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# THE PULMONARY COMPLICATIONS OF INFLUENZA.

CLINICAL LECTURE DELIVERED AT THE PENNSYLVANIA HOSPITAL, PHILADELPHIA, PENNSYLVANIA.

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Physician to the Pennsylvania Hospital, etc.

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# Medicine.

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GENTLEMEN,—I propose this morning to bring to your notice cases that will serve as illustrations of the pulmonary complications of the epidemic of catarrhal fever or influenza through which we have recently been passing. In other words, I desire to make some connected remarks on the subject of the lung-conditions that are found associated with influenza. I shall base these remarks chiefly upon the experience which has come to us here, and upon my personal observations during this epidemic; though I shall also take a wider survey of the subject and make use of the lessons of experience derived from previous epidemics.

Now, it is a remarkable fact that epidemics of influenza differ very materially in the amount of respiratory disorder. In some epidemics that I have witnessed we find simply a catarrh affecting the upper air-passages, with laryngeal and bronchial involvement, but with little tendency to spread to the deeper parts of the lungs. This has not been the case in the epidemics through which we have passed in the last few years. Though there have been many cases of especially obstinate laryngeal as well as bronchial catarrh, yet, alike in the epidemic of two years ago and more markedly in this one, the pulmonary complications have been extreme, both in their frequency and in their gravity.

Let me take this case that is before you, and that is now convalescing, as a type of a very frequent acute pulmonary complication which this epidemic has shown us.

CASE I.—The man was admitted December 21, 1891; he had been, so far as we could learn, ill for two weeks. When he was admitted, his temperature was 103°; pulse 80; the respirations were 48 to the minute, and the breathing was labored. His face wore a dark flush, the lips had a bluish tinge; in fact, he presented very much the appearance of a case of pneumonia. The cough was hard and followed by a small quantity of expectoration, thick and slightly blood-tinged, but not viscid. In the course of the next few days the sputum became more viscid, yet it never assumed the characteristic appearances of the rusty sputum of pneumonia. The temperature remained between 100° and 102°; his cough was always harassing, as well at night as during the day. The physical signs showed numerous fine rales, sibilant and subcrepitant, both anteriorly and posteriorly, with slightly impaired resonance at the lower part of both lungs posteriorly; but at no point could bronchial breathing or marked dulness and other signs of pulmonary consolidation be detected.

These are the outlines of the history upon admission. The only doubt I have is whether the man has really been ill for two weeks. He is an Italian sailor, from whom it is difficult to obtain information. Nor can we tell if he has had a chill; the most that we could learn from the people who brought him was that he was chilly. The progress of the fever is seen in this chart. You observe the gradual decline of the temperature, and how it finally in convalescence is subnormal. (Chart I.) Let me add that the lungs never became consolidated, that the circulation was throughout weak, and the heart-sounds feeble. It was only after a great struggle that recovery took place, and this was brought about, I think, by good nursing, by careful attention to food and stimulants, by thorough dry-cupping, and by considerable doses of chloride of ammonium, whiskey, and digitalis. Towards the end, we gave nitro-glycerin, and at the beginning, in consideration of the feeble action of the heart, strychnine. Yet I cannot say that the effects of these drugs were very obvious. We had more decided and visible results on the feeble, irregular circulation from tincture of digitalis and from whiskey.

He is now convalescing from serious illness. He is still feeble, but evidently out of danger. His face has lost the deep, dusky flush, that gave us such alarm. The respiration, as heard this morning at the upper part of the left lung, is harsh, as, indeed, it is more or less so through the entire lung. A few coarse rales, dry and moist, mask the breath-sounds on the right side anteriorly and posteriorly; at the lower part of the right lung the respiration is feeble and is obscured

