

THE PROBLEM OF PULPLESS TEETH UNDER MILITARY CONDITIONS¹

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INTRODUCTION

No profession jumped to the colors of our country with more promptness or greater enthusiasm than the dental profession. This response to the nation's call was actuated by the profession's recognition of the tremendous importance of good dental service for the fighting men. The importance of securing such benefits was convincingly demonstrated by the dilemma in which the forces of the European belligerents found themselves soon after the outbreak of the war. We learned of the dental sufferings of the men while on the march and in the trenches, and we know of the serious epidemic of so-called "trench mouth" which cost the British army, particularly, tens of thousands of effectives at a time. The proportion of soldiers on the sick list due directly to dental causes was extremely high. The number of soldiers incapacitated because of secondary infections from primary dental foci, and indirectly from lowered systemic resistance due to dental auto-infections, must have been very great. Every American dentist had undoubtedly become acquainted with

¹ Presented at a meeting of the First District Dental Society of the State of New York, on March 31, 1919. See p. lxxxi of the section on Proceedings of Dental and Stomatological Societies for a discussion of this paper.

these facts, and at some time or other had said to himself, "These preventable sufferings and ailments must not be visited upon our Americans if they are ever called upon to fight." Possibly this thought was the power behind the wonderful response of the dental profession to the country's call.

We are fundamentally a peace loving people. We desire to live and are willing to let live. Consequently all our industries have been organized on a peace basis. Our professions likewise have educated, progressed and practised, upon a peace basis, and have always been spared the necessity of turning around from time to time for an over-the-shoulder glance for possible war clouds. So we have traveled along for years, only to become involved in the most gigantic struggle of all time, for the greatest stake of all time, and suddenly to find that all our industries and professions must be reorganized and reconstructed to meet the new situation.

Naturally, at such a time, exceptionally difficult problems must be faced; and every phase of life is involved in their solution. Capital has its worries, and so has labor; manufacturers have their problems of grand-scale production; engineers are confronted by construction developments on a staggering scale. Physicians have their many prophylactic and epidemic problems, and surgeons their worries over new forms of infection and restoration. All these complex questions, which demand answers, often try the very heart and soul of those responsible; and tax resourcefulness and courage to the limit.

Our great American dental profession first had to increase the army dental corps from about eighty-five officers to over five thousand. We had to secure supplies for these men at a time when instrument makers were overwhelmed with orders, and our importations had been stopped. The construction of dental infirmaries by the score was necessary. These five thousand new officers of the dental corps required instruction not only in some of the developments in war dentistry, but also in necessary military subjects. We had to instruct a certain number of officers in jaw and plastic surgery, with a very limited number of qualified instructors available. All these problems were material ones of organization, but we also had our operative problems, just as did the medical profession. Many of these problems have been solved but some are still unsolved; and

these are going to require knowledge, foresight, and courage, to bring them to a solution, in keeping with the best interests of the military service and with the scientific reputation of the American dental profession.

The officers of the dental corps of the United States army have not only their dento-military problems, but also problems of operative procedure and practice which are common to their civilian confreres. It is natural, and to be expected, that the most perplexing question before the entire dental profession should be, also, the most trying of all the problems before the dental corps; and so it happens that the dental officers of the United States army have become squarely confronted by the problem of the treatment of pulpless teeth.

At the close of a paper read by me in December, 1916, at a meeting of the First District Dental Society of the State of New York,² I presented a series of conclusions regarding the problem of pulpless teeth. So wide a difference of opinion, on the various points in that paper, was shown after its publication that it seemed hopeless ever to obtain anything like unanimity of thought on any one of the questions involved. However, after a careful analysis of all the arguments presented on the various points in that paper, it has seemed to me that, while it is true that there are many important questions involved in the problem of the treatment of pulpless teeth, the answer to most of them depends upon the answer given to one basic question which is: "*Do you accept the theory of the causation of secondary infections from primary dental foci?*" I maintain that all the other questions are subsidiary, because a dentist's acceptance of this basic principle necessitates his acceptance of all of those principles of practice which tend to eliminate all possibilities of the operative causation of a primary dental focus of infection.

The writer believes that, if the majority of the profession was willing formally to accept or reject the focal infection theory, on the basis of available scientific data and clinical proofs, the great bulk of the profession would forthwith accept the decision. However, inasmuch as the acceptance of this theory carries with it the obligation to practise it, and since there are many ulterior considerations

² Palmer: The new era in dentistry; its relation to the increase in malpractice lawsuits. *Journal of the Allied Dental Societies*, 1917, xii, p. 1.

involved, it seems impossible, unfortunately, to secure approval of the theory on clear cut scientific lines.

Strange as it may seem, public opinion in this case is considered by the profession in its judgment of a purely scientific theory. It is an unfortunate complication and a very serious one; and it cannot be overcome by the mere statement that such a situation should not exist. This same public has been through two stages of dental education and is beginning the third. First, the public was educated to call upon a dentist whenever a tooth ached; and it seemed as if it was in order, in those earlier days, to resort to the wholesale extraction of vital teeth and to replace them with dentures "which would never ache." Next, the public was instructed with great and unceasing effort to the end that a tooth was a most important factor in digestion through its masticating function, and that under no circumstances should a tooth be extracted just because it ached or was badly decayed. Under the influence of this guidance patients became accustomed to visiting dentists week in and week out for months of treatment for the purpose of avoiding the extraction of a tooth. This has been the schooling of the present generation. In practice this plan has been carried to the extreme of dentists strongly urging the retention of necrotic teeth in the arch, year after year, indefinitely. The present difficulty with the public has been caused by the teaching of our profession that "a tooth should be retained in the mouth as long as it is comfortable and is strong enough for masticating purposes." So, we have a public with an ingrained horror of the extraction of a tooth which is causing no pain.

The acceptance by a dentist of the theory of dental foci of infection frequently involves his instructing a patient to have extracted an apically diseased tooth which, to all outward appearances and to sensation, is *in the patient's opinion*, a "perfectly good tooth." Insistence, by the dentist, often results in the patient's believing him lacking ordinary dental skill and experience. Unfortunately, only too often such patients consult other dentists, who, I must blushingly admit, in many cases sum up the first dentist's advice as "rot;" and then proceed to drug the inside of the affected teeth so that they will remain "*quiet for a period*," regardless of what may be going on at their apices.

The great majority of dentists, while practising their chosen profession as a life's calling, also practice it as a means of providing the necessities and also some of the luxuries of life. To practise a theory which, though correct, is unpopular, and contrary to the desires and opinions of the patients involved, is certain to result in many instances in a loss of practice. It is this unvarnished truth which, to a great extent, has prevented the acceptance of the focal-infection theory; for, as previously stated, the acceptance of this theory means, *to a conscientious man*, its practical application as well—and the practise of it today undoubtedly means the loss of a part of one's clientele. Therefore, the tendency is to avoid the necessity of practising the theory by not accepting it; to fight and argue against, and to scoff at, the theory; and to ignore the clinical evidence that supports it and proves that it is true.

With the foregoing explanation it is interesting to classify, if possible, the dentists who support and those who oppose the theory. Those opposed are the younger members of the profession, who dare not accept it because they do not enjoy the unlimited confidence of their limited number of patients; and also the older members of the profession, who have not had a bacteriological education, and who have become "set." The great body of dentists who have accepted the theory are the middle aged, more or less independent practitioners, whose patients have every confidence in them. This classification must be considered as a broad one, for there are numerous individual exceptions. Many very young and very old practitioners accept the theory, and many middle aged dentists reject it; but, generally speaking, the classification seems to hold.

The importance of this classification, as it affects the army dental service, rests on the fact that the largest part of this service is made up of dentists who, it is reported, have had an average of very few years of civilian practice before being commissioned, and who therefore fall into the class of the very young practitioners who, in civil life, find it economically difficult to put into practice our modern theories of the treatment of pulpless teeth. Therefore I may state that the biggest part of the army dental corps is now composed of dentists who are not accustomed to practising apicodontia with that extremely thorough, time consuming technique which our scientists

have decreed as essential to the safety of health and life. This point is emphasized by the fact that the most common excuse given by dentists for failure to practise scientific apicodontia does not apply in the army, for there the dentist is remunerated by the government and not by the patient. In the army the dentist is the sole judge of the operative procedures, and the type of operation which he selects is the one which will be performed. Therefore, as there is no economic question involved, we can approach the subject of the treatment of pulpless teeth for soldiers in the field with but one clean cut issue before us, that of scientific correctness of practice and the effect of that practice on the efficiency of the army.

