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Radiographic Study of the Effect of Mandibular Fractures on Hypercementosis Development

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Abstract

Mandibular fractures are frequent among facial injuries and tend to arise from trauma. Though commonly treated without major issues, such fractures can still lead to several complications. Malocclusion. Trismus. Infection. Particularly when oral hygiene is impaired or, more critically, in cases involving open wounds. Each adds complexity to the healing process. Over time, less immediate effects can surface. Some involve underlying dental tissues. One such condition, hypercementosis, involves an unusual accumulation of cementum along root surfaces. This may emerge as a delayed complication. Detectable on dental radiographs, hypercementosis presents clinical challenges. Tooth extraction, in such cases, tends to present greater difficulty. The roots are often bulbous, irregularly thickened, and resist conventional removal techniques, and the likelihood of root fracture rises noticeably. In many instances, surgical intervention is ultimately the only feasible route. As for endodontic procedures, complications also arise. Excessive cementum build-up often blurs familiar anatomical cues; canal routes, for instance, may present as faint, oddly shaped, or even fragmented. As a result, the likelihood of procedural errors increases; perforations tend to occur more often, especially during the early stages of access or while navigating instruments.

Aim of the study

To explore whether any relationship might exist between healed mandibular fractures and the later emergence hypercementosis in mandibular teeth.

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Materials and Methods

A total of 360 patients were included. Divided evenly. Control group: 180 individuals with no prior mandibular fracture. Experimental group: 180 with documented fracture history, all at least five years post-injury. Panoramic radiographs were reviewed to identify signs of hypercementosis.

Results

Statistical testing, Chi-square analysis ($\chi^2 = 3.64$, p-value = 0.056) showed no significant association between fracture history and hypercementosis. Yet, prevalence differed. Hypercementosis appeared in 3.3% of the fracture group, versus 0.5% in controls. Most cases occurred in mandibular premolars (1.67%), followed by first molars (1.11%) and second molars (0.56%).

Conclusion

The study suggested a possible non-significant localized risk of hypercementosis following mandibular fracture, more so in teeth situated near the injury site.

Keywords

Mandibular fracture; Hypercementosis; Teeth Traumatic injury; Trauma; Endodontic treatment; Tooth extraction.

Introduction

Fractures of the mandible tend to appear most frequently among facial injuries. Quite often, they occur alongside fractures of the nasal area and the zygomatic bones. Trauma is considered the most frequent etiology of these fractures [1]. Complication rates in mandibular fractures vary from 7 -29% and have been associated with fracture injury site, severity and the number of affected regions [2]. malunion, nonunion, infection, wound dehiscence and osteomyelitis are the most common complication [3,4,5]. Elevated complication incidence is observed among patients with systemic disorders, smokers and patients with medication abuse. Antibiotic treatment was reported not to influence the increase of these complications. On the other hand, complications are reported to be less common in children [6].

Other researchers stated the presence of social or medical risk factors, as well inadequate reduction or fixation and multiple fractures leading to nonunion which was most frequent in the mandibular body region [7,8]. Post operative malocclusion still the furthermost functionally important complication and is typically due to technical faults in fixation procedure [9]. Moreover, mandibular fractures as well as their complications can cause negative pressure on the teeth and surrounding structures, resulting further dental consequences. One such potential consequence is hypercementosis. The current study investigated the possible development of hypercementosis in mandibular teeth following mandibular fractures.

‟Hypercementosis” often presents as added cementum buildup along the root, most notably near the apex. The surface may take on a bulbous form, sometimes nodular, with the thickening not always following a consistent pattern. Deposition tends to vary in extent and appearance, or include the entire root [10,11]. Generally, two kinds of cementum are deposited on the root surfaces. Many researchers reported that acellular (primary) cementum and cellular (secondary) cementum are distinguished. Acellular cementum layer is detected as a relatively thin layer coating the root dentin. A layer known as cellular cementum

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appears to cover the acellular part beneath. Typically, more prominent development takes place around the root's middle third, sometimes near the apex, and often in areas like the bifurcation zones. [12-14].

