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DIFFERENTIAL DIAGNOSIS OF ORAL AND NON-ORAL CAUSES OF SYSTEMIC INFECTION

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PROBABLY the most important problem before the dental profession today is such differential diagnosis as will enable an operator to determine when a tooth is a menace to health. The ultra conservative say: "A tooth should be retained provided its retention will enable a patient to masticate without discomfort." The extremist: "Extract every pulpless tooth, plus teeth with live pulps affected by pyorrhea alveolaris."

We are regaled with wonderful and so-called scientific theories to substantiate the claims of the latter operators, but in looking over dental literature to date, I fail to discover any definite scientific arguments that prove conclusively these theories. Therefore, we have deemed it expedient to adopt the following procedure in dealing with pulpless teeth:

Class 1. Patients in Good Physical Condition

Radiograph the entire upper and lower arches where there be discolored teeth, large fillings and crowns; or where extensive restorations are required. If radiographs show the impossibility of opening canals of teeth, then extract. If canals can be opened and filled to apices, treatment is indicated; results to be verified at regular intervals by further radiographic examinations.

Class 2. Patients Suffering from Chronic Impairment of General Health

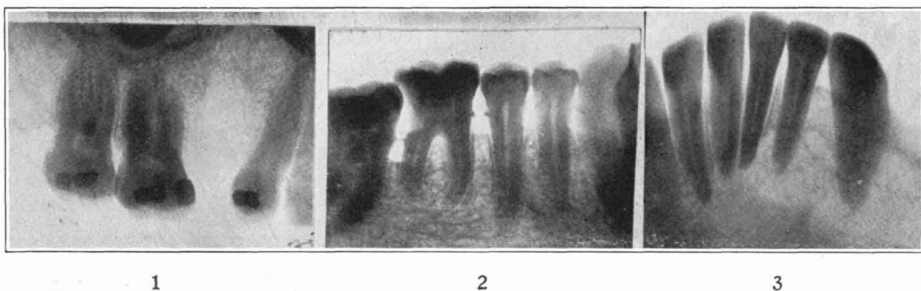
a. History of case; *b.* examination with explorer and mouth mirror; *c.* test teeth for live pulps; *d.* note condition of soft tissues; *e.* tentative diagnosis; *f.* full radiographic examination of arches; *g.*

thorough physical examination of patient; *h.* study of report of physical examination, radiographs, and further examination of the patient; *i.* extraction of all pulpless teeth; *j.* extraction or eradication of pockets of vital teeth affected by pyorrhea alveolaris.

The cases which concern us most and which require all the skill and knowledge at our command come under Class 2. Patients suffering with arthritis, infection of blood stream, heart, lungs, various parts of the alimentary tract, genito-urinary organs, etc., have had, in many cases, these conditions traced directly to the teeth, as the primary cause. There-

equally important part in determining correct diagnosis in dental cases.

One case is of a school girl, aged 17, with exposed pulp in upper left bicuspid. Treatment brought no relief, consequently tooth was extracted. As pain continued, the dentist treated socket in various ways, finally curetting and packing. Patient was finally referred to me for radiograph (Fig. 1), which showed socket clear and at least a quarter inch from the antrum. In taking a history of the case we found that the girl's mother had had maxillary sinus infection about five years previously. Upon further questioning patient it developed that she was



Figs. 1-3.—Fig. 1, clear socket; Fig. 2, hidden cavity under gum margin; Fig. 3, soreness of gum distal to lower right tooth.

fore we shall consider at some length the various steps in diagnosis of such cases, with examples of value in each case.

a. The history of the case should be the first step, for frequently by this means some facts are brought out which aid materially in diagnosis. The Board of Medical Licensure of Pennsylvania deems case histories of so much importance that no hospital in the state can rank in Class A, regardless of other qualifications, if the staff fail to report a full written history on each chart. One of the qualifications for membership in the American College of Surgeons is that each applicant submit fifty complete histories of cases treated. The foregoing facts emphasize the value attached to case histories by the medical profession and in many instances they play an

positive sinus was infected on account of her mother's infection. Patient was highly nervous, in fact, inclined to be hysterical. Was underweight and anemic and was advised to see a physician for a thorough physical examination. Tubercular ovaries, tipped uterus and adhesions were discovered. The girl was operated on by a specialist who removed the ovaries, corrected other conditions, and who reported that had the condition continued another month she would undoubtedly have been beyond medical aid. Patient was operated upon five years ago and has completely regained her health.

b. Examination with explorer and mouth mirror frequently reveals hidden cavities and pyorrhea pockets.

