we must not devote all energy to these infections to the exclusion of foci in other parts of the body which may be the chief foci, and relief cannot be had until they are located and removed. Further, there are many roentgenograms which show rarefied areas around the apexes of the roots that are rightly interpreted as being foci of infection, but it must also be remembered that there are lots of others which show the same rarefied areas which are not foci of infection, being localities in which there possibly once was a focus but which has been removed, and the tissue not yet completely filled in, which may never completely take place. This is amply proved by using an aspirator and removing a portion of the content of that supposed focus, only to find it to be nearly free from bacteria. Except in extreme cases, therefore, there is no justification for the extraction of a tooth, simply because a roentgenogram showed a rarefied area, unless substantiated by other diagnosis. The extraction of teeth, in an effort to check infections in other parts of the body, just because a roentgenogram showed a rarefied area, except in extreme cases, is to be condemned. If this practice is to be indulged in, it must have its completion in the extraction of all devitalized teeth whether or not the Roentgen ray shows a rarefied area to be present. Also all teeth that are pyorrheic would have to be extracted because they are foci of infection, and those that are not yet affected would have to be extracted because they might become foci of infection.

THE ETIOLOGY AND TREATMENT OF INTERSTITIAL GINGIVITIS*

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My researches on interstitial gingivitis and pyorrhea alveolaris¹ were published in book form in 1899. In this work every conceivable phase of the disease was studied on animals as well as man. The pathology was beautifully illustrated from its beginning to the formation of abscess, on the one hand, and exfoliation of the teeth, on the other.

The object of this paper is to try to make clear the etiology, pathology and treatment based on the researches laid down in my work.

The tissues about the roots of the tooth may become diseased under extreme local irritation or from constitutional disease, but as a rule the progress of tissue building about the first and second set of teeth prevents tissue degeneration. Not until the bone has obtained its growth, from 27 to 35 years of age, does degeneration take place to any great extent, although marked inflammation of the gums may be present. When the alveolar process has obtained its growth about the second teeth, the bone may be said to have reached the senile stage, and absorption under favorable conditions begins.

THE ETIOLOGY

In considering the etiology of interstitial gingivitis, my researches have shown that the tissues surrounding the roots are end-organs, owing partially to the

fact that the teeth, so far as nerves and blood vessels are concerned, are foreign bodies, and partly to the end-structure of the bone. An end-organ is a structure in the body in which nerves and arteries extend to the extreme end and then stop. The veins being extremely sluggish, the blood containing poison remains, and, being unable to return, sets up a low form of inflammation. The dental pulp is the best example of an end-organ in the human body. A study of this structure under the microscope, of persons over 40 years of age, will reveal all the degenerative pathologic conditions possible.²

The blood, then, which flows into the alveolar process, owing to local irritation about the gum margin or root of the tooth, does not return into the circulation. Blood charged with metallic, drug or body poisons collects in the alveolar process and produces irritation. Stasis results (Fig. 58, Interstitial Gingivitis¹), nutrition is cut off, and a low form of inflammation is produced. Nerve end degeneration takes place, endarteritis obliterans, and arteriosclerosis occurs.

Ziegler³ says:

The causes of inflammation may lie either in mechanical, thermal, electrical or chemical influences, as well as in the influence of parasites. The common characteristic of all these injurious agencies is the production, in the first place, of a local tissue degeneration, which, when of a certain extent and intensity, is associated with disturbances of the circulation and of vascular secretion.

This exactly describes the condition found in the alveolar process. Stasis of blood in interstitial gingivitis is, then, due to mechanical irritation and possibly chemical changes in the blood.

Ziegler³ again says:

Under the designation inflammation are grouped those pathological processes, consisting on the one hand of tissue degenerations and tissue proliferations, and on the other, pathological exudations from the blood vessels.

In this particular form of inflammation, tissue degeneration takes place. There is no pain, heat or swelling as observed in the other forms of inflammation.

When we consider the peculiar endotransitory nature of the alveolar process, degeneration of tissue is the natural result. At the senile period when the excretory organs are diminishing in activity and in disease, vital resistance is at its lowest ebb, metabolism is diminished, and degeneration and absorption of the alveolar process is in active operation. As age advances, the destruction of bone is a natural normal pathologic process.

The disturbances in circulation bring about tissue degeneration because the gingival border of bone is very thin, transitory and easily destroyed. The action of this mechanical irritation is to produce artery changes, nerve end degeneration and absorption of bone about the arteries, called halisteresis. Stasis of blood may take place in a circumscribed area, or on the entire border of the alveolar process; or the apical end of one or more roots may be involved. This depends on the nature and quality of the irritant. The nature and severity of the irritation, stasis of blood and a lowered vitality of the patients will also determine the extent of the destruction of tissue, whether the irritation is located at the apical end of

* Read before the Section on Stomatology at the Sixty-Seventh Annual Session of the American Medical Association, Detroit, June, 1916.