Ill health impairs the efficiency of an army. Septic teeth produce ill health. Non-aseptic and incomplete apicodontic operations produce septic teeth. Therefore we are led naturally, directly and uncompromisingly to the following axiom, which should govern the work of the dental corps of the army: "Eradicate existing dental infections—cause no dental infections."

THE AUTHOR'S PLAN FOR DIVISIONAL DENTAL SERVICE

In May, 1917, previous to accepting a commission in the dental corps, I had been assured, by the Chief Surgeon and the Division Surgeon of the New York Division, that I not only would be given the responsibility to organize the dental corps of the division, but also would receive their coöperation in putting into effect the following program, which I believed necessary in order to secure efficiency in the dental service of the division.

1. Superficial examination of the entire division for the purpose of securing the names of the men having teeth obviously requiring extraction, this examination to be made company by company.
2. Extraction operations for the men listed as a result of this examination, these men to be sent to the organization dental infirmary in groups.
3. Upon the completion of all the necessary extracting indicated in an organization, a second and similarly conducted examination to be made for the purpose of listing those soldiers having teeth with deep cavities approximating the pulp.
4. Filling of all such teeth (3).

5. Detailed examination of all soldiers, in the chair, and completion of any dental operations indicated, such as superficial cavities and cleanings. If possible roentgenographic examination of any suspected devitalized teeth should be made at this time.

The strength of the foregoing program rests in the fact that apico-dontic toxic absorption, the most powerful dental influence on health and resistance, would be eliminated first and at the earliest possible moment, and the dental condition of the *entire division* would be greatly improved *at once*. Then, the filling of dangerously deep cavities next would result in the conservation of thousands of pulps. The accomplishment of these first two steps would practically eliminate the conditions which cause the greatest suffering while on duty. If, instead of adopting the foregoing program, we had placed the soldiers, as they arrived, in chairs and performed all the operations necessary to put their teeth in a state of perfect repair, the result would have been twofold. First, at the end of a stated period, comparatively few men would have been in perfect condition dentally; second, while these few men of the organization were having this work performed, the thousands constituting the great majority would have been suffering from local infections, secondary infections, the loss of vitality in thousands of teeth, and all the pain that goes with such conditions. Therefore, from the standpoint of the greatest good for the greatest number, in the shortest possible time, the program suggested meets all requirements.

It is not the purpose of this paper to discuss the various unforeseen difficulties which were encountered and which prevented execution, according to schedule, of the program contemplated. It is sufficient to remark that the obstacles were in the nature of (1) a very natural and understandable shortage of dental equipment that prevented us, for the first few months, from accomplishing much more than the relief of cases of "toothache" for the soldiers in most of the organizations of the division. (2) There was lack of coöperation on the part of some organization commanders; also opposition on the part of some medical officers (supported by some dental officers) to the stand taken against septic dentistry in the army.

As the officer in charge of the school of instruction for the division dental officers, I delivered a series of lectures on "primary and second-

ary dental infections," "essentials of aseptic root-canal operations," "teeth, health and war," etc. The object aimed at in these lectures was to create in certain quarters where it did not exist, and to strengthen in some quarters where it did exist, a recognition of the possibility of an improperly performed dental operation causing a serious condition of ill health. Upon inspection, several weeks later, it was found that septic root-canal work was being performed by about 60 per cent of the dental officers, so I formulated and had issued by the Division Surgeon, as official, the following memorandum, dated November 15, 1917, and signed: E. R. Maloney, Lieut.-Colonel, M. C.

THE "ROOT-CANAL BULLETIN"

From: Division Surgeon, 27th Division, U. S. A.

To: All Dental Surgeons, Camp Wadsworth, S. C.

Subject: Memorandum on dental root-canal operating.

1. Officers of the Dental Corps must realize that military dentistry is performed under conditions entirely different from those governing dentistry in civil life, and that the principles governing dentistry for soldiers at an army post in peace times cannot possibly be applied to dentistry for the soldiers of a mobilized division in the field.

2. Under present conditions, with the War Department exerting every effort toward training and equipping the country's soldiers for foreign service, at the earliest possible moment, and with the Surgeon General's Office exerting every effort toward conserving the health of the soldiers by prophylactic measures, and by strict sanitary regulations, it becomes necessary for the officers of the Dental Corps to adopt the following two principles which must govern their procedure:

- (1) Perform no dental operation, which, through being septic, may possibly offset and nullify all the efforts made to conserve the health of a soldier and keep him fit to fight.
- (2) Accomplish the greatest good for the greatest number in the shortest possible time.

3. Accordingly, root-canal operating must be abandoned in the field for the following reasons:

- (1) It cannot possibly be performed aseptically and thoroughly, and it must not be performed in the contrary manner, because of the possibility of establishing foci of infection in violation of the principle previously set forth.

- (2) Under ideal conditions, and with the most simple type of single rooted teeth, at least two and one-half hours ($2\frac{1}{2}$) of operating must be expended to properly extirpate the pulp, treat and fill the canal and insert the filling. The average time expended upon a molar tooth for the same operation probably exceeds five (5) hours. There are but eleven workably complete dental outfits in camp. Eight hours of operating are performed daily with each outfit, or four hundred and eighty-eight (488) hours weekly. If all this time were given to root-canal work, the maximum number of teeth which could have their pulp canals treated and be filled in a week of operating could not possibly exceed one hundred and fifty (150) and these would probably be in the mouths of one hundred (100) men. There are more than thirty thousand (30,000) soldiers in camp and probably half that number have pus-generating teeth, which should be immediately extracted. Probably twenty-five thousand (25,000) of the men have decayed teeth, which, if neglected for long, will result in devitalization and subsequent loss of them. To use the limited number of available dental infirmaries for root-canal work for comparatively few men, when so many others require immediate attention would be very unfair to the majority and would not work out to the best interests of the division. If we had double or even triple the number of dental outfits now available, this relative situation would not be changed.
- (3) As limited as the dental equipments are in camp and as poor as the present conditions are to work under, they are probably far superior to conditions which will have to be met abroad, and consequently as much work as possible should be accomplished here.
- (4) To have a man relieved from duty and instruction every day or so, for weeks, for root-canal treatment is not in keeping with desires of the War Department to have every man trained thoroughly at the earliest possible moment.
- (5) It is far better from the view-point of military efficiency to improve the dental condition of the whole division somewhat, rather than to put in an absolutely perfect condition, the teeth of one company of men.
4. Therefore, if the officers of the Dental Corps would accomplish the greatest good for the greatest number of men in the shortest possible time,

they must rid the fifteen thousand (15,000) men of their health-endangering septic teeth, and keep vital the teeth of the twenty-five thousand (25,000) men by filling them in time, rather than to operate many hours for a few men and in consequence, show no perceptible improvement in the dental condition of the division.

In explanation and substantiation of the foregoing memorandum the following statements are offered.

It must be apparent at once that some of the principles of practice which are followed in civilian dentistry must be abandoned in the army. For instance, in civilian practice we have only the interests of the patient to consider, whereas in military dentistry we have not only the interests of the patient, but the best interests of the army as a whole to consider; and, if what seems to be to the interests of an individual soldier appears to be contrary to the best interests of the army, then in times of stress the interests of the individual must be disregarded.

In peace times an organization and its dental officer are quite often at one post for a number of years. Consequently, there is not, at such a post, the urgent necessity that exists in war times for improving dentally an entire organization for field service at the earliest possible moment. My information is that, in peace times, the practice seemed to be to put in perfect repair the teeth of each soldier who reported to the infirmary.

The frequent and prolonged absence from duty of soldiers undergoing root-canal treatment is not conducive to that intensiveness of military training which the War Department had decreed as essential in order to get our troops ready for action at the earliest possible moment. Unfortunately, from the military viewpoint, root-canal involvements were not limited to privates, but were just as apt to be present in the mouths of drill sergeants and corporals, with a correspondingly increased importance. Even for short operations, it had been noticed, some commanding officers of organizations frowned upon visits to the dental infirmary when such visits resulted in the necessity of relieving a soldier from drill or duty. While in a sense short-sighted, this attitude had probably been caused by soldiers' imposing on the privilege.

The performance of septic root-canal operations in the army, at a time when all the efforts of the Surgeon General's Office are directed at

securing the *prevention* of disease, may be compared without exaggeration to a deliberate breeding and liberation of the anophiline mosquito in a camp where the medical authorities are bending every effort toward combating malaria.

