

supposed that enough of the germicide could be taken internally to render all the tissues antiseptic, and on no other supposition can the necessity of the internal treatment be justified. (In some cases the antiseptic, though strong, is said not to have caused a slough.) (15)

Another form of treatment may be noticed in passing. The use of electricity has been repeatedly tried, but, on the whole, without good results. And Apostoli's experiments show that its only means of action is by the acid set free at the positive pole, which he finds destroys the bacillus (16). But the method is less thorough, and more difficult of execution, than the other more radical procedures described. Davies-Colley (17) has reported cures by ipecac in large doses internally and locally applied. His treatment was suggested by Muskett's report of (18) fifty cases without a single death, treated by large doses of ipecac.

Evans (19) has tested this treatment by a bacteriological study in which he has shown that ipecac is fatal to the bacilli in cultures. But the treatment has one serious flaw, if we may judge by Evans's results; the spores are not destroyed. As powerful antiseptics the cautery and the knife would destroy all the local spores. They are in this respect more thorough, and to be preferred.

CONSIDERATION OF CLINICAL HISTORY; PATHOLOGICAL AND BACTERIOLOGICAL REPORTS, AND LITERATURE OF THE SUBJECT.

The points of interest in this case, as they presented themselves to the writer, are the completeness of the history of infection; the recognition of the disease by Dr. Monks; the severity of the man's illness; the increase of the systemic poisoning upon the sixth day of the disease; the relief which was given the patient by the excision of the pustule; the rapid subsidence of the glandular swelling, and his complete recovery. The reports of Mr. Tucker and Drs. Mallory and Jackson are filled with interesting points, especially when their reports and the clinical history are considered in the light of the literature of the subject.

It was a surprise to the writer to know that the old operation of excision of the pustule had been so far supplanted as it has been by the treatment of injections of corrosive sublimate and carbolic acid. The reports of Davies-Colley and Muskett in reference to ipecac, and the bacteriological study of Evans on ipecac are of great interest.

Mr. Tucker states that in the cultures which were taken from the vesicles there must have been in the serum some living organism, or some substance not an organism which, while it permitted the development of anthrax upon agar, entirely inhibited its growth in gelatin; permitting the deduction that it might also inhibit its growth in the serum or tissue of the patient. This, while advanced by Mr. Tucker as purely a suggestion, is full of interest, especially when we consider the classification of the disease by Sabatier and Colin.

That there are different forms of malignant pustule, all dependent upon the same bacillus, seems probable, but not settled. That this patient should have been inoculated with anthrax, have suffered for six days and yet recovered, is so different from the recorded history of many cases where the patient succumbs to the virulence of the systemic poisoning in from forty-eight to sixty hours, that it would lead us to suspect that the difference in the clinical manifestations may depend upon whether the infection is local or systemic.

Again, the literature of immunity by inoculation which Woodbridge has obtained by the injection of a fluid from which the bacteria after culture had been removed by filtration, and Henkin, where a distinct chemical substance obtained from the organs of an immune animal—the rat—possessed the power of conferring immunity upon the inoculated animal are of interest.

That an antagonistic influence should exist between different bacilli is a matter of congratulation as well as of great interest, and in considering this case the antagonism between the anthrax bacillus and other bacteria must be considered. The absence of the bacilli in the blood is a matter of interest.

From the bacteriological reports of both Mr. Tucker and

Dr. Henry Jackson, the belief may be entertained that systemic poisoning had not occurred, yet the patient presented the appearance of an extremely sick man suffering from systemic poisoning, which systemic poisoning on the sixth day was much greater than upon the fifth day, and for this reason I believe that he was systemically poisoned either by the anthrax bacillus or its products.

The presence of the anthrax bacillus having been proven in this case by three different bacteriological experts places the diagnosis beyond a shadow of doubt. In Dr. Jackson's report there is a statement made of great interest from the operative standpoint. He states that in many of the sections no bacilli existed, or only a very few. In some of the sections he found a few small areas in which were numerous bacilli. Where found the bacilli were situated either in the vesicle on the surface, or in the new-formed granulation tissue surrounding the hair follicles. No bacteria were found in any of the sections in the deeper portion of the tissue removed. Just beneath the skin were numerous small areas of hæmorrhagic infiltration. The outer portion of the tissue, however, showed no abnormal appearance, so that from this report it is fair to deduce that the excision completely removed the nidus of disease, which was situated principally in the skin and about the hair follicles, and it further demonstrates that the removal of a pustule after extensive glandular swelling is not a useless measure.

From a theoretical standpoint it is interesting to speculate as to the reason why this patient did not die from his infection with the anthrax bacillus. That he was systemically poisoned I feel certain, but that this was by the bacillus I do not believe. The opinion is held by many bacteriologists that death in charbon occurs by the crowding of the blood with bacilli, which at times mechanically produce thrombosis of the arteries of the lungs, etc. That this is one method of death cannot be doubted; but we also know that in anthrax, as in other infectious diseases, death occurs by the toxic action of the products of bacteria (ptomaines, toxins, etc.).

If the patient were systemically poisoned by the products.

of the anthrax bacilli, and the local nidus were removed, the patient would probably recover. This may offer an explanation why patients from so fatal a disease recover under radical local treatment.

The application of this reasoning to other diseases, such as diphtheria (20), may by analogy be made, and it is possible that in the future we shall more radically treat areas of local infection which are sources of danger to life from systemic poisoning.

In the light which has been given me by the clinical history of this case, the reports of the bacteriological examination, and the literature of the subject which is at my command, I would make the following deductions in regard to treatment:

(1) That where applicable, the old and obvious method of treatment by complete excision of the pustule, when vital structures are not involved, is the best.

(2) That where extensive surfaces involving vital parts are involved, the treatment by injecting strong solutions of the most energetic antiseptics may be used.

(3) That glandular swelling about the malignant pustule, and apparent systemic poisoning do not contra-indicate operative treatment.

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