Notes

ON

THE PATHOLOGY AND TREATMENT OF CHOLERA.

BY

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[Continued from p. 494.]

THE EVIDENCE AS TO THE EXISTENCE OF A MORBID POISON IN THE BLOOD AS THE CAUSE OF CHOLERA.

In a previous communication (p. 465), I stated that the presence of a morbid poison in the blood, as the essential cause of cholera, is very generally admitted. There does, however, exist some scepticism with regard to this point; and, therefore, it seems not undesirable to state briefly the chief facts and arguments which are in favour of the doctrine in question.

Now, the proofs of the existence of morbid poisons are to be found mainly in the history of the diseases to which they give rise, and in the impossibility of giving a rational interpretation of the morbid phenomena without assuming the existence of some morbid agent. Neither chemistry nor the microscope has thrown any light on the essential nature of morbid poisons. "It is the human body," as Dr. Carpenter well observes (*Human Physiology*), "which forms the appropriate testing-apparatus for morbid poisons; and even if we could always obtain them in a separate state, and could subject them to chemical analysis, we should know much less of their most important properties than we can ascertain by observation of their actions in the system; this alone affording the means of judging of their dynamical character, which is of far more importance than a knowledge of their chemical composition."

The hypothesis, that a poison in the blood is the cause of the gastro-intestinal symptoms of cholera, is supported by many analogous facts. For instance, vomiting and diarrhoea not unfrequently result from breathing air which is contaminated by the exhalations from decomposing animal matter. Thus Dr. Christison states (*Treatise on Poisons*, 4th ed., p. 636) that M. Ollivier, "while visiting a cellar where old bones were stored, was seized with giddiness, nausea, tendency to vomit, and general uneasiness; and subsequently he suffered from violent colic, with profuse diarrhoea, which put on the dysenteric character, and lasted for three days."

Breathing the air of the dissecting-room and the dead-house is a common cause of diarrhoea; and Mr. Simon (*Lectures on General Pathology*, p. 231) remarks upon the instructive fact that, when a diarrhoea has been excited by dissecting animals whose flesh has a peculiar odour, this odour may sometimes be detected in the evacuations of the patient. Some years since, I was present while a medical friend examined the dead body of a patient who had died of cancer of the bladder and bowel. The stench was singularly strong. Within a few hours, my friend was seized with diarrhoea; and he noticed that his stools had the strong and peculiar odour which had pervaded the room when the body was being examined. In such cases as this we have conclusive evidence that foetid gases may pass, with the inspired

air, through the lungs into the blood, and thence be eliminated through the bowels. Can it be beneficial to prevent or retard that process of elimination?

It has been proved by experiments on animals, that many of the symptoms of cholera may result from the injection of putrid matters into the blood. Mr. Henry Lee, in his *Pathological and Surgical Observations*, describes several experiments of the kind which were followed by vomiting, diarrhoea, difficult breathing, great prostration, and death.

The remarkable arrest of blood in the branches of the pulmonary artery, which I have shown to be the essential cause of choleraic collapse, has its exact analogy in the arrest which is caused by the injection of certain salts into the blood, or by the admission of atmospheric air into the veins. (See ante, p. 492.)

Evidence of blood-poisoning in cholera may be derived from a consideration of the symptoms of invasion, as they have been called. The pathological theories which have unhappily prevailed in this country have led to an undue regard being paid to diarrhoea as a premonitory symptom of cholera, and to an almost entire disregard of other symptoms, to which the Indian practitioners attach great importance. The symptoms in question are those indicative of general discomfort and derangement of function, particularly affecting the nervous system. Twining says (*op. cit.*, p. 9): "Prior to the more distinct and alarming attack, there are sometimes for a few hours, and in some cases for two or three days, symptoms of indisposition, evident not only to the patient himself, but to his friends. When cholera is raging severely, the disease is often ushered in by diarrhoea; at other times, it begins with catarrh, nausea, and oppression at the scrobiculus cordis, which are not in an early stage to be distinguished from the slight indisposition which often precedes fever. The approach of cholera in this manner makes the patient suppose he is feverish or bilious; and if recourse be had to some of the medicines commonly used in slight ailments of that sort, the disease is said to be caused by the dose of medicine taken, when, in fact, it had been insidiously making progress for some hours." In this country, it has not unfrequently been asserted that an attack of cholera has been caused by the operation of a rhubarb pill or a dose of castor-oil. I can give a parallel to this *post hoc ergo propter hoc* argument. Some years since, when I was seeing out-patients at the hospital, a woman brought a child who was suffering from febrile symptoms, and for whom I prescribed a mixture containing nitrate of potash. Two days afterwards, the mother returned, and said, in a complaining tone, "Your medicine has brought out the small-pox." Truly the small-pox had come out; but certainly it was in the blood before it came into the skin. So, when symptoms of cholera follow speedily on the action of an aperient, the morbid poison was before in the blood, and probably caused the feeling of derangement for which the dose was taken. It is as probable that small-pox might result from rubbing croton-oil on the skin, as that a specific disease like cholera would be caused by a purgative.