1. Talbot, E. S.: *Interstitial Gingivitis or So-Called Pyorrhea Alveolaris*, Philadelphia, S. S. White Dental Manufacturing Company, 1899.

2. Talbot, E. S.: *Developmental Pathology*, Boston, Richard G. Badger, 1912, chapter on the dental pulp.

3. Ziegler: *General Pathology*, p. 314.

the root, midway between the apex and the cervical margin, or at the cervical margin.

When the inflammation has once become established at the cervical margin, the absorption is progressive to a greater or less extent until the tooth or teeth are removed. Owing to the transitory nature of the alveolar process when irritation and stasis of blood occur, the nutrition of the part is interfered with and the bone tissue may be partially or wholly destroyed, leaving the fibrous tissue (trabeculae) undisturbed, thus holding the tooth firmly in position, although it can be moved laterally by the fingers. In most cases, however, the entire structure, including the fibrous tissue, is destroyed.

My researches have shown that the deposits on the roots of the tooth, other than tartar, are the detritus of destroyed bone and not deposits from the blood, as was formerly supposed. The pus stage is an after-consideration, and has nothing to do with the disease.

In summing up the etiology, then, in this disease: 1. We have to contend with the bone as an end-organ in which the blood accumulates (stasis). 2. Stasis of blood cuts off nutrition. 3. Local and constitutional irritation and chemical changes in the blood set up a low form of inflammation and bone absorption. 4. The absorption is enhanced because of the transitory nature of the alveolar process. 5. Nerve end degeneration and arteriosclerosis occur. 6. Want of vital resistance assists absorption.

LOCAL TREATMENT

The first symptom of interstitial gingivitis is bleeding of the gums on the slightest injury. The classification of the different phases of the disease renders the treatment, so far as we are capable of directing it, simple and easy.

The first thing that naturally comes to the mind of the operator is to remove the cause. The local treatment may begin immediately. For personal reasons of cleanliness of the patient and the operator, one or two applications of iodine should first be made to the gums, which will destroy the germs and cleanse the mouth. After this has been accomplished, the removal of all local irritation may begin.

We have seen that stasis of blood cuts off nutrition, causing degeneration of tissue (absorption of bone). The main object to be obtained in the treatment of this disease is to remove the stagnant blood, reestablish the metabolic process and cause a normal flow of fresh blood to nourish the parts. The nutrition of the part must be renewed that Nature may restore the tissues to health.

How shall this be accomplished? To remove congested blood, physicians, from fifty to a hundred years ago, resorted to cupping, leeches and scarifying the tissues. These methods must be resorted to at the present time in treating this disease. If the gums are congested and festoons hang down between the crowns of the teeth, they may be removed on a line with the alveolar border with a lance.

The gums should be allowed to bleed as freely as possible. In removing the deposits from the roots of the teeth, the parts may be injured as much as possible with as little pain to the patient as possible, the germs having first been destroyed. In this way much of the congested blood can be removed.

The suction process, not unlike the old method of cupping, is excellent when properly performed.

Scarifying the gums is also a good method of procedure. Vigorous gum massage with a stiff gum massage brush should now be employed to stimulate the tissues to healthy action.

Before the operation and after bleeding, iodine should frequently be employed to destroy all germs in the mouth. All loose teeth should be removed.

The following preparation has been used since 1878:

Water	10 parts or grams.
Zinc iodid	15 parts or grams.
Iodin	25 parts or grams.
Glycerin	10 parts or grams.

The iodine destroys all germs in the mouth and cleanses the tissues. The zinc iodid is used to contract the tissues, the glycerin to assist absorption. This preparation is applied to the gums, teeth and mucous membrane by a long, slender applicator with cotton wound about the end. It should be applied as often as every other day if possible. It is not to be used by the patient.

Friction and stimulating methods must be employed by the vigorous use of a "gum massage brush." The brush should be so shaped that it will reach the festoons between all the teeth.

It should be made of the stiffest unbleached bristles that can be obtained. The brush should be inserted into the mouth, the mouth and teeth closed. In performing this operation the mind should be concentrated on the gums and not the teeth. When the tissues have become revitalized, deposits from the alveolar process on the roots of the teeth will cease to form.

