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The Enigma of the Lateral Canal

Franklin S. Weine, D.D.S., M.S.D.*

The true significance of the lateral canal in clinical endodontic therapy, and here I emphasize the word clinical, has long evaded me. I cannot agree with those who seem to worship at the altar of the lateral canal, by displaying cases that demonstrate such conditions to give the impression that this is the dominant or even constant finding. However, further I cannot take the position of Shovelton" and Korzen et al. who have minimized the significance of these features. The former stated, "There was less bacterial invasion of dentin around a lateral canal than round the main canal of the same tooth." The latter wrote, "The periodontal ligaments adjacent to the (lateral) canals occluded by dentin fragments remained uninflamed regardless of the histopathologic condition of the pulp" and that dentin fragments as a result of instrumentation frequently blocked the orifices of the lateral canals.

Subtractive reasoning clearly indicates that the cleaning and packing of the lateral canals play a very small role in the total picture that leads to a successful endodontic case. Altman et al. have reported on the number of lateral canals in central incisors. Rubach and Mitchell investigated their frequency in posterior teeth as well. Both reported lateral canals in far greater numbers than even the strongest advocate could ever even attempt to fill. As these canals are present so constantly, yet demonstrated much more rarely, many cases would fail if their consequences of cleaning and filling were the key ingredient in gaining success or lack of same, indicative of failure.

It is my objective in this article to answer some of the most common questions relating to the significance of the lateral canal in endodontics. I will start with some interesting, but still peripheral, questions and use the answers to build up to the final and ultimate question. Although these questions and answers are generally theoretical, I will always attempt to use them in clinically relevant terms. Also, in these days of the need for disclaimers, I wish to emphasize that the views stated herein are mine alone and should not be construed to be that prevailing in endodontic circles in general. In fact, I recognize that there are many other theories that...
in vogue concerning this subject, any of which may be more correct than mine.

What Is the Difference Between an Accessory and a Lateral Canal?

Although these terms are often used interchangeably, they do mean different things. A lateral canal extends from the main, central canal to the periodontal ligament. Although the path may be somewhat tortuous, anatomically it is a direct route. Most frequently, it is perpendicular to the main canal. The lateral canal is generally found in the main body of the tooth and might be quite near to the gingival margin (see subsequent cases). The accessory canal, on the other hand, is found in the apical regions of the tooth and goes from apical secondary branching of the canal to the periodontal ligament.

Do Certain Filling Techniques Lead to Larger Numbers of Demonstrated Lateral Canals Than do Others?

Although advocates of warm, vertical condensation would have you believe differently, the answer is no. I have demonstrated lateral canals with silver cones (Fig. 1), routine lateral condensation with gutta-percha (Fig. 2), and chloropercha (Fig. 3). In certain cases, the demonstration of a

Figure 1. A. Preoperative radiograph of mandibular first molar demonstrating periapical lesion associated with the mesial root. A necrotic pulp was present. B. Immediate postfilling view, angled from distal with distal and mesiobuccal canals filled with laterally condensed gutta-percha and Kerr's antisepctic sealer and mesiobuccal canal (left) filled with a silver cone and the same sealer. The lateral canal (arrow) is associated with the silver cone-filled canal. C. Sixteen years after original treatment of the molar, patient was referred for treatment of the second bicuspid. Endodontic healing of the periapical lesion has been retained for this period of time and there has been no lateral breakdown. (Unfortunately, needed scaling has not been performed, and there is a periodontal problem on the distal.)
have you ever seen canals forming percha?

radiograph demonstrating the mesial root. B, Im- 1 from distal canals filled with gutta-percha and mesiobuccal one and the l (arrow) is filled canal. Treatment of the right middle incisor is under way. Endodontic treatment has been completed in all cases.

