

An Aid in Successful Replantations and A Post Resection Canal Filling Technique

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A. POST RESECTION CANAL FILLING

The primary purpose of this paper is to present, first, a simple, rational technique of treating badly infected anterior teeth, devoid of the usual complicated and impractical procedures so commonly advocated. The second part deals with an improved replantation technique. Herein is a radical technique, based upon experience gained in over ten thousand cases, for conserving periapically involved permanent anterior teeth. This may include the bicuspid, providing they do not involve the sinus or mental foramen. Usual root canal procedures require time and prognosis questionable in selected complicated cases.

I. Definition

Post Root Resection Technique is one whereby, prior to the root canal filling, the periapical reservoir of infection is removed surgically and the canals filled before suturing.

The conventional method of filling the canal before resection has been quite successful in the retention of permanent anterior teeth. However, this method often requires a long drawn out series of root canal treatments before it is possible to get the canal dry enough to properly fill. In many of our minds there has always been some doubt about the sterility of the periapical area even after repeated treatments with drugs and electromedication. Our attempts to render the contents of a large infected periapical area sterile through the apical foramen of a tooth seem about as rational as trying to clean out a large room through the keyhole. If this be true, then our chances of success in this method of resection de-

pend largely upon a hermetically sealed root end in the presence of a questionable sterile periapical area—an area which may be at times a residual focus of infection.

We always face the questions (a) What are the chances of success if this technique is employed? (b) Should an attempt be made to save such teeth? (c) Can the cost of such treatment be brought within the reach of the average family's budget?

The answer to the first question is based upon over ten thousand cases performed on patients ranging in age from seven to sixty-seven years, indicating that over ninety-nine per cent of the periapically infected permanent anterior teeth can be saved by this technique.

Regarding the second question, Kronfeld¹ says, "Microscopic findings justify such an attempt—." These findings are substantiated by many others, among them men like Blayney², Coolidge³, and Hill⁴.

In the third question dealing with the cost of such treatment, we find that most periapically infected permanent anterior teeth can be successfully treated by means of root surgery at a cost within the average family's budget, if we employ a technique which consumes not over one hour to complete all the treatments necessary to assure a successful termination. The "Post Resection Canal Filling Technique" fulfills these requirements.

¹ Kronfeld, Rudolph: Histopathology of the Teeth, Text. Lea & Febiger, 1933, pp. 176-203.

² Blayney, J. R. & Wach, Edward C.: A Study of Tissue Repair Around Resected Root End, Dental Forum, 1924, p. 58.

³ Coolidge, Edgar D.: Root Resection As a Cure for Chronic Periapical Infection, J. A. D. A., 1930, Vol. 17, p. 239.

⁴ Hill, Thomas J.: Regen. of Periodontal Membrane After Root Curetment.

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Epstein¹ states, concerning endodontia, "The patient must understand that this work is exacting and the fee will be the same as for the restoration which would be required if the tooth were removed instead of being treated."

II. Advantages Over Conventional

Method

- a. Less danger of seepage of septic material from principal area at the time of root canal filling.
- b. Acute symptoms are less likely to follow.
- c. No pressure is transmitted to the periapical area during the condensation of the root canal filling.
- d. Facilitates condensation of gutta percha points.
- e. Less trauma, postoperative swelling, and less pain following.
- f. Absence of requirement for a negative culture.
- g. Less expensive, fewer visits and fewer radiographs are required. Many times it is impossible as well as impractical to completely stop seepage from a chronic, long standing, and extensive periapical infection. Furthermore, it is difficult, if not impossible, to get two consecutive negative cultures even after prolonged therapy in these cases. If the destruction of the periodontal membrane has progressed farther than disclosed by the radiograph, and the retention of the tooth is jeopardized, the tooth can be extracted without having wasted valuable time in prolonged root canal treatment.

III. Indications

- a. Any anterior or bicuspid tooth, requiring root canal therapy, when there is sufficient time to carry out the accepted routine treatment.
- b. Method of choice for a person in poor health, if root canal therapy is to be attempted.

- c. All devital single rooted teeth with infected periapical areas, granulomas, or radicular cysts. Granulomas and cysts seldom, if ever, undergo spontaneous resolution. The capsule must be removed by surgical means. If allowed to remain, these residual areas of infection are of great danger to the patient.
- d. Cases which do not respond to usual treatment in a reasonable length of time; that is when the root canal cannot be dried or made bacteriologically negative.