One of the best gum washes for the patient to use in connection with "gum massage" is that of the zinc sulphocarbonate recommended by Dr. W. H. Whittlar of Cleveland. This drug may be used in different strengths and in many forms. The following is a combination which I use:

GUM WASH

Zinc sulphocarbonate	60 grains
Alcohol	1 ounce
Distilled water	2 ounces
True oil of wintergreen	8 drops

The patient should use this gum wash and massage the gums three times a day. The patient should be under the care of the operator at least two or three times a week, so that he may direct the treatment. The treatment of interstitial gingivitis at the apical end of the roots must be carried out according to symptoms.

CONSTITUTIONAL TREATMENT

While the local treatment is being conducted, the patient's general health should be inquired into. A twenty-four hour sample of urine should be obtained, and a thorough laboratory examination made. If there are casts and high acidity, and indican is abundant, meat should be excluded, the patient placed on a vegetable diet, and the acidity reduced. The bowels should be kept open and large quantities of water consumed. There are many methods of cleaning the system and bowels. The following may be used to good effect; a teaspoonful in half a glass of warm water every four hours:

Calcined magnesia (heavy)	½ ounce
Sodium bicarbonate	1½ ounces

If the patient has sugar, albumin or other complications, it is best to refer the patient to a physician for general treatment.

By this method of treatment the patient, in the estimation of the average dentist, is cured, not, however,

as other diseases of the body are cured. Eternal vigilance is necessary on the part of both operator and patient to prevent blood from again collecting in the blood vessels of the alveolar process, and a return of the disease.

The bone is still an endotransitory structure, and having once become diseased, it is much easier for the stasis of blood again to take place. As the patient advances in years, the excretory organs become senile, poisons collect in the blood, resistance is lowered, and there is a gradual absorption of bone taking place about the teeth throughout life.

31 North State Street.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. LESCOHIER, POTTER, RHEIN, HARRIS AND TALBOT

DR. ARTHUR D. BLACK, Chicago: The first most outstanding feature of the pathology of this group of diseases is their chronicity and this has possibly contributed much to the difficulty of a clear understanding of the pathology. This condition, which I will term a chronic suppurative pericementitis, will, in the average case, be progressive extending over ten, fifteen or even thirty years. In those cases where we have a systemic cause as the principal one, we would naturally expect to find a general involvement of the peridental tissues. Except for some added local exciting cause, there is no reason why one or a few teeth should be picked out; all of the teeth should be included in the manifestation of the disease where the systemic condition is the principal cause. On the other hand, in those cases where a limited number of teeth are involved, we would naturally expect to find that the local exciting causes had played the primary rôle. As to the bacteriology, many men have endeavored to find a specific organism which could be associated with this disease, and they have failed. One fact argues against a specific organism as being the cause, and that is the progress in these pockets, and this progress is very much more rapid toward the apex than laterally around the roots. We observe many cases in which from an original pocket there have developed a number of other surface pockets, without any involvement of contiguous surfaces of the teeth. The tendency is for a tooth to move away from the side of the pocket, because encircling each tooth are the fibers of the peridental membrane. These are on a tension, and when the tissue is destroyed on one side of the root the balance of those fibers is lost, and the fibers of the opposite side draw the tooth in that direction, unless some obstruction of occlusion prevents this. There never is a detachment of the peridental membrane alongside the root that is not preceded by a gingivitis. In the destruction of the tissues about the root one of the earliest manifestations of the presence of a pocket alongside the root is a stripping off of these tissues from the cementum. As time passes there is left a connective tissue which has nothing which may differentiate it from a general connective tissue. Those elements which are necessary to a normal reattachment of tissue to the tooth are lost. What else has happened? The cementum has absorbed the products of that suppurative process. It has been changed from a positively chemotactic tissue into a negatively chemotactic tissue, which will repel tissue attachment.

As to rebuilding of the cementum: I have examined many cases and seen many in which there has been an absorption, not only of the cementum, but of a considerable portion of the dentin of the tooth, but I have never seen any in which there was a detachment in that area. They were not infected cases; there had been no suppuration. They were not cases in which, if you leave the end of a root, you will find cementum building over it. Dentin has no power of rebuilding cementum. Some one said it was closely comparable to bone. It is, except that it has no circulation. Its life depends on the cementoblasts on its surface. No changes take place within it. As the pocket progresses farther down the side of the root, we must expect the first absorption of the alveolar process to take place near the crest, and then as it continues

around the root, in cases of long standing we have a funnel formation in the bone. That is one of the marked symptoms of progress of this disease. I would like to criticize Dr. Potter's use of the term erosion in connection with these destructions or absorptions of the bone. It seems to me that the term rarefaction is hardly applicable to these cases, because the bone is either destroyed or absorbed. Dr. Potter spoke of looseness and tightness of some of these teeth. Many times we have a very loose tooth, so far as motion is concerned, and yet it is difficult to extract. As a result of inflammation, the fibers of the peridental membrane which remain attached to that tooth have lost their tonicity; they are not taut, and are apparently lengthened considerably, so that the tooth has an excessive motion, which does not at all compare with the amount of destruction of tissue which has occurred. Treatment will tone up those fibers and they will again exert their normal pull.