Regarding the statement that root-canal operations cannot be performed for troops in the field, with due regard for asepsis and scientific thoroughness, there can be but little argument; and it is to be presumed that no one will advocate unscientific and septic root-canal operating under any circumstances. In the fall and winter of 1917, the 27th Division was, in every sense, a mobilized division in the field. The officers and men alike lived in tents in weather which touched zero; and some dental officers conducted infirmaries in tents without floors until winter was well under way. Those who were fortunate enough to secure infirmaries in corners of mess shacks, found it necessary the first thing in the morning to thaw out the medicines and water which had become frozen over night. One enthusiastic dental officer made a habit of taking his bottle of cocaine solution to bed with him, to keep it from freezing, so that he would be prepared early in the morning for any emergencies developing over night. For weeks at a time no alcohol was available as fuel for the alcohol stoves which had been issued for sterilizing purposes; and although oil was obtainable, we had no oil stoves, and chemicals were the only sterilizing agents we were able to use. Those operators who had wood stoves for heating purposes managed to get their sterilizers well warmed up occasionally but rarely could boil the water in them. It is known, of course, that many other camps were much better provided for; but it is also known that we were not the only division dental corps which worked under difficulties that winter. But, it may be suggested, these conditions no longer prevail. Now, many dental infirmaries are established in their own buildings and full equipment might be made available for the performance of scientific root-canal operations. Let us see just what the possibilities are along this line. The following is a quotation from my paper, "the new era in dentistry," previously referred to (1916).

"The x-ray apparatus is indispensable to correct root-canal operating. An initial roentgenogram should be made of *every* tooth requiring root-

canal treatment. One should be taken to show the completed work, and as many intermediary exposures made as may be necessary for guidance during the work.

"We know the serious systemic results caused by improperly filled canals. There is no way of ascertaining the thoroughness, or lack of it, in root-canal operating unless we use the x-rays. *Thorough and scientific root-canal results are dependent as much upon the x-ray apparatus, as upon the instrument sterilizing apparatus.*"

Let us say, then, that in the ideal and simple case, at least three roentgenograms are necessary. In the Base Hospital in each camp there is a roentgenologist who functions as such for the entire camp. He has all of the x-ray work for chest and abdominal cases, in addition to the cases of bone roentgenology; and such dental cases as obscure abscesses, antrum involvements, impactions, fractures, etc., for which it is imperative that we receive x-ray assistance in making our dental diagnosis. I venture to state that twenty-seven to thirty dental operators in a camp of the same number of thousands of soldiers, by performing a normal amount of root-canal work according to accepted principles, could alone keep one roentgenologist extremely busy. It is impracticable, therefore, under these conditions, to obtain x-ray service for root-canal work on a large scale.

The numerous reports filed within the last year, and other reports which I know are being compiled, indicate that ionization is essential to scientific apicodontia. Even under ideal conditions, in a well-equipped dental infirmary, just imagine the consumption of time which would be required daily in order to ionize and properly perform root-canal operations on an army scale. In civil life not one dentist in ten practices apicodontia aseptically and scientifically. The period of civilian practice for most of our dental officers prior to entering the military service is only a few years. It is not to be expected that the proportion of scientific operators will be much greater in the army than in civil life, where even the most prominent practitioners sense the necessity of receiving post-graduate instruction in this branch of the profession. It must be apparent that, even if granted every requisite in the matter of equipment, the dental corps must instruct its operators in the scientific technique of apicodontia before we can hope to have operations in this field properly performed in the army.

My contention regarding the consumption of time in root-canal operating cannot be satisfactorily answered, for it is but necessary to total the hours of time consumed in the following steps to settle the question:

1. Study of primary roentgenogram.
2. Adjustment of rubber dam.
3. Pressure, or conductive, anesthesia (arsenic should not be on the dental supply-list).
4. Removal of pulp; cleansing of canals.
5. Opening of canals to apex.
6. Roentgenogram with wires in canals.
7. Filling of canals.
8. Roentgenogram of filled canals.
9. Preparation of cavity.
10. Filling of tooth.

Regardless of difference of opinion on the exact amount of time required for the accomplishment of these steps for the treatment of one tooth, for one man, multiply the estimated time by the number of other teeth in the same mouth in the same condition; multiply that total by the number of men in the division who have devitalized or practically devitalized teeth; and the grand total will indicate a consumption of operating time which would absolutely prevent proper attention, in the great majority of the soldiers, to the elimination of thousands of septic teeth and to the treatment of tens of thousands of deeply decayed teeth with endangered pulps. In other words, if it is admitted that it is imperative, as a prophylactic measure, to remove all dental foci of infection at the earliest possible moment; and if it is considered important to retain the vitality of teeth with pulps already endangered by decay, then it must be admitted that the time consumed in root-canal work would absolutely prevent the accomplishment of this greater service.

The entire question of time consumption is summed up in the foregoing memorandum as follows (3, 5): "It is far better from the viewpoint of military efficiency to improve the dental condition of the *whole division* somewhat, rather than to put in an absolutely perfect condition the teeth of one company of men." Time consumed in

root-canal operating for the few, prevents the great majority of men from ever reaching the dental infirmary for more necessary work. In one brigade of the division which was fairly well equipped, and in which nearly all the dental officers, medical officers, and commanding officers were entirely coöperative, all the septic teeth were removed and the constructive work was well under way, long before the overseas sailing orders came. While enroute to France one of the dental officers of this brigade told me that sometimes a period as protracted as two weeks elapsed without a case of "toothache" being reported. This condition allowed him to continue his progress in constructive work without interruption; and, of course, the elimination of dental suffering must have had a beneficial effect on the morale of the men. If, instead of working as he did along the lines set forth in this paper, the officer referred to had used his time to put into perfect condition the mouths of one company of his regiment, root-canal work and all, he would have found the balance of his companies, through the natural extension of caries and sepsis, in a far worse dental condition on the day of embarkation than when the men entered the service. As a further example it may be stated that, in one regiment of the division which followed the original program, there were performed five times as many filling operations as extractions in the month of July while in the line in France; whereas, another regiment in which, in the States, there was the least coöperation, there were performed for the same month, twice as many extractions as fillings.

The writer apologizes for the length of this discussion of the "root-canal bulletin," but he desires to prevent possible misunderstanding of the statements contained therein.

Despite the most patient efforts to convince everyone concerned that the stand taken against dental sepsis was correct, it was found impossible to change the attitude not only of some of the line officers but also of some of the medical officers. The agreement of some of the dental officers with the opinion of those medical officers who could not see any reason for extracting septic teeth which were not painful, and who could not understand why a ruling had been issued to prevent the plugging of root-canals in the "good old fashioned way," resulted in considerable friction and interference. In an effort to convince these obstructionists, I sent a circular letter, on December 5, 1917, to

several of our prominent dental practitioners, enclosed copies of the bulletin, explained the perplexing situation, and asked for either an approval of my stand or the presentation of a *scientific* alternative. The following replies were received.

LETTERS FROM DENTAL AUTHORITIES ON THE PROHIBITION OF ROOT-CANAL OPERATIONS BY THE DENTAL CORPS

Letter from Weston A. Price, Research Institute of the National Dental Association, Cleveland, Ohio; February 20, 1918

Your letter of the 11th is just received and I hasten to reply. I have given a great deal of study to your former communication and, since receiving it, have gone to Camp Sherman, Chillicothe; and have studied the conditions under which men are working and the conditions of the men of the army. I realize, fully, your very great embarrassment. However, I cannot but feel that, if the conditions under which you are working are similar to those at Camp Sherman, you could do root filling with perfect safety, so far as the sterilization of instruments and materials to be used are concerned. The relative importance of various operations is probably very nearly the same in any two cantonments; and yet we find that, while your camp does not allow any root filling to be done, in Camp Sherman, so near as I could ascertain, every operator is free to make any operation on any patient that he deems to be indicated. I am quite sure that this does not contribute the greatest good to the greatest number as effectually as does your policy. However, it does not seem clear to me that you are justified in condemning all teeth with unhealthy or freshly exposed healthy pulps, either on the ground of lack of time, inability to make operations that will be satisfactory to nature because of probable systemic involvement, or inability to sterilize the instruments and materials. My judgment would be that freshly exposed, healthy pulps, in important straight-root teeth, should be removed under a local anesthetic and the root permanently filled. I would add to this, favorable cases of infection of the pulp, but where the pulp is still vital; and by favorable cases I would mean single-rooted teeth of easy access. In these cases, the time required for pulp removal and root filling I would expect to be much less than you have indicated.

I am not favorably impressed with the idea of a temporary root filling for two reasons: first, it will take nearly as long to put in a temporary filling properly, as a permanent one; and, second, we know of no material

as yet which will continue to disinfect, or preserve the sterility of, tooth structures for a great length of time. Dr. Ames has suggested the use of a paste made of mercurous iodide powder and a liquid composed of thymol in camphor. We have not tested this as yet, but he has been observing it for some time and claims a great deal for it.