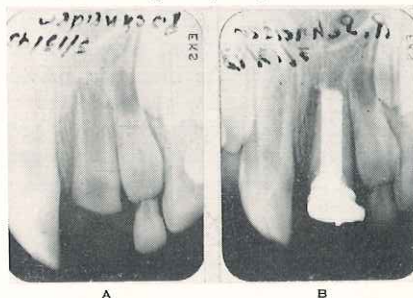


Fig. 1.—A. Accidental fracture of crown on permanent central incisor below gum on seven-year-old boy.

B. After resection and root canal filling.

- e. Where crown is broken off and impossible to place a rubber dam (Fig. 1).
- f. Teeth with perforated root canals.
- g. Anterior teeth in which the pulp has become necrotic before the root was completely formed, resulting in a large apical opening.
- h. Foreign bodies in the apical end of root canal, such as broaches or reamers (Fig. II).

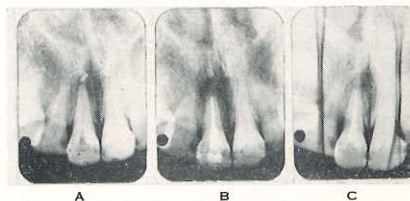


Fig. 2.—A. Broken instruments in canal.

B. Following post root resection.

C. Periodic check-ups, three and six months later.

¹Epstein, Irwin A.: The Opportunity for Root Canal Therapy, Northwest Dentistry, October, 1944.

- i. Curved roots that are difficult to fill completely.
- j. In teeth, which were unsuccessfully treated and filled by another technique, one may be justified in attempting a "Post Resection Canal Filling."
- k. Overfilled or underfilled, partially obliterated and obstructed root canals.
- l. Devital teeth, having apical third fractures or supernumerary buds in proximity of periapical area, which may be removed easily at this time (Fig. III).

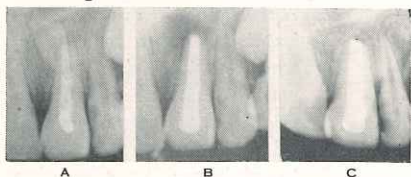


Fig. 3 — A. Improperly filled canal which proved unsuccessful (notice supernumerary tooth).
B. Correction — removal of supernumerary tooth and condensed filling of canal during resection.
C. Recheck—note lamina dura regeneration.

- m. To prevent the collapse of space when a person is too young for bridgework.

IV. Contraindications

- a. Loose teeth in which the alveolar process has been destroyed and deep pockets are present.
- b. Teeth that have the root canals completely obliterated.
- c. Patients who lack interest in retaining teeth or are intractable.
- d. Patients having debilitating diseases such as migrating osteomyelitis, a blood discrasia or diabetes.
- e. When the etiological factor will not, or cannot be removed.

V. Steps in Order of Post Resection Canal Filling

- a. First visit with an acute infection.
 1. Take an accurate roentgenogram of the tooth or teeth involved.
 2. Open the pulp chamber on the lingual by means of a small diamond stone or sharp 33½ bur,

followed by a larger sharp bur. Meanwhile, if necessary, support the tooth by placing compound over labial surface, using thumb and first finger, or one may even tie a ligature around neck of tooth to counteract the pressure caused by the drilling, thus keeping the pain of pericementitis down to the minimum. If there is a point of fluctuation on the gingiva above tooth, it should be opened widely by means of a sterile scalpel. 25,000 Units of Penicillin, which is now available, may be injected subperiosteally in the palatal surface with good success. Carefully remove the pulp chamber and root canal contents with a broach. Flush the canal gently with Tri-Chlor (or Zonite or Dakin's Solution) alternating with 17 vol. hydrogen peroxide, using a glass hypodermic syringe with the point of the needle cut off. The needle should fit loosely so that there will be regurgitation when the solution is deposited, in order that necrotic substance from canal may be washed and irrigated out. Leave the canal open twenty-four to forty-eight hours or until the tooth is comfortable. Home treatment: Apply cold application, force fluids, may prescribe sulfa drug if conditions permit. Treat thereafter as a chronic case.

- b. First visit of patient with a chronic infection.

1. Preparation of tooth to be treated.
 - (a) Radiograph tooth involved.

The radiograph cannot be relied upon to give the entire extent of periapical bone involvement. Invariably, the periapical bone involvement is much more extensive than the radiogram would seem to indicate.

