

# International Journal of Research in Health and Allied Sciences

Journal home page: [www.ijrhas.com](http://www.ijrhas.com)

Official Publication of "Society for Scientific Research and Studies" [Regd.]

ISSN: 2455-7803

## ORIGINAL RESEARCH

### Evaluation of the Canal Configuration in Extracted Mandibular Incisor Teeth

Neha Chaturvedi<sup>1</sup>, Mohit Chaturvedi<sup>2</sup>

<sup>1</sup>M.D.S. (Endodontics and Conservative Dentistry), <sup>2</sup>M.D.S. (Orthodontics and Dentofacial Orthopaedic)  
Abha Tooth World- A Comprehensive Dental Care Centre, Near Chandra Medicos, Janta Colony, Vaishali Nagar, Ajmer

#### ABSTRACT:

**Background:** A successful endodontic treatment depends upon complete debridement of the root canal system. Therefore, the dentist should have thorough knowledge of the root canal morphology of the teeth. Thus, the aim of this study is to evaluate the presence of the second canal in extracted mandibular incisor teeth. **Materials and methods:** For this study we collected 50 freshly extracted mandibular incisors. In which 27 were central incisors and 23 were lateral incisors. All teeth were placed in 5.25% sodium hypochlorite for 30 minutes and after that access cavities were prepared and pulp tissue was dissolved by immersing the teeth in 5.25% sodium hypochlorite for 24 hours. India ink was injected into the pulp chamber with an endodontic irrigating syringe with gauge 27 needle. The stained teeth were air dried and decalcified with 5% nitric acid for 3 days. The specimens were then dehydrated in ascending concentrations of ethyl alcohol (70%, 96% and 99%) for 12 hours each. Finally, transparent specimens were obtained by immersing the dehydrated teeth in methyl salicylate solution into which teeth were stored until examined. The specimens were examined using magnifying glass. The canal configurations were categorized into the first four types of Vertucci's classification. **Results:** The result of our study shows that type I is most prevalent canal configuration in both mandibular central (66.66%) and lateral incisors (65.21%). In mandibular central incisors the prevalence of canal configuration follows as: type III followed by type IV and type II. In mandibular lateral incisors the prevalence of canal configuration follows as: type III followed by type II and type IV. **Conclusion:** Our study concluded that type I is most prevalent canal configuration in both mandibular central and lateral incisors. A thorough knowledge of tooth morphology, canal configuration are important factors for a successful treatment.

**Key words:** Mandibular incisors, Vertucci's classification.

Received: 1 February, 2019

Revised: 20 February, 2019

Accepted: 23 February, 2019

**Corresponding author:** Dr. Neha Chaturvedi, M.D.S. (Endodontics and Conservative Dentistry), Abha Tooth World- A Comprehensive Dental Care Centre, Near Chandra Medicos, Janta Colony, Vaishali Nagar, Ajmer

**This article may be cited as:** Chaturvedi N, Chaturvedi M. Evaluation of the Canal Configuration in Extracted Mandibular Incisor Teeth. Int J Res Health Allied Sci 2019; 5(1):102 -104.

#### INTRODUCTION:

The morphology of mandibular incisors is very similar. The morphology of the mandibular incisors is not as simple; it may be complicated by the presence of second (bifurcated) canals, lateral canals, and apical deltas, when viewed under other conventional methods.<sup>1</sup> The presence of leakage into the root canals is the main cause for failure in endodontic therapy.<sup>2</sup> The leakage may occur as a result of incomplete knowledge about the anatomical variations of root canals or from leaving unreachable areas intact, or unacceptable filled during preparation. A canal is often left untreated because the dentist fails to make out its presence either due to lack of knowledge of root canal morphology or due to lack of experience and skills to confer that canal.<sup>2</sup> The most utmost reason for endodontic failure of

mandibular central incisors is the presence of an undetected lingual canal or the presence of a untreated isthmus.<sup>3</sup> The incidence of two canals at the tooth's apex is reported to be as low as 1% and as high as 43%.<sup>4</sup> Thus, the aim of this study is to evaluate the presence of the second canal in extracted mandibular incisor teeth.

#### MATERIAL AND METHODS:

For this study we collected 50 freshly extracted mandibular incisors In which 27 were central incisors and 23 were lateral incisors. Teeth in which intact clinical crowns and fully developed apices were present were included in this study. All teeth were placed in 5.25% sodium hypochlorite for 30 minutes and after that access cavities were prepared with a high speed hand piece and pulp tissue was dissolved by immersing the teeth in

5.25% sodium hypochlorite for 24 hours. Teeth were washed under running tap water for 2 hours and dried overnight. India ink was injected into the pulp chamber with an endodontic irrigating syringe with gauge 27 needle. Excess ink was then removed from the surface of the tooth with gauze soaked in alcohol. The stained teeth were air dried and decalcified with 5% nitric acid for 3 days. The teeth were washed under running tap water overnight and then air dried. The specimens were then dehydrated in ascending concentrations of ethyl alcohol (70%, 96% and 99%) for 12 hours each. Finally, transparent specimens were obtained by immersing the dehydrated teeth in methyl salicylate solution into which teeth were stored until examined. The specimens were examined using magnifying glass. The canal configurations were categorized into the first four types of Vertucci's<sup>5</sup> classification as follows:

- Type I: A single canal present from the pulp chamber to the apex.
- Type II: Two separate canals leave the pulp chamber, but join to form one canal to the site of exiting.
- Type III: One canal leaves the pulp chamber, divides into two within the root, and then merges to exit in one canal.
- Type IV: Two separate and distinct canals are present from the pulp chamber to the apex.

