SOME COMMON ERRORS ABOUT THE ACTINOMYCES AND ACTINOMYCOSIS

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Till comparatively recently the common view was that actinomyces was a rare organism, whereas in fact it is very common. If cultures be made from soil it will be found that more than half will belong to the family Actinomycetaceae. Of course few, if any, of these would prove pathogenic to human beings or animals, but the remarkable fact needs to be remembered that from some of these lowly organisms have been produced some of our most beneficent antibiotics, e.g. streptomycin and aureomycin.

There has been considerable confusion concerning the name. The first man who clearly differentiated the organism was Bollinger, and the name actinomyces was given to it by his friend Harz. But other observers coined other names, some of which are, unfortunately, used even today. Discomyces, coniomycetes, oospora, nocardia, streptothrix and cohnistreptothrix are some of these names. In 1913 Foulerton commented on the strange fact that while the Continental pathologists used the term actinomyces, in England and in America the name streptothrix was preferred. His words should be remembered:

'Writers on general medicine have not always appreciated that these two terms are absolutely synonymous; so that one sometimes finds even in recent books reference made to the streptotrichoses as if they were in a class of disease in some sort different from the actinomycoses.'

Since Foulerton wrote the above sentence the terms actinomyces and actinomycosis have been adopted by nearly all pathologists and the word streptothrix has almost gone out of use. But in reading older books one must remember the unfortunate confusion.

The actinomyces has been defined as 'an organism growing in the form of a much branched mycelium which may break up into segments that function as conidia. Sometimes parasitic with clubbed ends of radiating threads conspicuous in lesions in animal body. Some species are micro-aerophilic or anaerobic. Non-motile. Type species actinomyces bovis.'

A mistake which was current for many years was that the variety which attacks human beings was of the aerobic type, whereas in nine cases out of ten it is the micro-aerophilic or anaerobic type. How this error came into currency is worth recording, for it shows how the doctrine which is first in the field may hold its own in spite of repeated proof to the contrary. The first to make a culture of actinomyces was Bostroem, who in 1889 obtained some cultures aerobically, but he only succeeded in getting 11 positive growths out of several hundred planted, so that the chance of contamination was by no means ruled out and, as we know now, was likely. The following year Wolff grew the organism anaerobically from an active lesion but his observation passed almost unnoticed and Bostroem's view that the organism which affected human beings was an aerobic fungus became current. In 1907 Homer Wright confirmed Wolff's observation and since that time Colebrook, Naeslund and many others have conclusively proved that the common actinomyces which affects humans is anaerobic. The aerobic variety which grows on grains or grasses and the like is rarely pathogenic to animals. Yet to this day at least one very well known textbook makes the statement that the actinomyces which affects animals is transmitted by straw or grass. The fact is that the common pathogenic actinomyces has never been found outside an animal body. It is true that in a few actinomycotic lesions there has been found a particle of straw or of wood, and the writer has observed such a case in his own experience. The part which the straw plays, however, is likely to be the causing of an abrasion of the mucosa through which the actinomyces can gain access to the deeper tissues in which it can grow; it may also aid bacterial growth by the irritation it causes.

So far as I am aware up to the present time no textbook has explained how the actinomyces gets from one human being to another. We know from the work of Lord and Naeslund that actinomyces bovis is often to be found resident in the crevices of carious teeth, ready to cause trouble if given the

chance. Similarly the organism resident in the mouth must occasionally be swallowed and live for a time in other parts of the alimentary canal, for we know that actinomycotic lesions may follow the perforation of a peptic ulcer or an inflamed appendix. The puzzle is to account for the presence of the organism in the mouth. The actinomyces bovis is difficult to culture, is delicate and soon dies if exposed outside the body, and cannot survive in dried dust. Among all the records over 75 years there are only one or two instances of the possibility of infection by direct contact between one person and another. There is only one likely and feasible alternative left and that is the transmission of infection through such an intermediary as a cup or other drinking vessel; if the cup be not carefully cleaned between the use of it by one person and another it would be possible for the organism to be transmitted from one to the other if the first person happened to have the pathogenic organism resident and latent in the mouth. This method of infection is theoretical but it is difficult to think of any other possible way.

Actinomyces bovis, as its name implies, often attacks the cow and the part chiefly affected is the lower jaw, commonly called 'lumpy jaw.' In many books it is stated that the 'wooden tongue' of the cow is due to the same organism. This latter statement is incorrect for 'wooden tongue' is caused by a bacillus and the condition is known as 'actino-bacillosis.' This may seem to have little practical significance but the failure to distinguish between the two conditions led in some cases to mistakes in treatment. In 1885 Thomassen made known the fact that potassium iodide acted as a specific cure for the 'wooden tongue' of cattle; although he did not know the different aetiology of 'wooden tongue' and 'lumpy jaw' he noted that the cattle with diseased jaws did not respond in the same manner to potassium iodide. Nevertheless, surgeons, probably basing their action upon the known effect of the drug upon the tongue of cattle, continued to regard potassium iodide almost as a specific cure for actinomycosis and for years it was customary to administer it in large doses, sometimes amounting to 500 or more grains per diem to patients suffering from the disease. It is true that compounds of iodine, including potassium iodide, have some beneficial effect on some actinomycotic lesions, but potassium iodide is no specific cure for actinomycosis as it is for actino-bacillosis.

Many persons who are aware that actinomycosis may cause lesions in the region of the face and neck believe that it is rare in other parts of the body. The fact is that almost as many actinomycotic lesions occur in other parts of the body as

occur in the cervico-facial region. In one case in five the lesion is in the abdomen, and the thorax is the site of disease once in every seven cases. Though actinomycosis is not very common it *may* occur in almost any part of the body, so that it is essential that the doctor should keep it in mind as a possible cause of any internal disease of doubtful origin. It is because the condition is not thought of that it is so often missed.