Annesley gives an extract from the letter of "a zealous and intelligent medical officer", who strongly insists on the great practical importance of studying the initiatory symptoms of cholera. Referring to the purging, vomiting, and spasms, his correspondent says: "I am so thoroughly convinced that these symptoms are only secondary, that, were the following marks present, I should not hesitate to pronounce the case one of epidemic cholera. As the patient is approached, an appearance of overpowering lassitude

is at once perceived, with a pallid, anxious, and sorrowful cast of countenance; and, in more advanced stages, the countenance is dejected and sunk." He then refers to a case in which he observed this peculiar expression of countenance; and, feeling confident that cholera was impending, he kept a close watch upon the man. After an interval of nine hours, vomiting, purging, and cramps set in.

Bell and Orton (*op. cit.*) describe the initiatory symptoms of cholera in much the same terms as Annesley; and Dr. Paine, whose experience of the disease was obtained in New York, says: "Diarrhœa and vomiting do not always distinguish the premonitory stage; but it is sometimes denoted only by headache, loss of appetite, oppression at the chest, etc.; and, again, spasms are known to have been the earliest symptom, and at first the only prominent one." These symptoms of general derangement, which often attend the invasion of cholera, appear to be strictly analogous to those which mark the commencement of other undoubted zymotic blood-diseases.

Again, Orton and others of the Indian authors have remarked on the striking resemblance between the symptoms of cholera and those which result from the bite of a snake or other venomous animal. The venom of these animals unquestionably enters the blood, and thus often destroys life. So, it is probable, does the cholera-poison enter the blood.

Another fact, which is almost certainly indicative of a morbid condition of blood in cholera, is the frequent occurrence of albuminuria during the progress of the disease. This symptom, in connexion with cholera, cannot, I think, be a result of a merely passive congestion of the kidney. Much more probably is it due to an active congestion excited by a morbid quality of blood.

One of the most conclusive arguments in favour of the doctrine that a morbid poison in the blood is the essential cause of cholera, is based upon the fact that the worst symptoms of collapse have often been observed to follow immediately upon the arrest of the vomiting and purging by opiates and astringents. The first case which painfully convinced me of the fatal mischief which may result from the treatment of diarrhœa by opium, occurred during the cholera epidemic of 1849. A woman, about forty years of age, was seized with the usual symptoms of choleraic diarrhœa—vomiting, purging, and cramps. She had not a symptom of collapse. The countenance was natural, the skin warm, the pulse good. I gave her five grains of Dover's powder every hour until three doses had been taken. When I saw her again, in about three hours from the time of my first visit, the vomiting, purging, and cramps had ceased; and she was in full collapse, from which she never rallied. This case gave a terrible shock to my belief that collapse is a consequence of loss of fluid, and that it is to be prevented by arresting the vomiting and purging which usually precede and accompany the symptoms of collapse. I saw no way of escape from the painful conviction, that my patient's condition had been made fearfully worse by my well-intended but mischievous interference. Since that time I have had frequent opportunities of ascertaining from the published reports of cases, and from what I have seen in the practice of others, that the immediate occurrence of profound collapse is a not uncommon result of the sudden arrest of the vomiting and purging by opium. The salutary and curative efforts of Nature—the vomiting and purging—by which the morbid poison is being eliminated, are thus arrested; the poison then accumulates in the blood; the flow of blood through the lungs becomes obstructed; and the state of collapse is established.

