Notes

ON THE

PATHOLOGY AND TREATMENT
OF CHOLERA.

BY

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MEDICINE IN KING'S COLLEGE; ETC.THE CONDITION OF THE LUNGS DURING
COLLAPSE AND AFTER RE-ACTION.

THERE have been during the last fortnight many opportunities for examining the condition of the lungs after death from cholera. And so far as I have seen or heard or read, the result of these observations has been to confirm the statements long since published by Dr. Parkes and others, to the effect that, when death has occurred during the stage of collapse, the minute tissue of the lung is remarkably deficient in blood; whereas, after death in the stage of reaction, and more especially if there have been consecutive fever, the lungs are exceedingly gorged with blood.

The appearance of the lungs in cases of collapse has been somewhat differently described by different observers. One condition which appears to have excited the surprise of practitioners in India, is the extremely small size of the lungs as they are found collapsed when the chest has been opened. This shrinking of the lung into so small a bulk is evidently due to the emptiness of the minute vessels. Such an extreme collapse of the lung-tissue is impossible when the small vessels are gorged with blood; and it may be stated, in general terms, that there is an inverse ratio between the degree of pulmonary collapse and the fulness of the capillaries of the lung. Emphysema and adhesions between the lung and the walls of the chest will, of course, interfere with the collapse of an anæmic lung.

My friend Dr. Massey has favoured me with the sight of some manuscript notes made by medical officers of the army in India in the year 1823. There I find it stated that, in seven cases of rapidly fatal cholera-collapse which had occurred in quick succession, "the thorax appeared to be entirely empty, and what might be termed lungs were found lying close to the vertebrae in a complete state of collapse, each lung not being the size of a small hand."

Scot (*Report on the Epidemic Cholera, Madras 1824*) states that some observers suspected that this extreme shrinking of the lung must be due to the pressure of air in the cavity of the pleura during life. And, in order to test this view, they opened the chest in some instances under water; but they found, of course, that no air escaped when the chest was punctured.

The degree of pulmonary collapse, when the lungs are structurally sound, is an accurate measure of the emptiness of the minute capillary vessels. In cases of extreme pulmonary collapse, the air is almost entirely expelled, so that the lungs are non-crepitant

on pressure. In most cases, the lungs are of pale colour, more especially at the anterior and upper parts; and if the examination of the body be made immediately after death, the pale colour may extend throughout the whole lung. In most instances, there is more or less engorgement of the back parts of the lungs, owing to *post mortem* gravitation.

The anæmia of the lung has generally been observed to be greatest in the most rapidly fatal cases of cholera-collapse.

The weight of the lungs is the most accurate measure of the emptiness of the minute vessels. This is generally much below the normal standard. The mode of ascertaining this is to weigh the lung after cutting through the root and allowing the blood to escape from the large vessels, where it is usually accumulated in large quantity. Dr. Parkes found the average weight of both lungs in twenty-two Europeans who died in collapse to be 26 ounces 6 drachms. Dr. Clendenning estimated the normal weight of the lungs of adult males to be 46 ounces. Dr. Reid makes it 43 ounces. Taking either estimate, the lungs of patients who have died in the collapse stage of cholera are remarkably reduced in weight. This reduction of weight is evidently connected with a great deficiency of blood in the minute capillary vessels. And, inasmuch as the larger branches of the pulmonary artery contain an unusual amount of blood, it is evident that the blood has suffered arrest in the minute branches of the arteries before the capillaries have been reached.

The defective aëration of the blood during collapse is explained by the fact that only a small proportion of blood passes through the pulmonary capillaries where it can be exposed to the air. It has often been supposed that the blood of a cholera-patient has suffered some change which unfits it for undergoing the respiratory changes. This is an unnecessary and a baseless hypothesis. The blood is not aërated simply because it is arrested before it reaches the air-cells. When the lung is incised, the cut surface, immediately on exposure to the air, becomes of a florid red colour; showing that the blood in its vessels is apt enough to undergo the usual respiratory changes when it has access to the air.

Two patients have died of cholera in the hospital during the last few days—one in collapse; the other with pulmonary engorgement, drowsiness, and convulsions after reaction. Each case affords a good typical example of the condition of the lungs in collapse and during reaction respectively; and a few particulars of these cases may perhaps be interesting and instructive.

J. B., aged 46, was admitted at 4.30 P.M. on the 1st August. He lodged at Old Boswell Court in the Strand; and on the morning of the 1st, at 12.30, he was seized with cramps; then he vomited; and between that time and 8 A.M., he vomited four times and was purged three times. The stools were not examined. At 8 A.M., his face became blue, the eyes sunken, and the fingers shrivelled. It could not be ascertained whether vomiting and purging had continued during the day. At 4.30, when admitted, he was in extreme collapse; cold, blue, pulseless, with sunken eyes; the voice a scarcely audible whisper; temperature of axilla, 92; respiration 44, very shallow; heart-sounds inaudible; no vomiting or purging. At 5 P.M., his breathing suddenly be-

came slower and more gasping. Dr. Fenn, the assistant house-physician, tried to bleed him, but scarcely half an ounce of blood flowed; and he died at 5.15, three-quarters of an hour after his admission.