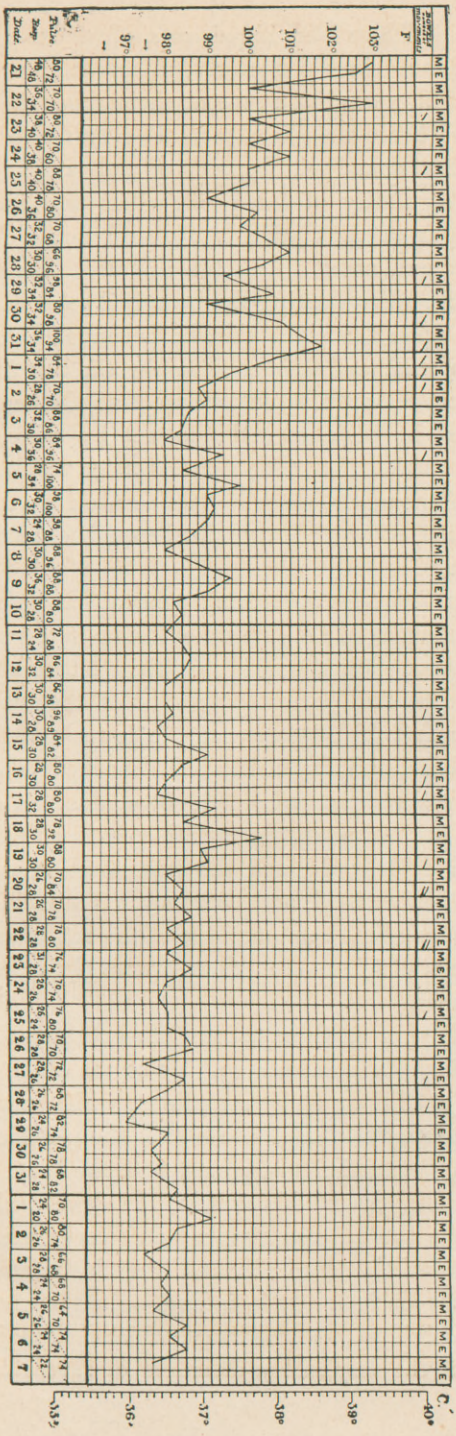

F°
103°
102°
101°
100°
99°
98°
97°
C°
40°
39°
38°
37°
36°
35°
Date
Temp
Pulse
Sputum
Urine
Bowels

CHART I.

by fine moist rales. There is no impairment of resonance, except that, on comparing the two sides posteriorly, the right side is rather less resonant than the left, a condition present throughout the case. Upon examination of the heart the second sound is found to be sharp and well defined, the first sound still lacks force and is short; there is no murmur. The irregularity of the pulse, which was such a striking feature at the height of the disease, has passed away. The pulse is now quite regular, and about 78 to the minute. The respiration is still rapid, about 30. Yet, barring the bronchial catarrh, which manifests itself chiefly upon the right side, he is convalescent. His temperature is now normal, and has been so for the last five days. By looking at this chart (Chart I.) you will see that the temperature has returned to normal by regular gradation, not by crisis, as is apt to occur in ordinary pneumonia. The heart remains feeble, and there is a little swelling of the ankles since he has been on his feet; the urine is free from albumen, of which it contained a small quantity during the height of the disease.

Now, this case furnishes a striking type of the chief pulmonary complication of influenza in the present epidemic in cases in which the lung-attack is severe. With rapid breathing, harassing cough, and evident oppression, we find intense congestion of the lungs, fine rales, and slight impairment of resonance at the lower part of the chest, especially at the back, and frequently more marked on one side than on the other, but without marked dulness or evidence of consolidation. In addition, you will observe the breath-sounds at the lower part usually feeble and ill defined; and the expectoration is rather tenacious, but not decidedly viscid, and not rusty. These, in a few words, are the characteristics of the common type of the influenza lung. This is the state of things which is often, though wrongly, called pneumonia complicating influenza.

