should it occur. And in our day the ligation of that vein is not regarded by the surgeon with such serious apprehension as it was at the time when Syme made his operation.

In this operation I am indebted for valuable assistance to my colleagues Prof. Donald Maclean and Prof. H. S. Cheever, and also to Dr. John Kapp, of Ann Arbor.

ART. XVIII.—*Case of Embolism and Thrombosis of the Pulmonary Arteries, which was rapidly fatal.* By ISAAC G. PORTER, M.D., of New London, Conn.

Among the internal causes of sudden death, we may enumerate—1st. The bursting of aneurisms, the result of atheromatous deposits in the large bloodvessels near the heart. 2d. The rupture of the heart itself, mainly through the influence of fatty degeneration. 3d. Valvular diseases of the same organ; although, of late, this cause is regarded as really less operative than was formerly supposed. 4th. In an interesting article in the last number of this Journal "Spasm of the heart" occupies a place in the same grave category. 5th. The "heart-clot" of Meigs, in puerperal women, or cardiac thrombosis. 6th. Extravasation and effusion of blood at the base of the brain, from disease and rupture of the arteries; also, large hemorrhages into the substance of the brain from the same cause, or from embolism, constituting apoplexy. 7th. Another similar factor, unknown and unsuspected until elucidated by Virchow, his contemporaries and successors, is exemplified in the case now to be detailed, viz., embolism and thrombosis of the pulmonary arteries. As remarked by Aitken, "results are now explained on simple mechanical principles which hitherto have been obscure. Formerly many of the cases thus explicable would have been recorded as cases of 'sudden death,' or as 'sudden retrocession of gout or rheumatism,' or 'gout in the stomach,' or 'palsy of the heart.'"

April 30, 1876. Called to H. P. H., of this city, merchant, sixty-one years of age, weighing 180 pounds; in appearance robust and somewhat plethoric, with capacious and fertile brain. His pulse for a man of his size was always small and weak, yet his health was ordinarily fair, having never had rheumatism or any cachectic disease, and, by ordinary rules, entitled to longevity by right of inheritance. Still he was always, voluntarily, overworked, unceasingly active seven days in the week, maintaining, for more than forty years, a Sabbath-school in a destitute region five miles distant, besides superintending the largest similar institution in town. For two weeks before his death he complained of unusual weakness, and had a slight bronchial cough. Still he attended to business,

and rode out the day before his death, driving the horses himself. He passed a restless night, but arose as usual, and among other things exerted himself in visiting the observatory at the top of the house. But he returned almost immediately, became faint and breathless, and barely reached the lower floor, when he almost fell into the arms of his family. I reached him very soon (at 7.45 A. M.), and found him cold and in profuse perspiration; countenance pale and ghastly; pulse very rapid, irregular, and scarcely perceptible. He was very restless, though without true pain, and complained earnestly of being faint and as having no breath, although at the time filling his lungs completely at every inspiration. The difficulty was not increased by the horizontal position, and yet he preferred to sit up, supported by friends. Stimulants conferred momentary relief, and sinapisms and external warmth were freely used, but in about half an hour his head fell on his breast, and he was gone, remaining conscious to the last.

A *post-mortem* examination was made at 4 P. M. by A. W. Nelson, M.D., assisted by other physicians of this city; but as the heart alone was examined, and there was found no very unusual amount of clot in the right side of the heart, the examination was not carried to the lungs, although we were disappointed in finding so little to explain the peculiar mode of death. At the suggestion of a son of the deceased, a student at the Harvard Medical School, the assistance of R. H. Fitz, M.D., Assistant Professor of Pathological Anatomy at that institution, was cheerfully sought, and I now have the pleasure of presenting the following letter from one so accomplished in his department as Professor Fitz, to whom the heart and lungs were forwarded, and which reveals the true cause of death, as well as the benefits of sometimes minutely examining organs which were not suspected of being mainly in fault.

