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The Indirect Resection

By GEO. C. HARE, D.D.S.

There are few operations in the field of endodontia which give more real satisfaction than the indirect root resection.

The necessity of such an operation arises from an unfortunate periapical or pulpal involvement following the placing of an anterior jacket crown, a bridge abutment with post or pins, or a cast gold crown. Both patient and dentist are mentally disturbed at the distressing situation and both invariably give a sigh of relief when informed that all is not lost.

The technic is similar in many respects to that employed in direct root resection, but there are certain important variations of technic which must be observed to ensure a minimum of difficulty.

Profound and lasting anesthesia is required. Monocaine 1½ per cent with 1:100,000 epinephrin gives excellent results.

The incision should be ample so that on retraction of the flap the area under consideration be clearly defined. The flap should be raised well above the actual area of operation. This is variation No. 1. Throughout the operation, access to the field is of prime importance. Penetration of the bone to the periapical area may be accomplished either by hand instruments or by surgical burs. The bone must be cut back more generously than in the case of direct root resection. The completed access should present a saucer-shaped depression rather than a deep cup-shaped space. This constitutes variation No. 2, and, again, emphasizes ease of access.

With suitable curettes remove all granulation tissue which can be reached and then irrigate with normal saline solution. A water or mechanical aspirator is almost a necessity for this operation.

With a 560 cross cut fissure bur cut the root apex at an angle of 45 degrees so that the root canal is brought into direct vision.

Select a series of style D files numbered one to five and bend them at right angles so that

four or five millimeters may enter the root canal from the cut apex.

Carefully open the root canal by progressive steps. When the canal has been opened to a number 3 file, introduce hydrogen peroxide by means of a small pipette such as described by Grossman. Fit a number 23 gauge Luer Lock needle to the aspirator point and immediately suck out the debris loosened by the effervescence. At this point a barbed broach, bent at right angles, may be used to further remove debris. Repeat the hydrogen Peroxide and aspirator process several times. Continue to enlarge the canal until a number 5 file enters smoothly. Complete the smoothing of the dentinal wall by dipping the file in phenolsulfonic acid, rubbing the inner wall of the canal, and then neutralizing the acid with sodium bicarbonate.

With the root canal now cleansed and enlarged to satisfaction select a number 4 or a number 5 silver point and cut in lengths of four or five millimeters. Silver points are uniformly conical and thus become progressively larger in diameter. Select one section and try it in the canal. If it fits loosely try the next larger section. Repeat the trial and error method until a section is found which fits so snugly that difficulty is experienced in withdrawing it by means of cotton pliers. Dry the area very thoroughly and with a bent smooth broach pump a root canal sealer cement into the canal. Roll the selected section of silver point in the cement and set to position within the root canal.

Lay a flat dental chisel over the part of the point extending beyond the canal and with a gold foil mallet give a sharp tap on the flat surface. In other words, rivet the silver point to place. Should there still be excess, this may be cut flush with the cut apex by running a 560 cross cut fissure bur in reverse so that the action of the bur tends to further seat the point rather than to pull it out of the root canal.

Finally burnish the silver at the apex

with a rapidly revolving gold burnisher in the straight handpiece. Irrigate the entire area and closely inspect for any portions of silver cuttings or remaining granulation tissue.

As this has been an operation without previous treatment it is good practice to blow powdered penicillin and sulfanilimide into the periapical area before closure.

The flap is carefully sutured to place, dried, and again powdered with penicillin and sulfanilimide. The silk sutures are removed in five days and healing is uneventful.

Radiographs taken at six-month intervals disclose the same regeneration picture pre-

sented in direct resection cases.

What are the reasons for performing this operation?

1. The beautiful restoration of which both a brother dentist and his patient are so proud, is left unmarred by the operation.

2. A positive method of forming lifelong friendships with a brother dentist and his patient.

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What Should a Lecture Course in Endodontia Include?