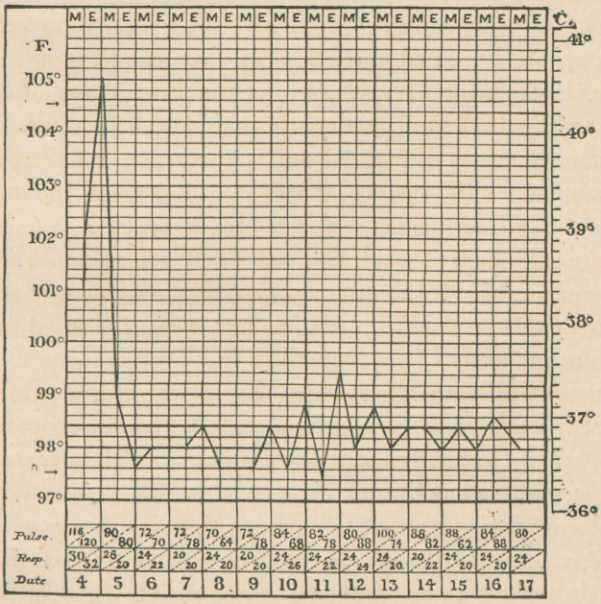
I shall now call your attention to some other features connected with the condition we have been examining. It begins often, as true pneumonia does, with a chill or chilly sensations, which may occur very early in the influenza attack, or come on after the peculiar pains in the bones, the ordinary catarrhal symptoms, and the fever of this have been present for some days. No matter how developed, the decided fever which attends the pulmonary symptoms very generally subsides gradually and regularly, or gradually and irregularly, and coincidently the other symptoms decline. It is, indeed, quite the exception to find the fever in these highly-congested lungs, which I have just said form so large a part of the respiratory disorders of severe cases of influ-

enza, leave abruptly and show a crisis as in true pneumonia. It cannot, however, be said that this never happens. Here is a case which proves the contrary.

CASE II.—*Pulmonary Congestion; High Temperature; Early and Marked Crisis; Convalescence.*—William S., eighteen years of age, a laborer, was admitted January 4, 1892. Since December 15 or 16 he had been suffering with a cough, which he attributed to exposure. January 2, he had severe chills, followed by fever, pain in left chest, increased cough, and expectoration of frothy mucus: there were all the evidences of the epidemic catarrhal fever.

On admission, his face is observed to be flushed, the tongue slightly coated; the chest is resonant, except that the percussion-note is somewhat impaired at the left side posteriorly, and some scattered rales are heard. The breathing at the involved spot is very feeble. Rales are not numerous in the lungs; the breathing is harsh everywhere, except at the left side posteriorly. There is no definite consoli-

CHART II.




dation at any place, but the lungs appear to be congested. Examination of the heart is negative. The respirations are 30; the pulse is compressible, 116; the temperature 101°. The urine is acid, of specific

gravity 1014, clear, and contains a small amount of albumen, with a few hyaline and blood casts.

The treatment consisted of chloride and carbonate of ammonium, each ten grains every second hour, and whiskey, half an ounce, every second hour. He was sponged and the chest was dry-cupped.

The evening temperature was 105° F., but this was reduced two degrees by sponging at eight and again at eleven o'clock. In the morning he was much better: the cupping afforded great relief to the pulmonary symptoms. His temperature was down to 99° F. by noon, and did not again rise. The respirations were 22. He felt very comfortable. There was no excessive sweating. With the occasional cough, he expectorated stringy liquid mucus stained with blood. (Chart II.)

Physical examination demonstrated relatively slight dulness upon the left side posteriorly, with feeble breathing, but no bronchial breathing. Respiratory percussion brought out the dulness, which, on ordinary percussion, was not marked.

January 6, the temperature was normal. With the exception of a slight cough and a little pain in his side, he was comfortable. The urine was free from albumen. Three days later he was allowed to get out of bed, and from this time he steadily proceeded towards recovery, under the use of iron and of chloride of ammonium.

In reviewing *the symptoms*, let me refer to a few other points. You will want to know about the expectoration. As a rule, it is not a rusty sputum; it may be blood-streaked and viscid, but it is not the intimate admixture of blood which constitutes the so-called rusty sputum of pneumonia. The expectoration is more copious and less viscid towards the end of the attack; in some of the cases we have observed here the sputum was thin throughout. Further, it is not unusual for the sputum, without being viscid, to be loaded with blood,—to be, indeed, so much loaded as to have the appearance of pure blood.