Figure 2. A, Preoperative view of maxillary anterior area, with failing endodontic treatment of central and lateral incisors. Periapical and lateral lesions are apparent on central incisor. B, Immediate postfilling view, canals filled by lateral condensation of gutta-percha and Wach’s paste, with sealer exiting through lateral canal on mesial portion of the central. C, Twelve years after original treatment, all lesions healed and remaining normal. Note that no sealing material is apparent radiographically on lateral surface of central any longer.
lateral canal is quite predictable (Fig. 4). If the operator is so inclined, a specific method for demonstrating a lateral canal might be employed. However, many cases of demonstrable lateral canals are achieved without previous intent or anticipation (Fig. 5) by whatever method is commonly utilized. Therefore, my advice is to fill canals by the technique with which the operator is most comfortable and competent. If a canal is not demonstrated, one, a refilling might be done.

Although I doubt that anyone can have a great effect on the number and size of lateral canals that are demonstrated. Canal enlargement of the orifice, flaring to 0.040-inch sodium hypochlorite as in the present canals and consequently 0.065-inch.

The article by Baker et al. recommends water as intracanal irrigant. This is true, but that the necrotic solveny has been demonstrated so that as much undesirable debris and radicle canals as there are may be directly contacted by the irrigant, and the root canal with necrotic pulps will be effective with vital pulps because of the lack of cleaning and dissolving which

Do Certain Teeth Have a Natural High Prevalence of Lateral Canals?

In my experience, most of the percentage of lateral canals.
the operator is most comfortable, whether or not a lateral canal is anticipated. If a canal is not demonstrated on a case that would appear to have one, a refilling might be considered (Fig. 6).

Although I doubt that the type of canal filling technique does have a great effect on the number of lateral canals filled, I do think that certain aspects of preparation do have an effect on the frequency with which they are demonstrated. Canal preparation techniques that emphasize enlargement of the orifice, flaring of the main body of the canal, and heavy use of sodium hypochlorite as intracanal irrigant will yield better cleaned main canals and consequently some chance for better cleaning of side canals. The article by Baker et al., which encouraged the use of sterile, distilled water as intracanal irrigant was a step in the wrong direction. It is important that the necrotic solvency action of the sodium hypochlorite be employed so that as much undesirable material is removed from both the main and side canals as there are multiple areas inside the tooth that cannot be directly contacted by the intracanal instruments. Greater numbers of teeth with necrotic pulps will demonstrate lateral canals as compared with those with vital pulps because the sodium hypochlorite is more effective in cleaning and dissolving where no vitality is present.

Do Certain Teeth Have a Higher Percentage of Lateral Canals than do Others?

In my experience, mandibular bicuspids have a seemingly higher percentage of lateral canals than do other teeth (Fig. 7). As stated by
Rubach and Mitchell,* a sign for persistence on the distal surface of the mesial root (Fig. 8). When a lateral rather than a vertical root is filled with nonvital pulps, lateral lesions are usually not demonstrated.

Lateral lesions are not infrequent and may be examined carefully to note the formation of early exiting apical foramina at various depths. Most lesions are in roots which have been previously filled on the sides of the roots. This may be due to obstruction of these lateral canals or to the inability of materials extruded into the lateral foramina. This question is unknown. In fact, more than one root canal is filled and no lateral canals are filled. No one has done radioisotope studies on the extrusion of materials from the lateral canals.

When a Radiopaque Area Consists of Root Filling, Does the Post Filling?

No one has done radioisotope studies on the extrusion of materials from lateral canals. It is stated that in his warm gutta-percha root filling, all lateral canals are filled and no lateral foramina are filled. This question is unknown. In fact, more than one root canal is filled and no lateral canals are filled. No one has done radioisotope studies on the extrusion of materials from the lateral canals.

* Rubach and Mitchell.
Rubach and Mitchell,⁶ a significant percentage of lateral canals are found on the distal surface of the mesial root of the mandibular first molar (Fig. 8). When a lateral rather than a periapical lesion is found in these areas on teeth with nonvital pulps, lateral canals are usually, but not always, demonstrated.

