of time too short, so far as we can judge, for the occurrence of change. And then, again, the cholera-bacillus can be grown through a large number of generations extending over months, and it does not show the slightest evidence of change. My own cultivations retain precisely the same characters as when they were first obtained five months ago. And yet, if this organism be so very unstable, that a few hours in a cholera-patient suffice to change its characters, one would expect that it would again revert to its original characters, more especially as it has been grown under a great variety of different conditions. The attenuation of anthrax-bacilli is not a case in point, as there there is no alteration in form and other characters, but only loss of pathogenic properties. The only instance which could be adduced is Buchner's experiments, in which he thought that he had converted the innocent hay-bacillus into the virulent bacillus-anthraxis, and *vice versa*; but these experiments have been repeated by various observers, amongst others by Dr. Klein, and the conclusion came to was that Buchner's results were due to accidental contamination of his cultivations, and not to conversion of one organism into another; and Dr. Klein has published a number of other observations on other bacteria to show that a change of this kind does not occur. But I need not refer further to this view, against which all experimental evidence is unanimous, and in support of which no reliable facts are known.

We are then left with the other alternative, namely, that, so far as our present knowledge goes, there is no other probable explanation of these two leading facts than that the cholera-bacillus is, in some way or other, causally connected with Asiatic cholera. There are, moreover, various other facts which favour this view, in addition to the difficulty of finding any other probable explanation of the exclusive association of this organism with Asiatic cholera.

According to Dr. Koch, these organisms are present in greatest numbers in the most acute cases of the disease, and at an early stage. In the cases previously mentioned, it will be seen that they were most numerous in the dejecta from a case only ill twenty-four hours, and least numerous where the patient had been ill for four days and was recovering. Again, the experiments on animals show that, when this organism can grow in the intestine, it sets up a morbid process similar to cholera. In my own experiments, two definite cases of this kind occurred, and I have previously hinted that we will shortly have very striking evidence from Dr. Koch on this point. In fact, it seems as if he had found out why it is that the injections performed in the way I have previously described are so uncertain; and apparently, as I understand, he can now infect the animals with certainty with pure cultivations of the cholera-bacillus. I need not, therefore, enter into this matter of experiments on animals, for Dr. Koch's further report will be published very soon. Again, this organism is remarkable for the rapidity with which it is killed by drying; and Mr. Macnamara mentions, in his work on *Asiatic Cholera*, that, during the epidemic spread of the disease, districts suffering from drought were entirely passed over, although small-pox and other epidemics were raging freely in them. Again, Mr. Macnamara states, as the result of his very precise observations, that dilute acids—the gastric juice, for example—kills the virus of cholera; gastric juice, as we have seen, kills the cholera-bacillus very rapidly. He also came to the conclusion that decomposition destroys the virus of cholera, and Dr. Koch came to the same conclusion with regard to the cholera-bacillus. Then the way in which epidemics disappear from Europe would imply that the virus cannot be very tenacious of vitality; the cholera-bacillus has no spore or resting-stage, and soon dies when it has insufficient nutriment.

But, while there appears to be every reason for believing that without this bacillus Asiatic cholera could not occur, it is evident that this disease is one in which other factors play a most important part. It remains to be ascertained whether this bacillus stands on the same footing as other pathogenic bacteria—say, the bacillus anthracis. Inject anthrax-bacilli into an animal, and they will practically, with certainty, cause anthrax. Is the cholera-bacillus equally potent? May there not be some truth in Pettenkofer's views, and may not this bacillus only acquire its virulence in suitable soil outside the body? What is the meaning of the epidemic outbreaks of this disease, and why is it at times endemic without being epidemic? In fact, what other conditions come into play, and what is the importance of the share they take in the causation of the disease? That other conditions do play a very important part, is evident from the whole history of cholera, and I can only explain the great, and apparently hopeless, diversity of opinion among Indian observers, as to the contagiousness of the disease, by supposing that one observer has paid special attention to one set of conditions, and that another must have been specially struck by other conditions. These are the points which, it seems to me, now urgently require investigation; for, till

some conclusion is come to as to all the necessary conditions concerned in the process, we can hardly expect to be able to decide on the best and most practicable means of prevention and cure, although, no doubt, the knowledge gained by Dr. Koch's work must greatly advance matters.