The respirations are always very frequent, but the pulse does not, as a rule, rise in proportion. It is mostly somewhat above a hundred and compressible, yet not nearly so rapid as the hurried and labored breathing would make us suppose; and this is true whether there be signs of consolidation or not. The breathing is often associated with a sense of soreness or with actual pain at the lower part of the chest. This pain receives its explanation in the plastic pleurisies that are a not uncommon attendant on the respiratory disorder. But more or less pain and a sense of thoracic distress are also present where no pleurisy can be detected.

The disturbance of the circulation is manifest in the quickened

heart's action, which is often also irregular in its rhythm and feeble. Short systolic cardiac murmurs near the apex are not uncommon, but much more general is a defective first heart-sound and a sharp second sound. Sluggish capillary circulation and bluish nails indicate how much the general circulation is disordered.

The nervous system shows the extent to which it is affected chiefly by insomnia and by delirium. Of these the latter is more common, and will force itself more on your attention. It is an alarming and generally a bad symptom, for though I have seen here and elsewhere cases with delirium that ended in recovery, yet every fatal case we have had here has had delirium. The mental wandering is often very peculiar, especially in business and professional men. The patient thinks of his occupation, dreams of it, and continues to talk of it when aroused. Indeed, this business delirium, if I may so call it, may become very distressing. I knew one instance in which the patient himself was so conscious of it that he begged that he be not allowed to sleep, so as to save himself from the worries of business which would come to him in his disturbed dreams.

A striking feature in a number of cases, especially the graver ones, is the appearance of albumen in the urine. Whether this is brought about by the respiratory distress, or is part of the general influence of influenza that disturbs both lungs and kidneys simultaneously, it is difficult to determine. I believe it is the latter more than the former. The albuminuria is attended with tube-casts and signs of actual renal involvement. It is, however, not persistent, but passes away with the attack. I have just said that it is especially met with in the graver cases. Yet it bears no strict relation to any nervous symptoms. It is found without delirium, as in a case I shall presently detail to you (Case III.), and, on the other hand, delirium is observed without its occurrence (Case VI.).

Let me show you a marked instance of this albuminuria with congested lungs in a patient who, moreover, presented some of the cardiac symptoms to which I have called your attention.

Case III.—*Influenza with Congestion of the Lungs; Albuminuria; Systolic Cardiac Murmur; Recovery.*—John F., forty-seven years of age, a sea-captain, born in England; was admitted into the hospital December 7, 1891, with the following history. He had been in good health until the 1st of this month, when, during a long ride in a street-car, he was chilled before he reached his destination, and soon afterwards began to cough. On December 6, after fresh exposure, his cough became troublesome and associated with expectoration, with pains

in the lower part of the back, fever, slight headache, complete loss of appetite, and constipated bowels. He was an unusually well-developed, broad-chested man, of medium height, weighing two hundred and twenty pounds. The tongue was coated, showing impressions of the teeth; the respiration was 26 to the minute, and somewhat labored; the pulse was of good volume, 108; the temperature was 101°; the lungs were clear anteriorly; posteriorly on both sides there was impairment of resonance, with large dry rales; the breathing was harsh, nowhere tubular; nor could the most careful examination detect any signs of consolidation. The heart was normal; a faint systolic murmur was heard at the apex. The urine was acid, of specific gravity 1024, clear, and moderately albuminous. It contained hyaline and granular casts of large size, and epithelial casts, not numerous.