**RESULTS:**

The result of our study shows that type I is most prevalent canal configuration in both mandibular central (66.66%) and lateral incisors (65.21%). In mandibular central incisors the prevalence of canal configuration follows as: type III followed by type IV and type II. In mandibular lateral incisors the prevalence of canal configuration follows as: type III followed by type II and type IV.

**Table 1: Distribution of canal configuration in mandibular central and lateral incisors.**

Tooth	Type I (%)	Type II (%)	Type III (%)	Type IV (%)	Total
Mandibular central incisors	18 (66.66%)	1 (3.70%)	5 (18.51%)	3 (11.11%)	27
Mandibular lateral incisors	15 (65.21%)	2 (8.69%)	5 (21.73%)	1 (4.34%)	23
Total	33	3	10	4	50

**DISCUSSION:**

Successful endodontic treatment depends mainly on the ability to completely clean and seal the root canal system.<sup>6</sup> Therefore, the dentist should have thorough knowledge about the canal configuration. The result of our study shows that type I is most prevalent canal configuration in both mandibular central (66.66%) and lateral incisors (65.21%). In mandibular central incisors the prevalence of canal configuration follows as: type III followed by type IV and type II. In mandibular lateral incisors the prevalence of canal configuration follows as: type III followed by type II and type IV.

Rahimi S et al reveals the result that all the incisors in this study had one root, and 12.08% of the canines had two roots. There was higher prevalence of the second canal in incisors than in canines (36.62% vs. 20.48%). However, the probability of canines having two separate apical foramina was higher than that for incisors.<sup>7</sup>

Boruah LC et al conducted a study and result of the study shows that the majority of mandibular incisors had a single canal (63.75% of teeth possessed a Type I canal system). Although 36.25% of the roots possessed two canals, only 6.25% had two separate apical foramina.<sup>8</sup>

Bhat SP et al study showed that 46.6% teeth had single canal, 49.8% teeth had two canals, and only 5% teeth had two separate apical foramina.<sup>9</sup>

Sert et al. studied 200 mandibular central incisors in Turkish population and reported that Type I canal in 65 teeth, Type 2 canal in 55 teeth, Type 3 canal in 54 teeth, Type 4 canal in 20 teeth.<sup>10</sup>

Chellammal MR study shows that the permanent mandibular incisors had 71.64% had a single root with single canal. Mandibular lateral incisors (10.45%) had a higher incidence of the second canal compared with mandibular central incisors (8.34%). A slightly higher percentage of incidence of a second canal was found in males (10%) than in females (5%). Vertucci type I (68.5%) was most common followed by type IV (0.62%) which was the least common.<sup>11</sup>

Al-Fouzan KS et al conducted a study in which fifty six of both mandibular central and lateral incisor teeth (70%) had type I canal configuration, while the remaining 30% of the sample (24 teeth) had a type III canal configuration.<sup>12</sup>

**CONCLUSION:**

Our study concluded that type I is most prevalent canal configuration in both mandibular central and lateral incisors. A thorough knowledge of tooth morphology, canal configuration is important factor for a successful treatment.

**REFERENCES**

1. Principles and Interpretation. 7th ed., Ch. 12. China: Elsevier; 2014.p. 206.
2. Ingle J, Bakland L. Endodontics. 5th ed. Hamilton: BC Decker; 2002.
3. Uma CH, Ramachandran S, Indira R, Shankar P. Canal and isthmus morphology in mandibular incisors – An *in vitro* study. Endodontology 2004;16:7-11.
4. Vertucci FJ. Root canal anatomy of the mandibular anterior teeth. J Am Dent Assoc 1974;89:369-71.
5. Vertucci FJ. Root canal morphology and its relationship to endodontic procedures. Endod Top 2005;10:3-29.
6. Hashem AA, Ghoneim AG, Lutfy RA, Fouda MY. The effect of different irrigating solutions on bond strength of two root canal- filling systems. J Endod 2009;35:537- 40.
7. Rahimi S, Milani AS, Shahi S, Sergiz Y, Nezafati S, Lotfi M. Prevalence of two root canals in human mandibular anterior teeth in an Iranian population. Indian J Dent Res 2013;24:234-6.
8. Boruah LC, Bhuyan AC. Morphologic characteristics of root canal of mandibular incisors in North-East Indian

- population: An *in vitro* study. Journal of conservative dentistry: JCD. 2011 Oct;14(4):346.
9. Bhat SP, Sheth R, Kumar P, Khilosiya A. Root canal morphology and assessment of incidence, type, and position of isthmus in permanent mandibular central incisor in North Indian population: An *in vitro* study. Endodontology 2017;29:107-14.
  10. Sert S, Aslanalp V, Tanalp J. Investigation of the root canal configurations of mandibular permanent teeth in the Turkish population. Int Endod J 2004;37:494-9.
  11. Chellammal MR. Study of root canal morphology of permanent mandibular incisors in an Indian subpopulation. Int J Orofac Res 2017;2:54-6.
  12. Al-Fouzan KS, AlManee A, Jan J, Al-Rejaie M. Incidence of two canals in extracted mandibular incisors teeth of Saudi Arabian samples. Saudi Endod J 2012;2:65-9.