Hypercementosis appears most commonly in adult individuals, and its occurrence rate increases during aging process, most likely due to total exposure to key determinants. [10,15,16] Hypercementosis-related teeth have no significant clinical signs or symptoms; no treatment is required, and a follow-up is sufficient. The most practical clinical importance is the complications that may be faced in extracting hypercementosed dentition. This proposes the biological significance of this condition, which is apparently to anchor the tooth in its socket more tightly.[17] Surgical intervention may be essential in particular instances to help in removal.[18] A precise diagnosis, involving differential diagnosis with other pathologies, is critical (e.g., cementoblastoma).[10,15,16] Radiographically, hypercementosis involves a relatively radiopaque thickened cementum layer beside the normal cementum and found just along the lamina dura edge, resting close beside what's known as the periodontal ligament space. [10] Despite hypercementosis being regarded as idiopathic, a variety of local and systemic conditions may be included in its aetiology [19]. Local factors involve abnormal occlusal trauma, chronic periapical inflammation, continuous dental eruption and non-antagonist teeth [19] and long duration impacted teeth,[20] Systemic factors involve atherosclerosis, thyroid disease, Paget's disease, arthritis, rheumatic fever, a calcinosis and acromegaly [19] probable vitamin A deficiency and Gardner's syndrome [10,16,19-22].

Materials and Methods

A group of 360 patients took part in the study. Selection happened at random, without factoring gender. Age ranged from 18 up to 50 years. Referrals came through to radiology units across several specialized dental centers. in Baghdad city, Iraq, between May 2021 and February 2024. The patients were divided into two groups; the control group consisted of 180 patients with no history of mandibular fractures (used for comparison). The experimental group consisted of 180 patients who had previously experienced a mandibular fracture, with at least five years having passed since their recovery. The study was conducted to find the possible relationship between mandibular fractures after their recovery and the development of hypercementosis in mandibular teeth. The mandibular fractures recorded in the current study included the condylar, body, symphyseal, parasymphyseal, and ramus, which are based on the patient's history, clinical examination, and radiographic findings.

A digital orthopantomographic system (OPG) was used to detect the signs of hypercementosis on panoramic images and to rule out other pathologies based on the following criteria:

- Smooth, continuous root enlargement (no separate mass).
- Intact PDL space (no radiolucent rim).
- No root resorption.
- No bony expansion or cortical disruption.

The severity of hypercementosis was classified as mild, moderate, or severe based on the thickness of the teeth roots in the mesiodistal dimension on panoramic images. Mild hypercementosis showed a root thickening approximately 1.5 times greater than the normal root width. Moderate cases showed root enlargement between 1.5 and 2.5 times the normal root width, while severe cases exhibited pronounced, bulbous root changes exceeding 2.5 times the normal thickness (Table 1). Root thickness on panoramic images was evaluated using the built-in linear measurement tool of digital imaging software (Romexis 4.0+ software), measuring mesiodistal root width to obtain an exact width. Affected teeth were compared with the known average dimensions for each tooth type [23]. Magnification present in panoramic images, was addressed by working out the magnification factor, which helped rule out its influence during evaluation. A stainless-steel ball of 5 mm diameter was placed near the molar region in the maxilla and mandible (where magnification is most critical), fixed into the molar tooth using orthodontic wax before the panoramic image was taken, and then imaged in an OPG. The diameter of the metallic ball is now measured on a panoramic image. If a metallic ball of 5 mm measured with 6.25 mm on the panoramic image, the magnification factor was calculated as follows: Magnification Factor (M) = 6.25/5 = 1.25x. The imaging system was done by Planmeca ProMax Model (2014) with Romexis 4.0+ Software, kVp: 65 kV, mA: 10 mA and Exposure Time: 10-15 sec.

Patients with systemic disorders, current or previous orthodontic treatment, dental implants, dental or maxillofacial infections, parafunctional habits like bruxism and clenching, malocclusion, osteoporosis, or any drug or condition affecting bone metabolism, as well as those with missing teeth, were excluded from the study. Statistical analysis was performed using chi-square tests to evaluate the relationship between mandibular fractures and the subsequent development of hypercementosis in mandibular teeth.