The next patient, aged 52, had pains in head and jaws. As he could not

sleep, he consulted a dentist, but no cause was discovered for condition. He took considerable morphine and whiskey; when he became violent he was taken to hospital for observation. A subsequent examination of teeth revealed a hidden cavity (Fig. 2) under gum margin; radiograph further confirmed extent of cavity. After the tooth was extracted the patient recovered within a few days.

c. Test teeth for live pulps.—Thermal tests, tapping with instruments and high frequency current will often assist in determining the vitality of the pulp when the radiograph will not be of much assistance, since no apical involvement is apparent.

d. Note condition of the soft tissues. Are they of normal healthy color, or inflamed, spongy, and of purplish color? Do tissues fit closely to necks of teeth? Are any growths or spots discernible which might be indicative of secondary infection? Patient complained of soreness of the gum distal to the lower right cuspid tooth (Fig. 3), but the dentist paid no attention to symptoms until several months later, when patient's chin became quite painful and enlarged. The result was that he lost anterior part of mandible and eventually died as the glands of his neck and deep structures had become involved to such an extent that the use of the knife, radium or X-ray were of no avail.

e. Tentative diagnosis.—Tentative diagnosis should be made before radiographs are taken. Radiographs should be used as a means of corroboration of diagnosis rather than the first step in the process. Furthermore, dental radiographs should be taken by an operator who knows the anatomy of the mouth, one whose lifework fits him pre-eminently for this branch of our profession, the dentist.

f. Full radiographic examination of arches.—When such examination is indicated, radiographs of each tooth should be taken as well as all spaces from which teeth have been removed, for occasionally

pieces of roots, impacted teeth, granulomas, etc., are found which may have remained in the mouth for many years.

We have on file many cases of faulty diagnosis from radiographs, taken by men who did not understand the different angles at which radiographs should be taken in various parts of the mouth.

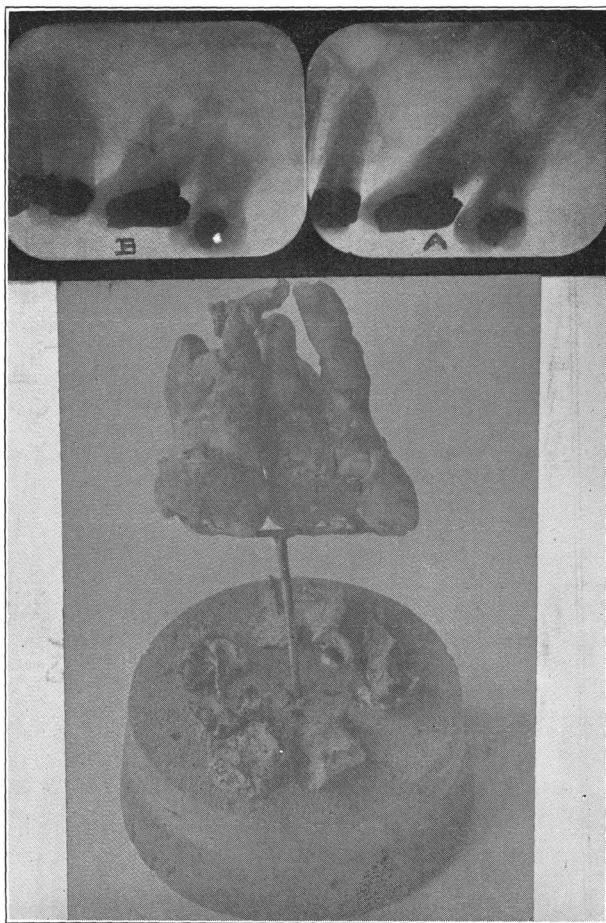
Mr. B, a minister, aged 55, had a swelling and pain over right maxillary region, with discharge from the right nostril, a fulness of the right cheek, and a temperature of 101°. Transillumination, right antrum dark. According to the physician's X-ray report, the film of right upper molars (Fig. 4 A) showed these teeth negative. The antrum was opened thru the nose and treated for six months. The patient was referred for radiographic examination. All of the above-mentioned symptoms were still present, except the temperature, which was normal. Film of teeth (Fig. 4 B) showed both first and second molars abscessed and roots extending into the antrum. The teeth were removed and floor of antrum picked out with a pair of tissue forceps. The bone was almost black. The estimated flow of pus at this sitting was a tablespoonful. Patient made recovery in less than a month. Figure 5 shows structure removed.

