No 1

Prevention of the Loss of Teeth

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Reprint from
THE MISSISSIPPI DOCTOR
May, 1943; pp. 522-527

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The importance of our subject arises from the following five observations:

1. There is almost universal prevalence of the diseases, caries, and periodontoclasia, from which practically everybody, if he lives long enough, sooner or later loses part or all of his teeth.

2. The duration of these diseases from which each separate tooth is lost, covers months, years, often many years.

3. There is impairment or loss of the function for which the teeth are provided. Most people, by the time they reach middle life, already have lost some, many, or all of their teeth. This means that they must go through the remainder of life masticating their food imperfectly and with more or less difficulty. They are deprived, to a greater or less extent, of the pleasure and satisfaction one enjoys from eating, and of the important aid to digestion which results from proper mastication of food.

4. There are comparatively so few symptoms that the average person has no correct idea of the nature and the extent of the damage and the pathological process going on in his mouth. Symptoms which he recognizes are usually only those of the far advanced stages of disease and appear only long after more or less permanent damage has occurred.

5. And finally, although these diseases and the resulting loss of teeth are entirely preventable, there is at present no source of the essential information for prevention available to the great mass of people who need it. The dental profession is depended upon, but very few people who consult dentists receive the advice and information which are absolutely essential for prevention of further disease or for prevention of further progress of the disease that already exists.

The wide prevalence of "bad teeth" in the general population throughout the country is indicated by the large number of rejections for this condition in the first selective service draft. Bad teeth stood at the top of the list of causes for rejection, until later on, when it was decided to disregard, more or less, this disability.

Casual observation of people as they smile and talk and laugh reveals only the gross diseases and abnormalities of the teeth, and the absence of some of those that already have been lost. Most people lose their chewing teeth first. A person who appears, upon casual notice, to have well preserved front teeth, usually will be found to have active and often advanced disease affecting part or all of those farther back; probably some are already gone.

Loss of teeth increases and advances as certainly as age advances, so that it is generally thought of, even by physicians and dentists, as being a part of the ageing process, and always to be expected, if one lives long enough. We are so accustomed to our own association of bad teeth, absence of teeth, and the makeshift of artificial appliances with advancing age, that we are hardly able to realize the fact that these conditions are entirely preventable and unnecessary at any age.

Even the physician, who should be in better position than others to realize the harmful and profound effects of the diseases and loss of teeth upon the health and comfort throughout life, and actually upon the length of life itself, is usually quite indifferent and neglectful of the matter. Not only does he already surely have disease from which he gradually loses his teeth, but if he looks for it, he will find the same condition in practically every adult patient he examines. He does nothing to prevent effectively the loss of his own teeth or to help his patients save theirs.

For the purpose of securing accurate and significant information relative to the prevalence of the two diseases from which teeth are lost, a careful study, especially applicable to physicians, was made recently of a cross-section of the present senior class at Tulane University School of Medicine. Ten per cent of the students in the class were selected in a way which would make the findings statistically significant. Each one of these twelve students was carefully examined for caries and periodontoclasia. In addition, a history was carefully

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taken of their oral hygiene habits, the dentists each had consulted during the previous ten years, and what, if any, advice or instructions had been given by the dentist for the prevention of further disease.

This is a favored group of young men whose oral health could reasonably be expected to be about as good as that of any other class of people in the country. They already have general college education and are now preparing themselves for health service and the combatting of disease. One third of them are sons of physicians or dentists, and one, the son of a trained nurse. These, especially, have come up in a medical environment. They should have had the advantage of whatever oral health service is available through professional channels.

Briefly, the survey showed that each one of these students had one or more fillings in one or more teeth, some many. Several already had lost one or more of their teeth. One young man had lost thirteen. Periodontoclasia lesions and some receding of periodontal tissues was found in every individual, varying from two to many lesions. Material from such lesions contained abundant pus cells, establishing the diagnosis of active inflammation and suppuration.

Many of these students had from one to several deep periodontoclasia lesions, indicating long standing suppuration and destruction of periodontal tissues. Such lesions represent advanced stages of the disease and more or less permanent impairment of the supporting mechanism of the tooth.

The oral hygiene practice necessary to prevent caries and periodontoclasia was not followed by any one of these students, as was shown by the histories given and by the presence of these diseases.

What was found in this representative cross-section of medical students indicates the conditions that exist in medical students throughout the country. We can be certain that the conditions in this regard, in people in general, of the same age group, are much worse than have been found in this rather favored group.