Severity	Radiographic Appearance	Parameters
Mild	- Slight, smooth radiopaque thickening of the apical root - Club-shaped or blunted apex	- Root thickness is about 1.5 thicker than normal root width - Intact PDL space - Clear lamina dura - Usually asymptomatic
Moderate	- Noticeable irregular radiopaque thickening. - Affects apex and mid-root - Altered root contour	- Root thickness is approximately 1.5 to 2.5 times thicker than normal root width - Distorted root outline - PDL space visible but compressed
Severe	- Marked radiopaque bulbous/root enlargement - Drumstick-shaped root - Entire root affected	- Root is more than 2.5 times thicker than normal root width - PDL space may be indistinct - Lamina dura irregular or lost

Table 1: Classification of Hypercementosis: Severity, Radiographic Characteristics, and Diagnostic Parameters.

Results

The statistical analysis showed no significant association between mandibular fracture cases after recovery and subsequent development of hypercementosis (Chi-square test $\chi^2 = 3.64$, $p = 0.056$) (Table 2). Hypercementosis rate in the experimental group was 3.3%, while the control group was 0.5%. Mandibular premolars showed the highest rate of hypercementosis (1.67%, moderate cases), followed by mandibular first molars (1.11%, moderate cases), and mandibular second molars (0.56%, moderate cases). On the other hand, the control group showed a mild case in the mandibular first molar (0.**5**%) (Table 3). Regarding distribution of mandibular fractures, the body fractures were mostly frequent (28.8%), followed by angle (23.8%), symphysis (17.7%), parasymphysis (14.4%), alveolar process (6.6%), condylar (4.4%), and ramus fractures (3.8%) (Figure 1).

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Patient Group	Cases without Hypercementosis	Cases with Hypercementosis	Total
Patients without Mandibular fractures	179	1	180
Patients with Mandibular fractures	173	6	180
Total	352	7	360

"The chi-square test was 3.64. The p-value was 0.056. Not significant at p-value < 0.05. df = 1"

Table 2: shows no significant association between hypercementosis and mandibular fractures.

Fracture Type	n (%)	Affected Teeth with Hypercementosis (n) (%)
Body Fracture	52 (28.8%)	Mandibular premolars 3 (1.67%)
Angle Fracture	43 (23.8%)	Mandibular first molars 2 (1.11 %)
Symphysis Fracture	32 (17.7%)	Mandibular second molar 1 (0.56 %)
Parasymphysis Fracture	26 (14.4%)	-
Alveolar Process Fracture	12 (6.6%)	-
Condyle and subcondyle fracture	8 (4.4%)	-
Ramus Fracture	7 (3.8%)	-
Coronoid Process Fracture	0	-

Table 3: Distribution of hypercementosis according to the fracture type in the experimental group.