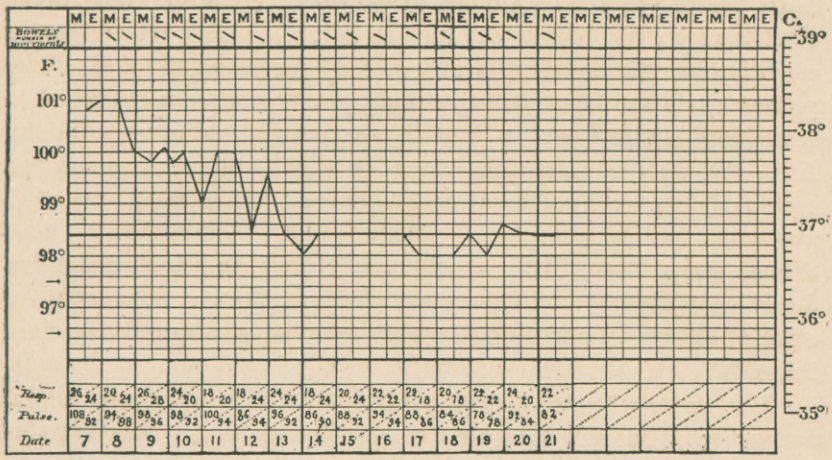
The treatment ordered was chloride of ammonium, ten grains every four hours, alternating with three grains of quinine. The chest was dry-cupped. He was placed chiefly on milk and broths. During the next two days the cough continued, but the expectoration and temperature diminished. On the 10th his chest was again cupped, as both lungs were considerably congested posteriorly. The quinine was now reduced to six grains daily, as he had an irritable stomach, and, in place of the ammonium chloride, calomel one-sixth of a grain, and bicarbonate of sodium five grains, were given December 11. (Chart III.)

By December 13 the temperature had reached the normal, the cough had nearly disappeared, and his appearance had much improved; his face was losing its congested look; but he was not allowed to rise from his bed until three days later. He was then convalescent, and the albumen had disappeared from the urine; he still had an occasional cough, and had some catarrhal inflammation of the larynx, with a husky voice. A few rales were heard in the back portions of the lungs. The tongue was clean, but still swollen and tooth-marked. He was now ordered strychnine sulphate one-sixtieth of a grain thrice daily. Dobell's solution and ammonium chloride by inhalation with a steam atomizer were used for his throat. December 19, when he was presented at the clinic, he still had some laryngitis; the tongue was slightly coated; the first sound of the heart was weak, but the murmur had disappeared. He was discharged two days later.

We come next to the question of the *physical signs* of the pulmonary complications. In part I have already mentioned them. They are the signs of congestion,—slightly impaired resonance, feeble breathing, and fine rales,—especially at the lower part of the chest, and here and there harsh respiration; but signs of consolidation do

not occur in the majority of the cases. Another point was observed in so many instances as to make a strong impression. When consolidation does take place, it is apt to be localized in small areas and

CHART III.




not to be general; moreover, whether it be lobular or lobar, it happens gradually. It may be days before the part of the lung affected gives evidence of hardening; it may be days before you can find dulness and tubular breathing. In a case which I am now seeing in consultation, there was heard for four days crepitation at one point before decided dulness and bronchial breathing occurred. A lobar pneumonia of the lower part of the left lung slowly developed, and, as it was disappearing, a pneumonia of the right lung followed. There is then merely congestion, or a congestion which for some time precedes a slowly-forming consolidation, if indeed this take place at all. Occasionally a widely-diffused bronchitis coexists; or there are shifting spots of feeble breathing and impaired resonance indicating collapse of the lung. There is often more or less attendant pleurisy,—in rare instances with the signs of effusion. This sums up the chest-signs; but I may remark that when once lobar consolidation occurs, though it may be slow, it manifests the same spreading tendency as in ordinary pneumonia.

Let us look at the course of the disease when once developed, and at its tendencies. The course is generally a rapid one, and convalescence very slow. The tendencies shown are to pulmonary œdema and to cardiac asthenia. The former, when fully developed, makes

a frightful complication, and one that you will learn to fear more than any other. The breathing becomes much labored, the face anxious and coarsely flushed, the lips livid, the blue finger-nails tell the story of the ill-oxygenated blood. Rales are heard all over the chest, obscuring the breath-sounds, and are so noisy that you notice the rattle before you place your ear to the chest. It is spreading bronchial catarrh; but this is not all. It is indeed chiefly an œdematous condition of the finer tubes and of the lung-structure; and, if the patient retain the power to expectorate, you do not see a thickened or more blood-streaked sputum, but often expectoration distinctly thinner. Now, this state of things may come on whether we have merely the congested lungs of influenza, or congestion with spots of catarrhal pneumonia, or lobar pneumonia. But it is in the two former that I have oftener met with it. Let me add that I have known the condition described to start in a small corner of the lower part of one lung in an adult of splendid frame, and in twenty-four hours to spread over both lungs and soon afterwards lead to fatal results.

