The peripheral zone of the

cementum is extending in the whole length of the root, at the apical and lateral aspect, which is thick with large irregular lacunae. Based on the clinical, radiographic and histological features. It is suggestive of cemental dysplasia and generalized hyper cement (clinical term).

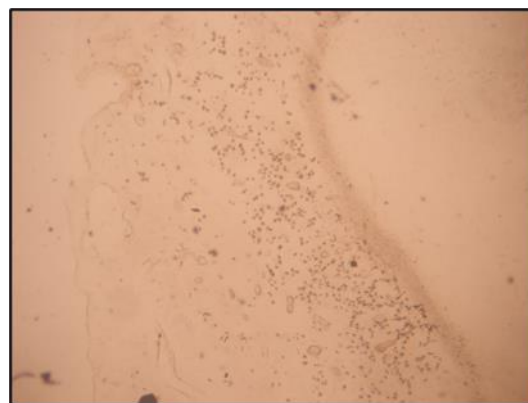


Fig 13: Ground section of extracted tooth (24).

Diagnosis

The case is diagnosed with severe skeletal class III malocclusion attributed to the narrow maxilla and prognathic mandible with horizontal growth pattern, constricted maxillary arch, prominent mid palatine raphe may be attributed to early fusion of mid palatine raphe, narrowed palatal vault, lingual placed upper canines, crowding in upper and lower anterior, more palatally placed 14&24, partially erupted 17,18,27,28,38,48, infra occlusion of 37, crossbite irt 16 to 25, partially erupted 33,43, severe reverse overjet & overbite, severe(extreme) freeway space, caries and grossly decay irt 24 and poor oral hygiene.

Treatment Plan

As the patient is having difficulty in mastication, an attempt has been made in the following case to achieve proper functional efficiency.

The patient has Angle's class III malocclusion with severe retrusion of the maxilla and mandibular prognathism. So the case is to be ideally treated by surgically assisted rapid palatal expansion (SARPE) and maxillary advancement for maxilla followed by bilateral sagittal split osteotomy for the mandibular setback.

In this patient surgical approach was contraindicated due to the following reasons surgical cuts for le fort one osteotomy

- It will involve hyper cemental lesions and might hinder the placement of bone plates and stabilizing screws.
- A surgical cut in the hypercemental area might lead to a comminuted fracture of the bone.
- Bilateral sagittal split osteotomy to set back the mandible in this patient is also difficult as there is decreased amount of bone at the Angle of the mandible, and hypercemental lesions associated with all the teeth are large florid and extend till to the lower border of the mandible.

Orthodontic treatment, as per contemporary literature, is contraindicated due to poor prognosis of tooth movement in hypercemental lesions. We planned for the possibility of levelling and aligning of the teeth after extraction of grossly decayed 24. Extraction of 24 was done trans alveolar method, and there was difficulty in extraction due to hypercemental lesion. Brackets were bonded only in the upper arch to check if any positive prognosis occurred and planned for placing of brackets in the lower arch if any positive response occurred. After bonding the upper arch with MBT 0.022 "slot 3M, Unitech brackets treatment was started by the placement of 0.014" cu Niti wire followed by 0.014" niti followed by 0.016" niti wire. Midline diastema was observed after initial appointments. There was a minor alignment in the teeth that occurred may be due to extraction of the left premolar (figure 14-17). Overall poor prognosis observed.



Fig 14: Frontal View.



Fig 15: Right molar relation.

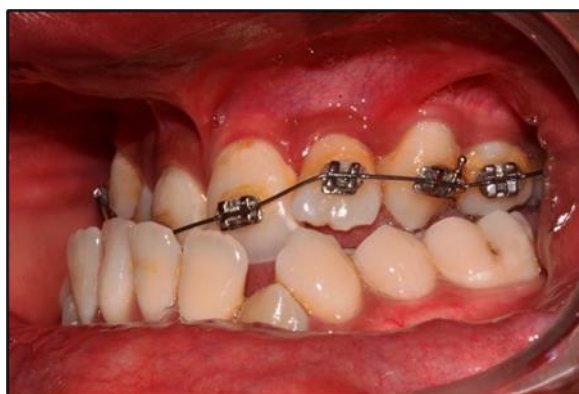


Fig 16: Left molar relation.



Fig 17: Maxillary Arch.

DISCUSSION

Remodelling of cementum occurs throughout life as part of the physiological process of secondary eruption.⁵ According to Dewey KW, hypercementosis is characterised by the formation of cementum beyond the physiologic limits of the tooth.^{2,5} However, there is no quantitative limit to differentiate between the physiological and pathological forms of cementum deposition.⁶

An advanced type of excessive cementum formation was observed in this patient. The prime interest of this case report is to know the effect of hypercementosis on the mobility of teeth.