Medical students of today will become the physicians of tomorrow. We have here, therefore, some indication of the unpromising outlook for the oral health welfare of the physicians of the future. We also have some suggestion of the very unhappy situation, in this regard, of the physicians of the present, who are surely worse off now than they were when they were medical students. And, since we can hardly expect the public generally to be better off or better informed on this health problem than the physicians to whom they are expected to look for leadership and guidance in health matters, how unpromising is the outlook for them!

Caries

The fact that caries is a local disease and that the way in which it is initiated and progresses as a result of bacterial action has been known for more than 50 years, since the original, thorough, and convincing work of W. D. Miller[1] first published in this country in 1890. The fact that this explanation of the cause of caries is still questioned, doubted, denied, or misunderstood by many is a good example of how long it may be, sometimes, from a scientific discovery before its potential benefits are fully realized.

The pioneer work and leadership in this country of G. V. Black[2,3] and his associates early in 1900, brought further evidence and confirmation of the local nature of caries and the way in which it is caused by the action of bacteria at favorable locations for their propagation and retention.

Notwithstanding the many known and other unknown factors that influence the occurrence and progress of caries, the fifty-year-old slogan is still absolutely true; viz., "A clean tooth will not decay." Conversely, any tooth that decays has not been kept clean.

Periodontoclasia

The local nature of periodontoclasia has been known since the epochal contributions of Dr. John W. Riggs[4] of Hartford, Conn., in 1876 and during several years thereafter. He maintained that periodontal disease begins as a local inflammation of the gingival tissues, produced by the irritation caused by calculi and other accretions on the teeth contiguous to the free margins of the gums. His claims were substantiated by his success in arresting and permanently controlling the disease by thoroughy removing these accretions from the teeth.

W. D. Miller[1] maintained that periodontoclasia is essentially a local infective process in which the periodontal tissues are destroyed. He identified several different species of bacteria as being present in the disease, but was unable to identify any particular organism as the specific cause.

Black[2,3] also maintained the local nature of periodontoclasia and emphasized the impor-

tance of invasion of the periodontal tissues by micro-organisms, several different species of which he found associated with the disease.

The lesions of periodontoclasia begin and progress only at locations where bacterial film and food débris accumulate and are retained for long periods of time, and never where the tooth is kept clean at the gum margin. Therefore prevention and cure is to be accomplished by keeping the teeth clean. To the former slogan, "A clean tooth will not decay," I would add with equal force, "Periodontoclasia does not occur about a clean tooth." Knowing these two facts and a practical way to maintain clean teeth is all that anyone needs to be able to keep all of his teeth throughout a long life. Under the circumstances, it may be helpful to direct attention to some important information, as to when and how to clean the teeth.

When to Clean the Teeth

There are enormous numbers and the greatest variety of bacteria in the mouth at all times. Others are being introduced frequently with food and drink, and otherwise. There is no such thing as sterilizing the mouth from bacteria. The best that can be done is to reduce the number as much as possible at frequent intervals and to remove the food which serves as culture media for them. Bacteria do not multiply or grow to any appreciable extent, except in the presence of suitable culture media. Removing remnants of food (particles and solution) in cleaning the teeth deprives the bacteria of nutriment and limits their growth.

Bacteria can produce the acids which initiate caries only when growing in the presence of sugars and other carbohydrates. Cleaning the teeth and mouth of food remnants prevents production of acid by the remaining bacteria until carbohydrate containing food is introduced into the mouth again.

If one cleans his teeth thoroughly at night before retiring, there follows a period of several hours during which no acid is present and none is produced at these vulnerable locations where caries is most likely to occur. It is to gain this longer period of freedom from bacterial growth and acid production which makes it necessary that the teeth be cleaned at night before retiring. If, on the other hand, one retires with an uncleaned mouth, containing the accumulation of bacteria throughout the day, plus retained food material, a most favorable condition exists for enormous multiplication of bacteria, fermentation of food, and production of acids during the night.

Acid producing bacteria, even in the presence of favorable culture media, do not produce considerable concentrations of acids until after a good many hours of incubation. The period from the time food is taken in the morning and during the day, until time for cleaning the teeth again at night is not sufficient for harmful amounts of acids to be produced. Therefore, for the purpose of preventing caries, it is only necessary to clean the teeth thoroughly at night before retiring.

If, for purposes of personal cleanliness and comfort, one finds it convenient to clean the teeth partially or thoroughly at other times of the day, such as upon arising in the morning and following some or all of the meals during the day, no harm will be done. However, this is not necessary to prevent decay of the teeth. Circumstances and convenience, and one's own personal pride will have to determine whether he is willing to carry about with him, at any time, decomposing and sometimes putrifying remnants of food in his mouth and about his teeth.

