

Review Article

# Ambiguity of lateral canals

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## ABSTRACT

For successful endodontic therapy, clinicians must have a thorough understanding of the complexities present in the root canal system such as accessory canals, lateral canals, furcal canals, and apical ramifications. It has been reported in the literature that lateral canals and/or apical canals are likely to be associated with pulp disease and canal reinfection. As a result, this emphasizes the importance of infection control not only in the main canal but also throughout the root canal system and its variations. The current article presents with an insight into the clinical aspects of lateral canals.

**Keywords:** Accessory canals, Apical ramifications, Lateral canals, Root canal variations

## INTRODUCTION

An adequate understanding of the intricacies of the root canal system is required for successful root canal treatment.<sup>[1]</sup> Accessory canals, lateral canals, furcal canals, and apical ramifications are all anatomical variations of the root canal system.<sup>[2,3]</sup>

“An accessory canal is a branch of the main pulp canal or chamber that communicates with the external root surface,” according to the American Association of Endodontists (AAE) Glossary of Endodontic Terms (AAE 2016).<sup>[4]</sup> A lateral canal, as per this definition, is a type of accessory canal that is located in the coronal or middle third of the root and usually extends horizontally from the main canal space.<sup>[1]</sup>

It has been reported in the literature that the lateral canals and the apical canals may be attributed to pulp disease, reinfection of root canals, and post-treatment disease.<sup>[3]</sup> As a result, this shows the importance of infection control not only in the main canal but also throughout the root canal system. According to the literature, pervasiveness of lateral and accessory canals is mentioned in the following [Table 1].<sup>[5-8]</sup>

## CLASSIFICATIONS OF LATERAL CANALS

Various authors proposed various classifications of lateral canal such as,

- Yoshiuchi *et al.* (1972)<sup>[9]</sup> according to their location along the root length
- De-Deus (1975)<sup>[10]</sup> categorized lateral canal, according to their location

- Vertucci (1984)<sup>[11]</sup> lateral canals were classified based on their location
- Weine (1989)<sup>[12]</sup> reported on three types of lateral lesions that can be seen on radiographs.
- Type I: There is a lateral lesion but no apical lesion [Figure 1a]
- Type II: Clearly differentiate between lateral and apical lesions [Figure 1b]
- Type III: Lateral and apical lesions coincide (“Wrap around” lesion) [Figure 1c].

Recently, Ahmed *et al.* (2018)<sup>[4]</sup> introduced a different morphology classification system for accessory canals that can be used in research, clinical practice, and training [Table 2].

## CLINICAL IMPLICATIONS, PRACTICABILITY, AND APPLICATION

Lateral canals can be suspected routinely on radiographic examination that is intraoral periapical radiograph depicting local periodontal ligament thickening on the root's lateral surface. This can be suggestive of lateral periodontitis lesion.<sup>[5]</sup>

When detected, lateral canals are difficult to negotiate and instrumentation. Therefore, the irrigating solution like 2.5–5.25% sodium hypochlorite with 17% EDTA is used continuous with intermittent ultrasonic activation by an oscillating needle which is the most effective methods for irrigant penetration and cleaning of lateral canal.<sup>[8]</sup>

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**Table 1:** Reported incidence of lateral and accessory canals (various *in vitro* studies).

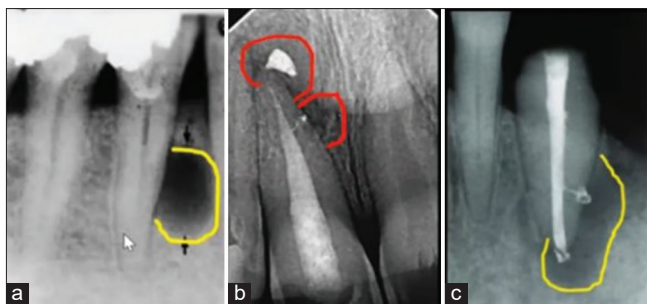
Investigators	Tooth studied	Total no of teeth	Method of study	Incidence
Dammaschke <i>et al.</i> <sup>[6]</sup> (2004)	Maxillary and mandibular molar	100	Scanning electron microscope	79%
Ricucci <i>et al.</i> <sup>[5]</sup> (2010)	All teeth	493	Light microscope	75%
Xu <i>et al.</i> <sup>[7]</sup> (2016)	Apical 3 mm of all teeth	204	Micro-computed tomography	52%

**Table 2:** C, coronal; M, middle; A, apical; a0-C-aF, accessory Orifice-Canal-accessory Foramen.

Configuration	Code
Accessory canal (s) located in one of the three-thirds of the root one of the three-thirds of the root	(CaO-C-aF) OR (Ma0-C-aF) OR (Aa0-C-aF)
An accessory canal starts with an a0 in one-third, and aF in another third of the root	(C, Ma0-C-aF) OR (M, Aa0-C-aF)
Accessory canals located in two of the three-thirds of the root	(CaO-C-aF, Ma0-C-aF) OR (CaO-C-aF, Aa0-C-aF) OR (Ma0-C-aF, Aa0-C-aF)
Accessory canals located in all thirds of the root	(CaO-C-aF, Ma0-C-aF, Aa0-C-aF)

