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Diagnosis And Nonsurgical Endodontic Management Of Localized Hypercementosis In A Mandibular First Molar: A Case Report

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Abstract

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Introduction

Hypercementosis is a non-neoplastic condition characterized by excessive deposition of secondary cementum on the external surface of the tooth root beyond physiological limits. It is generally considered an adaptive or reactive process and is most commonly detected as an incidental radiographic finding because affected teeth are usually asymptomatic.

Radiographically, hypercementosis appears as a bulbous enlargement of the root with preservation of the periodontal ligament space and lamina dura, features that help distinguish it from other cemento-osseous lesions.

The etiology of hypercementosis is multifactorial and includes both local and systemic factors. Local factors such as chronic periapical inflammation, occlusal trauma, excessive functional loading, attrition, periodontal disease, orthodontic tooth movement, and root repair have been implicated in its development. Generalized hypercementosis has also been associated with systemic conditions including Paget's disease, acromegaly, rheumatoid arthritis, and thyroid disorders, although many cases remain idiopathic.

Although hypercementosis itself rarely requires treatment, it may pose significant challenges during endodontic therapy. Excessive cementum deposition can alter the position of the apical constriction and apical foramen, resulting in discrepancies between electronic apex locator readings and the radiographic apex. Failure to recognize this altered anatomy may lead to inaccurate working length determination and over-instrumentation. In such situations, cone-beam computed tomography (CBCT) serves as a valuable adjunct by providing three-dimensional visualization of the root morphology and facilitating accurate diagnosis and treatment planning.

The present case report describes the successful nonsurgical endodontic management of a mandibular first molar with distal root hypercementosis that was initially suspected on intraoral periapical radiography because of bulbous root morphology and subsequently confirmed using CBCT following an unexpected discrepancy in working length determination. The report also highlights the importance of differentiating hypercementosis from other radiopaque lesions based on clinical and radiographic findings and discusses its implications for endodontic treatment.

Case Report

A 38-year-old female presented to the Department of Conservative Dentistry and Endodontics with the chief complaint of continuous pain in the lower right posterior region for one week. The pain was spontaneous, continuous in nature, aggravated during

mastication, and had progressively increased in intensity. The patient's medical and family history were non-contributory, with no history of systemic disorders known to be associated with hypercementosis.

Clinical examination revealed deep occlusal caries involving the mandibular right first molar (tooth 46) along with generalized occlusal attrition. The tooth was tender to vertical percussion. No swelling, sinus tract, abnormal mobility, or periodontal pocketing was detected. Electric pulp testing elicited no response, indicating loss of pulpal vitality.

Based on the clinical findings, a provisional diagnosis of pulp necrosis with symptomatic apical periodontitis was established. A preoperative intraoral periapical radiograph demonstrated deep occlusal caries approaching the pulp chamber with widening of the periodontal ligament space. In addition, a well-defined bulbous enlargement of the distal root apex was observed while maintaining an intact periodontal ligament space and lamina dura, suggestive of localized hypercementosis (Figure 1).

Following administration of local anesthesia and rubber dam isolation, an endodontic access cavity was prepared. The canals were negotiated with stainless steel K-files, and working length determination was attempted using an electronic apex locator. Repeated measurements consistently indicated the working length several millimetres short of the radiographic apex. The discrepancy between the electronic apex locator readings and the radiographic working length, together with the bulbous appearance of the distal root, raised suspicion of altered apical anatomy secondary to hypercementosis.

To further evaluate the root morphology, cone-beam computed tomography (CBCT) was performed. Three-dimensional imaging confirmed excessive cementum deposition involving the distal root, producing a bulbous apical enlargement while preserving the periodontal ligament space and surrounding alveolar bone. No evidence of root resorption, cemento-osseous lesion, or other pathological calcified mass was identified. The CBCT findings confirmed the diagnosis of localized hypercementosis (Figure 2).

Working length was established according to the electronic apex locator and verified radiographically(Figure 3). Cleaning and shaping were completed using the Orodeka rotary file system with irrigation using 5.25% sodium hypochlorite throughout instrumentation, followed by a final rinse with 17% ethylenediaminetetraacetic acid (EDTA). After drying the canals with sterile paper points, obturation was performed using a single-cone gutta-percha technique(Figure 4) in conjunction with a bioceramic sealer. A postoperative radiograph demonstrated satisfactory obturation within the established working length (Figure 5).

The patient was recalled after one week and was completely asymptomatic. Clinical examination revealed absence of tenderness to percussion and satisfactory healing. The patient was advised to undergo definitive coronal restoration and periodic clinical and radiographic follow-up.

