Pulp Canal Therapy

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This brief outline is given to you with the hope that it will aid you in the diagnosis and treatment of involvments of the dental pulp.

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UNFORTUNATELY, dental education of the laity has not advanced to a degree where pulp involvments, the result of decay, do not occur. Even when this ideal is a reality there will be much root canal work to be done. I refer to the ever increasing number of involvments, the results of accidents, trauma. No branch of dentistry offers a greater opportunity for the dentist to so quickly gain the confidence of those who come to him for service than the immediate relief of pain, and that confidence increases in direct ratio to the ability of the operator to carry the treatment to a successful conclusion. Successful treatment is dependent on correct diagnosis.

Pathognomy is, many times, confusing. A patient of nervous temperament who has been subjected to considerable pain over a period of time, is of little aid to us in making a diagnosis. As for instance, an incipient pericementitis may be due to infection or it may be due to disturbance of function. The symptoms are the same and the radiographic examination does not show structural change.

The same is true of pulpal abscess in multi-rooted teeth. It is frequently diagnosed and treated as a partially vital and putrescent pulp, with much discomfort to the patient.

Inharmonious occlusion, a disturbance of function, may and frequently does cause a reflected pain, similar to that of an exposed pulp.

To aid us in diagnosing the different clinical manifestations we have the radiogram and electric pulp tester. Both are essential and each has its limitations.

Unfortunately, the majority of radiograms that are made are of little aid in making a diagnosis. The negative must present a minimum of distortion and permit a detail study of the pulp chamber, the length and curvature of the roots, the lamina dura, periapical area, and be of sufficient density to have good contrast.

Most films are placed in the mouth in a careless manner. With a little care the film can be placed so all of the crown, as well as the periapical area will be shown. By including

all of the crown we can more easily see if the negative represents a true outline of the tooth.

Electric Pulp Tester

The electric pulp tester is invaluable in making a thorough examination. The electric response of the patient can be established when the current is applied to one or more teeth with a normal pulp, care being used to start with a minimum of current and slowly increasing it until the patient responds to the sensation.

This is used as a guide in testing other teeth, due consideration being given to teeth with abraded occlusal or incisal surface.

If the radiogram shows pulp recession and secondary dentine formation we may not expect the normal response to the electric current. When there is an acute inflammation of the pulp the response is more pronounced.

Tooth Color

A change from normal tooth-color is an aid in diagnosing the health of the pulp. However, due consideration must be given to the presence of large restorations.

An engorgement of the blood vessels of the pulp gives the crown a pinkish tint. This circulatory change frequently results in discoloration of the crown, unless the pulp is removed before the blood infiltrates the dentine.

This condition is most frequently the result of trauma and occurs most often in the anterior teeth. The prognosis is more favorable in youth where the foramen is large and permits an expansion of the blood vessels. As an aid in diagnosis, cold applications cause an increased discomfort. Such teeth are very sensitive to the electric test.

Most often this inflammatory condition does not cause the patients sufficient pain to cause them to seek relief until the pulp becomes putrescent. When cold is applied to a tooth with putrescent pulp it gives temporary relief. The application of heat increases the pain, due to expansion of the gas, the result of decomposition. The tooth is sensitive to percussion and does not respond to the electric test.

If we are not *very* thorough in our examinations we may overlook one of the most potent sources of infection, the tooth or teeth in which the pulp has died without discomfort to the patient. Frequently such teeth are not discolored nor are they subject to thermal change. The radiogram does not show a change in the peri-apical structure or if it does it is so slight it is easily overlooked. It is for this reason that a diagnosis should never be made from the radiogram and one of the reasons why the physician cannot make a correct diagnosis. Such teeth can only be located by the most careful use of the electric tester.

Mouth Lamp

The mouth lamp should be used by every one who does root canal work, not only as an aid in diagnosis, but for transillumination in locating the entrance to fine canals.

Cases have been referred to me, where the dentist could not locate the entrance to the canal. After all debris has been removed from the pulp chamber the entrance to the canal will appear as a dark spot when the lamp is placed under the rubber dam adjacent to the gingival tissue of the tooth being operated on.