Lateral lesions are not infrequent, and preoperative films must be examined carefully to note their presence. Such lesions may be indicative of early exiting apical foramina and are important in determining working lengths. Most lesions are in relation to lateral canals when they occur on the sides of the roots. This may or may not be demonstrated during filling. Whether or not this occurs, evaluation of healing must include the evaluation of these lateral as well as immediate periapical areas. Such lesions probably should be referred to as periradicular rather than merely periapical lesions. They are really one and the same, rather than periapical or lateral lesions.

When a Radiopaque Area Corresponding to a Lateral Canal Is Noted on a Postfilling Radiograph, Does It Mean that the Lateral Canal Has Been Filled?

No one has done radioisotope or dye studies to investigate the sealing ability of materials extruded into lateral canals. Therefore, the answer to the question is unknown. In fact, no one is certain whether or not anything more than sealer is packed into these side canals. However, Schilder has stated that in his warm gutta-percha technique, softened gutta-percha is forced into the lateral canals. This would improve the likelihood of sealing as compared with sealer alone.
Investigations into the sealing of main canals indicates that impermeability to isotopes or dyes does not always occur using standard filling techniques. Therefore, I find it difficult to believe that these side canals, exiting in unknown and unpredictable directions, have a high percentage of sealing, be it attempted by any conventional method including warm gutta-percha. However, a very high percentage of lateral canals indicated by sealing material corresponding to lateral lesions do seem to heal. A small percentage of these cases heal initially, but break down again later, possibly due to a sealing failure. My own analysis of why these lesions heal despite imperfect sealing will be presented later in this article.

On the basis of these observations, rather than referring to lateral canals as being filled, I prefer the term demonstrated.

If Lateral Canals Are Demonstrated, Does that Indicate that the Main Canal Has Been Well Filled?

Probably not. I have taken many radiographs during the course of canal-filling and noted material in lateral canals after only a few auxiliary cones had been placed, much before the main canal has been completely sealed (Fig. 9). I have also seen cases several months to several years after treatment in which lateral canals are demonstrated, but the treated tooth is failing at the apex. The operator should never be deluded into thinking that the canal is well filled merely because a lateral canal is demonstrated. Only when the entire canal is packed out by the technique of choice, should the filling procedure be terminated.

Can Other Conditions Simulate Lateral Apical Foramina?

The answer to this is most likely yes, in terms of the existence of a laterally-extending canal frequently mistaken for a lateral accessory canal several millimeters from the root apex, leading to the false impression of a second or man-made canal beyond the true apex.

Certain types of apical perforations may appear as similar to lateral apical foramina (Fig. 11). Also, a canal may be seen to divide in the body of the root, giving the appearance of several canals, such as a condylar or ramus. This suggests that the second apical canal and reserve canals may be underutilized in endodontic therapy.

The questions posed to this point are not of great importance to those of you interested in direct clinical implications. What is the best clinical approach to the deepest and most inaccessible canals?

Can Inflammation or Infection Cause Disease?

Most definitely, yes. Pappalardo, Mitchell, Staffileno, and other clinicians have shown that the presence of infection can lead to disease progression. The role of bacteria in periodontal disease has been well documented, and it is clear that a thorough understanding of the microbial ecology of the oral cavity is crucial for effective treatment. The use of antibiotics and other antimicrobial agents has revolutionized the treatment of periodontal disease, allowing for more effective control of the bacterial flora and a reduction in the progression of disease.

The prevention of disease should always be the goal of treatment, and this requires a comprehensive approach that includes addressing the root etiologies, removing the bacterial plaque, and maintaining excellent oral hygiene. The use of mechanical methods, such as scaling and root planing, in combination with antibiotics, has been shown to be effective in the treatment of periodontal disease. The combination of these two approaches allows for the removal of the bacteria and their products, as well as the destruction of the infected tissue, leading to a reduction in disease progression and an improvement in the oral health of the patient.
Can Other Conditions Simulate Filled Lateral Canals?