By LOUIS I. GROSSMAN, D.D.S., Dr. med. dent.*

(From the Oral Medicine Department, School of Dentistry, University of Pennsylvania)

Earlier this summer, I spent a half day in a workshop for secondary school teachers, the theme pursued being "Current Trends in American Life." I listened to a very fine discourse by an eminent artist during which he gave what amounted to a brief history of the development of art. His subject matter was well arranged and illustrated but, as the director of the workshop later pointed out, it was quite unrelated to the theme under discussion. And, I learned, this was not the exception but the rule so far as the other lecturers were concerned as well. Each one had given a good account of himself so far as his particular subject was concerned but the subject as presented bore little or no relation to the general theme of "Current Trends in American Life." It reminded me somewhat of the lack of correlation, at times, of preclinical and clinical subjects in the dental field. What can we do about it? Is the preclinical teacher always to blame? No, I think not. While the responsibility should rest, perhaps, with the preclinical teacher, the clinical teacher should also share in this responsibility. He is indeed a poor clinical teacher who lives in the penthouse of dentistry without time and

again visiting the lower stories to examine the foundation stones. The clinical teacher of endodontia has an excellent opportunity of correlating his subject with dental anatomy and physiology, chemistry and pharmacology, pathology and bacteriology, therapeutics and medicine.

The lecture course in endodontia is the connecting link between the preclinical technic course and chair-side practice in the endodontia clinic. In the lecture course, bio-mechanical considerations of the living organism supersede the operative mechanics of the endodontic technic course. In the lecture course the student is to be given an understanding of the scope and limitations of endodontic practice, of the means and methods of diagnosis and treatment of diseases of the pulp and periapical tissues, of the relationship of these diseases to the body as a whole, and of the constant interweaving of endodontic practice with other branches of dentistry and with medicine.

The lecture course in endodontia at our

*Read at the Boston meeting of the American Association of Endodontists, Aug. 3, 1947

school is presented during the first semester of the Junior year, one hour a week for a period of 14 weeks. It follows soon after the completion of the technic course. During the second semester of the Junior year, the lecture course is supplemented by clinical demonstrations but the student is permitted to operate in the endodontia clinic at this time so that there will not be too long a lapse of time between what he has learned and what he is expected to apply clinically.

The question assigned to me: "What should a lecture course in endodontia include," is not an easy one to answer. One could dismiss it lightly, as one of my friend endodontists did, by saying, "it should include everything there is to know about pulpless teeth." The answer wouldn't be far from correct but it would not be a complete answer nevertheless. The content of a lecture course is more or less of a personal matter depending upon the attitude and outlook of the lecturer but, even so, stripped of individuality there is still the solid substance of textual material to be presented. And, this I now plan to discuss with you. You may disagree with the order in which the material is presented, or you may feel that too much or too little is included or excluded, or you may feel that the material is not too well integrated. Even so, I am here to listen and learn as well as to drone. This presentation is not being handed out as a finished blueprint of what a lecture course in endodontia should contain but only to serve as a basis for discussion.

At the first meeting with the class an effort is made to let the students in on the objectives of the course in order to inform them what the course is about, and how it fits in with the technic course just completed and with other courses in the curriculum, and with clinical practice which is to follow.

Because toothache is often the reason for bringing patient and student together in the endodontia clinic (as it may be later on when he first begins private practice), this subject is discussed first, both from the standpoint of prevention and from the

standpoint of giving emergency relief. In view of the fact that certain clinical tests are brought into play even in the case of toothache if only to establish a provisional diagnosis or to locate the offending tooth, methods of diagnosis are thoroughly considered. This includes the art of questioning the patient, from which much can be learned, as well as the various clinical tests necessary for establishing a correct diagnosis.

Following this, the subject of inflammation—that bulwark against disease—is briefly reviewed in order to lay the groundwork for considering the diseases of the pulp and periapical tissues. The question is then asked how bacteria gain entrance to the pulp in order to discuss the pathways of infection and the bacteriology of the diseased pulp. Each of the pulpitis is then considered in sequential fashion, giving definition, cause, symptoms, diagnosis, differential diagnosis, histopathology, prognosis, and a brief outline of treatment. The diseases of the periapical tissues are discussed similarly, after asking the question: "What is a pulpless tooth?" The latter gives one an opportunity of pointing out essential differences between vital and pulpless teeth and helps to clear up misunderstanding in the minds of some students about so-called "dead teeth."