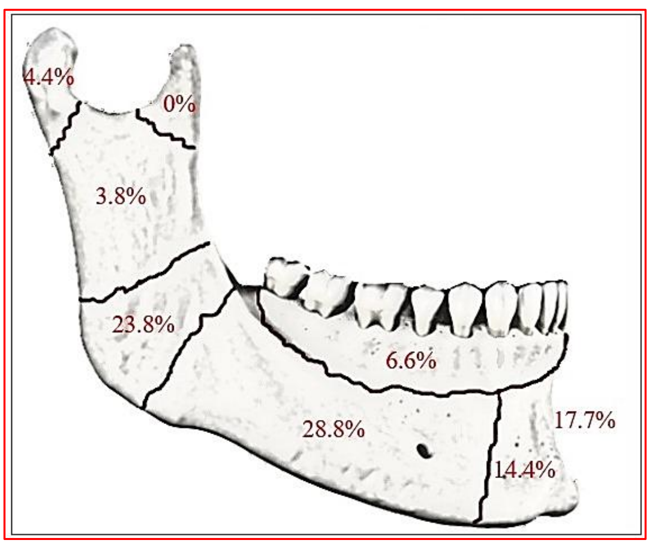

Figure 1: Distribution of mandibular fractures in the experimental group

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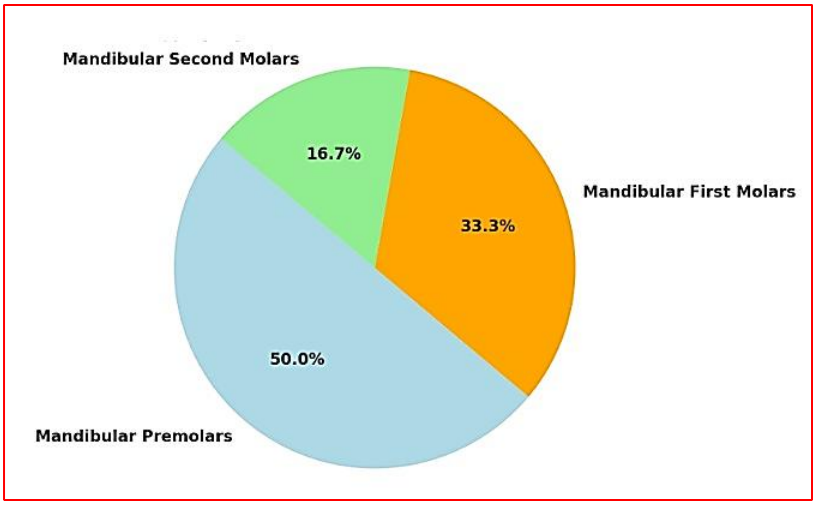

Figure 2: Pie chart showing the distribution of affected teeth with hypercementosis in the experimental group.

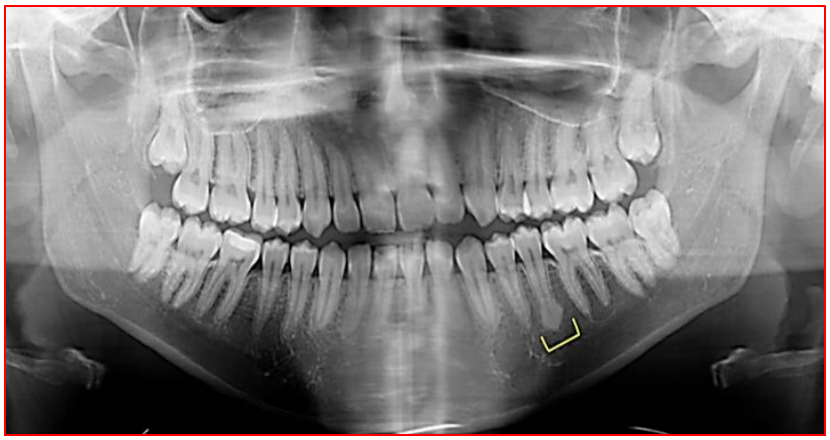

Figure 3: A panoramic image of a patient (43-year-old female) reveals moderate hypercementosis affecting the mandibular second premolar in the experimental group.

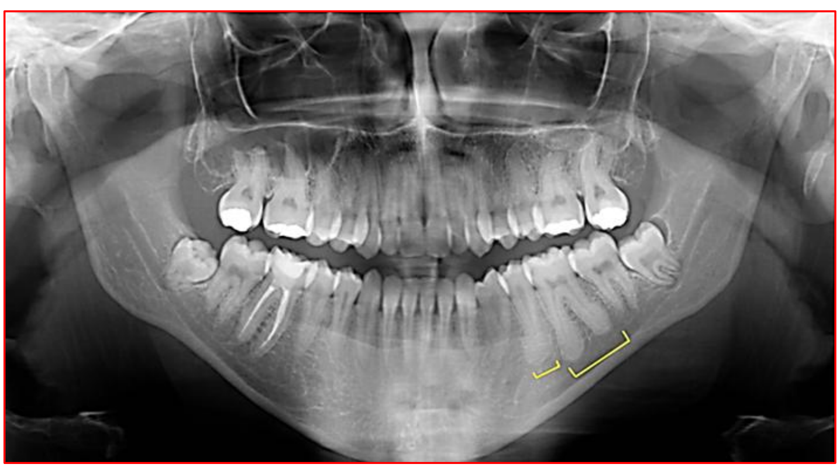

Figure 4: A panoramic image of a patient (50-year-old male) reveals mild hypercementosis affecting the mandibular first molar and second premolar in the experimental group