Our studies here, on the "relative and actual efficiency of medicaments," which we reported at the National meeting in October, and which will appear shortly in the *National Journal*, indicate that it is an exceedingly difficult matter to sterilize infected dentine and cementum, as you know; and also that this probably can be done better by short-time treatments than long; also, that the use of silver-ammonia-formalin treatment, as suggested by Dr. Howe, or formalin alone, by the method suggested by Dr. Cameron, is much more efficient than our current methods. Both of these methods contemplate immediate sterilization and immediate root filling. We will report on this latter in further detail.

You will be interested to know that we are laying out our work in the Institute this year in the way that will be most directly helpful in maintaining the highest possible efficiency for our soldiers, our problem being the "management of pulpless teeth." It is our wish that we may be as helpful as possible to you men who have the very great responsibility of caring for the men. The writer is personally assisting on an Advisory Medical Board, and is seeing a great many cases that, according to the recent regulations, must go directly into the service; and there must be a great deal of reclaiming done before they will be safe, either for themselves or for their country.

Dr. Price touched the vital spot in this question in stating: "While your camp does not allow any root filling to be done, in Camp Sherman, so near as I could ascertain, every operator is free to make any operation on any patient that he deems to be indicated. *I am quite sure that this does not contribute the greatest good to the greatest number as effectually as does your policy.*"

*Letter from Arthur D. Black, 122 S. Michigan Boulevard, Chicago, Ill.;
March 27, 1918*

I have read a number of times both your letter and the "Memorandum on dental root-canal operating," by E. R. Maloney, Lieut.-Col., M. C., and I am at a loss to offer a solution of the problem under existing conditions. At the same time, I think no dentist should accept the proposition

of either temporary root filling or extraction of teeth presenting with vital exposed pulps.

There appear to be two questions to be answered before headway may be made.

1. Does the army need more dental service than one dentist per thousand men can give?

2. Will the military authorities give the enlisted men sufficient time to receive proper dental service, presuming the number of dentists is adequate, or shall be made adequate by increasing the number of dentists?

The basic problem is to establish what the real dental needs of the army are. You give "probable" figures. These may be wide of the facts in either direction. You are sure from your personal observation that the dental service provided is inadequate, but you must have facts which will convince the Surgeon-General's Office, the War Department and Congress. These facts are easy to obtain (a) by the tabulation of a sufficient number of carefully made mouth examinations to be able to calculate the service required per man, (b) by having a limited number of members of the dental corps spend a sufficient number of days in doing as thoroughly as it should be done all of the service which a selected group of men require. I say selected group in order that a sufficient number of each type of operation may be included. If the time is recorded for each operation it will then be a matter of calculation to determine how inadequate the present allotment of one dentist to a thousand men really is.

The second question, the willingness of the military authorities to grant the men leave for this service, can be solved after the first question is determined. If it is figured out, for example, that each man needs so many hours, the real delay in training will be known; few hours per man, at most.

The pressure to be brought must be founded on indisputable facts. On these the army dental corps and the profession can stand squarely, and demand that our army shall have proper service. Naturally, your problem is not different from that in every other camp. The statistics should be gathered by direction from the head of the dental service issued to the heads of the respective corps. Nevertheless, statistics collected by a single small group would show the way and point out the need of a more widespread investigation. I believe it is only necessary to fully establish the facts in order to get action.

Dr. Black's letter contains excellent advice regarding the necessary procedure for correcting, by legislation, the inadequacy of the dental

service in the army. However, Dr. Black did not offer a solution of our immediate troubles. If we were to solve our military root-canal problem by an increase of the dental service per thousand men to such a point that there would be sufficient operators to do root-canal work without at the same time working an injustice on the majority of the soldiers in need of other work, we should require in my opinion, at least six operators to a thousand men. My observation of the trials endured by those of the profession who worked for years for the recognition which the Army Dental Corps has recently received; and my understanding of the politics involved and the opposition to be expected in securing additional legislation convince me that, to put dependence upon such an increase in the number of operators, for the solution of our root-canal problem as it exists today in the field, might as a matter of judgment be compared to the lobbying efforts of a small town to secure state legislation authorizing the creation of a local fire department for the purpose of combating an *existing* huge conflagration.

Without any attempt to perform root-canal operations, the present dental service is inadequate by about 60 per cent. Regarding Dr. Black's second question, I would state that my eighteen-months' experience with troops in the field convinces me that unit commanders would never consent to having their men absent from duty for extensive root-canal work. It is difficult even now to get these men away for general operating. This condition has been partly created by soldiers' "ducking" of unpleasant duties to "go to the dental officer."

Letter from Edmund Noyes, 1108 Stewart Building, Chicago, Ill.; January 11, 1918

I this morning received your letter and the accompanying bulletin. I do not believe there is any satisfactory solution of the problem you are up against. There would need to be two or three dentists for each thousand men instead of one, and even then it would be a greater task to put 30,000 men in order than to keep them so afterward. It is evident, as you say, that in army conditions teeth septic in the apical space must be extracted; but, if pulps are still vital, I think every available resource should be used to save the teeth. The first suggestion I think of is to allow

such cases to seek dental service, if they will, outside the camp in a nearby town; or, if practicable, that they be given furloughs home to get dental service there. In ordinary cases of living pulps the operations can be completed, if necessary, in two or three days. I expect this does not go very far toward solution of the problem.

In the case of soldiers who are presumably in robust health, I believe that freshly exposed pulps with no previous history of pain can be capped with much greater prospect of success than in private practice. If the cavity is thoroughly disinfected without destroying any pulp tissue and the exposure covered with a piece of gutta percha (I use Hill's stopping), sterilized and softened by heat and moistened with eucalyptol, or covered with phosphate cement, I believe the chances of success would be good enough to forbid extracting the tooth. Where pulp extirpation is necessary I would be in favor of straining the point pretty hard in favor of all teeth forward of the molars. Your first requirement for "the antiseptic instead of an aseptic root-canal technique," I believe entirely practicable and safe. I know of no other place about the human body where antiseptics, strong ones if necessary, can be so effectively and safely used as in the pulp canals of teeth. Of course army dentists can use rubber dams; and, if hands are well washed and the fingers that handle cotton are well rubbed with alcohol, there need be no risk whatever of infecting a pulp canal, if suitable antiseptics are used that will not destroy any tissue in the apical space. When a pulp canal is ready for filling, I would suppose the additional time required to make a permanent filling instead of a temporary one would not be worth mentioning in comparison to the risk attending the temporary one. However, I do not know anything about temporary canal fillings or what they should be made of. I judge it is impossible for a man in private practice to know what can or cannot be done in an army camp; and what I have written must be considered as only mildly suggestive, and not in the least to be considered as giving advice. I wish that we could all of us do more to help out the dental problem in the army.

Dr. Noyes does not help us very much. He believes as we all do that one dental officer per thousand soldiers is insufficient. It is impossible to give men furloughs home for dental treatment, and the treatment they would receive in cantonment towns would probably be no better than that procurable in the camp infirmaries. I am in absolute accord with Dr. Noyes's ideas regarding the capping of pulps whenever practicable.

Letter from J. P. Buckley, Chicago, Ill.; January 28, 1918

First let me say that even at this day and age I work, in my root-canal surgery, with and through antiseptics and disinfectants. I believe this is safer practice than to depend upon what might be considered strict asepsis: when, if all facts were known, the word "strict" should not be applied. Now, I hesitate somewhat to let this statement go for fear of being misunderstood. I like to see men make an honest effort to carry out asepsis in their work in every particular, especially where it is possible to introduce infectious material through an open wound or the canal of the tooth; but the point I wish to make is that asepsis as such is not necessarily essential, though very desirable, for the success of our root-canal work. As you know I use the phenolsulphonic acid in my technic of removing pulps from teeth and cleansing the canals. Surely while I am working with and through this agent in the canal of the teeth, I am working under antiseptics at least. When the canal is cleansed I seal in, with both temporary stopping and cement, a dressing of eucalyptol compound. Thus again I am using an antiseptic. When at the subsequent sitting I fill the canal I want to be certain, if I use cotton-wrapped broaches, that the cotton thereon is sterile. Here, more than at any other sitting up to this time in this work, we need real asepsis, especially if we use, as many do, cotton-wrapped broaches. As a matter of fact the canal may be filled properly without using cotton on any of our broaches, in most cases, if eucalyptol compound was the remedy last sealed in the tooth. If this is done, and we do not use cotton, we may again depend upon antiseptics and disinfectants rather than asepsis. I trust I have made this plain, for I cannot afford to be misunderstood. I do not object in any sense to asepsis, if men carry it out so that it is in fact what it is supposed to be. No one can be too aseptic for me. To sum up briefly: let me say that I simply mean there is plenty of hot water with which all instruments used can be made sterile; the points or working end of these instruments can be kept sterile at the chair, by dipping them continually as they are used in some disinfectant and its neutralizing solution—phenolsulphonic acid and a 10 per cent solution of sodium bicarbonate, or phenol and alcohol, or whatever else the dentist may select. The drugs used in the canal, whatever they may be, should be antiseptic in character. The gutta-percha points may be sterilized in such disinfecting solutions as formalin or alcohol; I prefer modified alcohol (70 per cent alcohol to which 1 grain of thymol is added to the fluid ounce). As the army dental offices at the cantonments and training stations are so closely associated with hospital facilities, it ought to be practical and con-