For three and one-half years Mr. T., seventy years of age, suffered pains in his left shoulder and leg which had gradually been getting worse. He was short of breath and had periods of extreme weakness. Patient had traveled to many of the springs, sanitariums and hospitals in the United States. Was admitted to hospital and permitted to be up and about his room two hours daily. Examination revealed a blood stream infection which was so impairing the heart action that after two months' treatment hope was practically abandoned of his leaving the hospital alive. Patient's teeth had been radiographed on previous occasions during his round of travels and reported negative. Therefore his teeth were not radiographed in our institution until

practically every other source of infection had been tested with negative results. Examination showed fourteen teeth present in mouth and a partial upper plate

which showed roots partially filled extending to the floor of the antrum. Tooth was removed and about 4 c.c. of a thick yellowish green pus was evacuated thru

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Figs. 4 and 5.—Fig. 4A, film of right upper molars negative; Fig. 4B showed both first and second molars abscessed and roots extending into antrum; Fig. 5 shows structure removed.

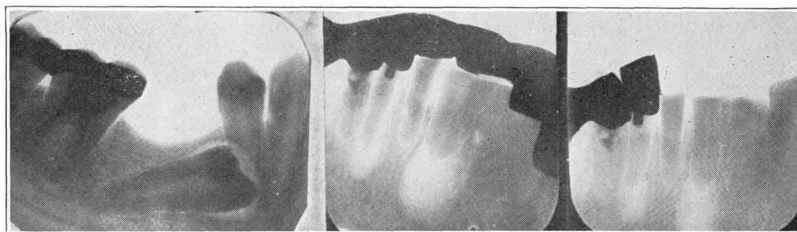
supported by attachments to several teeth, one of which was a right upper second molar covered with a gold crown. All teeth were radiographed with negative results except the above-mentioned molar,

the nose by the insertion of the tip of an ordinary sterile water syringe into the tooth socket and forcing normal salt solution into the antrum. The odor was so offensive that it was

almost impossible to stay in the operating room. After this treatment the patient was taken to his room and during the next few days had several very serious relapses. He was kept in bed and the antrum irrigated daily. The quantity of the secretion gradually decreased and the odor became less offensive. Within a month he was discharged from the hospital with instructions to rest in bed at least half of each day for some time to come. He was so disgusted with teeth that he had some dentist extract the remaining teeth in his mouth, all of which had live pulps. It is four years since this trouble occurred, and the man is improved in health.

physician asked that teeth be extracted immediately. We refused to extract until after a thorough examination of patient and a report of general condition had been received. The patient died within twelve hours, and our refusal to extract probably saved us the odium of having caused his death. The Wassermann report, received after the patient died, was positive. Autopsy showed that practically every organ in the body was infected, yet there were absolutely no external signs of syphilis. Patient had been in good health until within six weeks of his death.

The above-mentioned case is cited to emphasize the value of thorough physical examination in patients below par and



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Figs. 6 and 7.—Fig. 6, second bicuspid horizontally impacted with crown pressing on first bicuspid root and resorption of side of root to pulp; Fig. 7, large abscesses in various parts of the mouth.

g. Thorough physical examination of the patient.—In all cases of suspected secondary infection, the patient should be thoroughly examined by some expert medical diagnostician in whom he has every confidence before any extractions or treatment be undertaken (aside from temporary measures to relieve pain.) Such examination should include various organs of the body, as well as blood, urine and Wassermann tests. We have avoided several embarrassing situations in severe cases by adhering to this policy.

Mr. F., aged forty, was in the hospital two days. Temperature 102 4-5°; blood stream infection. Examination and radiographs revealed six badly abscessed teeth, four additional pulpless teeth and a bad case of pyorrhea alveolaris. The

the following case will further emphasize this fact, as a thorough physical examination saved this patient from a very serious and useless operation (Fig. 6).