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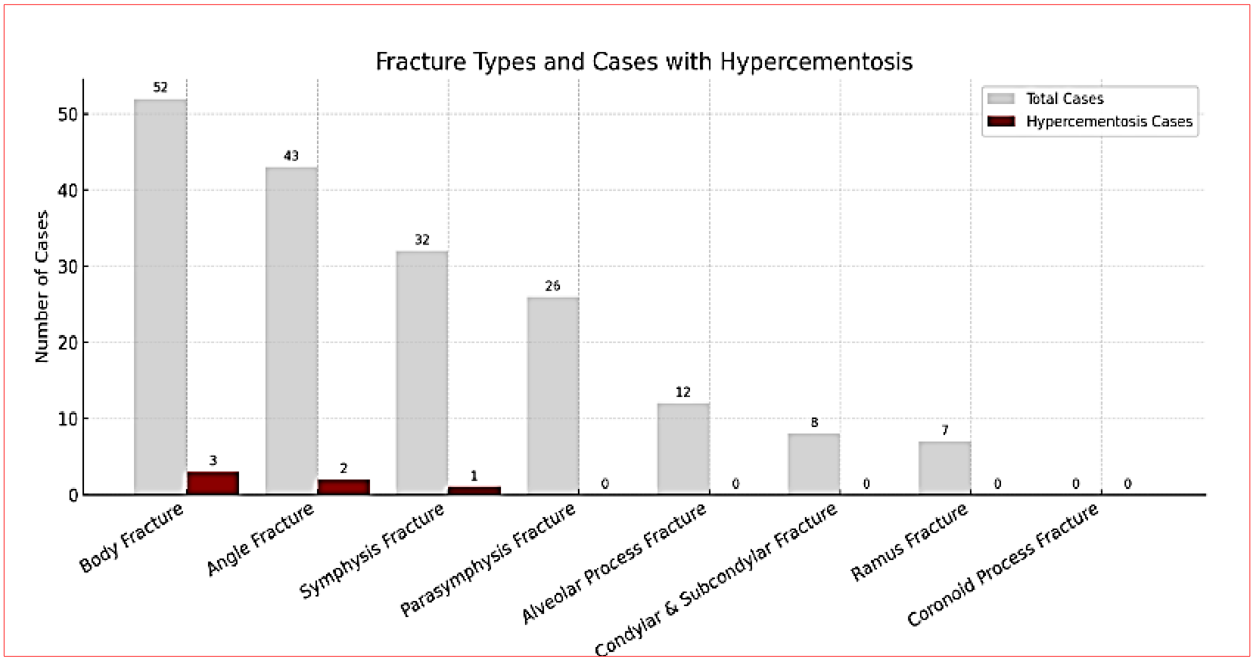

Figure 5: A bar graph showing the distribution of different fracture types in the mandible alongside the associated hypercementosis cases: Light grey bars represent total cases of each fracture type. Dark red bars represent the subset with hypercementosis.

Discussion

Hypercementosis refers to excessive cementum deposition on the root surfaces of teeth, causing increased root thickness with intact lamina dura and periodontal ligament. The condition is mostly identified incidentally on dental radiographs. Hypercementosis can substantially complicate tooth extraction, due to the increased root bulk and irregular root shape, making tooth removal more difficult, often requiring surgical sectioning. Hypercementosis also poses challenges in endodontic treatment, because of irregular canal pathways and root canal obliteration. The thickened cementum can make negotiating and locating the root canals more difficult, complicating working length measurement and elevating the hazard of perforation.

Several studies reported that many risk factors are involved in the development of hypercementosis. For example, Bruxism and occlusal trauma have been reported among the factors strongly associated with hypercementosis [24]. Other researchers reported the effect of orthodontic treatment on the development of hypercementosis in response to excessive stress or occlusal trauma [25]. However, the role of occlusal forces has been a controversial matter for many years [11]. In addition, hypercementosis is also observed in many cases in non-antagonist teeth or teeth with damaged crowns [24].

Thoma and Goldman proposed that hypercementosis not only affects erupted teeth but also occurs in unerupted or embedded teeth [26-28]. Research studies and case reports also advocate that periapical inflammation may cause hypercementosis [26-30]. Low intensity irritation is primarily increased cellular activity, leading to hypercementosis promotes cementum development around the inflamed area [26, 27].

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Gardner and Goldstein reported that hypercementosis takes place more than four times in teeth with necrotic pulp necrosis compared to teeth with vital pulp [29].