Periodontoclasia is caused primarily by the long continued presence of an accumulated mass of bacteria, sometimes called tartar, on the teeth at the margin of the gums, especially between the teeth. Bacteria are able to grow and accumulate here where they are not washed away by the saliva or dislodged by the normal movements of the mouth and tongue. They are nourished by food material which also may lodge and be retained in such favorable locations for long periods of time. Sometimes particles of food that were taken, even two or three days previously, can be removed from such locations. Of course decomposition of such retained material may be far advanced. One who has not thoroughly cleaned the spaces between his teeth previously will be surprised at the amount and the character of material which is retained there.

If the approximal surfaces of the teeth at the gum margin, where periodontoclasia begins, are cleaned of bacterial film and retained food material at night before retiring, there follows a period of several hours, during which there is little increase in bacteria. Indeed the most rapid recovery of the gum tissues occurs from the irritation and inflammation going on there previously.

Such harm as is caused by retained food taken during the day and before time to clean

the teeth again at night usually is not sufficient to offset the benefits of freedom, during the previous night, from irritation.

If, on the other hand, the day's accumulation of bacteria and food débris is retained during the night enormous increase of bacterial activity goes on. Irritation and inflammation of the gum tissue impinged upon, continues through the night, in place of the normal healthy condition, which would have existed if the foreign material had been removed.

Therefore it is perfectly clear that to prevent periodontoclasia and to allow lesions that already exist an opportunity to heal, it is absolutely necessary that the teeth be thoroughly cleaned at night before retiring. Of course no harm will be done and some benefit may accrue if it is found convenient and practical to clean them at other times also.

How to Clean the Teeth

In order to save all the teeth it is necessary that all should be cleaned. To clean a part of the teeth thoroughly and others poorly or not at all means that only a part of them are being saved and that the preservation of the others is being jeopardized. Each tooth, to be saved, must be kept clean.

We may think of a tooth as presenting five different surfaces for cleaning; viz., the labial and buccal surface in contact with the lips and cheek, the lingual surface in contact with the tongue, the occlusal or grinding surface, and two approximal surfaces next to adjacent teeth. The first three surfaces can be cleaned by the proper use of a suitable toothbrush. The approximal surfaces can be cleaned *only* by the proper use of dental floss. No other effective way has been found. Neither is it likely that one will be found in the future. In the light of all the information we have now, one must learn how to clean the approximal surfaces of his teeth with dental floss, and do it, or sooner or later suffer the inevitable consequences of caries and periodontoclasia.

Use of the Toothbrush

Many years ago a special committee from the American Dental Association, after thorough study and investigation, reported and published the specifications for a toothbrush that had been found best for cleaning the teeth. They recommended a plain, straight-handle brush, with the brush head about one inch long, handle about five inches long, three rows of bristles, six tufts to the row. No other shape, size, or kind of brush is as effective as this one for cleaning the teeth.

One will find brushes conforming to these specifications in the toothbrush stock of almost any store, together with an elaborate display of brushes of many other kinds, every one of which is inferior to the extent that it deviates from the above specifications. One cannot clean his teeth successfully with some of them, no matter how hard he tries. Anyone who, through high pressure salestalk, misleading advertising, lack of information, or misadvice from others, selects and depends upon such inappropriate toothbrushes is already partly defeated, however sincerely he desires and tries to save his teeth.

The extent to which people do not now use toothbrushes that are best adapted to the purpose of cleaning the teeth is indicated by what was found in the study of the cross-section of medical students referred to above. Two of the twelve had brushes that conform to the best specifications, as given above, and two others had brushes that were not very far from these specifications. Eight had brushes that deviated seriously from the best kind. In several instances it would have been practically impossible to clean the teeth with the brushes they had. It is a serious situation when the information and influences that govern the selection of toothbrushes lead at least two thirds of the people, as indicated here, to use inappropriate and ineffective ones, and cause many people who really do try to save their teeth, to fail.

The toothbrush cleans the teeth by the digging action of the ends of the bristles which are forced into the fissures, grooves, and depressions on the teeth, where food débris and bacterial film tend to accumulate. The brush should be held firmly against the surface of the teeth and drawn back and forth with short strokes. All the teeth in the mouth can be cleaned well in this way in less than one minute's time. A better job can be done in this way than by any other method of brushing. The special methods so often advised to brush "up and down" or "round and round" or some other abnormal way, are entirely unnecessary, if not worse.