venient to have sterile cotton and absorbent points at hand; but if one cannot be certain regarding this, it should be remembered that it is not necessary to use as many cotton-wrapped broaches as is generally done; though with reasonable care regarding cleanliness one may safely absorb moisture with cotton without the latter having just been taken from the sterilizer. There are generally two extremes with most problems in life; and surely there has been manifest, in recent months, one extreme in the matter of asepsis as such being absolutely essential in connection with the treatment of pulpless teeth. The other extreme in this case has been too much in evidence for years past. It is for this reason that I made the statement that no one could be too aseptic for me. Let us keep both feet on the ground and evidence, on all occasions, the good judgment and common-sense which most dentists possess.

This is rather a long preface, but I felt it necessary to say what I have in order to make plain what I will say regarding the questions asked. I am going to base my reply on my twenty years' experience in practice along therapeutic lines. I do not know exactly what I would do were I in the Dental Corps of the Army, but I believe that I could successfully handle any emergency which might arise in such a way that the tooth could be made comfortable for the soldier at least for such a time as we all hope the war will last. And, while I sincerely trust that the war will not last two or three years, when I make this statement I have in mind the possibility of the war lasting this length of time or even longer. I can conceive of no reason or excuse for adopting the rule in army dentistry at the cantonments and training stations (it would be different of course on the actual battle fields), that vital teeth containing pulps which are exposed, or diseased to the extent of necessitating the removal of the organ, should be extracted. I will go even farther than this and say that I can see no excuse for extracting the majority of teeth containing dead pulps. It would seem to me that only those teeth with which complicated abscess conditions are associated should be extracted. The reasons indicated in the circular letter for adopting the general rule for extraction in cases of dead pulps, and your loss to know what should be done with teeth the pulps of which were exposed or diseased, were lack of time and the uncertainty regarding, or the impossibility of having, strictly aseptic environment and conditions. In regard to the "lack-of-time-for-treatment" proposition let me say that the measure of efficiency in large degree, in army matters today, is the ability of the man to "speed up" along all lines and yet maintain the standard. There is no reason that I can see why army dentists at least could not speed up wisely and safely in the handling of these cases;

and so far as asepsis is concerned, I have already covered this point by suggesting the possibility of working with and through antiseptics and disinfectants with equally as good results as though strict asepsis had been maintained. Believing this as I firmly do, I want to repeat that I see no excuse, with the equipment I am told is provided at the cantonments and training stations, for the men in the service adopting any such rules for extracting teeth as was implied in the circular letter received.

Now to take up in detail the speeding up process of handling these cases. Let us remember that the patients in the army, for the most part, are young men, healthy and vigorous, engaged in daily work which stands to keep their health at 100 per cent. This means that the roots of the teeth in the mouths of these patients are fully formed and that the canals have not been constricted as is so frequently found later in life. Exceptions to this may be third molars, but we do not need to worry about saving these here. All these things are greatly in our favor. When a pulp is found to be exposed in a tooth in the mouth of such a patient, or diseased to the extent of necessitating its removal, one should be able to adjust the rubber dam, anesthetize, remove the organ, clean the canal with an acid (I use phenolsulphonic) and seal in an antiseptic dressing in from thirty to forty-five minutes. The filling should be polished subsequently if time permits, which need only require ten to fifteen minutes. All told, therefore, this tooth could be permanently treated and filled in from one and one half to two hours; and some of this time could be saved by filling the cavity with a good grade of cement which would last at least two or three years. If the dentist preferred to devitalize rather than anesthetize the pulp, it could be done in as short a period of time. An arsenical application could be sealed in and the patient out of the office in ten minutes time. In a day or two, this dressing could be removed, the pulp chamber opened liberally and formocresol (which is my practice) sealed in. Fifteen minutes would be ample time for this. In two or three days, the pulp could be removed, canal cleansed with the acid and filled at this time in at least one hour—with the cement or amalgam filling. If I did not have the time for the one and a half or two hours necessary to do permanent work, I could conscientiously treat the case after devitalizing or anesthetizing the pulp, as I frequently treat an emergency in my practice as outlined below in the "history of a case." The teeth in the few complicated cases could be extracted with the consciousness, on the part of the dentist, of having done his duty. I could not have this consciousness if I adopted, even under army conditions, any such general rules for extraction as was implied in the circular letter.

History of a case. Patient, girl, about eighteen years old. Had been working very hard in school and was highly nervous, pale and anemic. On examination a good size cavity was found in the upper first bicuspid with that characteristic white, rapid decay. On excavating, the pulp was exposed. Devitalizing fibre was sealed in on October 1, 1915. This was removed on October 4, pulp chamber well opened and formocresol sealed in. On October 8 the pulp tissue was partially removed but, on account of the highly nervous condition of the patient, no attempt was made to remove all the tissue and clean the canal; though, under ordinary conditions, it could and should have been done at this sitting. Phenol compound was sealed in and on account of illness the patient did not return until November 1—a period of over three weeks. At this sitting, just as the rubber dam was nicely adjusted, the cavity opened and all in readiness to clean the canals with the acid, the patient became nauseous, necessitating the removal of the dam. Subsequently at this sitting the cavity was cleaned with alcohol without the rubber dam and a paste, made of thymolized calcium phosphate and formocresol, was placed in the pulp chamber; and with cotton in the pliers, compressed gently into the mouth of the canals and a cement filling inserted. A note was made in my records that these canals were to be filled later when the patient's physical condition was improved. At this time there was a small cavity in the second bicuspid which was also filled temporarily with cement.

The patient did not return until October 16, 1917—two years later. At this time the small cement filling in the second bicuspid had disappeared and the same white decay, mentioned above, had progressed to the extent that excavating exposed the pulp. At this sitting phenol compound was sealed in and when the patient returned on October 23, seven days later, the pulp was capped. My reason for capping in this case was the previous experience with the patient in an attempt to remove from the canals a devitalized pulp; though the patient's general condition was much improved at this time. The tooth remained comfortable for about six weeks. On December 7, patient returned with a severe odontalgia in this second bicuspid. On opening the cavity it was found that the pulp was partially dead and just beginning to undergo the process of decomposition. Formocresol was sealed in the pulp chamber. Patient returned December 11, when the pulp was removed and the canals cleansed with phenolsulphonic acid; and diagnostic wires were placed in the canals carrying a eucalyptol-compound dressing. At this sitting also the first bicuspid, the one having the formaldehyd paste, mentioned above, in the pulp chamber for over two years, was opened into and with phenolsulphonic acid, the tooth desiccated, pulp partially removed, diagnostic wires sealed in, and radiograph ordered. The radiograph shows that the periapical tissues around the first bicuspid are not at all involved, so far as this can be shown by a radiograph, and that the tissues around the second bicuspid are quite extensively involved. Six weeks ago the pulp in the second bicuspid was acutely alive, in my opinion, or I would not have made the attempt to save it by capping. As a matter of fact, however, the invading organisms in this instance were more active than usual or else I was misled regarding the health of this pulp at the time. I think, now, that both these conditions were true. The patient returned on December 17, when acid was used again in both teeth—in the first bicuspid to explore the canals and open them to the end of the root, which was somewhat difficult on account of the desiccated tissue; and, in the second bicuspid, to gently pump some of the acid through the end of the root to cauterize the affected tissues. At this sitting the canals of both teeth were filled as shown by the radiograph which was taken on December 26. While I am sure now of the results in both these teeth as treated, I feel

that it would have been better, in fact I know it would have been, to have devitalized the pulp in the second bicuspid two years previous; this to have been done in case the patient could have stood the adjustment of the rubber dam without nausea. I want it understood here that in no sense do I believe in or practice pulp mummification. This paste was used to keep the canals aseptic until such time as permanent work could be done. That this was accomplished is clearly shown by the radiograph as well as the condition, tough and desiccated, in which the pulp was found two years later. Under, in my opinion, justifiable conditions, I have treated not many, but quite a few, cases in my practice in this manner during the past twenty years; enough cases I feel to justify my making the statement that the practice is successful for the purposes for which it is intended. In no case should a permanent filling of a metallic character be inserted over such a treatment. In war emergencies, I see no reason why it should not be used with the printed card suggested by Dr. Palmer to be given the soldier, advising him to visit a dentist when returning to civil life.