- (b) Apply rubber dam, paint area liberally with 2% Tr. of Iodine; using aseptic technique, open the root canal on the lingual surface. Enlarge the opening until it will admit a No. 6 round bur.
- (c) Flush the canal with a fresh solution giving off free chlorine, as described under treatment of acute conditions.
- (d) Remove the contents of the pulp chamber and canal with broaches, reamers and files. Enlarge the apical foramen by means of files. Quoting Fred Adams,¹ "Mechanical cleansing cannot be replaced by chemical sterilization—no antiseptic should be expected to disinfect more material than is necessary."
- (e) If available, one may apply electromedication, using Churchill's Iodine as an electrolyte. Harry B. Johnston,² Grossman & Prinz,³ Girardot,⁴ Sommer,⁵ and many others too numerous to mention here, are all unanimous in that electro-medication for the sterilization of root canals is the method of choice in 1935. However, the reason electro or ionic medication is used in this technique is mainly to cause stimulation of the local tissue by the faradic current to hasten phagocytosis and reduce inflammation. We have found that post-operative swelling and pain is greatly

reduced by this pre-operative therapy. Flush with Tri-Chlor. Place a sterile J & B absorbent point saturated with Formocresol into the canal and seal with zinc oxide and eugenol cement.

- (f) After the tooth has been prepared as above, one may continue with resection and filling, or the patient may return in twenty-four to forty-eight hours, if time is limited.

c. Post Root Resection Proper

1. Preparation of the patient.

- (a) Premedicate with Elixir Nembutal in order to alleviate apprehension and produce mental quietude and cooperation. Dosage: one teaspoonful for each five years of age in children; usually about four teaspoonfuls for 125 lbs. in adults. When using pre-medication, the patient must always be accompanied home and not allowed to drive an automobile.
- (b) Face is washed with soap and water followed by 70% alcohol. Keep the alcohol away from the patient's eyes.
- (c) The hair is covered with a sterile towel. An exodontia apron is placed over the front of the patient, and a sterile towel, used as a bib, is placed over the apron.
- (d) Mouth is sprayed with solution of merthiolate 1:1000, or patient may be given one sulfa gum tablet to chew fifteen minutes earlier.

2. Aseptic technique must be used throughout the operation.

- (a) All instruments, including handpiece sheath, that are to be used, must be sterilized immediately before use and placed in proper order on the

¹ Adams, Fred R.: Penicillin in Pulp Canal Therapy, Dental Items of Interest, Dec., 1944.

² Johnston, H. B.: Imp. Status of the Pulpless Tooth, J.A.D.A., Vol. 25, March, 1938, pp. 429-442.

³ Grossman, H. I. and Prinz, Hermann: Comparative Study of Root Canal Therapy with Elec. Steril., Dent. Cos., Vol. 74, Apr., 1932, p. 327.

⁴ Girardot, R.: Ther. Treat. of Root Canals, J.A.D.A., Jan., 1935, p. 71, Vol. 25, April, 1939, pp. 595-601.

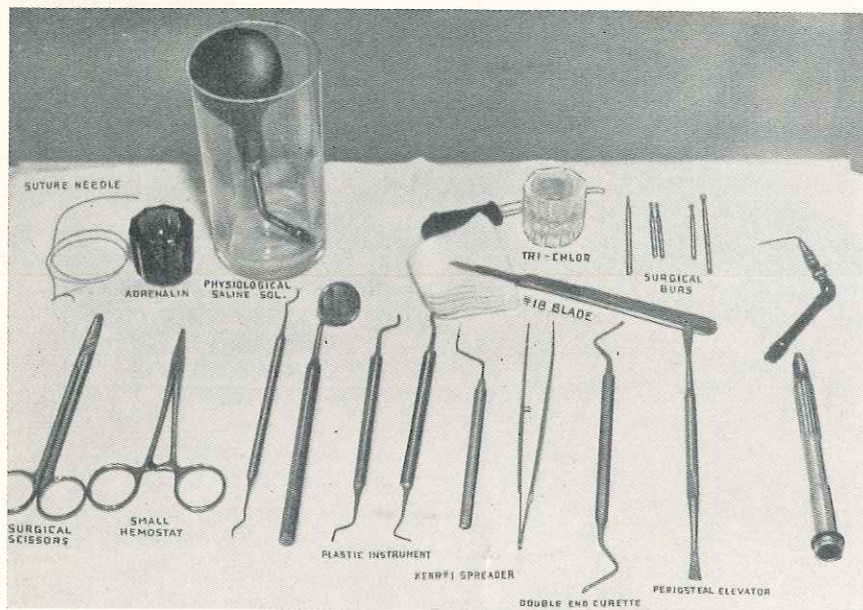


Fig. 4—Set-up for root canal therapy.

instrument tray and covered with another sterile towel (Figure IV and V).