**Table 3:** Clinical controversy regarding lateral canals.

To fill	Not to fill
Bacteria do not concern if they are in the main canal or one of the lateral canals. They must be destroyed, and the “lateral orifice” must be sealed in the same way as the central apical foramen. <sup>[13]</sup> Versiani <i>et al.</i> (2019) <sup>[13]</sup>	Although lateral canals have been shown to occur often, they may not always be visible radiographically following root canal filling. Even so, in the large majority of cases, failure to fill lateral canals does not result in endodontic treatment failure, which is defined by a post-treatment lateral lesion. <sup>[14]</sup> Weine (1984) <sup>[14]</sup>
A lateral canal that is not sealed can lead to negative consequences and responsible for failure and subsequently may require nonsurgical or surgical retreatment <sup>[13]</sup> Versiani <i>et al.</i> (2019) <sup>[13]</sup>	The histologic condition of tissue in lateral canals and apical ramifications reflects the pulp’s condition in the main canal. <sup>[16]</sup> Campus (1991) <sup>[16]</sup>
Detection of a lateral canal and disinfection of these avenues becomes, much more important, when there is an obvious lateral lesion. <sup>[15]</sup> Teja and Ramesh (2020) <sup>[15]</sup>	For a successful root canal therapy, lateral canal filling is not usually required. <sup>[17]</sup> Camps and Lambruschini (1887) <sup>[17]</sup>
	In vital cases, when the filling material was not visible within the lateral canals, the tissue there remained viable, and the outcome was unaffected. <sup>[5]</sup> Dmenico Ricuui (2010) <sup>[5]</sup>



**Figure 1:** (a) There is a lateral lesion but no apical lesion. (b) Clearly differentiate between lateral and apical lesions. (c) Lateral and apical lesions coincide.

### CONTROVERSY OF LATERAL CANALS TO FILL OR NOT TO FILL?

As one can assume from this discussion, although the significance of filling lateral canals on treatment outcome has been subject of debate.<sup>[5]</sup> There are no conclusive scientific data in this regard. However, the controversy related to its filling or not to filling is summarized in this [Table 3].<sup>[13-18]</sup>

### CONCLUSION

With the advances in technology related to visualization help in diagnosis and it also assisted in treatment. When the pulp is vital, then not treating these canals would be more

practical for practitioner. If there is an evident lateral lesion, finding a lateral canal and disinfecting and filling it is crucial to the final outcome of endodontic therapy.

#### Declaration of patient consent

Patient's consent not required as there are no patients in this study.

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#### Conflicts of interest

Author Dr Pratima Sheno is on the Editorial Board of the journal.

#### REFERENCES

- Schilder H. Canal debridement and disinfection. In: Cohen S, Burns RC, editors. *Pathways of the Pulp*. 2<sup>nd</sup> ed. St Louis: CV Mosby; 1976. p. 111-33.
- Schilder H. Cleaning and shaping the root canal. *Dent Clin North Am* 1974;18:269-96.
- Ahmed HM, Neelakantan P, Dummer PM. A new system for classifying accessory canal morphology. *Int Endod J* 2018;51:164-76.
- American Association of Endodontists. *Glossary of Terms*. Chicago, Ill: American Association of Endodontists; 2016.
- Ricucci D, Siqueira JF Jr. Fate of the tissue in lateral canals and apical ramifications in response to pathologic conditions and treatment procedures. *J Endod* 2010;36:1-15.
- Dammaschke T, Witt M, Ott K, Schäfer E. Scanning electron microscopic investigation of incidence, location, and size of accessory foramina in primary and permanent molars. *Quintessence Int* 2004;35:699-705.
- Xu T, Tay FR, Gutmann JL, Fan B, Fan W, Huang Z, *et al.* Micro-computed tomography assessment of apical accessory canal morphologies. *J Endod* 2016;42:798-802.
- Al-Jadaa A, Paqué F, Attin T, Zehnder M. Necrotic pulp tissue dissolution by passive ultrasonic irrigation in simulated accessory canals: Impact of canal location and angulation. *Int Endod J* 2009;42:59-65.
- Yoshiuchi Y, Takahashi K, Yokochi C. Studies of the anatomical forms of the pulp cavities with new method of vacuum injection. (II) Accessory canal and apical ramification. *Jpn J Oral Biol* 1972;14:156-85.
- De-Deus QD. Frequency, location, and direction of the lateral, secondary, and accessory canals *J Endod* 1975;1:361-6.
- Vertucci FJ. Root canal anatomy of the human permanent teeth. *Oral Surg Oral Med Oral Pathol* 1984;58:589-99.
- Weine FS. *Endodontic Therapy*. 4<sup>th</sup> ed. St Louis: Mosby; 1989.
- Matsunaga S, Shimoo Y, Kinoshita H, Yamada M, Usami A, Tamatsu Y, *et al.* Morphologic classification of root canals and incidence of accessory canals in maxillary first molar palatal roots: Three-dimensional observation and measurements using microCT. *J Hard Tissue Biol* 2014;23:329-34.
- Versiani MA, Basrani B, Sousa-Neto MD, editors. *The Root Canal Anatomy in Permanent Dentition*. Cham: Springer International Publishing; 2019.
- Weine FS. The enigma of the lateral canal. *Dent Clin North Am* 1984;28:833-52.
- Teja KV, Ramesh S. Is a filled lateral canal a sign of superiority? *J Dent Sci* 2020;15:562-3.
- Camps J, Lambruschini GM. Obturation of lateral canals: Necessary therapy or radiologic satisfaction? *Rev Fr Endod* 1991;10:19-26.
- Langeland K. Tissue response to dental caries. *Endod Dent Traumatol* 1987;3:149-71.

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