DR. FLOYD D. LEACH, Chicago: There is a certain amount of tooth movement laterally, that is, from buccal to lingual. Dr. Black said something about a peculiar action of the micro-organisms which caused a destruction of the investing tissues of the teeth, especially along the proximal surfaces of the roots. We have all seen this condition, causing the breaking down of the contents, due to the lateral motion in the act of mastication. It is not easy to guess or feel quite sure that those fibers of the peridental membrane which die to the buccal, labial and lingual sides of the socket should take the mechanical strain. I have an idea this condition may be the reason why the progress of the destruction is more pronounced on the proximal surfaces of the roots than on the buccal, labial and lingual. You have always noticed that the pockets are really on the interproximal surfaces. The gum would recede from the lingual, labial and buccal surfaces of the roots, and still in a great many cases be very firm as to attachment. Food substances constantly massaging these areas, and the friction of the brush when a brush is used in cleansing the gums and teeth stimulate to a greater extent those areas on the buccal, labial and lingual surfaces. But I think the mechanical arrangement of the fibers adds more resistance, more tone and more strength to these buccal, labial and lingual vestiges.

DR. RUSSELL W. BUNTING, Ann Arbor, Mich.: We have been told by some that pyorrhea is the result largely of constitutional factors, and by others that pyorrhea is the result of local disturbance, such as infection and irritation. Almost all have agreed that very frequently there are combinations of these two. May I present this view of the situation? May we say that pyorrhea is caused by an exciting condition, such as the infection which destroys the tissues about the teeth and severs their attachment? But infection is not the determining cause? The determining factors are all the predisposing causes, either local or general, which make the characteristic action of the exciting causes possible. I like Dr. Rhein's statement that healthy tissues cannot be infected. How often have we seen ten times the local infection that would be necessary to produce pyorrhea existing in the mouth, and no pyorrhea present? Why? Because those tissues were so healthy that they were not infected, even under very untoward local conditions. If this is true, we must recognize not only the local but the general conditions as causative factors. As Dr. Rhein said, our constitutional factors are often so obscure that the ablest and most careful internist cannot detect where they are located, or what their nature is. The infective condition alone which is present in the mouth could not have produced the pyorrhea in such cases but for that remote constitutional condition which made it possible for this to happen. Fortunately, we find that very frequently the clearing up of the local causes allows the tissues to come back to an apparent normality.

Can we cure pyorrhea? I have taken the stand that we cannot cure pyorrhea unless we can obliterate the pockets. Dr. Harris said that the pocket may be obliterated because cementum is built on the denuded surface, and that new attachment is had to the tooth. Dr. Black does not believe that pyorrheic teeth can ever have a reattachment. We must admit that if pyorrhea is to be cured absolutely, either the soft tissues must be reattached to the tooth completely

up to the free line of the gum or else the gum line must be retracted down to the place on the root at which it is attached. If it is true that these tissues can never be reattached, why should we not treat pyorrhea by opening the pockets, cutting away all overlying tissue, clear down to the bottom of the pockets, exposing the healthy tissue and allow it to heal? We would then have obliterated the pocket and the pyorrhea. But is that the only way in which it may be done? It is my conviction that the tissues may be made to physically join to the surface of the root after they have been denuded from it in the formation of a pyorrhea pocket, if the conditions are right. I have had many specific instances of pockets, in which I could get one quarter, one half or three quarters of the length of the root with an explorer, or any other instrument, and at the conclusion of a month or two of surgical treatment, assisting the tissues to return to as near the normal as possible, I have been unable to get the finest instrument between those soft tissues and the root of the tooth in the identical place where the pockets had existed previously. What has taken place in those pockets? Are there any other two tissues in the body that would so approximate and still not be physically attached? I do not think so. Let us take a surface view of that pocket. Pyorrhea seldom goes down circumferentially, attacking the tissues equally. It rather goes down one surface. If we prepare this root surgically and make it clean, we have remaining on either side living, healthy pericementum, which is capable of reproduction and filling in the space with new tissue. This is laid down first in the form of granulation tissue from which tissues may develop having the propensity to form a bony-like material, or even true bone, which may be deposited on the surface of the root, and attach those primitive fibers, or embryonic type of transitional tissue, to the surface of that root. When a root is resorbed there is in many cases entire breaking up of the fibers. The bone is entirely taken out at a given area and only a transitory type of tissue remains. Dr. Black said that in one case the destruction was not infective and that in the other it was. But was it not destroyed in both cases and what is the difference? There are cases on record in the literature in which a bone has been cut across; a section has been taken out, and in the gap there has been placed an ivory bit that reproduced as nearly as possible the bone which was removed. Later that section has been removed and has been examined in microscopic section. It was found that the ivory had about it a layer of new bone which was quite like a lamellar bone placed on the outside of the ivory. Outside of the bony layer a soft tissue formed, quite like periosteum. These tissues had adapted themselves to form a direct attachment of soft tissue by a bone forming process to the ivory, in which there was no circulation, without which Dr. Black stated reattachment could not occur. We are told that exactly the same thing has been done with platinum in which bone has been laid on top of platinum, and the soft tissues glued to the platinum in the same manner.