The current study, at its core, explored whether signs of hypercementosis might begin to appear in cases involving mandibular fractures, once healing had already taken place. The study showed no significant association between mandibular fracture cases after recovery and subsequent development of hypercementosis. The prevalence of hypercementosis in the experimental group was higher (3.3%) than in the control group (0.5%). Mandibular teeth close to the fracture line, especially in the body, angle, and symphysis areas, showed a higher prevalence of hypercementosis than teeth in non-fractured areas. Traumatic effects such as reparative responses, altered bone metabolism and elevated occlusal forces have been associated with mandibular fractures. In this manner, the surrounding bone undergoes remodeling, modifying stress distribution in the jaw. Therefore, teeth adjacent to the fracture line may be exposed to elevated mechanical load, initiating excessive cementum deposition as a protective mechanism. Vascular and inflammatory modifications during the repair mechanism could also stimulate more cementum deposition.

The study revealed that hypercementosis showed the highest incidence adjacent to fracture lines, with moderate cases predominantly affecting the mandibular premolars (1.67%), followed by the mandibular first molars (1.11%) and lower second molars (0.5%). This increase within the mandibular premolar teeth is likely due to their position in the middle arch and increased vulnerability to fracture. This pattern reflects how root anatomy and tooth position affect both fracture vulnerability and subsequent hypercementosis development, indicating the need for special monitoring in mandibular premolars after trauma. Distribution of hypercementosis, in some cases, might reflect how biomechanical stress tends to act across mandibular regions during injury patterns (Figure 2-5).

The study found also that body fractures showed the most common type of mandibular fracture (28.8%), followed by angle (23.8%), symphysis (17.7%), parasymphysis (14.4%), alveolar process (6.6%), condylar (4.4%), and ramus fractures (3.8%). respectively. These fracture patterns may influence the distribution and severity of hypercementosis in affected regions.

Long-term observation of mandibular teeth in patients with a history of mandible fractures can help to predict possible complications, control occlusal forces efficiently and prevent periodontal and functional problems. Furthermore, these findings could also be important in forensic dentistry and trauma management, explaining the need for dental evaluations to assess potential long-term root changes in patients with mandibular fractures. In endodontic treatment, flexible files can be used with precise instrumentation to enhance treatment success. Correct diagnosis and planning are necessary to prevent complications in dental procedures.

Conclusion

Mandible fractures presented as a significant predictive risk factor in localized development of hypercementosis, especially in teeth near the fracture line. The mandibular body, angle, and symphysis fractures are significantly associated with the highest prevalence of hypercementosis; more than fifty percent of the hypercementosis cases were in the mandibular body. This conclusion could be important in forensic dentistry and trauma management.

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Ethical approval

The study was conducted following the ethical standards of the Ethics Committee for Scientific Research at the College of Dentistry, University of Wasit., Ref. No. 162021 on 2/5/2021.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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Nil

Conflicts of interest

No conflict of interest.