Miss A., a school girl aged seventeen, had acute symptoms of mastoiditis several times during the year preceding our examination, which subsided after local treatment. Attending physician said that the next attack would require operation. Symptoms recurred within three months. The girl's mother insisted upon a thorough examination before giving her consent to an operation. In an examination of the mouth two teeth were missing on the lower left side. Patient said one tooth had been extracted, and further questioning developed that she occasionally had a burning sensation in this region with

slight soreness of first bicuspid during mastication. Radiograph (Fig. 6) revealed the second bicuspid horizontally impacted with crown pressing on first bicuspid root and resorption of side of root to pulp. Removal of these teeth resulted in severe symptoms of mastoiditis for three days, after which they gradually subsided. After three years, the patient has had no recurrence of the trouble. In this case the symptoms of mastoiditis were undoubtedly due to reflex pains from lower bicuspid region.

h. Study of report of physical examination, radiographs and further examination of patient.—If evident that all or some of patient's teeth should be extracted and there be nothing in patient's general condition to warrant delay we proceed at once. But if it be doubtful that teeth are causing trouble, and there are other factors, such as diseased tonsils, infection in genitourinary tract, etc., we refuse to extract until the other conditions have been cleared up. In the meantime, we try treatment.

i. Extraction of all pulpless teeth in advanced cases of systemic infection, as a patient's life is certainly of more value than the teeth. Better far to err on the side of extraction in such cases than to be held responsible for the loss of human life.

Mr. R., aged fifty-seven, for three years had been unable to comb his hair, dress himself, or to arise without assistance. He walked with the aid of a cane and crutch. Examination of the mouth showed a number of bridges which took the place of all masticating surfaces of original teeth. There was no discomfort of any kind associated with the teeth or jaws. Radiographs showed that no attempt had been made to fill the roots of pulpless teeth. There were a number of large abscesses in various parts of the mouth, two radiographs of which are shown (Fig. 7). The patient was subjected to a thorough physical examination with the result that his chart showed

him to be physically perfect in every way. Removal of all his teeth was advised to which he finally consented after about ten days. Specimens from same revealed streptococcus viridans in practically all. The patient was sent to his home without any treatment or medicine of any kind and showed practically no improvement for two months. At the end of six months he was apparently normal and has had no recurrence of the trouble in more than five years.

j. Extraction or eradication of pockets of vital teeth affected by pyorrhea alveolaris. Mrs. C., aged forty-eight, physical examination negative. Sudden and great swellings appeared on the face and neck, particularly when she was excited or overworked. The swellings turned purple, in fact, to such an extent, that at times the patient was ashamed to let people see her. Took treatment from physicians for nearly two years, but without result. Radiographs revealed a number of pyorrhea pockets, some of which were removed by treatment, others by extraction. No return of the trouble within the past fifteen months.

In other cases we have removed all teeth and surgeons have removed nearly all organs of the body except the heart and lungs, and there has been no improvement in the condition of the patient, which simply proves as we already know, that a certain disease does not always have the same origin or manifestations in different people. Therefore, too much emphasis cannot be laid upon the careful study of individual cases, and the elimination of all other symptoms before resorting to wholesale extraction of teeth. Once convinced, however, that the teeth are or probably are the cause of impaired health, we should not falter in our duty, as human life is not a thing with which to trifle.

Every dentist should be in touch with some good pathological laboratory, either private or hospital, where he can send specimens and swabs from his cases for

examination and report. Many times by this means knowledge is gained which is of great value in treating a patient as well as of inestimable value in treatment and diagnosis of future cases.

The first essential of successful root canal technic is thorough sterilization of materials, instruments, trays, and dressings. Aseptic methods are just as essential for this work as in the surgical operating room, otherwise, our operation is a failure at the outset, and the patient would be rendered a greater service by the extraction of the tooth.

I shall not deal with the opening of the canals further than to say that good access must be established and the canal must be opened sufficiently to admit the gutta-percha point to apex, or here again we are doomed to failure.

The following materials and instruments should be used in filling root canals: Eucalyptol, chloropercha, gutta-percha points, cotton and paper points, smooth broaches, canal pluggers.

The entire operation is performed with the rubber dam in position. (1) The field is sterilized before removal of temporary filling. (2) The cavity is sterilized after the removal of the temporary filling. (3) The gutta-percha point is passed to the apex of the root and radiograph taken. If point extends beyond the apex, the excess is clipped off; if unable to attain apex, another point is inserted and a second radiograph taken. When point is found in correct position, it is removed and one of two methods is employed in filling root canal.