DR. EUGENE S. TALBOT, Chicago: I conceive an entirely different condition of things than has been explained to you by Dr. Black and Dr. Bunting in regard to pockets. There is no question about the pathology. It is all laid down in my work, and has been verified in a great many different methods of experimentation. My own researches explain that many of the statements, made by Dr. Black and Dr. Bunting, are much more simple than the points brought out by them. For instance, arteries run through the alveolar process and the periodontal membrane. When irritation takes place, whether local or constitutional, the artery is filled with irritation. If constitutional, it may be poison; if local, it may be anything that produces a local irritation. If you will examine the illustrations in my book, you will find that the bone extends around the artery. The irritation, then, is set up in and around the artery, and if there are a dozen arteries there are a dozen points of irritation, inflammation and absorption, and the absorption starts out from the artery. We will say that this irritation is due to lead or mercurial poison. That material is carried down into the artery, and it may extend clear to the end of the root. What has taken place? Absorption has taken place around that artery, and only one artery is involved. Absorption has gone down to the end of

the root. But if the irritation is greater, either constitutional or local, these arteries passing in a lateral direction, as well as those passing longitudinally, may absorb the entire process on the one side of the tooth, while absorption has taken place downward in the other case clear to the end of the root in one or two arteries. To explain Dr. Bunting's point about filling up of the alveolar process with new material if the inflammation has extended down the side of the root, with one, two or three arteries involved, the bone is liable to heal up if the cause is removed. If, on the other hand, the bone has been entirely destroyed downward and pockets have been formed, that bone is never restored, because the fibrous tissue is entirely lost. Bone absorption takes place by halisteresis before the fibers of the periodontal membrane are destroyed—just the reverse of Dr. Black's idea.

DR. MEYER L. RHEIN, New York: Not a thing has been said in regard to cemental repair that can be denied under certain conditions, and yet we have listened to statements that appear to be absolutely in opposition to each other. I know that Dr. Bunting is correct in what he has said. I know that exposed cementum can be repaired and the normal condition replaced, but each of the speakers has omitted to state in what conditions repair, or lack of repair, takes place. Dr. Talbot gave a very lucid description of what takes place in the tissue when arteriosclerotic conditions manifest themselves. We get these conditions in certain forms approaching the period of senility, in certain forms of malnutrition, nephritic and diabetic conditions, and under such conditions that repair of the kind that Dr. Bunting spoke of is impossible. Why does a pocket form? We get a pocket on account of imperfect nutrition to that particular spot, and as a consequence there is the impossibility of repair which must ordinarily take place throughout the body daily. The same conditions that produce pyorrheal conditions are at work in erosion, where there is found a continuing loss of gum tissue, exposing the root surface, except that the local resistance, due to many causes, has prevented infection from taking place. In other words, in the retraction of the gum which results in the exposure of considerable of the root surface of the teeth, we meet with the same lack of nutrition that is demanded at every ultimate point of nutritional circulation. Pyorrhea may occur in people suffering from fatty degeneration about the heart. What are the appearances of the mouth in this condition? There is no suppuration. There is no deposit on the roots, but very extensive pockets that frequently go down deep, and we find the gum in ribbons over these pockets. They are great big flabby pockets, with a deterioration in color and character of the circulation. I have never seen one with any purulent condition. I have seen those gums come back absolutely to what we would consider comparatively healthy gum tissue under the Nauheim treatment. If the malnutritional factor has disappeared after treatment, you may call that patient cured. What is the reason that exposed cementum, considering that there is no condition of malnutrition present, will not permit the tissues to recover? It is due to the fact of exposure of this cemental surface to the irritating fluids that are in circulation. I believe it will take exceptional conditions to permit a cemental surface that has suffered abrasion to repair, because of the danger of retrograde metamorphosis going on from its exposure to the fluids of the mouth, consequently the therapy must be of such a mechanical nature to cover that cementum that it will not be exposed to the fluids of the mouth. I have done this for many years by coating the surface of such cementum with chloropercha, keeping the exposed cementum hermetically sealed and thus protecting it from the fluids of the mouth.