MM. Briquet and Mignot have published some instructive particulars of the results obtained by them in the treatment of diarrhœa by opium. (*Op. cit.*, p. 514.) Their practice was to prescribe rest, rice-diet, and from fifteen to thirty drops of "laudanum of Sydenham"; the dose to be repeated in an hour, and to be followed by opiate enemata, if necessary. In obstinate cases, they gave altogether as much as from eighty to a hundred drops of laudanum. The result of this practice was, that, out of 200 patients who came under treatment at the commencement of the attack ("dès le début des premiers accidents"), no fewer than twenty-six—that is, 13 per cent.—passed into collapse. This, I have good reason to believe, is a far larger proportion of cases of collapse than would ordinarily occur if choleraic diarrhœa were allowed to take its own course and terminate, as it tends to do, in spontaneous recovery. Those who advocate the use of opiates and astringents in the treatment of choleraic diarrhœa appear to forget that there is such a result as spontaneous recovery, and they claim the credit of a cure in every case of diarrhœa so treated which does not pass on to collapse. During the last epidemic of cholera (in 1854), the late Mr. Wakefield stated, in a letter to the *Times*, that in a large number of cases of diarrhœa occurring amongst the prisoners at Cold Bath Fields, the only medicines which he gave were carbonate of soda and mint-tea; and not a single case passed into collapse. It can scarcely be supposed that this plan of treatment had any other effect than to dilute the contents of the bowel, and so to assist their speedy expulsion—a mode of operation entirely different from that of opium and astringents.

Mr. French states, with reference to the treatment of diarrhœa (*The Nature of Cholera investigated*, 2nd ed., 1854, p. 75): "I am satisfied, from much experience, that cases of epidemic diarrhœa generally subside speedily under the use of the simplest possible remedies which are wholly free from astringent properties." In this statement I entirely concur.

But it may be asked how it could happen, if there be a morbid poison in the blood the escape of which it is dangerous to arrest by opium, that so large a proportion as nearly seven-eighths of MM. Briquet and Mignot's patients escaped without more serious consequences? Ought not the whole number thus treated by opium to have passed into a state of collapse? To these questions it may be replied that, happily for the patients, in a large proportion of cases, the diarrhœa continues, in spite of repeated doses of opium, for a period varying from a few hours to several days; and, in such cases, it is reasonable to suppose, that the curative efforts of Nature succeed in eliminating the morbid poison from the blood, notwithstanding the opposing influence of the drug.

During the last epidemic of cholera, I saw several cases in which a diarrhœa had for some days gone on, in spite of large and repeated doses of opium and astringents. In each of these cases, the diarrhœa quickly ceased after the exhibition of one or two doses of castor-oil. And it is evident that the experience of MM. Briquet and Mignot was in perfect agreement with this; for they state that if, in spite of the energetic employment of opium, the diarrhœa continues for a period of two days, opium is then of no avail; and they have found in such cases that an emetic of ipecacuanha has immediately put a stop to the disease. It is probable that a diarrhœa which thus continues for several days while opiates are being given, and which is so speedily arrested by an emetic or a purgative, is due, not to the continued presence of a morbid poison in the blood, but rather to the local irritation of the mucous membrane of

the digestive canal by the morbid secretion which has been poured into it, and the complete escape of which has been retarded by the opium.

The peculiar character of the intestinal discharges in cholera affords some evidence of blood-poisoning.

Boehm (*Die Kranke Darmschleimhaut in der Asiatischen Cholera*, 1838) was the first to publish the fact, that the secretions discharged during life, and those which are found in the bowels after death, contain a large amount of epithelium.

The flocculi in the rice-water stools consist almost entirely of perfectly organised epithelial cells, most of them of large size. Of this fact, I have satisfied myself by repeated examinations of the discharges from different patients. The peculiar creamy viscid secretion, which sometimes nearly fills the small intestines after death, is also almost entirely made up of the same fully formed epithelium. Now, it is obvious that this large amount of epithelium cannot be explained by the peeling away of one or two layers of cells from the surface of the mucous membrane—the result of a local irritation during life, or of maceration by the fluid contents of the bowel after death. This abundant cell-formation can result only from a very active vital effort. And if the object of that cell-growth be not to withdraw from the blood some morbid products—some constituents of the blood or of the tissues which have been damaged by the morbid poison—it is difficult to suggest any explanation of the phenomena.