The most commonly affected teeth are mandibular molars followed by mandibular and maxillary second premolar, where anterior teeth are seldom affected, but the present case showed generalized involvement of all teeth.⁷

Origin of hypercementosis may be attributed to many conditions such as functional stress due to occlusion force continuous dental eruption, incorporation of periodontal cementicles during physiologic cementum deposition, reactionary deposition in response to periapical inflammatory processes, systemic factors such as atherosclerosis, acromegaly, deforming arthritis, hypertrophic arthritis, thyroid diseases and Paget's disease.⁸

Humerfelt and Reita and Azaz *et al.* suggested that the apposition of cementum is a phenomenon caused by age.² However, cases have been reported in young individuals as well. There are reports of familial cases making hypercementosis an inheritable condition.⁹

Radiographically, hypercementosis does not alter the biologic width between the root surface, the periodontal ligament, and the alveolar bone. Although hypercementosis can be identified radiographically, it is not possible to estimate the amount of extra cementum present in the affected root because dentin and cementum have the same radiodensity.¹⁰

Coming to the present case, a patient came to the department of orthodontics with a chief complaint of proclined upper front teeth and difficulty in chewing. The patient's past medical history has no quite relevant, and he was apparently healthy.

The occurrence of hypercementosis in this patient is unknown aetiology. For this patient, hypercementosis may be developed after 12 years of his age, so there is ankylosis of second molars in upper and lower arches is present.

According to many authors that hypercementosis of first molars is fairly common. But not infrequently, premolars may become involved, and even canines and anterior teeth. Observations of

Hypercementosis in several teeth of the same person as described above must nevertheless be regarded as fairly uncommon.^{2,5}

As observed in the present study, hypercementosis may influence the movability of teeth during eruption and orthodontic treatment, which is in accordance with other studies. Hypercementosis may cause disturbances in the rearrangement of the periodontal fibres. This may result in a delayed eruption. Shrinkage and atrophy of the periodontal ligament may also occur, subsequently leading to ankylosis. In addition, the roots of teeth which have been arrested in their eruption may frequently become curved and prevents further eruption.¹¹

The orthodontic force will stimulate alveolar bone remodelling, leading to tooth movement, but in hypercementosis condition, there will be altered osteoclast/Odontoclast distribution, which leads to altered tooth movement and delays primary tooth exfoliation.¹²

Orthodontic tooth movement in cases of early hypercementosis may lead to compression and atrophy of the periodontal ligament with ankylosis between the root surface and bone. Such ankylosis was observed in the present study. We observed a mild tooth movement towards the left side of the maxillary arch that is maybe because of the extraction of 24.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

CONCLUSION

This case report describes that

- In hypercementosis case, we cannot achieve any noticeable tooth movement
- In the present case, mild tooth movement observed is due to dentoalveolar changes taken place in the area of extraction site of 24.
- Hypercementosis in teeth may cause ankylosis due to frequent curvatures of roots of involved teeth. In present case we can observe unerupted /ankylosed teeth irt 17,18,27,28,37,38,48,33,43.

- Hypercementosis tooth may be moved orthodontically to a certain extent in the early stage of Hypercementosis. Ankylosis may occur between bone and root surface may lead to compression and atrophy of the periodontal ligament around the root. If there is root resorption, this may be repaired by the formation of cellular cementum. In some cases, osteocementum and bone tend to fill in the resorption lacunae of the root surface.

REFERENCES

1. Aravind W, Divya V. Irregular periapical radiopacity in mandibular premolars and molars. *Case Rep Dent* 2014; 1-3.
2. Leider AS, Garbarino VE. Generalized hypercementosis. *Oral Surg Oral Med Oral Pathol* 1987;63:375-80.
3. Patil SR, Yadav N. Generalized hypercementosis with multiple missing teeth in a young female: A rare case report. *Int J Health Allied Sci* 2015; 4: 178-80
4. Israel H. Early hypercementosis and arrested dental eruption: Heritable multiple ankylodontia. *J Craniofac Genet Dev Biol* 1984;4:243-6.
5. Hitesh S, Sujir N, Sunil M, Keerthilatha M Pal. Hyercementosis: a rare finding in a patient with systemic lupus erythematosus. *BMJ case Rep* 2014: 1-4.
6. Pinheiro BC, Pinheiro TN, Capellozza AL, et al. A scanning electron microscopic study of hypercementosis. *J Appl Oral Sci* 2008;16:380-4.
7. Purva BB, Purv SP. Generalized Hypercementosis- A report of an incidental finding. *IP Int. J Maxillofac Imaging* 2018;4(1): 36-8.
8. Pinheiro BC, Pinheiro TN, Capellozza ALA, Consolaro A. A scanning Electron microscopic study of Hypercementosis. *J Appl Oral Sci.* 2008;16(6): 380-4.
9. Basdra EK, Stellzig A, Komposch G. Generalized hypercementosis in a young female patient. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1997;83:418-19.
10. Monahan R. Periapical and localized radiopacities. *Dent Clin North Am.* 1994;38:113-36.
11. Consolaro A, Consolaro RB, Francischone LA. Cementum, apical morphology and hypercementosis: A probable adaptive response of the periodontal support tissues and potential orthodontic implications. *Dental Press J Orthod* 2012; 17(1):21-30.
12. Reduced orthodontic tooth movement in Enpp1 Mutant Mice with Hypercementosis Wolf M, Ao M, Chaver MB, Kolli TN, Math VT, Becker K et al; *J Den Res* 2018;97(2):1-9.