Now I will return to the original subject matter and carry it one step farther: I do not see why most of the treatable cases with dead pulps could not be treated and the teeth kept healthy, comfortable and useful, as well also as the periapical tissues healthy and the patient's general condition in no way lowered or affected, so far as these teeth are concerned—this work to be done in about the same time required for the treatment and removal of exposed pulps as the above outlined. For those who believe that the slow, more or less complicated, and little understood (so far as to how the real effects are produced) ionization method of treatment is essential and necessary, I know that it would be out of the question to try and treat such cases under the conditions which prevail with the army dentist, but ionic medication is not necessary; for any case of periapical involvement which can be treated and saved by ionization, can have the same results produced with far less time in the treatment by simpler methods.

In the case of a gangrenous pulp, with or without periapical involvement, the pulp chamber could be opened and a dressing of formocresol sealed in with the cement and the patient dismissed in ten minutes. At a subsequent sitting, a day or two later, the canals could be cleansed with phenolsulphonic acid, and in the case of periapical involvement, some of the acid gently pumped through to cauterize the affected area; then, after neutralizing, with a ten per cent solution of sodium bicarbonate the acid in the canal—not that which has passed through the apex of the root—the canals could be desiccated and an antiseptic dressing sealed in; all accomplished easily and without undue haste in an hour in the ordinary case, such as would prevail with the class of patients in the army. A day or two following, the root-canal operation could be performed and the cavity filled with cement or amalgam in at least forty-five minutes. In the average

case and rather than to extract the tooth, in the instance where the soldier was going to leave camp at once, I would not hesitate to do the root-canal operation at the sitting at which the canal was cleansed with the acid, thus saving time. In the event this was done there would likely be more or less soreness in the tooth for a few days, but the end result, the thing we should keep in mind here, will be satisfactory, in that the tooth will be saved, it will be useful and it will not be a source of infection or a menace to the general health of the soldier; for bone regeneration, if bone had been destroyed, will result.

The recent legislation at Washington has placed a grave responsibility upon the shoulders of the profession, and especially the men who are with the colors. I would not feel that this responsibility had been met and that our position in the army service was justified, if it were necessary to follow the general rules for extraction as laid down in the circular which was sent to me. I know that the men in the army are going to master the difficulties which present and that our position will be creditably sustained.

Dr. Buckley's letter is very much appreciated because he has undoubtedly given the subject serious consideration and has tried to help us. However, I cannot agree in the main with his findings. His statement that if he were an army dentist he could successfully handle these cases so that the tooth could be made "comfortable" for the soldier, for at least as long as the war will last, does not solve our problem, which is not one of making teeth "comfortable" but of making them *safe*. This comfort test is exactly what we are striving to cast out of our practice of dentistry, and it is what I am opposing in the army dental service. The creation of comfort in a devitalized tooth is the least of the responsibilities of a modern dentist.

Dr. Buckley's opinion regarding the increase of speed in root-canal work as an indication of military efficiency cannot be better answered than to quote Dr. M. L. Rhein, of New York, who has written: "It is impossible to permit the opportunity to pass without objecting to the advice of speeding up in root-canal therapy. We are endeavoring in every field to learn the meaning of efficiency, and while it is very true in many matters of import that speed and efficiency go hand in hand, the very exception is found in root-canal therapy. Here, efficiency is never found united with speed, but the necessity of anatomically locating every abnormal diversion of pulp tissue makes

necessary the most accurate observation of all recesses and possible canals." Likewise, I cannot accept the opinion of Dr. Buckley regarding the use of arsenic as a devitalizing agent. Its routine use under any circumstances is not in keeping with our knowledge of its action and its dangers. This agent should be removed from the supply list of the Army Dental Corps.

Dr. Buckley feels that if he were in the army his conscience would not permit him to extract a tooth which had an exposed nerve or an infected canal. I respect Dr. Buckley's conscience in this matter, and hope he can understand how certain army dental officers can have a conscience which rebels at sealing up bacteria in an ideal incubator such as a tooth is, to generate toxins which in some cases might result in the patient's death. I cannot share Dr. Buckley's confidence in the result which he claims we would achieve by the treatment of gangrenous pulps along the lines he has set forth.

Dr. A. C. Fones of Bridgeport has written a statement regarding root-canal work in the army which I am taking the privilege of quoting: "My almost daily use of the roentgen ray has convinced me that anything short of the most careful procedure in an aseptic and thorough root operation may result in serious menace to the patient's health and life. The members of our profession who have a full appreciation of focal infection realize that one of dentistry's chief missions from now on is to see that bacteria and their toxins should not be allowed to gain access to the blood stream through root canals. Therefore, in the light of our present day knowledge of the subject, I would say that where conditions are unfavorable for painstaking and aseptic root-canal operation, such as in the army, navy or in public clinics, I believe that the loss of the tooth is the price one must pay for permitting dental caries to involve the pulp."

Letter from M. L. Rhein, 38 E. 61st Street, New York City; December 18, 1917

I am in receipt of your letter together with a copy of the order of Lieut.-Col. Maloney, and hasten to reply to same. I find this order expressing my sentiments and views in every way, and consider it an admirable document for it describes in no uncertain terms the exact status of things from a scientific standpoint. Personally, I want to extend my sincere congratulations to you for the admirable stand you have taken on this question.

I can realize that you have done so against the criticism of many men who, from a charitable point of view, are ignorant of the basic principles involved in this important matter. Your argument is so complete that I do not believe it can be improved in any way.

Letter from Harold S. Vaughan, 471 Park Avenue, New York City; December 18, 1917

I have read your bulletin as issued to the officers of the Dental Corps of the 27th Division, N. G., and think it the only solution of the problem. There can be no short cuts in the treatment of root canals containing decomposable organic material. Such canals must be opened to the apex and aseptically sealed. The mummifying pastes are worthless; as no chemical antiseptic will sterilize the pulp canal contents and continue to inhibit bacterial growth. Liquids are absorbed into the dentinal tubuli and disappear in a very short time, while solid substances are inert; hence the canal contents become pabulum for spores (that have resisted the germicide) or endogenous bacteria that occasionally pass in the blood stream. It is certainly wiser to apply all energies in filling present cavities to prevent future exposed pulps, than to do questionable root-canal work for a small number and allow simple cavities to become complicated by pulp exposure.

Letter from Leland Barrett, 220 West 98th Street, New York City; December 18, 1917

In my own office with ample time for the work, with the x-ray to check up treatment and results, and with the best possible opportunity for success, I am still in doubt as to whether any devitalized tooth is ever *safe* no matter by whom treated, when, or how. Far less is it likely that the army dentist, even though an expert, can, under camp conditions, make devitalized teeth safe against becoming *primary foci of infection*.

I appreciate your ideal of saving masticating units for the individual soldier, but I feel that "the greatest good for the greatest number in the shortest possible time" contraindicates any attempt at root-canal treatment in the army during war times, whether that attempt be to achieve a permanent root filling, or a semipermanent treatment for the duration of the war with the expectation of a subsequent competent treatment; which, as you justly say, may prove absolutely incompetent, or even more likely to be totally neglected.

The greatest good the dental corps can do, in my estimation, is to pre-

vent the further destruction of dental pulps by caring for the cavities *in time*, attention to prophylactic measures, and dental education of the soldiers.

Letter from O. J. Chase, 17 East 38th Street, New York City; December 26, 1917

I have tried very hard to answer your letter now before me, but it has been simply impossible for me to do so. I fully realize your dilemma on the subject of root-canal procedure. From your letter it appears to me that there are three things to be considered, viz: (1) Amount of time at your disposal, (2) keeping the soldier on duty, (3) future welfare of the patient.

Time, of course, is very important in all root-canal treatment. Working under pressure as you are, with lack of time and proper dental equipment, I can think of no alternative but extraction. Certainly so with infected teeth. In all clinics today which are working for the interest of the patients, the doctrine of the forceps is practical. Multi-rooted teeth are always extracted whether the pulp be freshly exposed, or the tooth infected; single rooted teeth are also extracted where time is a serious consideration. I realize how hard it is to advise extraction of teeth with freshly exposed pulps, especially in the six anterior teeth, yet that is the practice that we follow in Vanderbilt Clinic because of lack of time and proper equipment. I cannot be too emphatic on this point—lack of time to do a proper and thorough operation should *always* mean extraction.