Apart from the well-known right iliac actinomycotic lesion which sometimes follows the perforation of an inflamed or gangrenous appendix, actinomycosis is not often considered as a possible diagnosis in diseases of the thorax and abdomen, at least not in the early stage. Even when the abdomen is explored it is easy to make a mistaken diagnosis, for the indurated tissue resulting from the reaction to the actinomyces is often very hard and may closely resemble malignant disease of the scirrroid type. Most recorded cases of actinomycosis of the colon have been diagnosed as malignant disease and either excised under that diagnosis or left as inoperable.

In the thorax actinomycosis is usually diagnosed as tuberculosis or as malignant disease of the lung until an empyema forms or a superficial abscess develops and is opened. Examination of the pus shows the characteristic granules containing the fungus.

Not long ago a student told me that he had been taught that actinomycosis did not attack bone. So far as the bones of the limbs are concerned he was taught (almost) correctly, but it is quite wrong to say that the disease does not attack any bone, for it very commonly attacks the mandible and there are many cases on record in which the vertebral column has been riddled with the disease. The lower jaw may show merely a periostitis or it may be thickened considerably and be traversed by sinuses. The condition in the latter instance is that of an extensive osteomyelitis somewhat resembling that which is found in the jaw of the cow. Such a lesion may cause great enlargement of the jaw.

The vertebral column is affected by extension from an abdominal or a thoracic focus. Usually several vertebral bodies are involved and the pathological process does not so frequently nor so readily attack the inter-vertebral discs. Collapse of a vertebra is not common. The neighbouring parts of the ribs are nearly always affected at the same time as the vertebral bodies.

Some Errors in Diagnosis

Actinomycosis is one of the most often misdiagnosed diseases. We have referred above to the simulation of malignancy when the lesion is within the abdomen. This may not only occur when the

surgeon, after opening the abdomen, merely looks at and palpates the affected part, but the misdiagnosis may be made by the pathologist after he has examined a series of microscopic sections. The reason why this is possible is that the tissue reaction may be hard and fibrotic and it may be necessary to examine many sections before the characteristic aggregation of mycelium will be observed. A mistaken diagnosis of fibro-sarcoma has been made at a first examination only to be corrected at a later examination when the symptoms made further examination desirable.

The liver may be affected by metastasis from any part of the portal area and there are two errors to be specially guarded against. The first is to expect that a primary focus will always be evident. Such a focus may be very small and in some cases may even have undergone spontaneous cure. I well remember a patient who proved to have actinomycosis of the liver without any symptoms referable elsewhere, but at the autopsy a minute abscess was found in the appendicular region. In some instances there may be no discoverable lesion other than that in the liver.

The second point to be remembered is that an initial actinomycotic lesion in the liver may be solitary, solid and on naked eye appearance more like malignant growth than an abscess. The doctor whose remembrance of actinomycosis of the liver is chiefly derived from the well-known pictures of multilocular abscesses in that organ (the so-called honeycomb liver) is very likely not even to think of actinomycosis when he meets with an early lesion caused by the actinomyces. In such cases it is essential to obtain a portion for biopsy in order to make a diagnosis, and this necessitates exploration of the upper abdomen.

In most cases of actinomycosis in every part of the body the diagnosis is usually ultimately made by examination of the pus and the finding and culturing of the organism. The actinomyces bovis is a delicate organism and culture is likely to be unsuccessful unless made almost immediately from fresh material. The little granules composed of agglomerations of the fungus commonly give one an indication of the nature of the condition, but it should be remembered that similar granules are sometimes formed by organisms other than the actinomyces; on the other hand, in some actinomycotic abscesses accompanying a rather

acute infection, the granules may be absent although examination of the pus will show plenty of branching hyphae which take the Gram stain. The pus of every abscess should be examined microscopically. If this be done as a routine it is likely that a number of abscesses attributed to simple sepsis may be found to be due to an acute or subacute actinomycotic infection.

Errors in Treatment of Actinomycosis

Fortunately the last 15 years has seen a great improvement in the treatment of actinomycosis. The sulphonamides have a definite beneficial effect and in the majority of cases of infection with actinomycosis bovis penicillin is curative, provided it is given in sufficient doses for long enough. A mistake which one can easily make is to stop treatment when all the signs and symptoms have disappeared. Actinomycosis may remain latent for long periods, and on account of the hard fibrous tissue in which the fungus may hide itself it may be difficult for the curative drug to reach the remote foci. The rule should therefore be to continue treatment for some weeks after all sign of the disease has disappeared. At least one million units of penicillin should be given daily for as long as may be necessary. The drug may be given in two concentrated doses intramuscularly or subcutaneously. There is no need to worry the patient with three-hourly injections. In those comparatively rare instances in which penicillin does not appear to be of great benefit, recourse may be had to streptomycin or aureomycin, and in some cases better results have been obtained by combining treatment by sulphonamides with treatment with penicillin.

A point which may be overlooked, particularly in the case of visceral actinomycosis, is that there is need for constitutional treatment. The patient is often anaemic and there is hypoproteinaemia, and this calls for a nourishing diet, treatment by some form of iron and, in some instances, by blood transfusion.

Finally the surgeon needs to be reminded that the chronic suppuration which accompanies actinomycosis of the viscera may cause amyloid disease; a careful watch should therefore be kept for this complication and the occurrence of albuminuria should be a warning symptom.