Pulp Chamber and Canals

The normal pulp chamber is of such outline and contour that entrance to the canals is made easy. In the multi-rooted teeth its base is convex at its center, gradually changing to concavity, having its lowest point at the entrance to the canals. This serves as a most important guide to the operator and one that is frequently destroyed when opening into the pulp chamber.

Never make a large opening into the pulp chamber, in single or multi-rooted teeth, until you have made a very thorough study of its size and contour, always examining the negative for anamalies in number, location and formation of the root or roots.

A very good rule to follow and one that usually runs true is, that the size of the pulp chamber decreases as the age of the patient and the abrasion of the tooth increases.

When we study the radiogram of the teeth whose cusps have been destroyed by abrasion, we may expect to find a very small pulp chamber, the dark area showing on the negative as a fine line leading from one canal to the other.

The canals of these teeth are most often of small diameter and present, to the man in general practice, one of his most difficult operations. I do not mean to infer by this remark that those of us who specialize in root canal surgery have found a royal road to their end, but there are certain precautions which, if closely adhered to, will make the operation far less difficult.

Considering root canal surgery from the technical side, there are two very important steps in the operation. These two, plus the failure to maintain strict asepsis, are the most common causes of failure. I refer to lack of proper access to the canals and the selection and preparation of the canal instruments.

It is not infrequent that we see where some one has attempted to treat and fill the canal of one of the anterior teeth thru an opening into the pulp chamber the size of a number three or four bur.

Even when such opening is made on the lingual surface, where it should be made, the small passage serves as a handicap to the thorough cleansing and filling of the canal, as well as the thorough cleansing of the pulp chamber. It is important that all fragments of the pulp be removed, as well as any other debris present, to prevent discoloration of the crown.

Normally, the greatest diameter of the canal in the anterior teeth is slightly beyond the point where it emerges to form the pulp chamber. This can be located by examining the radiogram. The cavity should be made cone shaped to this point, with the greatest diameter at its entrance, keeping the center of the opening as nearly in line with the long axis of the root as the crown of the tooth will permit.

This is important in the treatment of all anterior teeth, regardless of the age of the patient, but it is of greater importance where the pulp is involved before the complete development of the root.

Pulp involvments in teeth with incomplete root formation are not difficult to treat, provided root development has advanced sufficiently to permit making the canal slightly cone shape in form. In other words, the diameter of the foramen must be slightly less than any other part of the canal. Even though the foramen is two or three milimeters in diameter the tooth can be successfully treated, provided the root is of sufficient size to permit enlargement of the canal.

One of the essentials of success in the treatment of all teeth is the complete sealing of the foramen or foramni, and if canal preparation and foramen are not considered, the operation is made difficult, if not impossible.

Time spent in enlarging and making the canal cone shape in form permits accurate filling and thorough condensing of the filling material.

Multi-rooted Teeth

I have tried to emphasize the necessity of proper access to the canal in teeth with one root. In the treatment of multi-rooted teeth this is of greater importance.

Not the ruthless destruction of the crown, but the cavity must be extended to a size that will permit the operator direct access to all canals. An opening the size of a number six or number eight bur on the occlusal surface of a molar will not permit visibility of all the canals, neither will it permit the entrance of instruments into the canals without distortion.

One of the greatest trials in root canal work is to dislodge a broken instrument from a fine or curved canal. The greater care we take to prevent unnecessary distortion of the instrument the fewer accidents we will have. It must be very difficult to temper fine canal instruments, to give them the maximum flexibility with sufficient rigidity to be useful. This must be remembered when the opening is made into the pulp chamber and when enlarging fine canals.

Reference has been made to the necessity of studying the outline of the pulp chamber from the radiogram. It is of greatest importance never to permit the bur to come in con-

tact with the floor of the pulp chamber. If its normal contour is not destroyed, paper points and instruments when placed near the opening of the canal will glide into it with ease. If this normal shape is destroyed and the floor of the pulp chamber presents a flat or uneven surface, the operation is made more difficult and the possibility of breaking fine instruments greatly increased.

When retreating teeth that have been carelessly opened and natural guides destroyed, the entrance to the canals are located and a blunt flame shaped bur can be used to enlarge the opening and reestablish the normal guide.