The answer to this is most definitely yes! The most common condition is the existence of a laterally-exiting apical foramen (Fig. 10). This entity is frequently mistaken for a lateral canal, particularly if the site of exiting is several millimeters from the radiographic apex and the operator attempts to ream, force, and/or chelate an area apical to that site, thus creating a man-made canal beyond the true exit.

Certain types of apical perforations, lateral transportations or “zips” may appear as similar to lateral canals when well filled with heavy condensation (Fig. 11). Also, a canal configuration exists where one main canal divides in the body of the tooth into two canals, each with separate apical foramina. Such a condition is found in at least 15 per cent of mandibular first bicuspids and in some maxillary second bicuspids (Figs. 12 and 13). When only one canal is located and prepared, but good irrigation and condensation is employed, material may be expressed into the second apical canal and resemble a filled lateral canal.

The questions posed to this point are of interest theoretically. However, they are not of great importance to the pure clinician, who is primarily interested in direct clinical implications. What is of significance in getting the best clinical results? With the background developed, we must now approach the deepest and most important questions.

Can Inflammation or Infection from Lateral Canals Simulate Periodontal Disease?

Most definitely, yes. Papers by Johnston and Orban, Rubach and Mitchell, Staffileno, and others have indicated that furcation areas of
Figure 10. A. Preoperative radiograph of maxillary first bicuspid, with lateral periapical lesion on the mesial surface. B. Immediate postfilling film, canals filled with laterally condensed gutta-percha and Wach's paste as sealer, seemingly indicating a lateral canal. Actually, it was a short exiting main canal. C. Excellent healing 1 year later. (Restorations by Dr. Jacob Lippert, Chicago.) (From Weine, F. S.: Endodontic Therapy. Ed 3. St. Louis, C. V. Mosby Company, 1982, with permission.)

Figure 11. Angled view from the mesial of a filled maxillary second bicuspid, seemingly indicating a demonstrated lateral canal to the mesial. It is probably an apical lateral perforation filled with sealer.

Figure 12. Mandibular first bicuspid area during canal filling by lateral condensation of gutta-percha and Wach's paste. There seemed to be a large demonstrated lateral canal to the mesial, but, in fact, it is the division in the middle of the root into two main canals, the distal of which seemed well filled. At the time that I did this case, I was not aware of the frequency with which the mandibular first bicuspid has one main canal dividing in midroot into two canals.
Figure 12. Mandibular first bicuspoid area during canal filling by lateral condensation of gutta-percha and Wach's paste. There seemed to be a large demonstrated lateral canal to the mesial, but, in fact, it is the division in the middle of the root into two main canals, the distal of which seemed well filled. At the time that I did this case, I was not aware of the frequency with which the mandibular first bicuspoid has one main canal dividing in midroot into two canals.

Figure 13. A. Preoperative view of maxillary second bicuspoid with periapical lesion. Endodontic treatment was required on adjacent teeth as well. B. Radiograph taken immediately following canal filling by laterally condensed gutta-percha and Kerr's antiseptic sealer. A lateral canal to the distal is indicated. C. Two years later, areas healed nicely. I now realize that this, too, was probably a case of a single main canal dividing in midroot into two canals. (Restorations by Dr. Asher Jacobs, Chicago.) (From Weine, F. S.: Endodontic Therapy. Ed. 3. St. Louis, C. V. Mosby Company, 1982, with permission.)
molar teeth may harbor many accessory or lateral canals. This means that there may be a direct path to the periodontal ligament via an infected or inflamed pulp canal or to the canal via an infected or inflamed periodontal ligament. If the pulp becomes necrotic in a molar tooth with a significant lateral canal exiting toward the furcation area, it is possible that the initial clinical and radiographic signs will be noted not apically but near the furcation area (Fig. 8). Such lesions might be assumed to be periodontal, rather than endodontic, and could lead to incorrect treatment.