Keeping the soldier on duty also appears to warrant a decision of extraction, certainly in all cases of multi-rooted teeth. I can think of no temporary root-canal filling that would insure the roots' remaining in an antiseptic condition for a very long period of time. *The soldier could be made comfortable and attend to duties, and the root treatment completed in a very short time, if the future welfare of the patient were not to be considered.* I know you are perfectly familiar with preparations which could be used to accomplish this object, so that it is not necessary to mention them here.

Future welfare of the patient. I feel very strongly on this point; the patient's health is after all the most important consideration. Surely a patient is receiving better treatment if we construct a clean well-fitting denture, or partial denture, than if his own teeth are preserved but are a possible source of infection at some future time. So many authorities in whom we have confidence are preaching and telling us, that many deaths or ill health are caused directly or indirectly by mouth infections, that I cannot con-

ceive of any method of procedure which would leave a possibility of such serious results.

To sum up: if careful root-canal treatment can be accomplished in the anterior teeth, I believe it should be done. Multi-rooted teeth should be extracted. Some cases may present where it may be wise to make exceptions where particular teeth are of very great value to the patient, and where it would be wise to do the best you can to save the tooth. Of course instruction should be given the patient as to further treatment. I know I can do nothing to help you solve your problem; in fact it appears to me that all I have written simply goes over much the same ground which your letter covers. In other words, I fully agree with all you have said.

Letter from Thomas B. Hartzell, 715 Donaldson Building, Minneapolis, Minn.; January 14, 1918

I have read the instructions suggested by yourself and promulgated by Lieut.-Col. E. R. Maloney. I believe they are excellent. My view of the case is that teeth containing infected root canals in the mouths of soldiers had better be extracted, unless the dental surgeon has time and facility for properly filling the canals. In these conclusions, I agree with you.

I have frequently opened single rooted teeth, emptying the canals, burning them out with sodium and then sulphuric acid, and finally filling the root canal, and amputating the root end (in many instances in the course of an hour), and obtained what seem to be very excellent results. However, to the man unused to this technique and lacking some of the material with which to do it (as the army dentist does), this would be very difficult. I, therefore, see no reason for a change in the methods you are following, and approve them. I think these abscessed teeth with diseased root ends should be removed and the sockets curetted rather than to leave them in to be potential causes of heart, joint, or kidney infections.

Letter from William B. Dunning, 140 West 57th Street, New York City; January 14, 1918

In reply to your recent letter enclosing memorandum on dental root-canal operating, issued for the instruction of dental officers at Camp Wadsworth I have to say that, upon careful consideration, I approve entirely of the decision that root-canal work be not attempted for our troops, and for the reasons given. The memorandum demonstrates clearly the physi-

cal impossibility of giving each man the kind of treatment necessary for the complete removal of the dental pulp and the correct filling of the root-canal; and we know from overwhelming clinical proof that incomplete or septic root-work almost invariably leads to periapical infection, which, as a primary focus, may cause serious secondary infections in remote organs. Therefore, in safeguarding the health of the man who shortly must undergo the terrible physical ordeal of trench life, we should relieve him of any teeth which are non-vital, or in which the pulps are exposed. It is well known that during exposure to cold, fatigue, etc., these infected teeth assert themselves, and give the most serious trouble—often incapacitating a man for service at a critical time. It is a regrettable but obvious necessity to extract such teeth at the earliest moment; and should any man resent the loss of what seems to him a good tooth, he should be reminded that that loss is part of his sacrifice in serving his country, at a time when every man must be fit for instant duty. I believe a conservative policy in this matter, under the circumstances, would be dangerous and unwise.

Letter from Kurt H. Thoma, 43 Bay State Road, Boston, Mass.; February 5, 1918

Since sending you my letter about the treatment of teeth from which pulps have had to be removed in camp, I have been corresponding with Dr. Rhein of New York; and have received a clearer insight into the dental problem of which you wrote me than I had at the time I answered your letter. The treatment which I favored in my letter would naturally require the strictest aseptic root-canal procedure. According to Dr. Rhein this is not possible with the present camp accommodations. In consideration of the grave consequences which occur from periapical infection I should under these circumstances revise the treatment which I suggested and advocate the extraction of all teeth in which the pulp cannot be kept alive.

Letter from Elmer S. Best, 933 Metropolitan Bank Building, Minneapolis, Minn.; February 21, 1918

Please do not think that I am at all inconsiderate when it comes to helping out a brother in need. Frankly, a consideration of the position is one that can by no means be dismissed with a wave of the hand. I have tried hard to answer it but could not when I carefully went into details. We have one big governing principle to which we must make all others conform, and that is to "accomplish the greatest good for the greatest

number in the shortest possible time." The speed with which our big army is being prepared for foreign service does not allow us a great amount of time for our work. There are probably many more teeth that have incipient caries than there are teeth with exposed pulps; and if we devote a great deal of our time to doing pulp-canal work, at the expense of this greater number of diseased teeth with the ultimate result that they too will require pulp removal, to my mind we commit a gross error. It may be that, in certain selected cases where the teeth are particularly valuable to the patients, and recognized as such by the dental officer and patient, they might be taken care of under aseptic conditions; but only in this manner. I would dislike very much to think that it would be an utter impossibility for a patient to obtain such a service in case it were highly desirable.

Personally, I consider the stand taken by you to be an absolutely correct one, and I want to compliment you for your courage in holding out for it. It will do a great deal for our soldiers and for dentistry.

Letter from R. Ottolengui, 80 West 40th Street, New York City; December 23, 1917

I have your communication in regard to root-canal technique and there is no doubt that the salvation of several teeth for several men is of more consequence in war time than the doubtful treatment of one pulpless tooth for one man. On the other hand, it does seem a pity that because a man is serving his country he should lose one of his twelve anterior teeth, any one of which should be readily saveable and the loss of which will be a permanent disfigurement as well as discomfort, never mind how it is replaced.

You speak of a temporary root-canal technique and possibly may be interested in a temporary root-canal technique which has given me satisfaction for over fifteen years. Briefly the situation is like this: Whenever for any reason I have felt it hazardous to fill a root canal just prior to summer vacation time, when either the patient or myself or both were leaving town for several weeks, I have filled the root with a dressing charged with iodoform. The iodoform is dropped into ether until a sediment forms on the bottom. This gives a saturated solution of iodoform in ether. A dressing of absorbent cotton or silk floss is dipped into this ethereal solution of iodoform, packed into the tooth, and the tooth sealed up with a cement filling. I have never had a tooth of this kind give pain or trouble of any sort. Even in absolutely infected areas I would look for some improvement of conditions rather than otherwise.

Letter from W. D. Tracy, 46 West 51st Street, New York City; December 31, 1917

1. In answering your letter of December 5, I will endeavor to keep in mind clause 2 in paragraph 2 of the bulletin sent out over the signature of Colonel Maloney on November 15.

2. It is my conviction that working under present conditions, all infected teeth must be removed as a prophylactic measure.

3. If the removal of a tooth having a freshly exposed pulp means a serious reduction in masticating efficiency, an effort should be made to retain it. On the other hand, if the patient has a full complement of teeth, and one of them becomes involved, with an exposed pulp, it would be better practice, everything considered, to extract it.

4. When the dental surgeon decides that a tooth with fresh exposure should be retained, it is possible to anesthetize the pulp, open the tooth boldly, extirpate the bulbous portion of the pulp and as much of the pulp in the canals as can be accomplished in a short sitting. Make a creamy paste of zinc oxide and creosote adding a tiny portion of iodoform powder. Pump this into the canals, then flow calxine, or some temporary cement, into the pulp chamber, over which a cement filling or an amalgam filling may be placed.

5. This is, of course, contrary to orthodox practice, but as an expedient, is justifiable in the present emergency.

6. Your suggestion that the men receiving this or other types of temporary root-canal work shall be provided with a card explaining the nature of the work, and giving directions for their future guidance, it seems to me, relieves the Army Dental Surgeon of any final responsibility.

Letter from H. W. Gillett, 140 West 57th Street, New York City; February 4, 1918

I have been giving much consideration to the root-canal matter, and on my trip to Pittsburgh last week, at a meeting of the Institute of Dental Teachers, I had a chance to talk with several men entitled to an opinion.

I have come around to Dr. Ottolengui's way of thinking, and have had many years' similar experience in temporary safeguarding of canals with iodoform and alcohol. I think his plan is better. It met with very general approval from men I talked with at Pittsburgh.