When "pulp stones" are present they should be removed with hand instruments, not with a bur.

Selection of Canal Instruments

Success or failure in opening and enlarging the canal is largely dependent on the selection of the type and size of the instruments to be used. The importance of this is not generally recognized. It is one of the most frequent mistakes and is one of the reasons why root canal work is so unpopular, and why it is considered difficult.

It seems to be the rule to select the largest instrument that can be forced into the canal. This is bad practice, for two reasons—if the canal is straight, debris is likely to be forced thru the foramen, if the canal is curved the large instrument is too rigid to conform to it, and the possibility of perforating or making a "step" in the canal is greatly increased.

If the pulp is being removed from the canal of a tooth with one root, or from the lingual or distal root of the molar and we see on examining the radiogram that the canal is large and the root is straight a medium or large size barbed broach may be used.

When the canal is small and curved the easiest instrument to break and the most difficult to dislodge is the barbed broach, if it is used in fine canals with acute curves it should never be rotated in the canal. A delicate touch, feeling the way with the instrument rather than forcing it, contributes to the ease and success of the operation.

There are several types of instruments from which we may select the one best suited for the tooth being treated. While it is true that one operator may like one type and another a different type, each has its advantages and limitations. The more common instruments used to open and enlarge canals are the smooth broach, the file, and the reamer.

Drills and reamers made to use in the engine do not have a place in root canal surgery.

Enlarging Fine Canals

The smooth broach is most often used as a path-finder. It can be made rough by placing it on a smooth hard wood surface, slowly turning the broach while passing a fine file diagonally across it. When treated in this way and used with dilute sulphuric or phenol-sulphonic acid progress can be made in enlarging fine canals. The file when used alone or with an acid cuts more rapidly than the modified smooth broach or reamer. Having more acute turns than the reamer it is more easily broken.

When enlarging fine curved canals neither file nor reamer should be revolved in the canal. It is for this reason that the reamer, in my hands, is not as satisfactory as the file.

If fine canals are to be enlarged we select the finest file, the Kerr XX. The next step is to remove the sharp point from the file. This is, indeed, a most important preparation. After this is removed with shears or fine stone, we remove the acute angles that remain by lightly passing the file over an Arkansas stone, slowly turning it as we pass it over the stone. If all sharp edges have been removed, the end of the file will pass over the finger nail and not scratch. When the file is given a ball like point it will follow the canal regardless of its curves.

There are occasions when the sharp point of the file or reamer can be used to advantage. When the entrance to the canal is small a number three or four Kerr file is more effective than a Rhine pick, when a previous attempt has been made to fill the canal with cement or cotton. Such "fillings" seldom extend beyond the coronal third of the root. They are more quickly and easily removed with a sharp pointed

instrument. Care must be exercised and radiograms made with the instrument in place to check the progress of the work.

When retreating teeth with fine curved canals, it is often most difficult to relocate the canal in the middle or apical third because the previous operation has made a "pocket" in the side of the root with an instrument that would not follow the curvature of the canal. And for the same reason, perforation of the root most frequently occurs at the curve. With careful selection and preparation of the instrument this trouble can be avoided.

Another very important factor in instrumentation is the care that must be exercised to prevent passing the instrument thru the foramen, a care that must be exercised when preparing the canal in all teeth, especially those teeth with large canals and foramen, and when the pulp is being removed under anethesia.

The prevention of peri-apical trauma is a very important factor in the successful treatment of the pulp, and one that is not difficult to control if the operator gives due consideration to the radiogram.

When making a radiogram of a tooth to be treated, the film should be so placed that all of the crown, as well as several millimeters of the peri-apical tissue, will be included, as previously stated. When all of the crown can be seen we can quickly determine if the negative presents a true reproduction of the tooth. If it does, measurements can be made, the instrument marked, and trauma avoided.

Sulphuric and Phenol-Sulphonic Acid

The use of sulphuric acid as an aid in the cleansing and enlarging of root canals was advocated by Dr. Callahan of Cincinnati, in fact he was among the first of our profession to practice modern root canal surgery. His research and work in root canal therapy stands today as a monument to him and an inspiration to those of us who carry on.