Having spent the better part of three hours dealing with the diseases affecting the pulp and periapical tissues, we are now ready to consider the philosophy underlying the treatment of pulpless teeth. It is essential that the student be made aware (1) that the pathology of the periapical region is not different from pathology of tissues elsewhere in the body and that the treatment, except for certain technical considerations, is also not different; and, (2) that if the microorganisms on the canal surface are destroyed and reinfection is made impossible by an hermetic filling of the canal, repair of the periapical bone will take place by the defensive mechanism of the body. However, it is pointed out to the student, that not every pulp-involved or pulpless tooth is a fit candidate for treatment (or will be

amenable to treatment once it has been begun), and good judgment must be exercised in selecting cases for endodontic treatment if failure, and possible risk to the patient, is to be avoided.

By this time the student is hankering to know something about the routine in the endodontia clinic and so the record card is introduced and discussed in class at this time so as to acquaint the student with the method of recording both the dental and medical history together with other pertinent data necessary for keeping complete records of each case treated. Principles of endodontic treatment are then discussed, pointing out that essentially endodontic treatment is surgical treatment as applied to the root canal and periapical tissues, and that general principles of surgery apply here as well. Sterilization of instruments and materials peculiar to endodontic practice, e.g., broaches and files by molten metal sterilizer or by antiseptic solutions, sterilization of rubber dam, etc., next claim our attention. The manner of arranging instruments on the instrument or bracket tray before beginning a root canal operation and the need for operating precisely and neatly is then stressed. A portion of a motion picture film is shown in order to illustrate just how the instrument tray is arranged and how root canal instruments are sterilized or resterilized just before use.

After this preliminary but very necessary preparation we get down to the actual work in the root canal itself. Procedures in gaining access to the canal and means of cleansing and enlarging root canals are discussed. This, of course, supplements the work in the technic course as it is applied to living structures. Mechanical preparation of the canal is stressed as the most important phase of root canal treatment but the need for confining instruments within the root canal so that they do not injure periapical tissue is also emphasized. Chemical agents which are useful in assisting mechanical preparation, both from the standpoint of enlarging and cleansing the canal of debris, are next considered. It is pointed out that

such mechanical and chemical means are only a prelude to the use of antiseptics for destroying micro-organisms present in the root canal but the value of such diligent preparation cannot be overemphasized.

Sterilization of the root canal is a rather broad field and gives one considerable opportunity for discussing the antiseptics used, their properties and action, and their relative effectiveness when employed for the treatment of infected pulpless teeth. Interest in the antibiotics still runs high and today more complete information can be given than a year or two ago regarding the effectiveness of the antibiotics for the treatment of pulpless teeth. It is now felt that in sufficiently high concentration penicillin is more effective than the older root canal antiseptics. Passing on to another method of sterilizing root canals, it is pointed out that while electrolytic medication need not be used routinely, it still has its place particularly for sterilization of the root canal just prior to root resection and I find that students are always interested in this method of root canal sterilization. Specific instructions are then given with regard to sealing the antiseptic dressing in the root canal and regarding how often dressings should be renewed.

The next step in the treatment of pulpless teeth, namely, bacteriologic examination, is then dealt with, including consideration of both smear and culture methods. The reasons why such an examination is made, as well as how and when it is made, are given in order to leave no doubt about the need for such an examination.

The question: "When is a root canal ready for filling," is then asked and answered. The properties of various root canal filling materials, their advantages and disadvantages, are next considered and the more important technics of filling root canals are comprehensively presented.

At this time we consider the subject of pulp conservation under the headings of pulp capping and pulpotomy. The causes and treatment of fractured and traumatized anterior teeth logically fits into our presentation here and is introduced at this point.

The subject of pulp extirpation is then considered and is illustrated with a full-length motion picture film showing the operation from the time the diagnosis is established to the final filling of the root canal.

We return again to a preclinical-clinical discussion—this time—of treating pulpless teeth with and without areas of rarefaction, giving the indications for each, and asking the question: How and when does repair of the periapical tissues take place? Following this, another motion picture film is shown, this one dealing with the treatment of a periapically involved pulpless tooth. Many of the technical operative procedures are repeated in this film so as to fix them better in the minds of the students.

The subject of root resection, with several

variations on the same theme such as immediate resection, periapical curettage, and post-resection-filling are discussed in detail and two motion picture films showing root resection of an upper and of a lower tooth are then shown.