(To be continued.)

A CLINICAL LECTURE ON SPINAL ABSCESS, AND ITS TREATMENT.

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GENTLEMEN,—There is a class of cases that very frequently comes before us in hospital-practice, in which there is still room for improvement in our methods of treatment. Spinal caries is a very common disease. It is not so common amongst the very poor as it is amongst the class just above them. The gutter-children are almost constantly out in the open air, and are as hardy as town-children can be. But amongst the children of parents who are too respectable to allow their children to play in the open streets, and who therefore keep them shut up in more or less unwholesome rooms, the diseases of a tubercular type are fearfully common, and amongst these cases are many of caries of some part of the spinal column. The spine is very liable to injury from falls and blows; and injuries of this kind, unless they be so severe that the patient is at once carried to a hospital, are not very likely to receive the care and rest which are in most cases essential to recovery, and disease is therefore a frequent result. Spinal caries soon results in deformity, from the destruction and absorption of the carious bone; and sooner or later that deformity, and the irritation which must be associated with it, promote the formation of an abscess. These abscesses in their early stages are often overlooked. Sometimes, very little treatment is adopted until the patients, not necessarily all children, are brought or come to the hospital with an abscess of considerable size. Several cases of this kind have been under treatment in the surgical wards from time to time. One was brought in almost moribund, from extensive caries and long continued suppuration, but the rest have gone to convalescent homes, with good promise of recovery. The last of these is the boy who leaves St. Matthew Ward to-day, a most satisfactory example of what may be done for this class of cases, and affording us a suitable text for our lecture to-day.

Now there is some difficulty in recognising the beginnings of these abscesses. They are naturally chronic and insidious. They may commence, as you know, in almost any position around the carious bone, and sometimes at a little distance from it. When once they begin, the pus may travel in a good many different directions, and finally point in some part remote from the source of irritation. When the abscesses travel backwards, they will soon become evident in the back by swelling and fluctuation on one side, or sometimes on both sides, of the spinal column. There is no excuse for not recognising these early. In the majority of cases, however, the abscesses commence in the neighbourhood of the bodies of the vertebrae, and will not be recognised either until they have attained a large size, or until they have extended downwards, and have approached the surface in the loin, in the groin above Poupart's ligament, in the perineum, in the upper part of the thigh, and even, occasionally, in some other part of the thigh or leg. These abscesses sometimes burst into the rectum, or may burrow through the obturator foramen to the back of the thigh, and point behind the great trochanter. The abscess will usually receive a different name in each position, but the disease is the same in all, and the treatment must be on the same principles.

In two of the cases that have been under treatment the abscesses had travelled backwards, and were found as dorsal abscesses on one side of the spine. In three, the collections of pus were psoas abscesses, and presented in the upper part of the thigh, in front of the insertion of the psoas muscle. And in the case before us there were the remains of a psoas abscess on one side, with a large similar abscess on the other side, but presenting above Poupart's ligament.