The chemical action of a 30 percent solution of sulphuric acid and an 80 percent solution of phenol-sulphonic acid is

practically the same. I prefer the phenol-sulphonic, being of a syrupy consistency it is more easily carried on the canal instrument to the tooth being treated, and is less destructive to the instrument. It is an invaluable aid in the cleansing and enlarging of root canals, when used with intelligence and care, remembering that it is escharotic in action and must not be forced thru the foramen. This can be controlled if it is frequently neutralized with a ten percent solution of sodium bicarbonate. The canal is then dried with sterile J & J paper points and the operation repeated as many times as is necessary to enlarge the canal to the desired size.

In the treatment of teeth with putrescent pulps and those that have been previously treated, we are dealing with conditions *very* different than a tooth from which we have removed a vital pulp.

In the first mentioned class we may justly conclude that the majority of such teeth do not contain vital tissue, and that they are infected, and may have lateral canal and multiple foramen. In such teeth the use of phenol-sulphonic or sulphuric acid is most essential, if they are to be thoroughly cleansed and prepared for the canal filling.

In a recent pulp removal, if previous treatment has been instituted and asepsis has been maintained, the use of either acid should be avoided if possible. If the canals are so fine and tortuous they cannot be sealed without enlargement it must be used very carefully and *never* carried to the dento-cemental junction.

Essentials for Success

One of the important essentials for success in the treatment of teeth with *vital pulps* is the maintenance of healthy peri-apical tissue, and to do this bacterial, chemical, and mechanical irritation *must* be avoided.

Strict asepsis must be followed *at all* times in the treatment of the dental pulp. Regardless of how beautiful the completed operation may appear in the radiogram, it is doomed to failure unless sterilization of the field of operation, which means the *isolation* of the *tooth* by the use of the *rubber dam,* the thorough cleansing of the crown of the

tooth and contiguous area with iodine, the sterilization of *all* instruments and materials that enter the pulp chamber and canals, the treatment of infected dentine and sealing the canal with sterile materials.

REMOVAL OF VITAL PULPS, EXPOSED BY DECAY

First Treatment

Carefully remove all debris with excavators and warm water. Dry cavity, moisten small pledget of cotton with mild antiseptic—Eugenol, Oil of Cloves, Phenol Compound. Seal with temporary cement. Permit this treatment to remain 24 to 48 hours.

Second Treatment

Procure anesthesia. Conduction or infiltration. Place rubber dam. Sterilize field. Study outline of pulp chamber as shown in radiogram. Flame bur and remove cement. Enlarge cavity to permit proper access to canals. Remove soft decay with excavators. If use of bur is necessary, use round bur, *carefully*. Select barbed broach—size determined by diameter of canal. Broach must not bind in canal. Mark length of tooth on broach with file. Point of broach must not pass beyond dento-cemental junction. Flame broach and remove pulp.

Dry canal with sterile paper points, remove point of points with flamed scissors. They must not pass beyond dento-cemented junction. Moisten point with mild antiseptic, place in canal. Seal with cement. Permit this treatment to remain five days.

Third Treatment—Filling Canal

Place rubber dam. Sterilize field. Flame bur and remove cement and dressing. Cleanse canal with alcohol. Dry canal with sterile paper points. Introduce rosin-chloroform solution. Remove excess with paper points. Select gutta-percha point of proper diameter and the length of apical third of canal.

If after selecting the condenser of proper diameter, it is

forced thru a small piece of unvulcanized rubber, or rubber dam, it may be used as a marker or guide in measuring length of tooth. Flame condenser. Heat point of condenser so gutta-percha point will adhere to it. Permit it to cool. Take measurement. With gutta-percha point attached to condenser the guide is adjusted with sterile pliers to mark length of tooth. Place in canal and *force* into place. Fill remainder of canal with short pieces of points, thoroughly condensing each piece. Fill cavity with oxy-chloride cement. Make radiogram.

A great many operators use measurement wires after the pulp has been removed or just before canal filling is placed. As a guide in placing the canal filling they are of little value to me. In the first place, if the radiogram that you are using as a guide to pulp removal is not a true reproduction of the outlines of the tooth, you have made a serious mistake, and if it is correct as to length all measurements can be taken from it.