References

1. Jin KS, Lee H, Sohn JB, Han YS, Jung DU, et al. (2018) Fracture patterns and causes in the craniofacial region: an 8-year review of 2076 patients. Maxillofac Plast Reconstr Surg. 40(1):29.
2. Gutta R, Tracy K, Johnson C, James LE, Krishnan DG, et al. (2014) Outcomes of mandible fracture treatment at an academic tertiary hospital: a 5-year analysis. J Oral Maxillofac Surg. 72(3):550-58.
3. Iizuka T, Lindqvist C. (1993) Rigid internal fixation of fractures in the angular region of the mandible: an analysis of factors contributing to different complications Plast Reconstr Surg. 91(2):265-71.
4. Anderson T, Alpert B. (1992) Experience with rigid fixation of mandibular fractures and immediate function J Oral Maxillofac Surg. 50(6):555-60.
5. Iizuka T, Lindqvist C, Hallikainen D, Paukku P. (1991) Infection after rigid internal fixation of mandibular fractures: a clinical and radiologic study. J Oral Maxillofac Surg. 49(6):585-93.
6. Odom EB, Snyder-Warwick AK. (2016) Mandible fracture complications and infection: the influence of demographics and modifiable factors. Plast Reconstr Surg. 138(2):282e-89e.
7. Haug RH, Schwimmer A. (1994) Fibrous union of the mandible: a review of 27 patients. J Oral Maxillofac Surg. 52(8):832-39.
8. Mathog RH, Toma V, Clayman L, Wolf S. (2000) Nonunion of the mandible: an analysis of contributing factors. J Oral Maxillofac Surg. 58(7):746-52.
9. Pickrell BB, Serebrakian AT, Maricevich RS. (2017) Mandible Fractures. Semin Plast Surg. 31(2):100-07.
10. Zhou J, Zhao Y, Xia C, Jiang L. (2012) Periodontitis with hypercementosis: report of a case and discussion of possible aetiologic factors. Aust Dent J. 57(4):511-4.
11. Bürklein S, Jansen S, Schäfer E. (2012) Occurrence of hypercementosis in a German population J Endod. 38(12):1610-2.
12. Orban B. (1994)Oral Histology and Embryology. St. Louis C.V. Mosby: 151–71.
13. Kronfeld R, Boyle PE. (1949) Histopathology of the Teeth and their Surrounding Structures. Philadelphia Lea & Febiger:212-23.
14. Humerfelt A, Reitan K. (1966) Effects of hypercementosis on the movability of teeth during orthodontic treatment Angle Orthod. 36:179-89.
15. Zaitoun H, Kujan O, Sloan P. (2007) An unusual recurrent cementoblastoma associated with a developing lower second molar tooth: A case report. J Oral Maxillofac Surg. 65(10):2080-2.
16. Shoor H, Sujir N, Mutalik S, Pai KM. (2014) Hypercementosis: A rare finding in a patient with systemic lupus erythematosus. BMJ Case Rep. 2014:bcr2013202370.

DOI: https://doi.org/10.52793/JOMDR.2025.6(2)-103

17. Neville BW, Damm DD, Allen CM, Bouquot JE. (2009) Oral and Maxillofacial Pathology. Elsevier: 96-7.
18. Langlais RP, Langland OE, Nortje CJ. (1995) Diagnostic Imaging of the Jaws. 19951st ed Philadelphia Williams & Wilkins:187-9.
19. Patil SR, Yadav N. (2015) Generalized hypercementosis with multiple missing teeth in a young female: A rare case report. Int J Health Allied Sci. 4:178-80.
20. Weınberger A. (1954) The clinical significance of hypercementosis. Oral Surg Oral Med Oral Pathol. 7:79-87.
21. Eren Y, Erdal O, Serdar B, Emin K, Enes G. (2017) Evaluation of the frequency and characteristics of hypercementosis in the Turkish population with cone-beam computed tomography Niger J Clin Prac. 20:724-8.
22. Raghavan V, Singh C. (2015) Hypercementosis: Review of literature and report of a case of mammoth, dumbbell-shaped hypercementosis J Indian Acad Oral Med Radiol. 27:160-3.
23. Nelson SJ, Ash MM. (2020) Wheeler's Dental Anatomy, Physiology, and Occlusion. 11th ed. St. Louis: Elsevier.
24. Consolaro A, Consolaro RB, Francischone LA. (2012) Cementum, apical morphology and hypercementosis: A probable adaptive response of the periodontal support tissues and potential orthodontic implications Dental Press J Orthod. 17:21-30.
25. Nadeem Jeddy RT, Krithika C, Saravanan R. (2014) Localized multiple cemental excrescences: A rare presentation of hypercementosis. J Clin Diagn Res. 8:ZD1.
26. Pappen FG, Fagonde CD, Martos J, Silveira LFM. (2011) Hypercementosis: A challenge for endodontic therapy Rev Sul-Bras Odontol. 8:321-8.
27. Thoma KH, Goldman HM. (1939) The pathology of dental cementum J Am Dent Assoc. 26:1943-53.
28. Prabhakar A, Reddy V, Bassappa N. (1998) Duplication and dilaceration of a crown with hypercementosis of the root following trauma: A case report Quintessence Int. 29:655-7.
29. Gardner BS, Goldstein H. (1931) The significance of hypercementosis. Dent Cosmos. 73:1065-69.
30. Shafer WG, Hine MK, Levy BM. (1974) A textbook of oral pathology. Philadelphia WB Saunders Company: 34-5.

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