Before speaking to you of the treatment of these abscesses, let me impress upon you the importance of preventing their formation by the

early recognition and proper treatment of the spinal caries which may cause them. Of course this can only be done when the cases come to you for treatment in the early stages of the disease. I would advise you never to look lightly upon dorsal or lumbar pain (I shall say nothing of cervical cases to-day), and especially after any history of an injury to the back, without a most careful examination as to the existence of any diminution of mobility, and of any tenderness in any part of the spinal column. These two symptoms are present from the very beginning of spinal disease. You will never find spinal disease without them, although you may get both symptoms with the mere hysterical simulation of the disease. I have, before, told you how you may diagnose these latter cases, and will not stop to do so now. I will only say that it will be better, if you are in doubt, to apply extension to a case where no disease exists, than to overlook and neglect the treatment of a case in which there is any spinal disease. By proper extension by means of a plaster-jacket—and you are all of you familiar with my colleague Mr. Richard Davy's admirable plan of applying them—taking thereby all weight from the spinal column, and ensuring perfect rest to the bones affected, the formation of an abscess may generally be prevented. The same treatment will often arrest the extension of an abscess already beginning, and lead to the contraction of the abscess-cavity, and absorption of the pus which has been formed. The lower in the spinal column the disease is situated, the more effective this treatment will be. To ensure complete rest to the part, it is necessary that the jacket should be so applied that it grasps the upper part of the pelvis below, and the ribs with the lower portions of the scapula above. When these jackets fail, it is generally because they do not get sufficient purchase to thoroughly bear the weight of the upper part of the body, and remove it entirely from the spinal column. It is important to remember that, in cases where the spinal disease has resulted in any paralysis of the lower extremities, these jackets are unsuitable; but in all other cases the sooner the jacket is applied the better your result will be, and hence the importance of making your diagnosis at the earliest possible moment. Another great advantage of this plan of treatment is, you can often avoid that pernicious treatment of these cases, the keeping your patient in bed. Confinement to bed does harm to your patient in three ways. It diminishes his vital powers. It debars him from air and exercise, and thus tends to wasting of his muscles. And it favours the gravitation of the contents of his abscess to dangerous quarters. On the other hand, if the patient be able to rise, and can seek light and air, and take some moderate exercise in the erect position, nutrition is maintained, and suppuration, if it be not arrested, will be encouraged to extend downwards along the muscles, in a direction most favourable to recovery.

Support and rest by means of a jacket, and the due maintenance of the health, are, then, the first of the objects of the surgeon in all cases of spinal abscess. Do not be in a hurry to open them, unless they be large, or attended by pain and tension. Under these conditions, the sooner they are relieved the better. But I want you always to remember the possibility of spinal abscesses diminishing and drying up, under a treatment which permits the healing of the bone-lesions. Even if the abscess do not disappear, it is very important to give the active bone-mischief time to subside before opening and emptying it. In three, if not four, of the cases above mentioned, the abscesses, which were not opened until a few weeks after the subsidence of all active mischief, contracted and healed very rapidly, the patients continuing to wear a plaster-jacket for a few months after leaving the hospital, as a precaution against relapse, and also as a support.

When it is necessary to open large or pointing abscesses, let me advise you always to open them very freely. Of course, be most careful in your antiseptic precautions. My early recollection of these cases is that nearly every patient with spinal caries, attended with large psoas or iliac abscess, died. Now, with proper treatment, a large proportion of them ought to get well, and strict antiseptic dressing will help us much. There is, however, always a difficulty in keeping these cases, when the wound is near the fold of the thigh, perfectly aseptic. The gauze-dressings were almost useless for this purpose, but in the treatment of these cases you have seen large absorbent pads used, as they may more easily be kept closely applied to the skin around the wound.

But strongly as I would advise you to be most careful in the use of antiseptics, I wish, at the same time, to accentuate the fact that thorough drainage is as important as, if not more important than, antiseptics. You cannot possibly keep a long discharging canal clean and free with all the antiseptics in the world, if you have only a small opening. There are other advantages in a free opening. All degenerating contents can be effectually scraped out. The condition of the diseased bone can often be ascertained, and sometimes dead portions