- (b) The operator must scrub, and gloves may be worn for self protection. The operator must be careful not to touch anything outside the field of operation in order to avoid contamination.
- (c) The dental assistant handles all unsterile equipment and makes adjustments.

3. Operation

- (a) Anesthetize completely¹ the area to be included in operation, using a 2% procaine, 1% butyn, 1½% monoccaine, or other suitable anesthetic solution, making it more lasting and profound by fortifying it with the addition of two drops adrenalin (epinephrine) hydrochloride solution 1:1000 to each c.c. *Maxillary anterior*

teeth: Subperiosteal injections are made on the labial surface over the entire length of the indicated incision, depositing from 1 to 1.5 c.c. Subperiosteal injections are also made into the palate over the apices of the teeth to be resected. Deposit ¼ to ½ c.c. into the naso-palatine canal.^{2,3} The palatal injections keep a reserve supply of solution for the area when the labial tissues are drawn away from contact with the periapical area.

Mandibular teeth: Use bilateral mandibular block in-

¹ Maxmen, Harold A.: Anesthesia for Periapical Curettage in Endodontia by Means of Subperiosteal, Nasopalatine and Mandibular Block, *Dental Items of Interest*, Dec., 1947.

² Phillips, W. H. & Maxmen, H. A.: Nasopal. Block Inj., *Amer. J. Ortho. and Oral Surg.*, Aug., 1941, pp. 426-434.

³ Phillips, W. H. and Maxmen, H. A.: Local Anesth., *Dent. Items of Interest*, July, 1941, pp. 620-638.

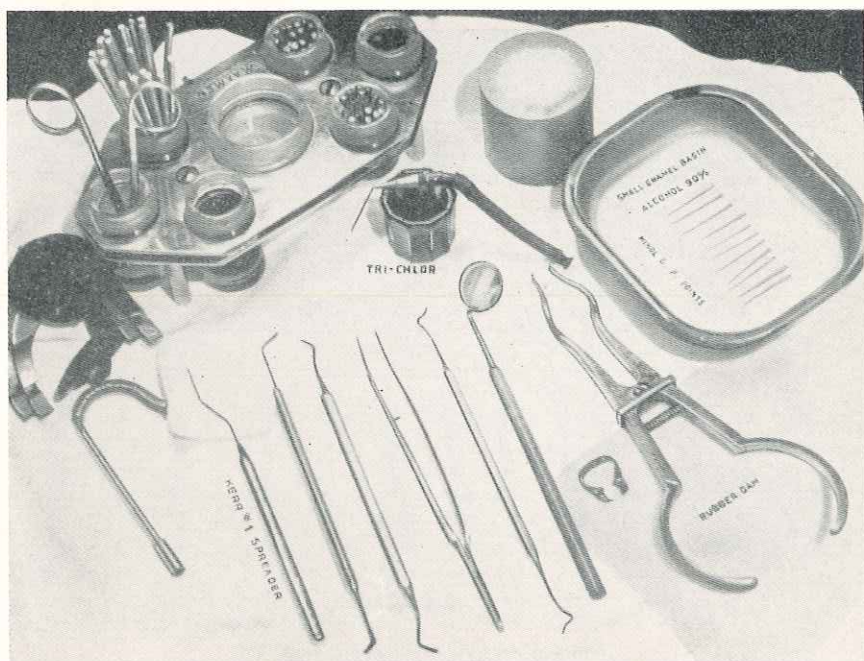


Fig. 5—Set-up for post root resection.

jections, supplemented by subperiosteal labial injections, using the fortified anesthetic, deposit 1 c.c. solution over apices of teeth to be resected. Cover the entire extent of the incision. Do not wait longer than two minutes before making the incision.

- (b) Using a Bard-Parker blade No. 15, make an incision, slightly curved, not less than one inch through the mucoperiosteum to the bone. The incision is made incisally to the point of resection as shown in the x-ray, but not

too near to gingival border. Make the incision long enough so that the flap will not be traumatized during the periapical curettage. Any fistula is included in the incision (Figure VI).