DR. GEORGE B. HARRIS, Detroit: I have been misunderstood a little in regard to the regeneration of cementum. In the first place, I do not wish to be understood as saying a complete regeneration takes place. The point I wanted to bring out is that there are cases in which the cementum has regenerated, and these cases were not under aseptic conditions. Can anybody imagine the crown of a tooth cut off below the gingival margins or split half the length of the root with the cementum forming over it, and say that this portion was in an aseptic condition? I do not believe it. Further,

where the cementum is diseased we can remove it, leaving nothing but the healthy cementum below, producing a condition that is as near aseptic as it is possible to get under the conditions, a condition at least equal to those mentioned where the cementum did reform. It is possible, then, that the cementum will reform there. Whether it ever has or not, I do not know, because there is no way of measuring it as it takes place in the mouth, unless you would happen to find a tooth where the difference in density of the cementum will show, or where it would be shown by the new cementum making a thicker coating.

DR. G. H. SMITH, Medina, O.: This subject of pyorrhea has been of intense interest to me for five years, and I would like to suggest to the medical profession that they advise more of their patients to select an ethical dentist. Dr. Moorehead made a statement in his address that I can hardly substantiate. He claims that only 10 per cent. of the dentists were efficient. There are dentists commercializing, but with the cooperation and advice of the medical profession many patients would escape many dental disorders.

DR. WILLIAM C. FISHER, New York: I want to ask Dr. Rhein if I understood him to say that in a diabetic patient he would not consider operative procedure as being wise, or that it had been known to even be fatal?

DR. RHEIN: Correct. I said diabetes not under control.

DR. FISHER: I am not thoroughly convinced that a dental operation is precluded in any patient—diabetic or otherwise—who is able to visit your office and go about his business. I believe, of course, in the medical treatment, but I certainly think that there is absolutely no shock, such as that experienced in a major operation while treating these patients. In pyorrhea I use the several solutions of iodine. Dr. Talbot spoke of gum massage with the brush. Do you mean the hand or engine brush?

DR. TALBOT: The hand brush.

DR. FISHER: I was afraid that possibly you meant the engine brush. In polishing teeth we want to get away from anything that will in any manner injure or tear the tissues, and I have devised a simple little mandril of one piece of steel. I use French tubing of different sizes to fit; and make my polishing powder, mixing in with that iodine. As this mandril revolves in the engine, the French tubing will flare out on the surface and coax up the gum, whether receded or not, and polish the surface beneath the gingiva. In the interproximal spaces select a smaller piece of tubing, and it is possible to get a polished surface there. With that method you get a massaging of the gum which the patient cannot possibly give it. You are massaging the gum at the same time that you are polishing the neck of the tooth where it has been scaled.

DR. W. A. PRICE, Cleveland: Two decades find us almost exactly where we were when I started to practice dentistry twenty-three years ago. We cannot come together and express a common idea relative to the etiology of pyorrhea and be united in supporting and substantiating it. We have made practically no study whatever of protein absorption, which takes place around these pyorrheal infections. A large number of nervous lesions of the body have apparently been traced directly to dental infections and to pyorrhea. The medical profession must bring these patients back to us for treatment, and we cannot even give the A, B, C of the infection in pyorrhea. We do not know the nature or the morphology of 50 per cent. of the bacteria that grow in pyorrhea pockets. They have not been grown artificially. What is the solution? If I were to ask Dr. Talbot how he got his information that has been the great cornerstone for a large part of this work he would say, "Hours and hours, and days and days, and years and years of hard work." How many men are devoting a worthy effort to this work? We are called on to redouble our efforts to answer with some degree of intelligence this great question of the etiology of pyorrhea, which today we know almost nothing about.

DR. HOLLIS E. POTTER, Chicago: I can see now that the pockets we are showing with the Roentgen rays represent more absorption of bone than any such slight detachment as you have been talking about. I should think that in cases where we are showing Roentgen ray findings of absorption around a tooth, when we are talking about a pocket, it is a

very gross condition as compared with the small and limited pockets that the controversy is about this afternoon.