The body was examined two hours after death. The lungs were collapsed, small, and pale. The right weighed eight ounces; the left nine ounces. Both sides of the heart were empty. The right cavities were flaccid, and had evidently emptied themselves through a wounded vein when the chest was being opened. There was the usual choleraic secretion in the small intestines.

In this case, death occurring during the stage of collapse, the anæmia of the lung was extreme. In the next case, death occurred after reaction, and an entirely different condition of lung presented itself.

M. P., aged 15 months, was seized with vomiting and purging on the 30th July, at 10 A.M. The stools were at first green; then like rice-water. In the course of the afternoon, the surface became blue and the eyes sunken. Admitted at 11.30 P.M. There was then marked collapse. The surface was cold and clammy; the pulse extremely feeble. There was neither vomiting nor purging. At 1 A.M., on the 31st, the general condition was the same; the temperature in the armpit was 96½. At 10 A.M., the temperature had risen to 99½; the stools were greenish; the child was drowsy, and lay with the eyes partly open. At 10 P.M., the temperature had again fallen; it was now 97½. Respiration 32; pulse 144. The drowsiness continued during the night; and death occurred at 10 A.M. on the 1st August. There were two attacks of convulsions shortly before death.

The lungs were very much gorged with blood, and there was a considerable amount of yellow bile in the small intestines.

In this case it is evident that death occurred after reaction had set in. And it is probable that the immediate cause of death was an accumulation of carbonic acid in the blood consequent on the capillary engorgement of the lungs. The order of events probably was this. During the period of collapse there was a partial arrest of blood in the minute branches of the pulmonary artery, and the defective oxygenation was indicated by the temperature falling to 96½. If death had occurred at this stage, the lungs would have been found anæmic. The occurrence of reaction was indicated by a rise of temperature to 99½. The blood was now passing more freely through the minute pulmonary arteries, and a more rapid combustion began, but with this there occurred some capillary engorgement of the lungs, a consequent accumulation of carbonic acid in the blood and drowsiness; at length convulsions and death. The fall of temperature again after reaction was a result of increasing capillary engorgement and consequent impeded circulation through the lung. If the child had not been closely watched, it might have been supposed that death had occurred during collapse. The occurrence of reaction, however, was distinctly proved by the rise of temperature, and by the abundance of bile in the small intestines after death.

This case affords an illustration of one of the most common sources of danger after reaction has set in, namely, capillary engorgement of the lungs, and in consequence of this, an accumulation of carbonic acid in the blood. During the stage of collapse there is an accumulation of combustible material in

the blood; when the circulation again becomes free, there is a rapid oxidation of this accumulated fuel, and an abundant formation of carbonic acid, bile, and urine.

The safety of the patient now depends upon the uninterrupted elimination of these excreta. In some instances, as in this case, capillary engorgement of the lungs supervenes so rapidly upon the occurrence of reaction, that great care is required to distinguish between the two stages. When a patient, apparently in collapse, has a warm skin, with a temperature above 98 degrees; when there is decided and increasing drowsiness, with hurried breathing and crepitation over the lower lobes of the lungs, we may be sure that capillary engorgement of the lungs has supervened after reaction, and that the drowsiness results from an excess of carbonic acid in the blood. When death occurs at this period, the lungs will be found excessively gorged and heavy, and the contents of the small intestines will be tinged with bile.

This pulmonary engorgement after reaction is a very common and a very serious and often fatal complication. I believe that the most hopeful mode of treatment consists in the application of turpentine stupes to the back, and the abstraction of blood by cupping over the lower lobes of the lungs.

ANÆSTHETICS. The editor of the *Cincinnati Journal of Medicine* reports the performance of Chopart's amputation of the foot under the influence of nitrous oxide gas.

DR. LAYCOCK. We regret to hear that Dr. Laycock has suffered lately amputation of the thigh. The operation was performed by Mr. Spence. The cause of the operation was, we believe, some old affection of the knee-joint.

ASYLUM FOR INSANE SOLDIERS AT NETLEY. On the 26th ult., Mr. Floyer asked the Secretary of State for War whether his attention had been directed to the proposed arrangements at Netley for the care and treatment of insane soldiers; whether, considering that there are at the present time in a private asylum at Bow 195 male and female patients belonging to the military service, he considered the proposed provision for 60 patients adequate to the wants of the army; and whether, in the event of its being considered necessary to provide for a much larger number in buildings under the control of the government, he thought that it was wise to make that provision in the grounds of the hospital at Netley. General Peel said the building now being erected at Netley, for the care of insane soldiers, was placed there in consequence of the report of the committee that sat in 1863, on the removal of the establishment from Chatham. The patients were only placed there for the purpose of observation, and would, after a short period, be removed to their friends or to private asylums. Certainly accommodation for only 60 patients would not be sufficient for a lunatic asylum for the whole army; neither was it intended that it should be. The reason for providing accommodation for 60 was that the committee reported that that was the greatest number placed at one time in the old lunatic asylum at Chatham. The great advantage of having at Netley a connexion with the marine establishments, was, that the lunatics who came home from abroad could be at once taken charge of there. Another advantage was, that the medical students of the hospital at Netley had an opportunity of studying the cases of lunacy in the asylum.