If time permits, the final period is devoted to a consideration of the technic of bleaching discolored teeth and to a review of the course.

In relating this brief summary of a lecture course in endodontia, I do not for a moment believe that I have presented anything new or original. It is my hope, however, that what I have presented may serve as a starting point from which we may go on to a more profitable general discussion of "What Should a Lecture Course in Endodontia Include?"

DISCUSSION*

By GEO. C. HARE, D.D.S., Toronto, Ont.

Dr. Grossman has very ably presented to us the subject matter and aims of a good lecture course in Endodontia. I am certain that the American Association of Endodontists could not have chosen a person better prepared and more competent for presentation of this subject to us than Dr. Grossman. At our school, we follow very closely a lecture plan similar to the one outlined by Dr. Grossman. Therefore I shall present some deviations which might add to the discussion.

We notice that as the course progresses, the student is taught the diseases of the dental pulp and periapical tissues, their diagnosis, pathology and the relation of these diseases to the general health. He is, also, taught why we practice endodontic treatment, when endodontic treatment is indicated, and how to treat the endodontic case correctly. It may be wise, also, to emphasize early in the course who should do endodontic treatment. The student should be impressed with the fact that this work is not beyond the reach of the average

practitioner. The lecturer should explain that with ordinary skill and the utilization of our knowledge of clinical and preclinical subjects and the use of good surgical care and judgment, endodontic treatment can be practiced in any office. Furthermore, he should be taught that in a general practice of dentistry, he can give his patients the best of dental health service only if he includes the endodontic practice in his work.

Early in the course, a brief review of the anatomy of root canals, pulp chambers and horns in each tooth supplemented by models is helpful in the teaching of a course in endodontia. This material has been covered previously in the course in Dental Anatomy. However, we find that repetition or review of freshman material is sometimes important and beneficial to the student entering the clinical years. This might be covered in either the lecture or laboratory technic course in endodontia.

*Presented at the Boston meeting of the American Association of Endodontists, Aug. 3, 1947.

After the material introducing the student to the course and its relation to other fields of dentistry, logically, the study of diseases of the pulp and periapical tissues is next covered in the lecture course. Since the pathological study of pulpal diseases is carefully covered in oral pathology, discussion of these diseases should attempt to explain and correlate clinical histories and findings with laboratory findings. After this point we vary our instruction from Dr. Grossman's outline. The question arises here, "Where does endodontic treatment begin?" We believe it begins as in other fields with prophylactic treatment or prevention of injury and disease to the pulp. The student is reminded that he himself may bring about pulpal injury or death during the act of cavity preparation or by failing to insert a cement base under a deep metallic restoration. Next, we discuss pulp protection by cement bases and cavity varnish and pulp sedation with zinc oxide and eugenol. Following this, pulp conservation under the headings of pulp capping and pulpotomy is discussed. These subjects and technics are covered in our course prior to the lectures dealing with the treatment of the pulpless tooth. By so doing, we believe that we can best emphasize to the student the preventive side of endodontic treatment or the desirability of protecting and retaining a vital pulp whenever possible. The student should be taught that cases for conservative treatment and pulp saving must be carefully selected, but that many teeth can be so treated, especially in children. The introduction of this material at this point serves the purpose of impressing upon the student where the practice of endodontia (preventive endodontia if you wish) should begin.

Dr. Grossman states that he stresses "mechanical preparation of the canal as the most important phase of root canal treatment." In our consideration of the four phases of root canal treatment, (1) Preparation, (2) Irrigation, (3) Sterilization, and (4) Filling of the canal, we try to stress equally the preparation of the canal and sterilization phases. A canal well prepared,

but unsterile when filled, is more likely to be followed by periapical infection than a canal which was sterile at the time of filling. At the same time, it is true that sterilization of the canal is impossible without mechanical and sometimes chemical preparation. Therefore we attempt to impress the student with the fact that the final success of the root therapy operation depends equally upon the proper preparation of the canal and the sterilization of the canal.

The course should, as suggested, include clinic routine, case record keeping, instrumentation, and sterilization procedures for the root canal instruments. No course in endodontia would be complete without a discussion of root canal antiseptics, antibiotics, ionization and methods of checking sterility. Dr. Grossman did not mention, but I know he augments these lectures with reading assignments to students in order that they might keep abreast of the rapid developments in the field. This is very important in any lecture course as it encourages and enables the student to read and keep abreast of the findings of others. Root resection, repair after surgical treatment of root ends, and bleaching of teeth logically come at the end of the course.