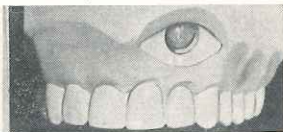
- (c) The flap, including the periosteum, is carefully and freely peeled back from the bone by means of a periosteal elevator and held back with the same instrument (Figure VII).
- (d) Apply adrenaline chloride 1:1000 for a minute on small squares of gauze to check hemorrhage.



Fig. 6—Incision for lateral requires at least enough length to cover adjacent teeth. Incision for bicuspid: We prefer a vertical incision over one tooth anterior and along free gum margin of adjacent posterior teeth.



Fig. 7—By means of periosteal elevator, the flap is retracted from the labial plate of bone. Fig. 8—The area of periapical necrosis is often apparent because of the bulging, thinness or perforation of the overlying bone.



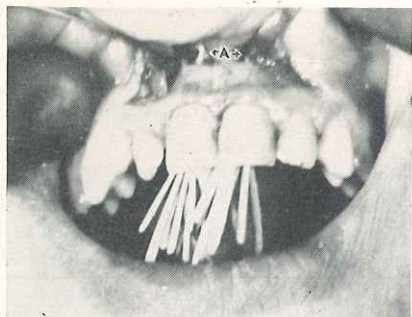


Fig. 9—Gutta percha points protruding through amputated or curetted end of roots. Note also large number of gutta percha points used in sealing each root canal—from twelve to twenty fine points are used for each canal.

(e) Often the area of periapical necrosis is apparent because of the bulging, thinness or perforation of the fistula of the overlying alveolar bone. A window is made by means of a sterile Hennehan surgical bur No. 42, and a double ended curette is used to remove over-lying bone (Figure VIII).

(f) Being guided by the x-ray and sterile explorer, determine the point of sound periodontal membrane. Using a sterile cross cut fissure bur No. 559, cut off the root with a flat or an oblique cut depending on which side of the tooth has the membrane more destroyed, or curette if necrotic tissue can be removed

entirely without disturbing root. Dr. Hyman Pearson of Montreal makes a good statement in a paper¹ of his: "A good rule to follow is to use that technique (resect or curette) which will result in the conservation of the greatest amount of healthy tissue by the elimination of the diseased tissue designed to encourage the speediest recovery." Flush with chlorine solution followed with sterile normal saline solution.

- (g) The root and the necrotic periapical tissue is dislodged and removed en masse by means of a curette and hemostat. The root is then smoothed with a sterile round surgical bur.
- (h) Check for complete removal of all pathologic debris.
- (i) Smooth bone cavity of sharp and rough edges by means of the sterile round bur. Flush bone cavity again.
- (j) Place a square of sterile gauze moistened with alcohol into periapical space.
- (k) Remove the zinc oxide eugenol cement filling. By means of a broach, remove the J. & J. point. Flush the canal with chlorine solution. The canal is then wiped with sterile point dipped in phenol, followed with a few dry points.
- (l) Select the largest sterile gutta percha point that will reach through the amputated end. The Gutta Percha point is dipped in Kerr's sealer, carried and forced into the canal under pressure by means of a Kerr No. 1 or No. 2 spreader. Additional points

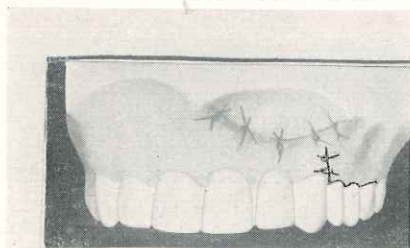


Fig. 10—Interrupted dermal sutures usually suffice to hold the flap in place.

¹ Pearson, H. H.: Curette or Resect? J. of Con. Assoc., Oct., 1948.

are carried and condensed until no more can be placed, thus producing a hard, dense core of gutta percha hermetically sealing the canal (Figure IX). A warm ball burnisher, Cleve-Dent No. 25, is used to compress the gutta percha at the end of the cut root and thus insure a good seal. Remove sponge from bone cavity.

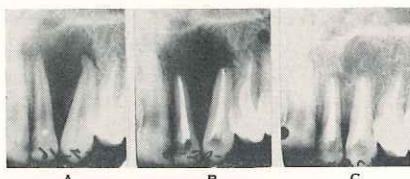


Fig. 11—A. Case of radicular cyst. The involved teeth are shown "A" before, "B" immediately after treatment and "C", one year later. Note that the teeth pushed apart by pressure of the cyst resumed their normal position.