Such condition need not be on molar teeth only, but could occur on any tooth where a significant lateral canal exits near the gingival margin and an appearance of periodontal breakdown is manifested. These conditions clear up only when correct endodontic therapy is employed (Fig. 14). The condition is, as previously stated, two-way, of course. A tooth with a relatively normal pulp may become involved if a lateral canal is exposed because of apically-progressing periodontal disease (Fig. 15) or periodontal treatment. The site of exposure is different from that of a large carious lesion, but the net effect may be exactly the same. If endodontic therapy is correctly performed, that portion of the problem will be solved, but the apical progression of the periodontal portion of the condition will not be alleviated.

Can the Failure to Clean the Lateral Canal of the Root Be the Source of Pain?

The patient had a number of complaints. He had a tooth with a significant lateral canal exit in the mesial area of the tooth. I suggested an extraction because of the lack of clinical and radiographic evidence of periodontal disease. The canal was filled with laterally placed gutta-percha and a lateral canal was noted in the mesial area of the tooth. The patient was given a follow-up appointment for the removal of the gutta-percha and the filling of the canal. He was scheduled for an appointment in two weeks.

The patient returned two weeks later with a lot of pain. He stated that the pain had been persisting for the past two weeks, and that it was getting worse. He also stated that he had been taking over-the-counter pain medication, but that it was not helping.

I examined the area and found that the gutta-percha had been displaced and that the lateral canal was exposed. I performed a root canal procedure, removing the gutta-percha and filling the canal with laterally placed gutta-percha. The patient was given a prescription for pain medication and was scheduled for a follow-up appointment in one week.

In the meantime, the patient began to experience some relief from the pain. He was scheduled for another appointment in one week. At the appointment, I found that the pain had subsided and the lateral canal was sealed with laterally placed gutta-percha. The patient was given a prescription for pain medication and was scheduled for a follow-up appointment in one month.

The patient returned for the follow-up appointment and stated that the pain had subsided and that he was doing well. He was discharged from care.
Can the Failure to Clean Lateral Canals Cause Pain, Discomfort, and Other Symptoms During Treatment?

The answer here is definitely yes. However, it must be emphasized that this is by no means a constant or even frequent finding, which is fortunate. Despite virtual unanimity over the importance of keeping teeth closed during treatment, particularly when vital pulp tissue is present, some teeth are incorrectly left open after the initiation of endodontic treatment, when the symptom of tenderness to percussion is present. Although the leaving of a tooth open during treatment usually increases the total number of appointments needed to complete therapy,10 the long-term analysis of success does not seem to be affected by that procedure. However, I have treated several cases in which symptoms were recalcitrant and directly related to the presence of lateral canals.

In these cases, teeth left open by the initiating dentist were referred to me for completion. Attempting to keep them closed resulted in severe pain that forced me to resort to surgical resolution of the problem. Using a filling first technique for the presurgical step, observation of the postfiling film demonstrated lateral canals (Figs. 16 and 17). The coincidental finding of these conditions seems to indicate that these lateral canals were able to retain enough irritants, in a protected sanctuary, of high enough level because of the superinfection offered by the communication to the oral cavity, to perpetuate the pain.

I have had several cases, still a very small minority, in which pain persisted during treatment of teeth kept closed. This was identified by the
The Enigma of the Lateral Canals

Patient by digital stimulation or heat, these teeth were filled, usually canals could be identified as sensitive for a few days following, is predictable.

Certainly chronic draining lesions (Fig. 19), sometimes cedency. These tracts clear up canal preparation, as they may communicate with the maxillary sinus. In some instances, the sinus may be in the preparation procedures, preventing its being adequately packed. The lateral canal is demonstrated in this situation is that the preparation is in the room. The sealing of the canal blows through and preparations. These tissues are well equipped to withstand previously noxious elements. The patient in the few days after the procedure, quickly disappears.

Figure 16. A. Mandibular incisor area. The tooth had been involved in an acute periodontal abscess and the canal had been left open to drain as emergency treatment. Each time a closure was attempted, the tooth became very painful and a reopening was necessary. After several such attempts, it was decided to perform surgical treatment. The canal was filled with laterally condensed gutta-percha and Tubliseal prior to the curettage, and multiple lateral canals are apparent. B. One year following the canal filling and curettage, excellent healing is apparent. (Surgery by Dr. Samuel S. Patterson, Indianapolis.)

