

Pulp Surgery and General Health.

Lecture at the Meeting of the Scandinavian Dental Society
at Stockholm on July 6th, 1939.

By

ALF WESTERGREN

Assist. Professor of Medicine
Stockholm.

616.31406:616
61602:616.314

My contribution to this series of lectures must be mainly a few reminders and reflections on so-called dental focal infection to which I shall endeavour to add some special personal experience of certain matters adducible to pulp surgery.

Firstly, let us recall that what is now called the focal infection principles seems to have been propounded about 1900 by PÄSSLER and was mainly concerned with the tonsils. In the years 1909—1910 came the works which are now deemed fundamental (HUNTER, BILLINGS etc.) but this focal infection theory did not at all yield what was expected. One said: "The proof of the cake is in the eating" and one extracted teeth, tonsils etc. in cases of polyarthritis, nephritis, psychoses etc. and when the patients failed to benefit, the whole cake was regarded as a construction or an "exaggeration". Attempts to uphold or reawaken interest may have been undertaken, but only in very recent years does this interest appear to have been enhanced. The medical attitude can be illustrated by the transactions of the German Medical Congresses of 1930 and 1939, respectively, when focal infection was among the subjects discussed at both meetings. This year it met with much attention and a good deal of understanding while in 1930 it only gave rise to a rather unfruitful polemic for or against ROSENOW (towards whose ideas I must resign to avow any position).

The problem of focal infection is a hard one, as well from the general scientific standpoint as in the concrete cases. This cannot be too often underlined. "Focus", i. e. septic source must not be regarded as a button to press. To be sure, it may often seem so, but by and large, the doctrine of focal infection coincides mainly with the *science of chronic and acute infections of the pharyngeal ring* where no fixed borderline can be drawn between on the one hand acute tonsillitis, angina or pulpitis and, on the other, harmless, often multilocular states of infection, where neither doctor, dentist nor patient is inclined to admit the existence of any morbid process.

The *tonsils* have been usually accounted the largest and most important part of the pharyngeal ring. The craze for tonsillectomy 20 years ago is now almost a thing of the past. Practically all of that tonsillectomy was blindly performed, but it does not follow that the indications are much clearer even now and in this connection one must deeply regret the lack of cooperation between doctors and dentists. The tonsils and teeth, however, are in lively cooperation as seats of acute and chronic infections. It is striking, however, what small attention these alternating symptoms command. "Toothache" of one kind or another is noticeably frequent after an acute throat infection and acute tonsillitis or the rise of chronic processes is, in my opinion, rather common after dental operations. This complication does not improve the prognosis of the treatment.

We do not know the boundary of the "infected area" and most likely there are no such boundaries. The processes of infection in the pharyngeal region largely proceed in the lymph passages and we also, in my opinion, have to reckon with *retrograde* infection. In 1932 FRITZ KARLSTRÖM (1.) undertook in my department an investigation of this problem which seems to show that presuppositional conditions for the retrograde spread of infections exist between the tonsils and the teeth — and the spread of such processes from tooth to tooth which, in my judgment, must mainly proceed along the lymph passages is, I believe, very common, though apparently little noticed. The greater the number of infected teeth (pulp, apical or marginal) the worse are the conditions for a good result of any treatment.

In this lymph apparatus of the pharyngeal ring, *adenites* are often noticeable, these being of interest both as symptoms of foci and as secondary foci. Here we ought not to limit our ob-

servations of the traditional submaxillary glands but extend them to the adenites of the throat and neck. Very often and perhaps especially in cases that are malignant from the general-septic point of view the presence of adenites cannot possibly be proved. In other cases we find vague infiltrations only noticeable to the trained observer.

As regards foci outside the pharyngeal ring consideration is often given to ear and nasal sinuses (these being in my opinion of less significance with regard to general septic effect) and, further, e. g., to gall-bladder, intestines, genitalia etc. From any of these and other focal alternatives symptoms may occur after a dental operation (or angina). Throat infection prior to acute appendicitis is admittedly liable to occur but an attack of appendicitis often occurs after trouble in the dental area. The lymph apparatus of the abdomen, like that of the whole organism, is moreover concerned in many cases which are at present mostly reckoned as vegetative neuroses, e. g.