- (m) Wash out the bone cavity with boiled Physiological Saline Solution, followed by an eye dropperful of fresh Tri-Chlor, followed again by Saline solution.
- (n) Examine the bone cavity for gutta percha, Kerr Sealer or bone debris. A rapid process radiograph at this time is advisable if any doubt remains.
- (o) Blow in sterile Penicillin sulfanilamide-sulfathiazole powder, place a few drops Tri-Chlor in the cavity. (Halogens appear to have a synergistic action with the sulfa drugs.)
- (p) Sufficient blood is drawn to fill the cavity by slightly irritating the surrounding soft tissue with a curette. The flap is replaced and sutured, using a No. 18, half round cutting edge, surgical needle. The sutures must pass through sufficient bulk of tissue, in-

cluding the periosteum to hold without cutting the tissue. Particular attention should be paid to suturing the mandibular incision together (Figure X).

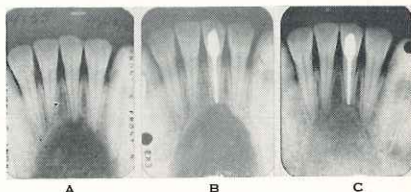


Fig. 12—A. Acute alveolar abscess with marked cellulitis.
B. After post root resection technique. Biopsy showed large granuloma and not a cyst. Adjacent teeth tested vital.
C. Ten months later—complete healing.

- (q) The excess gutta percha from the pulp chamber is easily removed by dampening the surface with eugenol and forcing a hot plastic plugger inward. When the plugger is removed, the surplus gutta percha and Kerr Sealer will adhere to it. Fill Chamber with zinc oxide and eugenol cement.
 - (r) Take a radiograph of the area operated.
4. Post operative care.
 - (a) Send patient directly home. Advise ice bag over area operated, during first twenty-four hours, to keep swelling down to a minimum. Wash mouth with warm saline solution every two hours. Force fluids and advise soft diet.

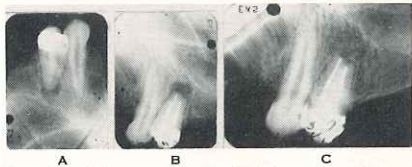


Fig. 13—A. Bicuspid with fistulous tract. Treatments consisting of antibiotics and camphorated mono-chloro-phenol did not stop discharge and swellings.
B. Resection followed by immediate root canal filling with silver points, followed by suturing.
C. Six months later.

Prescribe hypnotic and analgesic drugs.

- (b) Have patient return in three days for a progress examination. Clean incision and remainder of oral cavity with saline solution and sterile cotton. Apply 2% Tr. of Iodine.

(c) Remove sutures in ten days.

- (d) A progress radiograph is taken three months later, and further progress radiographs are taken every six months. Bone regenerates normally in the periapical area within six months in approximately 99% of periapically infected teeth which have been resected by this method (Figures XI, XII, XIII and XIV).

use of radiogram.

2. PROFOUND ANESTHESIA
3. FREE and UNOBSTRUCTED ACCESS
4. THOROUGH CLEANSING OF CANALS
5. STERILIZATION
6. USE OF COMPACT FILLING
7. RESECTION or CURETTMENT where necessary
8. USE OF SURGICALLY CLEAN technique from start to finish

B. REPLANTATION OF LOST TEETH—AN AID

Definition

- a. Replacement of a tooth, in its original alveolar socket, which the host has previously lost by accidental means.

Technique

The following technique, which has been used during the past five years, has proved successful. We believe this is primarily due to the elimination of the air pocket that is present in the apex of the alveolar socket when the root of a tooth is forced into it. Also an aseptic technique is followed which is similar to the above described technique.

- a. X-Ray tooth and also socket, for any defects.
- b. Wash teeth with soap and water and submerge in sterile saline solution.
- c. Under strict aseptic technique, open tooth from lingual into pulp chamber, being careful not to destroy or remove any periodontal membrane.
- d. Remove pulp by means of broaches, instrumentation, follow by flushing

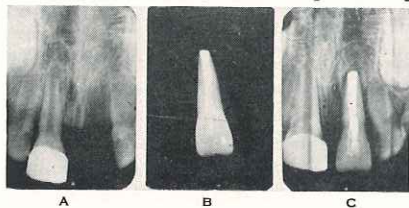


Fig. 15—Replantation.