No mention was made of endodontic practice on deciduous teeth. In some schools the endodontic treatment of deciduous and young permanent teeth is taught in the pedodontia class. This procedure is not undesirable. Still in the endodontia course some attention to the variation in technique required for the pedodontia patient should be made.

Finally, throughout the lecture course, the opportunity is available for us to emphasize to the student his role as a teacher of the patient. Too little time is spent by the dentist at the chair in teaching the patient the importance of, and the care of each and every tooth. In this course especially the necessity of teaching patients of the need of frequent dental examinations, of early detection and correction of incipient carious lesions in order to prevent pulpal disease should be stressed. Also, the student should

learn to teach the patient the value of the tooth, and the treatment possibilities of the "sick" or diseased teeth. He must instruct many patients as to the value of retention of a correctly treated non-vital tooth over an artificial appliance. This education of the patient is often necessary in introducing the patient to the possibilities of endodontic treatment. It is at the same time our best endodontic practice builder.

Dr. Grossman is to be commended for this very fine paper on "What a lecture course in

Endodontia should include." He is to be commended upon the employment of motion pictures and other visual aids in connection with the lecture course. These visual aids are of very great value in the execution of a good lecture course. If duplicates of these films could be purchased or made available to other teachers, they would be welcome adjuncts in the teaching of endodontia in all dental schools and they would help greatly to standardize the teaching of endodontic technics.

A Study of Bacteria Found in Root Canals of Anterior Teeth and the Probable Mode of Ingress

By GEORGE G. STEWART, A.B., D.D.S.

This report presents the bacterial findings in a series of fifty-two infected anterior teeth presented for root canal therapy. An attempt was also made to correlate the mode of bacterial ingress and subsequent death of the pulp tissue.

Procedure

A careful history was kept for each patient treated, and a special note was made of the following: presence or absence of a restoration in the tooth to be treated, type of restoration, history of trauma, open or deep caries, previous root canal therapy, or lack of an apparent mode of bacterial ingress to the pulp tissue.

After completion of the case history, the tooth was prepared for bacterial study. It was carefully isolated, dried, and the anterior surface sterilized by swabbing first with untinted tincture of metaphen (1 : 200) followed with alcohol. Access was then gained to the pulp chamber by means of sterile burs. The contents of the pulp chamber were removed and a sterile paper point was then inserted in the root canal. After one minute the point was removed and placed in a prepared tube of glucose broth and immediately sent to the laboratory for study.

If, because of caries or trauma, the pulp

tissue was open to the oral cavity, the procedure was slightly altered. Before the sterile paper point was inserted in the root canal, the contents of the pulp chamber and that of one-half of the root canal were removed. This procedure was resorted to in order to determine as accurately as possible the type of bacteria responsible for the then existing pulp involvement. Following this method of study, pure cultures were almost invariably found.

The technique followed in the treatment of the infected root canals will not be discussed here.

Findings

Necrotic Pulp.

Eight of the teeth treated presented necrotic pulps. In these cases, involvement of the periapical tissues was not apparent in the roentgenogram. There was no swelling present.

In four of the eight teeth, *Streptococcus alpha* organisms were isolated. Two teeth contained *Streptococcus gamma* organisms, and two contained *Staphylococcus aureus* organisms.

In three teeth of this group, deep caries was the probable avenue of bacterial invasion.

Four teeth had silicate restorations, and one tooth had a history of trauma.

Acute Abscess.

Six teeth in this series were treated for acute abscesses. These teeth were sensitive to pressure and percussion, swelling was present, pain was acute and constant. At the time of the first treatment there was usually no evidence of bone destruction detected roentgenographically.

The organisms isolated from the root canals in this group were as follows: *Streptococcus alpha*, two cases; *Bacillus paracolon*, one case; *Staphylococcus albus*, three cases.

Two teeth in this group had deep caries, and the other four teeth had silicate restorations.

Chronic Abscess.