The *bacteriology* of focal infection can, on this occasion, scarcely be touched upon. Over and above the most common viz. streptococci types of low virulence, I believe we ought, particularly in dental infections, to reckon with *anaerobe* bacteria (streptococci, fusiformis etc.) and I regard it as possible that the great liability of the dental foci to become "enclosed" is of particular importance regarding anaerobe growth. Cultural demonstration is here often difficult and uncertain and in the majority of investigations anaerobe culture has not even been attempted.

A problem which has interested me in a high degree in connection with the bacteriology of the focal infections is that of *mixed infection*. It has been shown that certain infections may have a virulence-heightening effect on others. (The opposite is also possible). Only by the aid of these viewpoints — mixed infection and heightening of virulence — does it seem to me conceivable that after a slight "chill-infection" with barely observable primary symptoms, serious acute or chronic septic or toxic states can develop.

When we come to the *mode of action* of the focal infections we are confronted with two principles of explanation viz. a) what may be called the general-septic one and b) the so-called allergic line. As I see the matter, there is no need here to set

up an "either-or". We may quietly endeavour to deepen our general and special knowledge of focal infections without being obliged to define our position to these difficult problems.

In the infancy of the focal principles about 25 years ago the septic-toxic causes of disease were reckoned with to a far less extent than now. Maladies like diabetes, Graves disease, etc. were designated more or less decisively as "constitutional". I am the last one to discard that label but in the pathogenesis of individual cases, in accordance with modern ideas, we also have to consider an *infectious influence* with more or less evident symptoms. As an example of the lack of understanding here I recall a discussion in the Swedish Society of Internal Medicine some years ago when the tendency of patients with stomach-ulcers to display subfebrile temperature was under debate. Many reasons were adduced but nobody mentioned that these patients, as a rule, are afflicted with slight chronic infectious processes.

For a rather long time now we have rightly deemed the *vegetative nervous system* to be a factor in these "constitutional diseases" — various digestive diseases, etc., etc. Here is another sphere where we should avoid the alternative of "either-or". In my opinion the diseases to which the rather happy label "vegetative neuroses" has been applied represent one of the most interesting spheres for the study of slight infectious influence and, moreover, one of the spheres where most can be done therapeutically. A large number of the vegetative neuroses might just as well be called focal toxicoses.

Respecting other symptoms from the nervous system in focal states of infection, and keeping entirely to the most common and obvious among them, we are reminded of various "neurites" and "neuralgiae" whose anatomical connection with foci or lymphadenites often becomes evident on a close analysis and where also "focal toxicosis" may be an important pathogenetical factor. These cases are often accessible for focal treatment.

The same holds good of some *rheumatic* states; certain kinds of muscular rheumatism, etc. and very slight polyarthritides. In the more serious polyarthritides, however, one must not hope too much regarding therapeutical possibilities even when an etiological connection with focal states is extremely probable. An accurate indication position and a somewhat radical method of

procedure may often be of some use and sometimes the effect may be astonishingly good, even in these types of disease.

The connection of acute polyarthritis with *heart disease* is well known and likewise their "origin" in infections of the throat. The dental infections are here, as a rule, difficult of determination but sometimes easily discovered if one takes the trouble to search for them and to question the patient thoroughly. The study of the connection with phenomena of deterioration in patients with chronic diseases of the heart and vessels is more profitable. In a survey of the effect of focal infections heart diseases represent a little noticed though, as I think, extremely important section. The importance of the infectious components is to a certain extent in principle well known and acknowledged but when we pass on to concrete cases bordering on arteriosclerosis, there are not many medical men who are willing to pay attention to the element of dental infection.

In the Swedish Society for Internal Medicine I published in 1934 a survey of *electrocardiographic investigations in so-called focal cases* (2.). It comprized 306 cases without clinical heart disease; various slight diseases of stomach and intestines, asthma, neuroses and fatigue where there was reason to suspect dental and other chronic states of infection. In one-sixth of these cases a clear pathological cardiogram (as the only sign of heart disease) was found and only in 10 % of the cases was there an indisputably normal cardiogram. The majority displayed slight, debatable changes which, I believe, as a rule are to be regarded as symptoms of infectious origin.