A. Alveolus. B. Root filled from apex.
C. Radiogram one year and six months later.

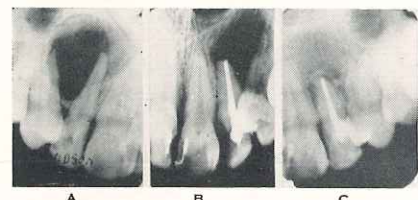
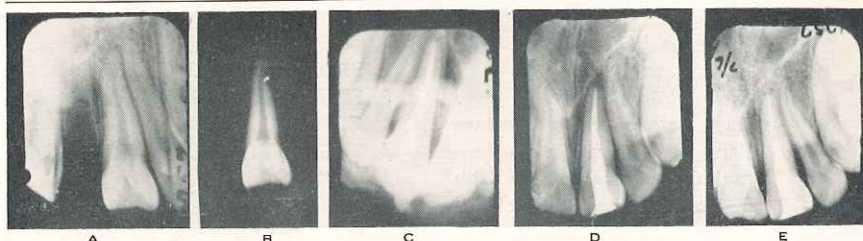


Fig. 14—A. Palatal abscess involving lateral incisor.
B. After post root resection performed from palatal surface.
C. Radiogram one year later shows nice regeneration of bone.
Note—No radiolucent zone is present as is often the case.

VI. Upon many occasions we have found, within a few days after periapical curettage and root canal filling, a marked improvement in various systemic conditions which are commonly attributed to focal infection.

In conclusion, this is not to be considered a "short cut" technique, because the recognized cardinal principles of good root canal surgery are closely adhered to; but rather a means of taking the guess work out of questionable teeth to be saved. The Cardinal Principles of Root Canal Therapy have been followed—

1. DIAGNOSIS, which includes the



A. Alveolus.
B. Lost tooth.

C. Compound splint.
D. One week later.

E. Two years later. Note regeneration of bone.

with Tri-Chlor.

- e. Over-fill canal with Kerr Sealer and Gutta Percha points by means of Kerr Spreader No. 1. Occasionally, in a very young, underdeveloped permanent anterior tooth, the pulp can be removed from the apex and filled from the apex as demonstrated in X-Ray (Figure XV).
- f. Cut off excess gutta percha, smooth apex of tooth a bit.
- g. Re-submerge tooth in 70% alcohol or Sol. Merthiolate.
- h. Prepare patient same as for resection.
- i. Anesthetize area using fortified anesthetic solution.
- j. Make semi-lunar incision, retract flap, place adrenalin chloride 1:1000 pad for one minute.
- k. With surgical bur, perforate labial bone into apical portion of alveolar socket.
- l. Using double end curette, remove old blood clot from socket; flush with Tri-Chlor and sterile normal Saline solution. If perforation is complete, the irrigation will flow freely through both openings.
- m. Curette socket again to establish free flow of fresh blood to fill socket.
- n. Place tooth back into socket—very little pressure needed because compressed air has escaped through perforation.
- o. Dust with sulphanilamide and suture.
- p. Oil teeth and make compound matrix splint where necessary.
- q. X-Ray and prescribe same post-operative care as for resection.

r. Remove splint in a week to ten days.

III. ADVANTAGES OF PERFORATING APEX OF SOCKET IN REPLANTATIONS:

- a. Auxiliary opening allows escape of trapped air and infected fluids which otherwise would have to be forced up into the cancellous structure beyond.
- b. Does not necessitate removing large portions of root, in order to have crown go into position in relation to other teeth.
- c. After flaps are sutured, there is a tendency of the tooth to be kept in the socket by means of a negative pressure or vacuum.
- d. Later, blood around tooth breaks down into fibrous connective tissue and new bone, as shown by the progress radiographs (Figure XVII).
- e. If periodontal membrane is not destroyed, the resorption of root would not take place.
- f. If periodontal membrane is destroyed, resorption may progress slowly, but tooth is retained for 4-10 years.



Fig. 17—Replantation—thirteen-year-old boy.
A. Acute abscess, both central and lateral loose and devital. Had been under treatment for the past year.
B. During resection, we found very little bone support around lateral and tooth came out in hand. Tooth filled out of mouth and replaced in what socket was left.
C. Three years later. Note regeneration of alveolar crest between lateral and cuspid.