The tendency to cardiac asthenia in influenza is always pronounced, and grave pulmonary disorder develops it still more. The heart as this advances is easily disturbed and apt to be irregular, and, to use that much-abused word, heart-failure becomes a threatening reality. In our management of the case we must, as I shall show you presently, bear this cardiac weakness always in mind.

I shall now tell you the particulars of a case in the wards that proved recently fatal from syncope during an attempt to raise himself in bed to use a bed-pan. You may also learn from the autopsy the truth of the statements I have been making to you as to the condition of the lungs and heart. There was, as you will see, with the intense congestion, but one small spot of consolidation. The right heart was dilated and contained a large ante-mortem clot.

CASE IV.—*Influenza; Congestion with Incipient Catarrhal Pneumonia; Death from Heart-Clot; Autopsy.*—Geo. S., a laborer, twenty-five years of age, born in Ireland, was admitted January 4, 1892. The family and personal history were good; for the first time in his life he was obliged a fortnight previously to take to his bed with illness. The present disorder began with prostration and pains in his bones and with a cough. After remaining in bed for a few days, he felt better, and on going out was exposed to wet weather. He returned to bed, with cough and other symptoms aggravated. He had laryngeal affection and lost his voice for over a week. About three days before admission, he noticed a pain upon the right side of his chest which

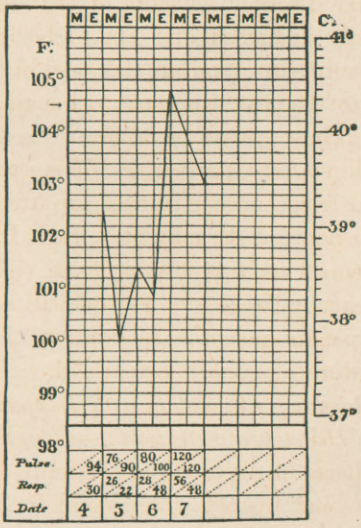
was increased by coughing. He had no appetite, the bowels were constipated, he was miserable and had continued fever.

The examination on admission showed a man of fine muscular development, weak and unable to speak above a whisper. He coughed considerably, expectorating a frothy mucus. The tongue was moist, heavily furred; the temperature was 102.6°, pulse 94, the respirations were 30. Upon percussion of the chest, slight impairment of resonance was noted to exist upon both sides posteriorly. The breathing was decidedly harsh throughout the lungs, with numerous scattered rales on both sides. The heart, liver, and spleen were normal.

The urine was acid in reaction, specific gravity 1028, turbid with urates and heavily albuminous; casts were numerous; narrow hyaline and epithelial cylinders, some renal epithelium, leucocytes, and blood-corpuscles, were seen.

He was ordered cinchonidine salicylate four grains every fourth hour, and a mixture containing ammonium chloride ten grains and

CHART IV.




ammonium carbonate five grains every second hour, and took chiefly milk as food, and some broth. (Chart IV.)

The following day he was better; but on the 6th of January, after sleeping well all night, he was noticed to get worse towards afternoon, when his temperature went up to 104.8°, with a weak pulse and oppressed breathing. The right lung was now deeply congested, especi-

ally at the back, with feeble breathing and fine rales, but no bronchial breathing or signs of consolidation were detected. His temperature was reduced by sponging. One-mimim doses of a one per cent. solution of nitro-glycerin were given every fifteen minutes, but had to be discontinued after the third dose, as his breathing became much more rapid and oppressed. On the following day he was in a very serious state; the breathing was rapid, the pulse weak. There was very marked pulmonary congestion, and on the right side posteriorly was found harsh respiration, with weakened vesicular murmur in certain places; and on percussion there was relatively greater dulness at these points. Under the use of tincture of strophanthus five minims every hour, begun at two o'clock P.M., he became easier; the temperature and pulse fell, and the respiration was more regular and less rapid. At eight P.M. he slept quietly, although the pulse remained very weak and rapid. Oxygen was administered by inhalation, commencing at five P.M., one gallon every fifteen minutes, but was discontinued, as the results were negative.