DR. ALEXANDER W. LESCHIER, Detroit: As Dr. Price said, it is possible that there are many good things we do not know about the bacteriology of pyorrhea, but there is one fact which I do believe has been established, namely, the preponderance of streptococcal infection. I do not mean to imply that the streptococcus is the cause of pyorrhea, bacterial infection being apparently a secondary element, characteristic of the pustular stage and not of the initial condition. But, in view of its potential virulence and the persistency with which the streptococcus is found, it is indicated that certain strains have a peculiar affinity for the periodontal tissues. Also that as far as the sequelae of pyorrheal infection are concerned, particularly the arthritic, the streptococcus overshadows in importance other micro-organisms.

DR. H. A. POTTS, Chicago: May I ask if it has been determined whether or not this streptococcus which he finds in pyorrhea is an aerobic or an anaerobic one; whether hemolytic or the *Streptococcus viridans*, and what connection there is between the effects of these streptococci of pyorrheal infection and those found in chronic abscess?

DR. LESCHIER: I cannot answer definitely the questions raised. The work of Hartzell and others has indicated that the *Streptococcus viridans* is found much more frequently than any other type, but hemolytic streptococci are also observed in some cases. I would not undertake to answer the question, as to the relationship between streptococci elsewhere and those in pyorrhea and alveolar abscess.

DR. MEYER L. RHEIN, New York: I do not want to let the inference go that I am oblivious to the fact that it is necessary to have an attacking organism when we come to this stage of infection. There seems to be a strong elective affinity of certain micro-organisms to attack the gingival tissue dependent on certain malnutritional predisposing causes. There is a type of pyorrhea due to certain kinds of malnutritional causes where the attacking organism is a protozoan. I have cured three distinct cases of pyorrhea in the last two years with emetin, and I failed in numerous other cases. Now, why should this be? It simply carries out in the ultimate analysis what Dr. Leschier's paper has shown us, that there is no one specific organism in pyorrhea. The three patients I cured all seemed to have the same kind of malnutritional predisposing causes; they were all cases of intense inflammation and infective conditions in the larger colon. They were cases that had shown symptoms that very closely resembled epidemic forms of dysentery. Now, is it illogical, is it surprising, that in a condition of that kind, where we know the endameba plays the rôle of attacking force, that when by reason of this predisposing cause the mouth shows the evidence of pyorrhea we should find the same organism again the attacking force? The place to find pyorrhea is not among the patients who come to the office of the dentist. You will find pyorrhea almost everywhere. About 85 per cent. of the cases that the average dentist treats as pyorrhea are nothing more than some focal infection that has been diagnosed improperly and in which a roentgenogram would demonstrate the error of the diagnosis. In chronic alveolar abscess, with its sinus opening out into the mouth, sooner or later symptoms appear that approach and grossly deceive the careless diagnostician, and there is no reason why you cannot get an alveolar abscess with a pyorrhea complication, if you want to call it such, that is dependent entirely on the apical infection. I have found such a condition in a considerable number of cases. On careful differential diagnosis I could put my hands on the point of focal infection. That is especially true in cases where there seem to be one or two teeth only subject to pyorrhea. When an individual comes with a pyorrhea in one or two teeth, the diagnosis is open to grave suspicion. I have found the focal infection of a pyorrhea showing in an upper incisor, away back in the roots of a second molar, and I recall quite well the difficulty of making a diagnosis in that particular case. I was a little surprised at Dr. Fisher's question as though I was in doubt as to whether operative interference was to be avoided in diabetics where the diabetes was not under control. It is not a question of a major operation that makes a surgical condition a most dangerous proposition under

such conditions. I know of no surgeon who would not seriously hesitate to do the most minor surgical operation on a patient showing a large percentage of sugar. It is true that under certain conditions, when it becomes a question of life or death, the surgeon will take chances. He knows the patient is going to die from septic causes, and he is going to give that patient the benefit of that chance. The deaths from teeth extraction in diabetics would fill a very large chapter if they could be brought together.

DR. FISHER: Does that mean from the anesthetic?

DR. RHEIN: No. I am simply stating what is an abstract fact that is settled in the minds of surgeons, pathologists and bacteriologists at the present time. In regard to research work: We have had to have recourse to animal experimentation to a large extent, and I am convinced that all the dental research work on animals in the past is replete with error, because the mouth flora of the dog is so different from the mouth flora of the human that it cannot consistently be taken as the same in any experimental work on animals. This is a very important factor, and it is far better for dental research work to proceed slowly and get results that are not going to be questioned in the future than to make comparisons and arrive at conclusions that cannot be verified.