In this connection may also be mentioned a survey of the effects of focal infection in cases of *tuberculosis of the lungs* which I undertook in conjunction with Dr. BJÖRN HILDEBRAND, (preliminary published in 1937 at the Helsingfors Meeting of the Scandinavian Tuberculosis Association). (3.). We had first gone through an unselected series of case histories from my department at St. Göran's Hospital (147 cases) from 1935. In the compiling of these cases far greater attention than usual had been devoted to dental and other infection complications. It was found that pronounced connection between focal phenomena (above all from the teeth) and progression phenomena with regard to tuberculosis could be traced in 20 % of the cases. In 55 % of the cases there was evident predisposition in the shape of considerable dental changes or tonsillites etc. but no direct connection with the development

of tuberculosis could be established in these cases. In 25 % of the cases the journals afforded no reason to suspect focal influence. On completing our investigations on a material from 1936—1937 (289 unselected cases) where still greater energy had been displayed in investigating the focal processes we found that in 43 % of these cases it was possible to trace a time connection between progression phenomena in tuberculosis and happenings in teeth or throat — most frequently dental interference of one kind or another. In 47 % of the cases there was disposition for focal infection influence usually taking the shape of considerable roentgenological tooth changes, yet without demonstrable time connection. Only in 10 % of the cases did the search for foci yield negative or very insignificant results.

These results are now mentioned in order to point out that, in my opinion, we must reckon with focal influence — and mixed infection principles — in pulmonary tuberculosis, and also to underline the immense difference it makes when foci are energetically sought and above all when the anamnesis receives particular care.

Of course it is very difficult to “prove” these connections. Anyhow, it appears to me manifest that there is here a general correlation between on the one hand disturbances in the state of health (slight ones included) and on the other chronic and acute dental infections. It has, I suppose, been commonly said that in certain diseases (diabetes, tuberculosis) the teeth deteriorate. With some more respect for focal infections, one has probably imagined some kind of *circulus vitiosus* and taken for granted that a general disease and the dental processes worsened each other mutually. This view is undoubtedly to a large extent quite correct and should never be lost sight of, but we are now chiefly interested in the cases where a dental infection ought to be regarded as relatively primary in relation to the general disease, and I believe such cases to be in the majority. The “proofs” are mainly obtainable by experience, but this experience must not be directed, as was formerly done, to the results of a focal treatment, awkward as it must be, but must above all be sought in an analysis of the *origin* of the symptoms of the disease.

Consequently, what I have to say about the importance of pulp surgery for the general state of health is not very much

concerned with therapeutical work nor with *when* and *how* such therapy shall be performed. It is my firm opinion that the most important side of the matter is where, when and how operations should *not* be undertaken. When it is a question of the effect of infection from the teeth, the dentist has undoubtedly greater possibilities of doing harm than of doing good.

The difficulties of discovering foci (or infected areas in general) by means of investigations of various kinds are certainly not unknown, though they are far from being sufficiently esteemed. Particularly it must be said that X-ray examination has been considerably over-rated as to both its positive, deciding possibilities and its negative, releasing ones. X-ray examination is certainly necessary, and a technically satisfactory and sufficiently extensive one (which unhappily is not common) but we must remember the rule that "X-rays are a good servant but a bad master". Local irritation symptoms of various kinds ought not to be despised but they are often unreliable. I regard the anamnesis as the most important thing. *Where* and *when* did the symptoms appear or was operative interference undertaken? *What* was done is relatively of less interest. It is not only when root-filling that we run the risk of activizing an infection or creating foci. This surely often occurs, perhaps equally often, in operations where the pulp is only indirectly affected. It seems to be deemed axiomatic that a tooth giving vital reaction is of no interest from the viewpoint of focal infection. For many years I have had a firmer and firmer opinion that this is from the very beginning a misleading view. How often it occurs that a vital tooth is treated in the belief or hope that the pulp will remain vital but an unobtrusive pulpitis either without subjective symptoms or with very slight such develops shortly after the operation — and a "focus" is at hand. Furthermore, I wish to draw attention to the circumstance, not altogether unknown, perhaps, but evidently not acted upon by the majority of dentists that after an operation on a particular tooth an infectious process in one or more other teeth, especially the neighbouring teeth, may be activized and progress in one way or another.

Operative action on the pulp, direct or indirect, always implies, in my opinion, an adventure which, as a rule or perhaps one can say mostly, all parties manage to get over without seeming injury at any rate at the outset, but where the early injuries are common and significant enough to give rise to scepticism

and where the loci minori resistente, afterwards revealed, further enhance one's scepticism as to human ability to repair. In this connection I would like to recommend compulsory examination (by X-ray etc.) from a half to one year after every operative action where the pulp was or can be suspected to have been concerned. Such examination should not only consider root-fillings and the like but every tooth which has been the object of an extensive reparatory work as also every treated tooth in the vicinity of a non-vital or merely much altered tooth.