It is of greatest importance to have a good radiogram before the operation is started.

The *object* to be accomplished in the filling of the canal is the *thorough sealing* of the *foramen*.

The important thing to *know* is the *diameter* of the canal at the dento-cemental junction, and the selection of a point which has a diameter slightly in excess, that it may be *wedged* into place. The diameter of the canal can be measured with paper points in large canals and smooth broaches with blunt points can be used in the finer ones, marking the length of the tooth in either case, which will act as a check.

If doubtful as to the first piece of point being in place, make a radiogram with dam in place and have it developed and continue to do so until satisfied with the filling.

Removal of Non-exposed Vital Pulps

The removal of the pulp from a normal tooth for the placing of a crown or attachment is, happily, an almost extinct practice. We do, however, have cases where the pulp has died, the result of shock in the preparation of the teeth for jacket crowns and large restorations.

It is sometimes very difficult to determine if we should remove the pulp from a tooth before the restoration is placed, in which the cavity very closely approaches the pulp. We frequently find this condition in the molars and bicuspid teeth that are to be restored with inlays, and in the anterior teeth that are to receive a jacket crown.

All decay may be removed and not expose the pulp. Mild antiseptics may be sealed in the cavity with cement. This may be followed by lining the cavity with oxide of zinc, made into a paste with oil of clove, this to be covered with cement. This is the most we can do to preserve the health of the pulp and yet, in many cases, it will die, or the tooth will be so uncomfortable that the removal of the pulp is necessary.

I believe one of the most serious sources of infection originates in those teeth where an attempt has been made to save the life of the pulp, exposed or nearly exposed, the result of decay. And it is one of the most difficult to recognize as a source of infection. Such teeth require our most serious consideration. In youth the prognosis is more favorable.

I do not wish to see a single pulp unnecessarily removed, but I do believe that where doubt exists as to the final results the patient is better served to have the pulp removed before it dies, the result of infection.

The Pulpless Tooth

Comparing the ratio of teeth treated, those with vital pulps exposed by decay, and those with putrescent pulps, the teeth with putrescent pulps win by a large margin. Many of these cases are the result of pulp exposure, neglect, the patient not having regular examination and prophylaxis, but the majority of such teeth that I treat carry some form of restoration and the pulp has died, the result of infected dentine or shock.

During the twelve years I have been doing this type of work, there has been a great increase in the number of pulps dying, the result of shock. This is due to the increasing number of so-called "dead teeth" that are being extracted

and their replacement with some type of bridge work. It frequently occurs in the anterior teeth, the result of preparation for a jacket crown, especially is this true of the upper lateral incisors. Synthetic porcelain has been another contributor to the cause.

Before placing a crown on these teeth have a radiogram made and study the size of the pulp chamber.

The first symptoms of pulp disturbance, as noted by the patient, is the more than normal reaction to thermal change, this does not apply to teeth with porcelain jacket crowns, and discomfort during mastication, slight pericimentitis. The inflamed or congested pulp is sensitive to heat and cold, as well as to the electric test. If this is followed by death, as it usually is, gases form, the result of decomposition, and the tooth becomes very sensitive to heat and percussion. When the pulp dies in a tooth with a porcelain jacket crown pericementitis is usually the first symptom of disturbance, increasing in severity as decomposition progresses. If such symptoms are recognized and treated in their incipiency serious peri-apical involvement may be avoided.

Treatment of the Putrescent Pulp

Isolate tooth, sterilize area with iodin, carefully open into pulp chamber. If exudate is present, absorb from pulp chamber with sterile paper points or sterile paper or cotton pellets. Slightly moisten cotton pellet with Buckley's Formocresol, place in *pulp chamber* and seal with cement. If the tooth is subject to trauma this must be corrected. Repeat this treatment in twenty-four hours, using small amount of formo-cresol sealed in *pulp chamber* with cement. If the patient is now comfortable permit second treatment to remain forty-eight hours.