Discussion

Hypercementosis is a non-neoplastic condition characterized by excessive deposition of secondary cementum on the external root surface while preserving the normal periodontal ligament space and lamina dura. The condition is generally asymptomatic and is most often detected incidentally during routine radiographic examination or during dental procedures. Although its exact pathogenesis remains unclear, hypercementosis has been associated with both local factors, including chronic periapical inflammation, occlusal trauma, excessive

functional loading, attrition, and periodontal disease, as well as systemic conditions such as Paget's disease, acromegaly, and rheumatoid arthritis. In the present case, the presence of generalized attrition and pulpal pathology may have contributed to localized excessive cementum deposition.

The most significant finding in the present case was the discrepancy between the electronic apex locator (EAL) reading and the radiographic apex. Repeated EAL measurements consistently established the working length several millimetres short of the radiographic root apex. This unexpected finding prompted further investigation using CBCT, which confirmed bulbous enlargement of the distal root due to hypercementosis.

The explanation for this discrepancy lies in the altered apical anatomy produced by excessive cementum deposition. Hypercementosis affects the external root

Volume 9, Issue 4; July-August 2026; Page No 439-445

surface without proportionately increasing the length of the root canal. As cementum continues to be deposited around the apex, the apical constriction and major apical foramen may become displaced coronally or laterally relative to the radiographic apex. Consequently, the radiographic root tip no longer represents the anatomical terminus of the root canal.

Electronic apex locators identify the transition between the canal and the periodontal ligament based on electrical impedance rather than radiographic root length, making them more reliable than radiographic estimation in such cases. Recognition of this phenomenon prevented unnecessary over-instrumentation in the present case.

Conventional intraoral periapical radiography suggested the diagnosis by demonstrating a bulbous enlargement of the distal root while preserving the periodontal ligament space and lamina dura. However, because periapical radiographs provide only a two-dimensional image, the true extent and morphology of the cemental enlargement could not be accurately assessed. CBCT provided three-dimensional visualization of the enlarged root and confirmed that the lesion represented excessive cementum deposition continuous with the root surface

rather than an independent calcified mass. The ability of CBCT to evaluate root morphology without anatomical superimposition makes it an invaluable adjunct when conventional radiographs and clinical findings are inconclusive.

Radiographic differentiation of hypercementosis from other radiopaque lesions is essential because anagement strategies differ considerably. Cementoblastoma is the principal differential diagnosis because it is fused to the root surface; however, it typically presents as a painful, expansile lesion associated with loss of the periodontal ligament space, obliteration of the lamina dura, and varying degrees of root resorption. In contrast, hypercementosis maintains the normal periodontal ligament space and lamina dura, produces smooth bulbous enlargement that remains continuous with the root surface, and is not associated with root destruction. Benign cemento-osseous dysplasia may exhibit increasing radiopacity during maturation but originates within the alveolar bone rather than the root itself and therefore does not alter root morphology. Condensing osteitis and idiopathic osteosclerosis similarly represent areas of increased bone density adjacent to the tooth and are separated from the root by a normal periodontal ligament space. The preservation of the periodontal ligament space and lamina dura, together with continuity of the enlarged cementum with the root surface on CBCT, enabled a confident diagnosis of hypercementosis in the present case without the need for histopathological examination.

From an endodontic perspective, recognition of hypercementosis is important because treatment should be directed towards the root canal system and not the excess cementum. The additional cementum beyond the canal terminus is not infected pulpal tissue and therefore does not require instrumentation or removal. Attempting to prepare the canal to the radiographic apex may result in transportation, perforation, extrusion of irrigants or obturation materials, postoperative pain, and delayed healing. Respecting the electronic working length corresponding to the apical constriction allows effective debridement while

preserving the integrity of the altered apical anatomy. In the present case, working length was established using the electronic apex locator and confirmed radiographically, resulting in satisfactory obturation and complete resolution of symptoms at the one-week follow-up.

Several published case reports have demonstrated that localized hypercementosis does not adversely affect the prognosis of nonsurgical root canal treatment when the altered apical anatomy is recognized and appropriate working length is maintained. Similar to previous reports, successful clinical resolution was achieved in the present case without surgical intervention, emphasizing that accurate diagnosis and careful endodontic management are more important than aggressive instrumentation of the hypercementosed root apex.

The present case highlights the complementary role of clinical examination, electronic apex location, conventional radiography, and CBCT in diagnosing hypercementosis and preventing procedural errors during endodontic treatment. Awareness of this uncommon anatomical variation allows clinicians to modify treatment appropriately and avoid unnecessary over-instrumentation while achieving a favourable clinical outcome.