Merely because I regard all surgical operations on the pulp as more or less risky, I decline to express any opinion as to when such operations ought to be undertaken. Even in cases where the best conditions for a good result may be presupposed, harmful consequences of a slight or serious nature may develop.

It is easier to say when such operations should *not* be performed. My experience, which tallies well with the results of the after-investigation just given by WESTIN (4. 5.), points to diminished prospects for a good result of pulp operations in proportion to the number of previously devitalized teeth and, I would add, the number of other focal possibilities altogether. I also desire to underline the particularly great risk of pulp operation on a tooth whose neighbour is more or less certainly infected.

For several reasons, not least on account of my defective knowledge, I cannot attempt to discuss technical details closely but I want to utter a warning against too zealous experiments in the "treatment" of infected areas. I put very little trust in the possibility of doing any good by introducing chemical disinfectants into living tissue and, further I have too often observed the bad effects on patients after every such treatment. I venture to assert that sufficient *drainage* with a minimum of operative interference must be the guiding principle in all treatment of local infection and that repeated irritations within the infected tissue such as often occur in dental treatment are mainly harmful both to the local process and to the individual.

What I have now put forward holds good both for "healthy" and "sick" patients. The difficulties increase when we have to do with persons in poor health — many of whom consider themselves healthy or just casually mention "a little indigestion now and then" or "a bit tired at present" etc. etc. Generally it is only "the heart" which is discussed and eventually a doctor

may be consulted as to whether the patient can "stand a local anaesthetic". Undeniably many people feel trouble after receiving a local anaesthetic for a dental operation. In my opinion this should not, or at any rate only to a very slight extent, be ascribed to the anaesthetic (novocain, pantocain and the like). Over-sensitiveness to such preparations is not rare but plays a very insignificant part in operations on all other parts of the body. The irritating element after local anaesthetics in dental work is, I believe, the infiltration of the lymph passages and the altered conditions of circulation arising therefrom — or toxic irritations of general effect. These often find expression in an irritation of the heart even when that organ is relatively sound and, as we know, the effect on the heart may in some cases be very fateful. It is not so much the valvular heart diseases which is to be feared but rather the latent myocarditic and vascular weakness which can often be discovered by a thorough examination (cardiogram, X-ray etc.) — though occasionally a sudden heart failure may afflict even a person who has recently been given a very good certificate after such examination. It is not to be expected that a doctor shall be able beforehand surely to classify all his patients with regard to their power of tolerating dental operations but a doctor who has obtained fairly accurate knowledge of a patient's constitution and eventual illnesses is undoubtedly often able to give a dentist valuable hints, especially in the way of cautions and such consultations ought to occur much more frequently than they do.

In addition to heart ailments there is another group of diseases, in many respects closely akin, where still greater surprises may occur after dental operations, including local anaesthetics; I refer to cases of nephritis.

It is obviously in diseases of the *circulatory system* that the greatest and most immediate risks occur but I should like to add "all morbid conditions" and not only the more serious bodily infirmities but also, and perhaps in equal degree, I would point out the risk for nervously labile individuals whether their vulnerability becomes apparent in e. g. a "metabolic disease" or in purely psychical symptoms.

Tolerance of dental operations of this kind may be seriously affected by one's *temporary disposition* and here we may distinguish between slight infections (cold in head, catarrh of throat, etc., etc.) and states of fatigue and psychic depression due to

external causes. As a rule a root-filling is no serious matter if one is healthy and in good form nor, perhaps, if one has a little hereditary disposition, e. g. if one's father had early cardiosclerosis, or if perchance one's digestion has been somewhat spoiled by irregular habits. And even if you are suffering from the remaining effects of a "bad cold" you may still be able to compensate a new irritation. If, however, above all that, one has lost one's job or had an unexpected bill presented for payment and, into the bargain been jilted by one's sweetheart — well, then one may fall ill after a root-filling. In one way or another. If it is to be a "nervous breakdown" or sciatica or heart failure will be settled by further circumstances.