Third Treatment—Isolate tooth. Sterilize field. Flame bur, remove cement and dressing. If remnants of pulp are present in canal they may be carefully removed at this time, care being used to avoid forcing septic matter or instrument thru foramen. Carefully dry canal with sterile paper points. Moisten point or points with best quality of beech-wood creosote, and place in canal, being careful

not to force thru, or at this treatment, quite to foramen. This treatment may remain three days.

Fourth Treatment—Isolate tooth and sterilize field and instruments. If, upon removal of dressing, there is a distinct odor of the mediciment present the canal may be carefully cleansed and enlarged, made cone shaped in form, at this time using phenol-sulphonic acid, neutrilizing it frequently with the sodium bicarbonate. Introduce the bicarbonate carefully, so that during the reaction it may freely escape into the pulp chamber.

Following the cleansing and enlarging of the canal, another treatment of beech-wood creosote introduced on paper points is sealed in the canal. This may remain five days, or for a slightly longer time.

Continue such treatments until a minimum of six have been given the tooth. Place the root filling two to three days following the last treatment. *Check all root fillings* by making radiograms to determine if foramen has been thoroughly sealed.

Putrescent Pulps with Peri-apical Involvment

When the tooth with putrescent pulp has advanced to a point where the peri-apical area becomes involved with pus formation, surrounding tissue perhaps swollen and painful, with marked pericementitis, relief cannot be expected until the pus has been given a means of escape. While it is sometimes necessary to administer an anesthetic and establish drainage by opening into the peri-apical area, most cases can be successfully treated by an opening thru the crown of the tooth. If the size of the foramen will permit the pus to escape into the canal relief is quickly given. If the foramen is too small to permit its escape, it must be enlarged. Many times the discharge can be absorbed by using the sterile paper points and the tooth treated as one with putrescent pulp, sealing a mild dressing of formo-cresol in the pulp chamber.

In other cases, with marked suppuration, it is necessary to leave an opening into the pulp chamber for several days to permit the pus to escape. This opening should not be

large enough to permit food to enter the pulp chamber. The size can be controlled by sealing the cavity with cement and making an opening thru it.

When the patient returns for further treament, remove the cement, remove debris from pulp chamber with excevators, absorb moisture in pulp chamber and treat with mild formo-cresol. Seal with cement. If two or three mild dressings of formo-cresol are placed in the pulp chamber it will reduce the infection in the canal, thereby reducing the possibility of a re-occurence by accidently forcing it thru foramen. In all such cases following the sealing of the first treatment, strict asepsis must be maintained.

It is necessary in some cases of this type to use the sterile paper points to absorb any pus remaining in the *peri-apical area.* This will many times expedite the treatment. When this is done the point should not be permitted to pass into the area far enough to come in contact with and cause any injury to the surrounding tissue. I have treated many cases, especially the anterior teeth, with large peri-apical involvments, and I believe the great majority of cases have been successful. It must always be remembered that a large peri-apical involvment does not of itself mean a large amount of virulent bacteria. A small amount of infection *plus a severe trauma* will cause a very dark area to appear on the negative, and so long as the tooth is subjected to trauma failure of regeneration is as certain as night follows day. So correct it before treatment is started and if a restoration is placed see that the occlusion is correct.

In treating teeth with large peri-apical involvments, after the first three treatments extend the time between treatments to one, two, and three weeks, giving them ten or twelve treatments before filling the canal.

Partial Vitality of Pulp

In multirooted teeth we frequently find the pulp tissue is gangrenous in the canals of the mesial root and vital in the canal of the distal root, or the reverse, as the case may be. To seal one medicement in the pulp chamber will cause pain. It is my practice to locate the vital pulp and place a small pledget of cotton moistened with phenol compound over it

On this I place a small, a minute, amount of devitilizing paste. Formo-cresol dressing is then placed over the entrance to the other canal, and the cavity sealed with cement for twenty-four hours.

The second treatment consists of removing the dressing, and placing a small amount of iodin over the area nearest the vital pulp to destroy the action of any remaining devitilizing paste. Mild formo-cresol dressing is then placed in the pulp chamber and sealed with cement. This is permitted to remain two or three days.

The third treatment consists of partial cleansing of the canals, the use of a more mild anteseptic in the canal from which the partially vital *infected* pulp has been removed and beech-wood cresote in the others.