Figure 17. Similar history to Figure 16. A. Maxillary central incisor left open prior to being referred to me for completion of treatment. Tooth failed closure. B. Surgery was scheduled and the canal filled with laterally condensed gutta-percha and Tubliseal, with post room prepared. The lateral canal is apparent to the mesial in midroot.

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patient by digital stimulation of tissue short of the apex of the tooth. When these teeth were filled, usually despite some remaining discomfort, lateral canals could be identified (Fig. 18). Generally, these teeth become quite sensitive for a few days following the filling procedure. Fortunately, healing is predictable.

Certainly chronic draining sinus tracts have been traced to lateral lesions (Fig. 19), sometimes without the presence of a periapical radiolucency. These tracts clear up almost immediately in most cases following canal preparation, as they do when the sinus tract is found to be in communication with the more immediately periapical area. However, in some instances, the sinus tract may persist following the routine canal preparation procedures, probably because the position of the lateral canal prevents its being adequately debrided. Fortunately, in most cases, when the lateral canal is demonstrated by sealer, the lesion heals. My analysis of this situation is that the privileged sanctuary of the lateral canal resists sufficient cleaning, but by building up of pressures during condensation the sealer blows through and forces the debris into the periradicular tissues. These tissues are well equipped to neutralize and lead to healing of these previously noxious elements. Generally, such cases are painful to the patient in the few days after the canals are filled, but these symptoms quickly disappear.

Figure 18. A, Preoperative view of maxillary first bicuspid. The patient complained of pain consistently during treatment, not at the apex, but rather in mid-root. B, Canal filling with laterally condensed gutta-percha and Waech's paste. The lateral canal is apparent to the distal and exited to the spot indicated by the patient. This site was acutely tender in the few days following canal filling, but then became asymptomatic. C, Three years later. (Restorations by Dr. Morton Rosen, Chicago.)
Can a Lateral Canal Lesion by Itself Cause a Failure of an Endodontic Case When the Immediately Periapical Area Either Heals Following Treatment or When the Area Prior to Treatment Is Normal and Remains Normal Postoperatively?

This is the ultimate question. For many years I felt that the answer was absolutely no. In the past ten years, however, I have observed cases that indicated that even though the percentage is extremely low, there are some teeth that heal or remain normal apically but fail laterally because of untreated lateral canals. Although other possibilities may exist, the most common condition is improper utilization of the post room prepared to accommodate the subsequent restoration. If this area is left vacant for too long a period of time (Fig. 20), or the attempt to seal it is insufficient (Fig. 21), and a lateral canal of significant size is located in this area, a failure due to lateral canal breakdown may occur. I again emphasize that this
The enigma of the lateral canal requires an extremely close watching:

1. The presence of a lateral canal in the root of a tooth requires extremely close watching. 
2. The location of this canal is generally packed off, and it has been removed to provide the required filling. 
3. The root of the lateral canal and the cement used allow the root canal to be cleaned.
4. Although not absolute, the tooth is vital at the inception of the treatment, but breaks down and becomes part of the tissue in the lateral canal. The tissue in the lateral canal prevents the root canal from filling, however, and acts as a nidus.

The solution to this lateral post room when the treatment fails. Secondly, every attempt should be made to ensure that the post takes root.