The dental pulp is perhaps the most delicate tissue in the body and the aim of the dentist should be to make pulp surgery superfluous. I have reason to pronounce and perhaps even the right of cherishing this pious hope.

Summary.

In a short survey on focal infection the connection is underlined between various localizations, particularly tonsils and teeth, and also the connection between chronic and acute infections. Cooperation among several types of bacteria, among others anaerobes, is probable. In a large number of cases the effects on the general state may be conceived as a focal toxicosis via the nervous system.

The practical significance of focal infection is best understood when one studies the time connection between morbid phenomena from the oral cavity and throat and a following illness. If the view is adopted that a "general" disease will be alleviated by focal treatment, the results will be too uncertain. In most cases, the anamnesis is more important than the X-ray picture. Focal treatment may often be useful in the slighter types of disease, sometimes in more serious ones, but unsuitable focal treatment can do harm. Prophylactic measures are the most important and generally speaking, work should be avoided which favours the rise of foci or irritations within the infected areas and this should be particularly observed in individuals whose health is in any respect delicate.

Zusammenfassung.

In einer kurzen Übersicht über Fokalinfektion wird der Zusammenhang zwischen verschiedenen Lokalisationen, besonders Tonsillen und Zähnen, sowie der Zusammenhang zwischen chronischen und akuten Infektionen betont. Eine Mitwirkung mehrerer Bakterientypen, u. a. anaeroben, ist wahrscheinlich. Die Wirkungen auf den Allgemeinzustand können in einer grossen Anzahl von Fällen als eine fokale Toxikose über das Nervensystem aufgefasst werden.

Die praktische Bedeutung der Fokalinfektion wird am besten verständlich, wenn man den zeitlichen Zusammenhang zwischen Krankheiterscheinungen in Mundhöhle und Rachen und einer nachfolgenden Allgemeinerkrankung studiert. Geht man davon aus, eine Allgemeinerkrankung durch Fokalbehandlung zu bessern, werden die Resultate allzu unsicher. Die Anamnese ist meistens wichtiger als das Röntgenbild. Eine Fokalbehandlung kann sich oft bei leichten, bisweilen auch bei schwereren Krankheitstypen lohnen, eine ungeeignete Fokalbehandlung aber kann Schaden anstellen. Die Prophylaxe ist das Wichtigste und dabei sollen überhaupt Arbeiten, welche das Entstehen von Herden, resp. Irritationen in infizierten Gebieten begünstigen, vermieden werden: dies ist vor allem bei Individuen mit einer in irgend einer Hinsicht empfindlichen Gesundheit zu beachten.

Résumé.

Dans un aperçu sommaire sur l'infection focal on a souligné la relation entre les localisations différentes, en particulier les amygdales et les dents, et la relation entre les infections chroniques et aiguës. C'est probable, qu'il y a une coopération de plusieurs types bacillaires, entre autres des anaérobies. Les effets sur l'état général de la santé sont à saisir comme une toxicose focale par la voie du système nerveux.

L'importance pratique de l'infection focale sera plus claire en étudiant le temps écoulé entre les symptômes de la bouche et du pharynx et une maladie suivante. Si l'on part du principe, que s'améliore une maladie générale par un traitement focal, les résultats sont trop incertains. L'anamnèse et souvent plus importante que la radiogramme. Le traitement focal se paie

souvent chez les types des maladies légères, parfois aussi chez les types graves; mais un traitement focal mal choisi peut causer du dommage. La prophylaxie est la plus importante, on doit éviter enfin toutes les opérations causantes des foci et des irritations dans les parties infectées; cela on doit observer spécialement chez les individus avec un état de santé délicat.

References.

- (1.) F. KARLSTRÖM. Oto-rhino-laryngolog. sektionens förhandl. 18/3, 1933. *Hygiea*, Vol. 96 (1934).
- (2.) A. WESTERGREN. *Nordisk Medicinsk Tidskrift*, Vol. 9, p. 686 (1935).
- (3.) A. WESTERGREN. Förhandlingar vid Nordiska Tuberkulosläkareföreningens möte i Helsingfors 1—3 juli 1937 (Helsingfors 1938).
- (4.) G. WESTIN. *Odontolog. Tidskrift*, 1939, Nr. 2.
- (5.) L. SRINDBERG. *Nordisk Medicin*, Vol. 2, p. 1421 (1939).

Address:

St. Görans sjukhus

Stockholm,

Sweden.