I believe where conditions of this type occur we are justified in using a devitilizing paste, the only place its use is justified. The final results are far better than the possible forcing of infection into the peri-apical tissue when anethesia is used.

The treatment is continued as previously described under the treatment of teeth with putrescent pulps, always using a more mild antiseptic in the canal or canals from which the partially vital pulp was removed.

Teeth with Defective Canal Fillings

I have always considered teeth of this type as being infected and treat them as a tooth with a putrescent pulp. The first two treatments formo-cresol is used. The third treatment consists of carefully removing the old root filling, an easy task if gutta percha was used. Xylol is used to disintegrate the gutta percha. It is then absorbed with sterile paper points, being careful not to force it thru foramen. This is followed with a treatment of beech-wood creosote, carried into the canal on paper points. The canals are then opened. It is many times more difficult to locate the fine canals in molars, where a previous attempt has been made to treat and fill them. When the canals are prepared the beech-wood creosote treatment continues until they are ready for filling.

When filling the canals of teeth where the pulp has died, the result of infection, or trauma, it is my practice to dissolve at least one-half of a gutta percha point in the apical area. The first piece of point is then forced to place and the excess chlora percha is removed with paper points, and the filling completed. This is done to seal other than the large foramen, should others be present.

If after having made several attempts to locate and open the fine canals, and failed. I use Howe's Silver Reduction Method and at the next appointment finish the filling with gutta-percha.

Formo-cresol has been severely criticised when used in the treatment of teeth on account of its escharotic action, and justly so, when improperly used. When properly used in the early treatment of teeth with putrescent pulps, and in teeth that are being retreated it is invaluable, and I know of no mediciment that can replace it. It should never be used in large quantities, nor introduced into the canal on paper points or cotton, remembering that it is the formaldehyde gas, modified by the addition of cresol, that neutralizes the gases, the result of bacterial decomposition of the pulp, and destroys bacteria.

In the treatment of teeth with putrescent pulps it should not be used more than two or three times, diminishing the amount used each time.

Beechwood creosote of good quality is slightly caustic in action, and a splendid disenfectant when used alone or modified by addition of iodin or creosote eugenol compound.

In the selection of a drug for the treatment of infected teeth, if the treatment is to be successful it must have other properties than being a good disenfectant. It must, if peri-apical regeneration is to occur, have the property of attracting the white blood cells to the area, and it is to this quality, that by extended treatment using a point or points moistened with beech-wood creosote and carried to the foramen thereby causing a mild irritation and stimulation that I attribute regeneration. When deliberately forced thru the foramen it will cause a severe pericementitis. Care must be used when treating the lower teeth with large foramen.

If the point carries more of the medicement than it can absorb the excess will pass thru the foramen and cause unnecessary discomfort to the patient.

SHALL WE ADVISE TREATMENT OR EXTRACTION?

This is a question that has caused serious concern to all of us. I shall not attempt to answer it here, other than to say that judging from experience, the one who makes the statement that a pulpless tooth can not be successfully treated, eliminated as a possible source of infection, is just as far from the truth as the one who says all pulpless teeth can be successfully treated.

I have treated pulpless teeth for the youth of twelve, whose health was greatly improved, following the treatment The oldest patient, with systemic involvment, was sixty-seven. There has not been a reoccurrence of this involvment since the work was done, about five years ago. Perhaps because it is more common or because more joint involvments are caused by oral infection, the larger percentage of systemic involvments successfully treated are of this type, with the age of the patients varying from thirty-five to sixty Successful treatment of the pulpless tooth is largely dependent on the resistence of the patient.

Decision to treat or extract can not be determined by an examination of the radiogram. Regardless of how the peri-apical area may appear, a complete history of the case must be considered. I treat many molar teeth with peri-apical involvment when the resistance is good and insist on extraction when it is low. This is not so important with the other teeth for they can be removed as a source of possible infection by curetage following the root treatment. This is also possible with the molars, but more difficult.

Curetage of the peri-apical area is not a short cut to success, but it is a positive way when, preceded by thorough treatment and filling of the canal. It is not a difficult operation and should be more widely practiced.