of bone and sequestra can be removed, as was shown some years ago by Mr. Furneaux Jordan of Birmingham. You have seen several of the recent cases successfully treated by free incision, and the boy who leaves the hospital to-day is a remarkable instance. His was a most unpromising case. He was admitted into the hospital, nearly eight months ago, in a state of extreme emaciation. He had a considerable angular curvature in the lower dorsal region, with a discharging sinus, evidently the remains of a psoas abscess, on the right side, the old wound in the right thigh being about two inches below Poupart's ligament. On the left side, there was a large abscess, not very prominent when the boy was lying down; but when he sat up in bed, it presented above Poupart's ligament in considerable bulk. The boy was in great pain, and could hardly bear to be touched. Under these circumstances, the immediate application of a jacket was out of the question. The abscess, from its volume and pain, was a source of danger, and must be first relieved. Ether was administered, and, under carbolic spray, an incision, four inches long and somewhat curved, was made above, and parallel to, the outer half of Poupart's ligament and the margin of the ilium. A large quantity of pus welled out whilst two fingers were immediately passed along the track of the abscess to the sides of the bodies of the vertebrae. No loose bone could be felt. A quantity of cheesy material was removed, and some broken down granulation-tissue. The wound was thoroughly washed out with weak carbolic lotion, a tube was inserted, some lint dipped in carbolic oil was applied to the wound, and the whole was covered over by a large absorbent pad, kept in position by an evenly applied bandage. The relief was complete. Pain disappeared, the boy's face brightened, and, a few days later, a jacket was applied, and the patient was transferred from the bed to the sofa. The boy had, for a long time, been unable to walk; and it was, of course, many weeks before he was strong enough to venture on crutches; but the size of the wound enabled the cavity to be kept clean and empty, and recovery, though slow, was uninterrupted. He is now able to walk well with his crutches, and by the kindness of a governor of the hospital, has had many airings in St. James's Park. His bones are now well covered with fat, and his muscles can be recognised as such. I trust that the change to the convalescent home to which he goes will complete his cure, and that he will soon do without his crutches. He will always, of course, have the deformity of his angular curvature, but his spine is fairly consolidated, and will be strong enough, in time, to admit of his doing useful work.

In the patient in Holland Ward with dorsal abscess, the incisions were made at right angles to the spine. In the abscesses that pointed in the thigh, a free vertical incision was made, and you have seen with what favourable results. In some of the cases, in spite of all our care, the caries goes on, and the patients die of prolonged suppuration; but I believe that the number of these may be more and more diminished by early recognition, and treatment by effective spinal support, and, in the cases where large abscesses occur, by the complete drainage and cleanliness which will be promoted by free incision and careful antiseptic precautions.

THE JENNER OF AMERICA.—In his valedictory address, Dr. Welch, President of the Philadelphia County Medical Society, gave an interesting sketch of the life of Dr. Benjamin Waterhouse, to whom the Medical Society of London once applied the title of "the Jenner of America." After serving as apprentice to Dr. Halliburton, of Newport, R.I., he attended the lectures at the University of Edinburgh for one session, and, in 1776, went to reside in London with his great-uncle, the illustrious Dr. Fothergill. He subsequently graduated at the University of Leyden, returned to America, and, in 1783, when only in his thirtieth year, was appointed the first professor of Theory and Practice of Medicine in Harvard University. In 1799, he first became acquainted with Jenner's discovery by receiving from Dr. Lettsom a copy of the *Inquiry into the Causes and Effects of the Variolæ Vaccinæ, or Cowpox*, which had been published in the previous years. Waterhouse was at once struck by the importance of the discovery, and, after several failures, obtained an active virus from Bath. The first person vaccinated in America was his own son, on July 8th, 1800. Waterhouse, in his effort to popularise vaccination, at first enjoyed the powerful encouragement and support of Jefferson, then President of the United States, but the history of his later years is very sad reading. He had to struggle against jealousy and misrepresentation; and, in 1812, was compelled, by the rancour of his opponents, to resign his chair. He, however, subsequently received a government appointment, which he held for several years, and which raised him above the pressure of actual poverty. He died in 1846, in his ninety-third year.