The desquamation of the skin and of the uriniferous tubes of the kidney, under the influence of the poison of scarlatina, is probably analogous to this intestinal desquamation in cholera. In both cases, it is probable that a poison in the blood is the immediate cause of the process.

The very peculiar odour of the rice-water stools—so entirely unlike any other odour, that it alone would suffice for the diagnosis of cholera—shows that the stools contain some new material, or that some constituent of the body has undergone a peculiar morbid change.

It is nearly certain that the intestinal discharges contain a morbid poison by means of which the disease may be communicated to others. So that, as Dr. William Budd has suggested (*ASSOCIATION JOURNAL*, 1854), a single case of cholera may, through the sewers, infect a whole district.

The facts and arguments here adduced are sufficient to warrant the inference that a morbid poison in the blood is the essential cause of cholera. The poison excites the gastro-intestinal symptoms, the vomiting and purging; by means of which the poison and its products are eliminated. And, in the worst cases, the same poison excites contraction of the muscular walls of the pulmonary artery, and then the condition of collapse occurs. During an epidemic of cholera, there occur many cases of choleraic diarrhœa which never pass into collapse. It is probable that both classes of cases are of essentially the same character; the same morbid poison is the cause of both; and the transition from choleraic diarrhœa with bilious stools to choleraic collapse with rice-water stools takes place by almost imperceptible gradations in different cases. The transition back again from the state of collapse to that of bilious diarrhœa occurs when the morbid condition of the blood is so far lessened that the circulation through the pulmonary vessels again becomes free. The stage of reaction is then established; and this is sometimes followed by fever, with engorgement of the lungs and a scanty secretion, or even complete suppression, of urine, which is often fatal.

[To be continued.]

Illustrations

OF

HOSPITAL PRACTICE:

METROPOLITAN AND PROVINCIAL.

HULL GENERAL INFIRMARY.

[Cases reported by T. M. EVANS, Esq., House-Surgeon.]

EXCISION OF KNEE: AMPUTATION: DEATH.

Under the care of WILLIAM J. LUNN, M.D.

ELLEN GANLEY, aged 11, was admitted July 28th, 1864. She was a strumous looking child, but in pretty good health at the time. The left knee was swollen, tense, and shining, and contracted at an angle of 135°; but not very painful, except when handled. It had been affected upwards of twenty months. She was ordered to rest in bed, and to take half a drachm of syrup of iodide of iron three times a day.

Aug. 24th. There was very little, if any, improvement. Under chloroform, a single transverse incision was made; and about an inch of the femur, and rather more of the tibia, with the patella, were removed; the limb being afterwards placed on a straight iron splint with foot-piece. The operation was borne very well.

The cartilages were much ulcerated, leaving the bone exposed in several places; and the synovial membrane was thickened.

In the evening, she was frequently sick, and suffered great pain in the limb. She was ordered to have soda-water as required, and ten minims of tincture of opium at night.

Aug. 25th. She was sick during the greater part of the night, but better this morning. She still had pain; pulse 150, and feeble; tongue slightly furred. She was ordered to have a citrate of potash draught with four minims of tincture of opium every four hours, and to repeat the opiate draught every night.

Aug. 27th. Pulse 120; cheeks flushed. She was still occasionally sick. The wound looked well.

Aug. 29th. She felt better, and had scarcely any vomiting. The limb was more easy.

Sept. 1st. She was still improving, and her appetite was returning. There was a free discharge of pus. She was ordered to have three ounces of wine daily.

Sept. 12th. The wound looked sloughy, and was painful. She slept badly. Half a drachm of tincture of cinchona was ordered to be taken three times a day in decoction of cinchona.

Sept. 22nd. The splint and pads having become very foul from the abundant discharge, fresh ones were applied under chloroform. The child was so restless that there was great difficulty in keeping the limb in good position.

Oct. 5th. The wound discharged profusely, and had extended in size.

Oct. 15th. Dressing the wound caused so much pain and nervous alarm, that it was sometimes necessary to give her chloroform. Her health was beginning to fail very much, the discharge continuing most abundant; but the limb was kept in better position.

Oct. 27th. Her health was suffering greatly. She was much emaciated, and her bowels were relaxed. The wound was very sloughy, and discharging pro-