Large, vacant or partially developed canals, if they are presented:
Figure 20. A, Preoperative view of maxillary cuspid, considerable subgingival decay present. B, Endodontic treatment completed through temporary crown, canal filled with laterally condensed gutta-percha and Wach's paste and post room prepared. The pulp had been vital prior to therapy. C, Six months later, a temporary post/crown has been fabricated, but a distal lesion is present at the site where the post preparation ended. D, The apical portion of the post room was widened to size #100, heavily irrigated with sodium hypochlorite, and that portion of the canal refilled with laterally condensed gutta-percha and Kerr's antiseptic sealer. The demonstrated lateral canal is readily apparent. New, shorter post room was also prepared. E, Eighteen months later, final restoration in place and lateral lesion healed. (Final restoration by Dr. Steve Potashnick, Chicago.)
requires an *extremely rare* combination of conditions, which are the following:

1. The presence of a lateral canal of sufficient size to accommodate a significant amount of tissue in a state of chronic inflammation
2. The location of this canal away from the apical fourth of the tooth where it is generally packed off, and more in the midroot area where the filling material has been removed to provide the room for the post
3. The room provided for the post is either completely unused, or the post and the cement used allow for communication between the lateral canal and the oral cavity
4. Although not absolutely always true, in virtually all cases, the pulp of the tooth is vital at the inception of treatment, but the tissue within the lateral canal breaks down and becomes necrotic after the completion of the endodontic case. The tissue in the lateral canal had retained its vitality at the time of treatment and prevented the sealer from entering that area. This tissue eventually breaks down, however, and acts as a nidus of inflammation and a lateral radiolucency develops.

The solution to this problem is prevention, initially, by only preparing post room when the treated tooth is close to the time of restoration. Secondly, every attempt should be made by the restorative dentist to ensure that the post takes up as much of the space provided as is possible. Large, vacant or partially filled post spaces are very conducive to lateral canals, if they are present, breaking down.

**SUMMARY**

It is difficult to summarize an article of this type, in which the author is certain that his case has been presented fairly, but is aware that other views that are contrary could be stated and endorsed by pertinent clinical cases. Bearing this fact in mind, I wish to reiterate the following:

1. Lateral canals are demonstrated in endodontic cases with much less frequency than they exist. This variance rarely, if ever, causes an endodontic failure. Some demonstrated lateral canals may really be other conditions. Preoperative evaluation should include examination of radiographs for lateral, as well as periapical, lesions.
2. Lateral canals may be demonstrated by a variety of filling techniques. Careful canal preparation may enhance the frequency of such demonstration. Cases with necrotic pulps probably yield more frequent demonstration than do cases with vital pulps.
3. Lateral canals harboring inflamed and/or infected material may cause pain during endodontic treatment. They may simulate periodontal disease and may cause problems with treatment if present when a tooth is left open for drainage. Periodontal disease may cause pulp exposure via lateral canals located coronally.
4. Improper use of post room may lead to lateral failure from breakdown of tissue in a lateral canal.
5. The enigma of the lateral canal has been the object of description and discussion in many articles, but no one is truly certain of their exact significance in endodontic therapy for the long haul.
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Loyola University School of Dentistry
2160 S. First Avenue
Maywood, Illinois 60153

In general, attitudes and treatment procedures are very much a part of the profession. We are often reluctant to try new procedures because we fear a less than satisfactory outcome. All of us, whether we are clinicians or teachers, tend to operate within a constricted box when treating patients, educating students, and answering very basic biologic questions. We are often forced together all of the observations that we make on a particular subject or problem, whether fact or belief become available and are passed on from mind to mind in order to accommodate this. As our knowledge of endodontics change and expand, our belief structure must change accordingly. Research studies, development of new intracanal medicaments, and the successful treatment of cases have led us to expand and, in some respects, even to question the clinical conclusions of the past.

Our ability to grow and change, and the very nature of our profession, is reflected in our willingness to reexamine and to alter, at times, some of the truths that we have come to hold as uncontestable under the light of current knowledge.

The concept of doing so is not new. However, it is only within the last several years that our willingness concerning the inclusion of the fields of research into endodontics appear to be universal. The expanding favorable clinical evidence stemming from the expanding favorable clinical evidence and from the increasing number of clinical research studies, led to a change in the way we think about endodontic treatment procedures. This, in turn, led to a change in the way we think about endodontic treatment procedure for certain classes of patients.