Dr. Ash asked me to look into the matter, and I am submitting a report today, with proposal of resolutions for the Directors to forward to you, commending your practice where recognized foci are present, but suggesting Dr. Ottolengui's plan in the recent cases.

Letter from C. N. Johnson, Marshall Field Building, Chicago, Ill.; January 12, 1918

Pardon a brief, offhand and hurried answer to your favor dated December 5, which has just reached me. I appreciate fully your dilemma, regarding teeth with exposed pulps, but I surely cannot countenance the extraction of all such teeth. I believe that pulps may be removed and the canals so treated and protected, and the cavities filled temporarily, that there will be little danger of infection occurring during the army service of the patient—and all this done in a very short time. This of course is contingent on the suggestion you make that the soldiers should be given a record card with instructions to have the tooth properly attended to after release from the army. If this is made sufficiently strong he will usually attend to it, and if he does not, the army dentist is not responsible.

I do not understand that you ask for a particular method of doing this, but I shall be glad to give you my treatment if you desire.

Letter from Charles F. Ash, 115 Broadway, New York City; January 30, 1918

It is my opinion that teeth with freshly exposed pulps can have the pulps removed, the canals dried out, and a dressing of iodoform dissolved with ether inserted in the roots, this dressing to remain from six months to a year or even longer. This, I believe, can be done with reasonable safety; and by so doing we can preserve many teeth which otherwise would be lost. While this treatment in the light of our present knowledge hardly seems ideal, yet under the circumstances I believe it is warranted.

Copy of resolutions adopted, March 4, 1918, by the First District Dental Society of the State of New York; signed Leland Barrett, Secretary

Resolved, That the Board of Directors of the First District Dental Society commend the course of Dr. B. B. Palmer, Jr., 1st Lieut. D. C., U. S. A., in recommending the removal of teeth in U. S. Army Service, when they are associated with definite infection foci; and further, be it

Resolved, That in the cases of recent pulp death, or where conditions call for removal of live pulps, the following plan be proposed as better practice than to remove the tooth, especially if it be a single-root tooth, or one that correct dental service will make safe and efficient, namely; that, with such appropriate antiseptic precautions as may be feasible, the pulp removal be carried out as well as is practicable, and that the root canal and pulp chamber receive a dressing of a saturated solution of iodo-

form in ether, or some other suitable agent, and be at once covered with a resistant filling. That, whenever this practice is followed, the soldier receiving the treatment should be notified, on an official form preferably, that the treatment is to be considered as temporary emergency relief work, and that such teeth should receive further and more permanent attention at the first opportunity.

OBJECTIONS TO TEMPORARY ROOT-CANAL OPERATIONS UNDER MILITARY CONDITIONS

In the letter which I sent to our dental scientists together with the root-canal bulletin, I stated that I did not believe that a permanent root-filling technique could solve our problem, because of the time it would involve; and I thought that only a temporary canal filling could be inserted in the time which could be afforded to an individual soldier. I expressed pessimism about such a procedure's being scientifically correct, but asked for investigation and opinions. In the many months which have elapsed since my letter was written, I have become convinced that temporary root-canal operating as an answer to our problem cannot be accepted for the following reasons.

1. The investing of many hours of a limited number of hours in temporary work of this nature, which has to be done over again, is not to the best interests of the military service where so much dental work of a permanent nature is awaiting accomplishment.

2. We have reached a point in the progress of our profession where we must cease sopping our conscience with the theory of permanent sterilization of pulp canals and apical regions through the insertion of a so-called "constant antiseptic." If such an operation produces constant and permanent antisepsis, why not perform all root-canal operations according to that principle and in consequence solve the pulpless-tooth problem for all time? If the advocates of this temporary root-canal work admit that sooner or later the antiseptic action of the dressing disappears and sepsis prevails, when does this period begin and when can we know that it has begun; and is it not apt to begin in three months in one case and in two years in another? And if that is admitted are we justified, under any circumstances, in treating a tooth in a manner which will produce a focus of infection "some-time?" Furthermore, is not this the type of dentistry which we have

been trying to eliminate from the profession? It impresses me as being merely the same old "cotton changing, smell-it-tomorrow" technique, excepting that the treatments are at longer intervals.

If it be admitted that it is imperative to remove all existing septic teeth at the earliest possible moment after soldiers go into the field is it not equally important that we perform all of our dental operations in such a manner as to avoid the necessity of harvesting another crop of septic teeth in six months or a year? If the War Department authorized a card informing a soldier that his dental operation was but temporary, and that he should receive further care at his earliest opportunity, it *might* relieve a dental officer of his responsibility *as an officer*; but I maintain that a dentist, *as a professional man*, cannot under any cloak shirk his moral responsibility for any of his operative acts. Does not our professional responsibility toward these men go beyond the operating room; and, if endocarditis results from our improper operating, are we not directly responsible?

Dr. Best, after months in the work of examining the mouths of men about to enter the military service, has "come to the conclusion that the estimate that 10 per cent of the people receive attention for their teeth is far too high." My observations have given me the same impression. If this situation be even approximately true, are we justified in temporarily filling hundreds of thousands of teeth which will never receive any further treatment in the army or afterward in civil life?

From November 17, 1917, when my root-canal bulletin was issued, root-canal operating was not permitted in the division, and I believe that this, combined with the elimination of all the septic teeth—the filling of all the germ-breeding carious teeth—and the instruction of all the soldiers in mouth hygiene, have had a strong influence on the existence of the following facts.

1. The 27th Division has consistently been rated as one of the healthiest divisions of the entire army. In point of low sick-rate and deaths from disease, the 27th has generally been rated among the first four divisions and frequently has been number one on the list.

2. The condition of "trench mouth," while rampant in divisions fighting on either side of the 27th, was seen in only isolated cases in our division.

3. Major-General O'Ryan has written that while his division was fighting in Belgium and France, from the assault on Mt. Kemmel to the smashing of the "Hindenburg line," it was not necessary to relieve one soldier from the firing line for dental causes, and he commends the dental corps of the division for its accomplishment.

CONCLUSIONS

Apicodontia is a branch of dentistry which can be practised scientifically only by those practitioners who have received special instruction and training in that field. At least 90 per cent of the dental profession is lacking in this special training.

The proven consequences of lack of asepsis and thoroughness in root-canal operating are such that a deliberate neglect of these essentials is not only unprofessional and unethical, but absolutely criminal.

The great majority of dental army officers have not the facilities at their disposal for performing scientific root-canal operations; but, even if every dental army officer had all the necessary equipment for, and training in, this work, it would still be impractical to perform scientific root-canal operations for troops, because it would prevent the dental corps from accomplishing the greatest good for the greatest number in the shortest possible time. The actual proof of this is found in the report of the dental treatments received by the troops of the 27th Division in New York State. Under my supervision the services of the Preparedness League were enlisted; and in one month (from June 15 to July 15, 1917) more than 10,000 fillings were inserted and 10,000 teeth extracted. In a bulletin which I formulated and which was officially issued from the Headquarters of the Division, it was directed that no root-canal operating be performed and that but one appointment be given each soldier. It was this provision which made it possible to accomplish more than 20,000 operations, each one of which was of definite value. Had root-canal operating been attempted, the figures would not have reached anything like the proportions attained; and the dental condition of the Division as a whole would not have been materially improved.

It is absurd, from every point of view, to attempt to take an army

of 4,000,000 men, the great majority of whom have never received dental care, or worse than no dental care, and in a time of great emergency give all of them ideal private-practice dental treatment. If we had eliminated the dental sepsis from that army, and if we had prevented exposure of the pulps of all the decayed but vital teeth brought into the service by those 4,000,000 men; and if we had educated them to the necessity of caring for their teeth—then we could today, as a profession and a corps, hold our heads up with pride and satisfaction, and with a sense of having successfully performed our part in the great war. We cannot have that sense of satisfaction, however, because the dental corps has not only failed to eliminate the dental sepsis from the army, but has possibly increased it. This is not the fault of the junior officers of the corps, but is due directly to inefficient leadership. For instance, the Surgeon General's office allowed to remain as division dental surgeons, *officers of the rank of colonel, who not only opposed the stand taken for aseptic dentistry in the 27th Division, but who also put themselves on record, in dental literature, as scoffing at the focal infection theory.* The responsibility for the failure of the dental corps during the war rests squarely upon the shoulders of those who were responsible for dictating its policy.

Referring once more to the root-canal problem I would like to have it understood in closing, that there is no one in the dental profession who recognizes the importance of conserving masticating units more than the writer, but also that no one has a stronger realization of the relation of septic teeth to the health.

I could sum up by stating that it is not that I value teeth the less, but that I value health and life the more.

17 East 38th Street.