The first method is for small curved canals, in which we use single cone extending the entire length of the canal. The canal is flooded with eucalyptol, which is displaced with chloropercha worked gently to the apex of root with a smooth broach. All excess chloropercha is removed from the pulp chamber and the gutta-percha cone previously selected, and tested for correct position is forced to the apex of root. The larger portions

of the canal are now filled with smaller cones, which if properly packed will leave a minimum of chloropercha remaining.

The second method is for filling large canals. Take cone which has been found to fit root canal and cut in small pieces, mounting apical end on root-canal plugger which will reach nearly to apex of root. Moisten the canal with eucalyptol and follow with a drop of chloropercha, placed near the apex of canal, then pass the point piece of gutta-percha to apex, and remove the plugger before taking radiograph. If point be found in position, it is followed by other small pieces of gutta-percha until canal is solidly filled. If the first piece of gutta-percha be not at the apex of the root, it is further packed with root-canal pluggers, and radiographs taken until its position be entirely satisfactory before attempting to fill the balance of canal.

I prefer the taking of radiographs with the actual point in canal, rather than with a diagnostic wire, as the wire may reach to the apex, whereas the point may not. However, if radiograph shows gutta-percha point has reached the apex the operator will undoubtedly be able to make the same point occupy the same position when the canal is moistened with eucalyptol and a small amount of chloropercha.

I am endeavoring to secure some absolute data regarding condition at the apex of a perfectly filled root canal which shows no indications of apical involvement, but this is very difficult since so many problems enter into the matter and besides there is only one way in which we believe this information may be secured, namely, the removal of the tooth after sterilization.

I have had three patients within the past three months who have insisted upon the removal of teeth which gave no clinical or radiographic evidence of infection. They regarded the teeth as a possible source of arthritis. These teeth were not removed to please patient or

physician, but in an endeavor to secure some evidence as to whether a pulpless tooth is always a menace to health, as some writers maintain.

Case 1: Patient aged forty-five: Tooth, upper left second bicuspid, root filled to apex, no indications of apical involvement, but root had been filled a number of years ago, before the profession had learned the necessity of thorough sterilization in all particulars. Laboratory report, streptococcus hemolyticus.

Case 2: Patient aged forty-eight.

the preservation of their teeth, I propose to eliminate all of these so called sources of focal infection that come directly under my observation, if patient continue to insist upon their removal after having been advised to the contrary. Until some such method of research has been carried out by a number of men interested in the subject and who are willing to experiment and record their findings, I believe we shall have no enlightenment upon this much discussed question. As a further suggestion, our schools could secure a number of patients,

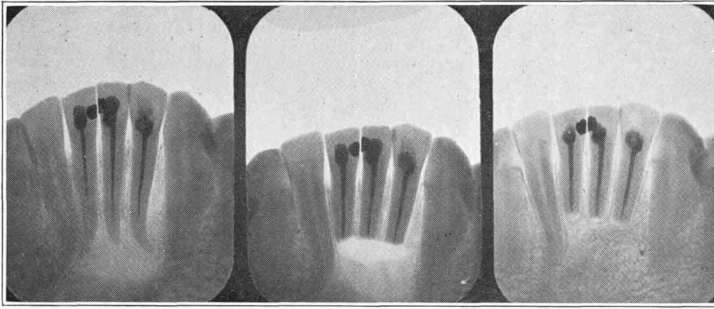


Fig. 8.—A case operated on five years ago. Local and general conditions excellent.

Tooth, upper lateral incisor filled to apex three years previously. Radiographed and clinical examination, negative. Tooth removed. Laboratory report, negative.

Case 3: Patient aged forty. Tooth, upper right central incisor. Root filled to apex and apical third removed. After two and a half years tooth was extracted and examination of socket showed a flat seat of bone which fitted perfectly over the stump of root. Laboratory test, negative.

Figure 8 shows a case operated upon five years ago. Both local and general conditions are excellent, and the radiograph confirms the examination.

In the interest of a more thorough knowledge of this subject and also for the benefit of the patients who do value

who do not value their teeth and who would be willing for a consideration to have a qualified member of the faculty fill roots of teeth and later remove the teeth in periods of from six months to three years. By this means definite knowledge would be gained of inestimable value to the profession which would result in the saving of many more teeth, or the health improvement of many patients by the removal of their pulpless teeth.

To recapitulate, my investigations to date point to the retention of pulpless teeth if roots be correctly filled to apices and there be no clinical or radiographic evidence of apical involvement, or serious systemic infection which cannot be accounted for after a rigid physical examination.