"The examination of the organs sent me has proven satisfactory as to the cause of death, which was embolism and thrombosis of the pulmonary arteries.

"The left ventricle of the heart was moderately dilated and hypertrophied—this condition being evidently due to chronic changes of the aortic orifice resulting in insufficiency. The septum between two of the crescents had almost wholly disappeared, the corpora aurantii of these were approximated, and the leaflets somewhat thickened and contracted. The appearance was thus presented as if but two semilunar valves of unequal size existed at the aortic opening.

"This condition gives the most probable explanation of the constant small and feeble pulse, as the appearance of the wall of the heart was not suggestive of any special degree of fatty degeneration.

"In one of the secondary branches of the pulmonary artery of the left lung, an adherent and slightly decolorized clot was found, which had probably been in position some days.

"From this a more recent coagulation extended towards the common pulmonary arteries of both lungs, and was continued into the main artery of the right lung, filling it and the primary branches.

"The arborescent clot was thus formed—its ends rounded and pointed passing from one and a half inch to one inch into the primary branches. Beyond its ends the blood was still fluid.

"The *bisoin de respirer* and the ability to inflate the lungs are thus quite compatible, the bronchiæ not being obstructed, but the blood not capable of aëration. Death is thus immediately produced by a lack of oxygenated arterial blood in the nervous centres, notably in the medulla oblongata.

"A certain degree of bronchitis existed, of no importance in respect to the sudden death. The heart did not indicate the seat of the original embolism, which may have been in the right side of the heart or in any of the body veins."

The closing sentence of the above letter leads me to say that, some eighteen months before his death, the patient made an overland journey to California, and, as he thought, through long and persistent confinement in the cars, his left leg and foot became very painful and swollen, so much so that for some time after his arrival, he was disabled for business, and was under the care of a surgeon, and by him kept very quiet in a horizontal position. The pain left him after a time, but the limb remained swollen quite to the time of his death, though it did not particularly incommode his walking.

In this connection the writer would add that his patient was careful of health and life as a duty, and in pursuance of the same was in the habit of using daily the "health-lift." About two weeks before his death, while exercising among the small hundreds, and he had nearly reached his accustomed allotment—without his knowledge and purely as an accident—the "slide," which, by its action, increases the weight to be lifted, had been moved. Feeling bound to do again what he had often done before, he exerted himself greatly and quite to his injury. The week after, he called at my office, stating the fact, and that he had felt unwell ever since. It may have been a vain fear; but on the other hand, when it is asserted of the machine "that the lifting effort is made entirely through the action of the muscles of the lower extremities in straightening and bending the knees," may we not inquire whether some old formation that had hitherto laid dormant, may not have been disturbed by the powerful action of the muscles on the crural veins, breaking down and detaching venous thrombi? That thrombosis, occurring in the peripheral veins, not infrequently leads to embolism of the pulmonary arteries is shown by the following statement of Niemeyer:—

"Within the last few years I have seen two cases, in which death occurred in the course of a few hours, with all the signs of intense dyspnoea and collapse, and in which it was found, *post-mortem*, that a large thrombus had been detached from the femoral vein, had passed into the circulation, and by obstruction of the main branch of the pulmonary artery, had occasioned this peculiar kind of suffocation." (Vol. i. p. 412.)

In the case which has received our chief attention, the persistent œdema of the limb would imply continued, but diminished obstruction of the vein or veins of the extremity. Aitken speaks of cases "where the coagulum adheres only to one wall, with the effect of narrowing the passage," etc.

The testimony of Prof. Fitz will be remembered, viz, "the heart did not indicate the seat of the original embolism." The point has probably never been settled how long a venous obstruction may remain quiescent, and yet ultimately break up and be detached to enter the circulation. The following caution, however, will be harmless, even though unjustified by the premises: The use of the "health-lift" is often attended by great advantages; but if our speculations are founded in truth, we can scarcely recommend the instrument in cases where œdema remains after the existence of what used to be called phlebitis of the lower extremities.