

All the Mandibular Incisors with Double Canals in a Single Patient: A Rare Case

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Abstract:

Single rooted tooth are considered to be the easiest for root canal treatment. The literature has documented cases with single rooted tooth showing more than single canal. Understanding of root canal morphology thus is an important aspect to be considered for successful endodontic treatment. The case presented here shows a rare entity of having double canals in all the mandibular incisors in a single patient.

Key Words: Cone beam computed tomography, endodontic treatment, intraoral periapical, root canals

Introduction

For successful endodontic treatment, thorough knowledge of root canal morphology along with its variation is mandatory. The main objective of endodontic therapy is to prevent and when needed to cure endodontic disease and apical periodontitis. To achieve these goals, locating, cleaning and shaping the entire canal system is a must. Ingle lists the most frequent cause of endodontic failure as apical percolation and subsequent diffusion stasis into the canal.¹ Variations in form of aberrant canal configurations, accessory canals, bifurcation, isthmuses, and anastomoses are often difficult to identify, thus creating a problem for endodontic treatment. Inadequate knowledge regarding variations of root canal system may be a major cause of the failure of root canal system.

Endodontic treatment of single rooted teeth is usually simple as these teeth usually have single root canal. The morphology of mandibular central and lateral incisors is very similar. Many

studies have examined the root canal systems of these single-rooted teeth, confirming that it is not as simple as it may appear to be on standard periapical radiographs.² However variations in form of presence of extra canal in mandibular incisors have been documented by various researchers in the past.

Vertucci in 1974 classified the canal configuration of mandibular incisors into four types:³

- Type I: Single canal is present from the pulp chamber to the apex.
- Type II: Two separate canal leaves the pulp chamber, but join short of the apex to form one canal.
- Type III: One canal leaves the pulp chamber, but it divides into two within the body of the root, the canals merge again to exist as one canal.
- Type IV: Two separate and distinct canals are present from the pulp chamber to apex.

Various investigators have studied root canal system in mandibular incisors and reported following findings:⁴

Investigators	Year	Type I %	Type II %	Type IV %
Rankine Wilson and Henry	1965	60.0	35.0	5.0
Maderiea and Hetem	1973	88.5	11.0	5.0
Dowson	1974	59.0	40.0	1.0
Vertucci	1985	92.5	5-2.5	

Although some of the morphological variations may depend on different ethnic backgrounds, two canals should be expected in about one-quarter for mandibular incisors. This proportion is not found clinically by practitioners during root canal treatment due to the failure of the dentist to recognize the presence of the second canal.^{5,6}

The case report presented here has a striking feature of presence of extra canal in all the mandibular incisors in the same patient.

Case Report

A 45-year-old male patient reported to the Department of Conservative Dentistry of Chatrapati Shahu Maharaj Shikshan Sanstha Dental College, Aurangabad, from Maharashtra state in India with the chief complaint of pain with lower anterior region. History revealed that the patient had a dull aching, intermittent pain mainly at night hours since 1 year.

On clinical examination edge to edge the incisal bite with severe attrition was seen associated with mandibular anteriors.

Gingival recession was seen in mandibular central incisors (Figure 1). All the mandibular incisors were positive to percussion. These clinical findings were confirmed with a negative response to electric pulp tester.

The intraoral periapical (IOPA) showed a loss of lamina dura with 31 and 41 and periodontal space widening with 32 and 42 suggesting chronic apical periodontitis



Figure 1: Intraoral photographs showing severe incisal attrition of all the mandibular incisors.

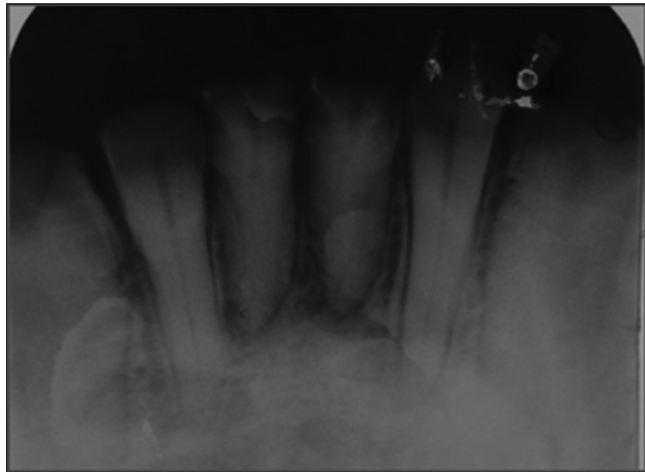


Figure 2: Intraoral periapical showing periapical rarefaction with all the mandibular incisors.

(Figure 2). IOPA's failed to reveal two root canals in these teeth. Non-surgical endodontic treatment was planned with exploration, cleaning, shaping and filling of the root canal of all the mandibular incisors. Root canal access opening was prepared through incisal edges initially with round diamond bur and later with round-end cutting tapered diamond in an oval shape with larger labio-lingual extension in an isolated condition with application of rubber dam. All the incisors when endodontically explored were found to have two separate canal orifices extending into two canals and joining short of the apex to continue as one (Vertucci's Type II canal morphology), thus showing one apical opening. The working length was determined for all the canals with apex locator as well as radiographically.

Complete chemo-mechanical preparation of all the teeth was done by hand instrumentation and use of 3% sodium hypochlorite irrigation. Isolation was done, and the canals dried. All the canals were then filled with intracanal calcium hydroxide for 1 week.