Thirty-four teeth treated had chronic abscesses. In all of these cases an active fistula was present or had been present. The roentgenogram showed evidence of a more or less diffuse area of apical rarefaction. Pain may or may not have been present.

The organism most frequently isolated from this group was of the *Streptococcus alpha* variety. This was the finding in twenty-three of the thirty-four cases. *Streptococcus gamma* was isolated in one case of this group.

Staphylococcus albus was found in three cases, and *Neisseria sicci* were found in three cases. *Diphtheroids* and the *Bacillus paracolon* were each found in two cases.

Of these teeth, eight had caries; twelve presented deep silicate restorations; eleven teeth had histories of trauma; unsuccessful root canal therapy was evident in two cases; and the cause of the pulp death was not evident in one case.

Granuloma.

Three teeth presented for treatment showed roentgenographic evidence of apical granulomas. These teeth were relatively asymptomatic. Small, rather well defined areas of periapical rarefaction were noted.

Two canals contained *Streptococcus alpha* organisms, and one contained *Neisseria sicci*.

One tooth had a silicate restoration and the other two had histories of trauma.

Cyst.

No pain was present in the one case treated, but the rarefied area was so extensive that the four mandibular incisor teeth were lost.

The organisms isolated from the root canal were of the *Streptococcus alpha* variety.

Caries was the mode of bacterial invasion.

TABLE I

Organism	Necrotic Pulp	Abscess Acute	Abscess Chronic	Granuloma	Cyst	Number of Cases
<i>Bacillus paracolon</i>		1	2			3
<i>Diphtheroids</i>			2			2
<i>Neisseria sicci</i>			3	1		4
<i>Staphylococcus albus</i>		3	3			6
<i>Staphylococcus aureus</i>	2					2
<i>Streptococcus alpha</i>	4	2	23	2	1	32
<i>Streptococcus gamma</i>	2		1			3
Total number.....	8	6	34	3	1	52

Discussion

In the findings presented above, and depicted more clearly in Table I, we see the various clinical manifestations of the pulp tissue and periapical structures, and the

types of bacteria isolated from the root canals of these cases.

Organisms of the *Streptococcus alpha* group dominate all others in frequency of their

presence in these infected root canals. This is consistent with the findings of Appleton (1), who states that the *Streptococci*, because of their invasive properties, probably induce the initial inflammation of the pulp. If the pulp succumbs, the non-invasive types of saprophytes can then survive and live in the necrotic tissues.

Returning once more to Table I, it will be noted that neither *Streptococcus alpha* organisms nor any of the other organisms are confined to producing a specific type of pulp involvement. A greater variety of organisms were observed in those cases that had chronic abscesses. This is quite natural since there

were more cases of chronic abscess observed than all others combined.

It is interesting to note that *Neisseria sicci* (2) were isolated in four cases. This organism is found in the respiratory tract and is considered to be parasitic. Most organisms found in infected pulp tissue are of the saprophytic variety.

Grossman (3) mentions five routes that bacteria may take to reach the pulp tissue: open cavity, extension from carious dentine, the gingival crevice, extension of periapical infection from an adjacent tooth, the blood stream.

TABLE II

Organism	Necrotic Pulp	Abscess Acute	Abscess Chronic	Granuloma	Cyst	Number of Cases
Caries.....	3	2	8	.....	1	14
Old Root Canal Filling.....	.....	.....	2	.....	.....	2
Silicate.....	4	4	12	1	.....	21
Trauma.....	1	.....	11	2	.....	14
Unknown.....	.....	.....	1	.....	.....	1
Total number.....	8	6	34	3	1	52

As shown in Table II, the greatest number of teeth studied contained deep silicate restorations. Of this group, only two had cement bases. It is known that silicate cements can be irritating and can produce necrosis of the pulp tissue. The bacterial invasion may have been secondary and via the gingival crevice or the blood stream.

Traumatic injuries were second in frequency as the probable cause of pulp necrosis. In some cases, trauma was severe enough to cause fracture of the tooth, permitting direct invasion of the pulp tissues. In several cases not included in this series, there was dry gangrene as a result of trauma. These were found to be free of bacteria.

In cases of pulp death associated with deep caries, little need be said. A deep cavity extending to the pulp tissue is a broad highway for infection.