DR. EUGENE S. TALBOT, Chicago: If you will examine the dental journals, and some of the medical journals, you will find that a large percentage of the pictures that have been shown are represented as abscesses. Dr. Potter has shown us that there are a great many different shades or conditions of the alveolar process which are not abscesses, and the reason for that is that we have a condition of absorption called halisteresis, and not lacunar absorption in the alveolar process, which may be or is due to the irritation that has taken place from the pulp chamber. The degree of absorption will depend on the amount of irritation. In regard to focal infection, the dental profession can hardly be blamed for abscesses at the roots of the teeth after the canals have been treated and filled. Up to within the last two or three years, when an abscess formed on the root of a tooth and the face swelled or a fistula had formed, the only means of knowing that the abscess was supposed to be cured was that the face became reduced to a normal state and remained so; the fistula healed and did not return. These were the only symptoms available when the tooth remained quiet without pain or swelling which led the operator to believe that the abscess was cured. With the modern methods of diagnosis, the Roentgen ray, we have learned that these signs are not for a moment to be considered. The Roentgen ray demonstrates that very few abscesses are destroyed and healed, but that they remain cold or blind abscesses, discharging pus into the tissues for an indefinite length of time. I recall one instance in which an abscess remained on the root of a left superior first molar for fifty-two years.

Characteristics of the Chinese.—It seems that the Chinese typically has a higher threshold of stimulation than the occidental. It takes a larger summation of stimuli or a greater single stimulus in the first place to rise into consciousness, and in the second place to cause reflex activity. So we see him impervious to noises, odors and sights which western nerves bear but poorly. We see him existing with no complaint and no idea of betterment, in squalor, misery and poverty which western personality would find at once unendurable. We see him exercise a fatalistic indifference to the immediate or remote future, because no clear picture has arisen in his consciousness of any condition or time different from his own immediate present. When the summation or single stimulus is sufficiently great, however, for sensation to appear in consciousness, there is but a narrow margin of normal response before the reaction becomes pathological. Hence it is that all the psychoses and neuroses are so easily aroused, since the zone of normal response is narrowed by the high threshold of stimulation. Thus we see the superficial anomaly of sluggishness, inertia and indifference associated with a high and poorly controlled emotional nature which involves and easily goes over into hysteria and various emotional crises.—Dr. Alfred C. Reed, *Scientific Monthly*, January, 1917.

AN ANALYSIS OF FIFTY CASES OF SCIATICA *

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The purpose of analyzing a series of cases of sciatica and presenting it before this section is to discuss whether there is such a condition or clinical entity that is called essential or idiopathic sciatica. Also I wish to discuss in relation to teaching, what should be taught, and in what department of the medical school should it be made the subject of teaching. There is no question but that it is firmly fixed in the layman's mind that sciatica is a disease in itself, a distinct entity, and I am sure that the profession at large also is satisfied that it is an entity, although realizing that at times it may be a symptom of a lesion elsewhere. If we appreciate that there is a definite cause in every case and that cause can be demonstrated as a physical fact, then much of the uncertainty will be changed and the treatment will become more rational and exact.

What is the necessity for discussing this subject? That it is an indefinite and undecided condition is very well shown by any textbook on internal medicine or nervous diseases. Either what the orthopedist believes to be true, and I suppose my experience as brought out in these fifty cases will correspond with yours, is entirely wrong, or else the various authorities on which we have to depend are giving a wrong conception of this condition.

Let me quote from one of the authorities as to treatment:

Certain remedies are of service in sciatica. Prolonged baths give excellent results. The patient must remain in his bath for several hours. Antipyrin may be prescribed in doses of from 15 to 45 grains. Injections of morphin and inunction of an ointment of methyl salicylate may give relief. Blister, the actual cautery, injections of sterilized water, injections of air, and epidural injections by the sacrococcygeal route have their indications. Bleeding leeches and cuppings are useful.

I am familiar with the teaching of two medical schools and as far as I know sciatica is not definitely taught as a part of the curriculum in either one. I received no instruction as a student and supposed that it was a pure nerve lesion. I rather believe that it is not considered of very great importance, and therefore falls between the departments of medicine, neurology and orthopedics. Therefore we had to gather our knowledge from the textbooks and current literature, and enough has been said to show the confusion that exists, and this is the reason for presenting these facts.

It may be argued that this is a rather selected group of cases, because I would be more likely to see cases with joint symptoms. There is a certain element of truth to such a statement, but many of these cases had been definitely treated for sciatica by other men, with the idea that there was an inflammatory lesion of the nerve trunk. I am sure that this series of cases represents what is commonly called sciatica. Fifteen years ago there were reported from the nerve department of the Massachusetts General Hospital of Boston a large number of cases of sciatica, as shown in the annual report. The other day I went over the records of this same department for the last six months and found

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