Volume 9, Issue 4; July-August 2026; Page No 439-445

Electronic apex locators (EALs) have become an indispensable adjunct for working length determination because they identify the transition between the root canal and the periodontal tissues based on electrical impedance rather than relying solely on radiographicinterpretation. Histological studies have demonstrated that the ideal apical endpoint for canal preparation and obturation is the apical constriction (minor apical diameter), asinstrumentation beyond this level may unnecessarily injure the periapical tissues and compromise healing.[1–3] A systematic review by Tsesis et al. further concluded that electronic working length determination may be more accurate than radiographic methods, while emphasizing that radiographs should be used to complement rather than replace electronic measurements.[4]

In teeth with hypercementosis, continued external cementum deposition alters the relationship between the radiographic apex, the apical foramen, and the apical constriction without proportionately increasing the length of the root canal. Consequently, the radiographic apex no longer corresponds to the anatomical canal terminus, and the electronic apex locator frequently indicates a reproducible working length several millimetres short of the radiographic apex. This apparent discrepancy should not be interpreted as an erroneous electronic reading but rather as a reflection of the altered apical anatomy. Therefore, reproducible EAL measurements, interpreted in conjunction with radiographic findings and CBCT when indicated, provide the most biologically acceptable endpoint for canal preparation in teeth exhibiting hypercementosis.[1,3,5]

The American Association of Endodontists (AAE) defines the working length as the distance from a coronal reference point to the point at which canal preparation and obturation should terminate and recognizes the apical constriction as the preferred biological endpoint whenever it can be identified. The AAE further recommends that electronic apex locators be used in conjunction with radiographic assessment to improve the accuracy of working length determination, particularly in teeth with complex or altered apical anatomy.[6,7] In the present case, adherence to these principles enabled accurate working length determination despite marked distal root hypercementosis and prevented unnecessary extension of instrumentation to the radiographic apex.

Clinical Significance

1. Hypercementosis should be considered when a bulbous root morphology is associated with an unexpected discrepancy between electronic and radiographic working lengths.
2. Electronic apex locator readings should be interpreted in conjunction with
3. radiographic findings and, when indicated, CBCT to establish the true apical endpoint.
4. CBCT is a valuable adjunct for confirming hypercementosis and differentiating it
5. from other radiopaque cemento-osseous lesions without the need for histopathological examination.
6. Respecting the biological working length prevents over-instrumentation and contributes to successful nonsurgical endodontic management.

Conclusion

Hypercementosis is an uncommon anatomical variation that may present significant challenges during endodontic treatment because of alterations in apical root morphology and working length determination. This case highlights the importance of correlating clinical findings, electronic apex locator measurements, conventional radiography, and CBCT for accurate diagnosis and treatment planning. Respecting the biologic working length rather than the radiographic apex facilitated successful nonsurgical endodontic management, emphasizing that recognition of hypercementosis is essential to avoid over-instrumentation and achieve favorable treatment outcomes.

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Volume 9, Issue 4; July-August 2026; Page No 439-445

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Volume 9, Issue 4; July-August 2026; Page No 439-445

Figure 1. Pre-operative RVG with 46

Figure 2. CBCT saggital view with 46

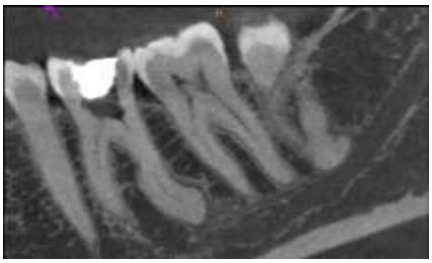


Figure 3. Working Length RVG with 46

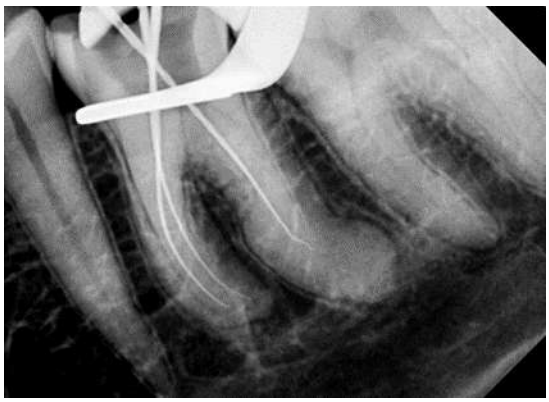
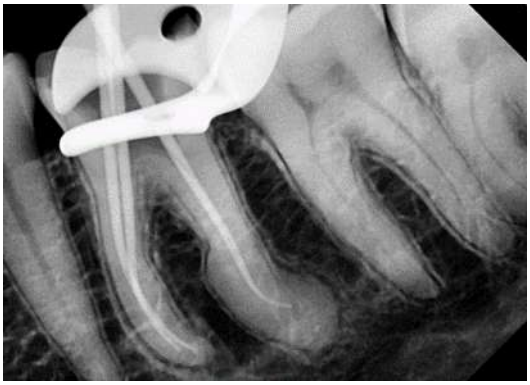


Figure 4. Master cone RVG with 46



Volume 9, Issue 4; July-August 2026; Page No 439-445

Figure 5. Post obturation RVG with 46

Volume 9, Issue 4; July-August 2026; Page No 439-445