It was evident in the two cases of unsuccess-

fully treated root canals studied, that the dentist relied upon powerful drugs and not upon sound principles of surgery. In this way the possibility of failure is increased manifold.

No cause for the pulp death could be observed in one case. The tooth was free of restorations or caries. There was no history of trauma. The gingiva were normally healthy. The only possible explanation for the bacterial invasion would be via the blood stream.

We may ask ourselves, will a given organism produce one type of pulp involvement in one case and an entirely different type of involvement in another case? The answer is not simple because so many variables are present. If the bacteria themselves are considered, their type must be noted. Are they of the saprophytic or parasitic variety? Will they flourish in an atmosphere of lowered oxygen content? The number of invading

organisms and their virulence will also play an important role. Will they produce a large amount of toxin? The greater the number of organisms and the greater their virulence, the more we may expect an acute or more violent response of the pulp.

We must also consider the tissue response. The more resistant the tissue, the more toxins or bacteria are required to destroy it. The younger the tissue the greater the resistance. This is easily demonstrated in younger patients. An instance of enormous tissue resistance may be found in chronic hypertrophic pulpitis. In this instance, irritation causes the tissue of the pulp to proliferate and even grow out of the tooth, via a large cavity. After eruption of the tooth, the pulp chamber and root canal become smaller because of dentine deposition. With this smaller volume the circulation within the pulp tissue is decreased and consequently the resistance as well.

After the pulp tissue has undergone necrosis, the bacteria and toxins within the canal may pass through the root apex. The response again is complex. If there are many bacteria or if large amounts of toxins are being produced, an acute abscess may develop. If there are fewer bacteria or less toxin, the more chronic involvements, such as a chronic abscess or granuloma, may result. The granuloma is composed, primarily, of granulation tissue, whose chief function is resisting the spread of bacteria

and their toxins. When the tissue is less resistant or the bacteria more virulent, an acute abscess may result. A radicular cyst may be caused by toxins stimulating the epithelial rests of Malassez (4).

It is still not known how much stimulation is required to produce one reaction in one individual and a different reaction in another. We even lack the information as to why a given stimulus may produce different reactions in the same individual at different times. The problem is intriguing but still remains unanswered.

Summary

1. The bacterial findings of fifty-two anterior root canals studied are presented.
2. The organism most frequently isolated was of the *Streptococcus alpha* variety.
3. Deep silicate restorations were found to be most frequently associated with pulp death.
4. Mode of bacterial ingress and consequent tissue reaction were discussed.

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Report on Boston Meeting

Another excellent meeting was enjoyed by the members in attendance at Boston, August 2nd and 3rd. The weather was ideal, helping to make the dinner on the roof of the Sheraton very pleasant for the twenty-five members and guests that were present.

Following the dinner an open executive meeting was held. A letter from the secretary, Dr. Burkman, was read regretting his inability to attend the meeting because of a recent appendectomy. He has now fully recovered. His report mentioned the acceptance of nineteen new members since February of this year with five applications pending. There were two honorary memberships issued during that time. Three members are deceased: Doctors J. H. Hospers, Chicago; M. O. Johnson, Lincoln, Nebraska; and David Dai, Chengtu, China.

The Editor reported a paid circulation of the *JOURNAL OF ENDODONTIA* of 355 including library subscriptions. Dr. Hill stated that the Student Award Committee is developing a plan to be reported on at the next meeting. Dr. Hine recommended that the Executive Committee elect a nominating committee to select candidates for office well in advance

of the next annual meeting. This was done the next day with the election of Doctors Van Valey (chairman), Brooks and Fenech as a Nominating Committee.

On Sunday the Program and Local Arrangements Committees put on a scientific meeting that was both interesting and provocative. More than 55 members attended, representing all sections from Texas in the South to California on the West and Canada to the North. Of course the eastern seaboard was well represented. From their comments, "I certainly learned a great deal today" and "this is my first meeting and I'm going to see that I attend the future ones," it was obvious that all in attendance had felt their time well spent.

On behalf of the officers and members of the Association, I want to thank Doctors Van Valey, Ostrander and Ross, of the Boston Program Committee; Doctors Zander and Yates, of the Local Arrangements group, together with all of those presenting papers for the fine work, cooperation and time spent in making this such a stimulating and thoroughly enjoyable meeting.

THE EDITOR.