On the next appointment, the intracanal placed calcium hydroxide was removed and obturation done with gutta-percha by lateral condensation technique. Post-treatment radiographs were taken with conventional radiograph as well as orthopantomogram, cone beam computed tomography (CBCT) technique with the consent of the patient (Figures 3-6).

Discussion

Dr. Hermann Prinze wrote "Object of the clinical dentistry is to institute preventive measures to relieve suffering, and to cure disease. To gain this goal clinician should have sound knowledge of dental anatomy, differential diagnostic modulates."⁷ During interpretation of diagnostic radiographs if there is sudden change in canal radiodensity, narrowing of canal space, abrupt disappearance of canal space, this gives us a clue for need of one extra angulated radiograph to diagnose an extra root or canal.⁸

Uma *et al.* studied 50 extracted mandibular incisor for canal and isthmus morphology radiographically and concluded that



Figure 3: Post treatment intraoral periapical radiographs showing obturation.

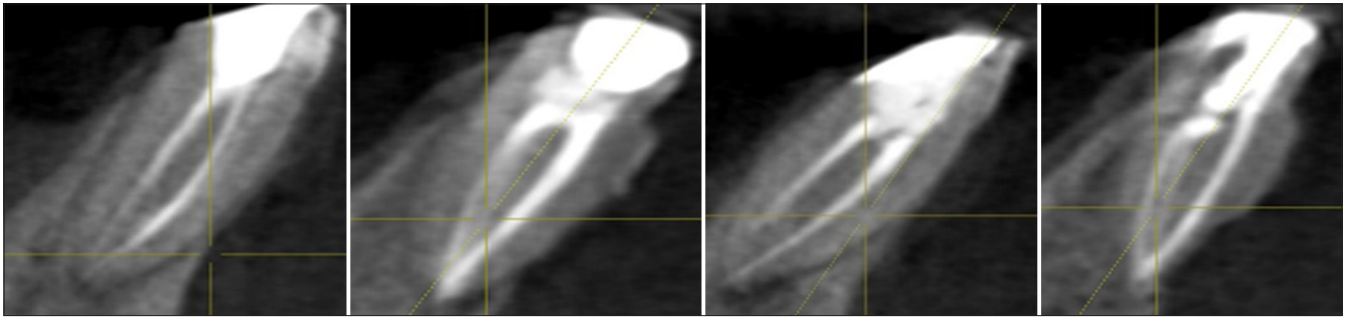


Figure 4: Cone beam computed tomography showing double canal in each of the mandibular incisor.

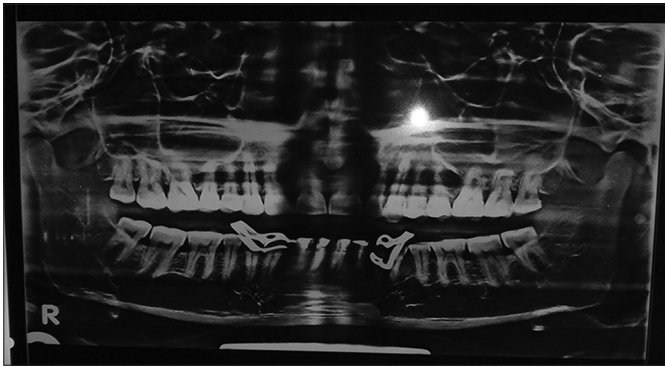


Figure 5: Orthopantomogram showing obturation with all the mandibular incisors.

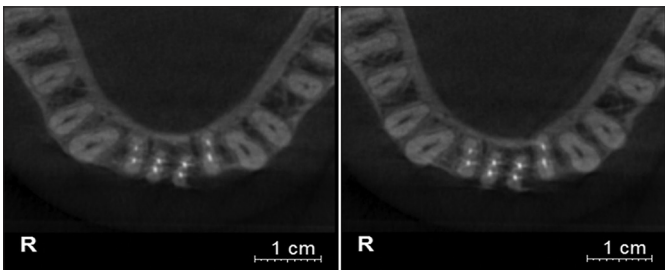


Figure 6: Cone beam computed tomography showing two obturated canals in all the mandibular incisors.

Type I and Type III canal configuration are much commoner than Type II canal which are rarely found.⁹ Sinzianna Scarlatescu *et al.* studied 32 extracted mandibular incisors in a South Eastern Romanian population by using color detector and a tooth-clearing technique. They concluded that Type I root canal configuration (65.5%), Type III was found in 25% cases, Type II in 6.3% and Type VII in 3.1%.¹⁰ Mandibular incisor root canal system has either ovoid or ribbon shaped with a single canal in the range of 71.8-73.6% and double canal in the range of 26-28.1%. Hence to achieve success in endodontic therapy it's important to locate, shape and obturate these extra canals.

A common reason for not locating a second canal in mandibular incisors is an inadequate access opening into the tooth that leaves a lingual shelf of dentine over the second (usually the

lingual) canal.¹¹ Therefore, it may be necessary to modify the conventional access preparation to permit better visualization and instrumentation of additional canal even at the emphasis of compromising the crown structure.¹²

Conclusion

This case report highlights the importance of thorough knowledge of root canals and its variations. Extra canals in mandibular incisors are not a rare entity as suggested by few investigators. Detailed knowledge and at times the modification of access opening is needed. The practitioners should be aware of how many canals to expect, their location, length and relationship to each other. Wilson and Henry have suggested that the access opening must be widened labio-lingually as well as inciso-gingivally to locate the extra canal, if any.¹³ It's also emphasized that radiographs taken from different angles are a must to anticipate the presence of extra canal. CBCT technique is also gaining grounds in this aspect.

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