Use of Dentifrices

Many dentifrices are harmful in one way or another. There may be some that are not harmful directly. If there are such, even these are indirectly harmful because their promotion and

use misleads their users to depend upon them to the neglect, more or less, of the other steps that are essential to save the teeth.

Hands and fingers soiled with greasy food, and similar material, are easily cleaned with soap and water. To help clean food and other material from the teeth, a touch of the same kind of toilet soap on the toothbrush is all that is needed. Usually, anyone who tries it for a few days will be rescued from the harmful effects and the cost of dentifrices of any kind, in the future.

Those who discolor their teeth with tobacco, and with food and drinks which stain them, may wish to polish them occasionally with some abrasive powder, such, for instance, as prepared chalk. However, excessive use of abrasives in this form or in dentifrices, and overbrushing with them, may do more harm than good. The same can be said of chemicals in dentifrices to whiten the teeth.

Use of Dental Floss

As was said previously, the only way by which anyone can clean the approximal surfaces of his teeth well enough to prevent caries and periodontoclasia there is by the proper use of dental floss. Anyone who does not clean these surfaces with dental floss cannot save his teeth against the ultimate effects of these diseases.

The best dental floss consists of a waxed round, silk string, twisted with about ten turns to the inch, and not more than 0.3 millimeter in diameter. Such floss is not now available. Perhaps it may be later. The dental floss now available for general use is oval or flat and has a twist of about three turns to the inch.

Before the war, practically all manufacturers made their dental floss of silk. Now they have to use synthetic substitutes because all silk supplies have been frozen for war purposes. The synthetic material used is better than nothing, but it is very inferior to silk. I do not know anything about the supply and the stock of silk available, or the urgency of the need for it for other purposes. However, I do know that it is certainly an unfortunate situation that enough cannot be released for the manufacture of dental floss, upon the use of which depends the oral health of so many millions of the American people, and of other millions in the armed forces.

Each person must develop his own technique or manipulations for cleaning his teeth with dental floss. The important thing for him to know is that it is necessary to clean both approximal surfaces of each tooth down to the gums. This is accomplished by carrying the floss down to the gum margin and into the gingival crevice, and then endeavoring to draw it diagonally across the surface of the tooth. Before removing the string from the space, the surface of the other tooth should be cleaned in the same way. One passes on to succeeding interspaces and cleans the two tooth surfaces, until finally all the teeth have been cleaned. Vigorous rinsing of the mouth and teeth with water helps to remove loosened material, and food material in solution, especially fermentable sugars.

Bleeding Gums

A person cleaning his teeth with dental floss for the first time may find that his gums will bleed. This is due to the presence of periodontoclasia lesions, which probably had not been recognized previously. Touching and manipulating the inflamed and congested tissue just beneath the gum margin is sufficient to cause the bleeding. The same thing happens more or less every time food is chewed. Many a person with extensive periodontoclasia would be alarmed to know how much blood flows from his gums and is swallowed with his food every time he eats. He would be worried also if he realized the amount of purulent material that is squeezed from his pyorrhea lesions and mixed with his food at every meal.

After a few days of cleaning the teeth with dental floss at night before retiring, all early and shallow periodontoclasia lesions heal and no longer bleed from cleaning. Farther advanced and deeper lesions may require longer time to heal. There may be lesions so far advanced that only partial relief and recovery can be hoped for. Little restoration of the tissues that have been destroyed can occur. Such a tooth can function only poorly at best.

Dental Service

If one has cavities in any of his teeth, these should be filled as soon as possible. This can be done only by a dentist.

If the dentist will remove the scale and accretions at the gingival margins and in the periodontoclasia lesions in the gingival crevices, and if he will smooth and polish the approximal surfaces of the teeth, this will hasten the healing of periodontoclasia lesions. Subse-

quently such dental service should not be necessary, except in case of far advanced disease, and in certain areas where the patient is unable to clean the teeth. Dental service alone, no matter how efficient, does not prevent the loss of teeth. This can be accomplished only by the efforts of the patient himself.

Summary

1. Almost all people, if they live long enough, sooner or later lose part or all of their teeth, from caries or periodontoclasia or both.

2. The dental health service and advice available at the present time are woefully inadequate to protect people in any walk of life from these diseases.

3. Both these diseases can be entirely prevented, and further progress of existing disease can be stopped, by properly cleaning the teeth with toothbrush and dental floss every night before retiring.

4. These diseases and the resulting loss of teeth cannot be prevented in any other way.

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