In the evening, at 9.30, while raising himself in bed in the endeavor to use the bed-pan, he suddenly expired.

The *autopsy*, made fifteen hours after death, showed a white clot, evidently ante-mortem, in the right side of the heart, extending from the auricle into the ventricle; the left side was empty and contracted. The muscular structure appeared normal to the eye.

Lungs: left not adherent, patches of emphysema in posterior part of the lower lobe, which was congested. There were spots of intense engorgement, one, as large as a silver dollar, wedge-shaped, sank in water; the other spots when thrown in water also showed increased density and deficiency of air, but did not sink. There were areas of non-crepitating pulmonary tissue which did not sink in water, but some parts of it showed more density than others did. These intensely-congested portions were especially towards the posterior part of the lung; but the whole lung was in a state of congestion. The right pleural cavity contained some serous effusion, and the surface of the lung was covered with a recent deposit of lymph. It was adherent to the diaphragm and also to the ribs, anteriorly and posteriorly, in the lower part of the chest. The same condition of intense congestion, with spots of engorgement of greater density, but which did not entirely sink in water, existed as in the opposite lung.

The kidneys were pale, not enlarged. Capsule thickened slightly and moderately adherent. No infarcts or cysts noted. Upon section, the kidney seemed normal. Other organs appeared healthy.

You will have been struck with the difference between these lung-

conditions of influenza and ordinary pneumonia. The question, indeed, forces itself upon the mind, "Are they the same disease?" "Has the influenza lung a distinct and separate cause?" "Shall we find the same pneumococcus?" I am unable to answer these questions as positively as I should like; but, for my own part, I consider the diseases different. I think, indeed, that we are wrong in combining the statistics of "influenza lungs" with those of true pneumonia; that we are wrong in basing our treatment upon the view of their identity; and that we are doubly wrong in deciding against the value of remedies which we have learned to depend upon in ordinary pneumonia, because they may fail us in the lung-disorders of influenza.

The condition of the lungs is that of general bronchial catarrh, with intense congestion principally at the back of the lungs, and more marked in one lung than in the other. There may be spots of greater density, in small wedge-shaped areas, from which the air has been almost entirely expelled, and which sink in water. This illustrates the passing of the congestion and bronchitis into broncho-pneumonia. But there are also cases in which there are found after death the appearances indicative of true croupous pneumonia. Therefore, while it may be said that the characteristic form is that in which intense congestion occurs, with patches of collapse, and with spots of localized consolidation here and there, if consolidation happen at all, yet there are instances in which real croupous pneumonia takes place involving considerable portions of the lungs. But these are comparatively rare; and true lobar pneumonia is not nearly so characteristic of the influenza lung as is the other form.

The question is, how does all this arise? In the absence of positive knowledge about the micro-organisms which are most likely the cause of influenza, we can only surmise that the lung-affection is the result of direct irritation of the finer bronchial tubes and the lung-structure by the irritating agents causing the influenza, or which they generate. The congestion that is produced may continue as such, or it may slowly pass into peribronchial hepatization and into points of secondary consolidation. It would appear, therefore, that the irritating cause first gives rise to fine bronchial catarrh and congestion of the lungs. Contrary to the view of the local irritation by the disease-poison, is the view that the lung-congestions originate through the nervous system, especially through the disordering effects of the poison upon the pneumogastric nerve. But this is as yet a purely theoretical consideration, with less in its favor than the former view.

As regards the *micrococcus* that is detected in the lungs, I caused

in the epidemic of two years ago some observations to be made in my cases, and we found the ordinary pneumococcus of pneumonia in the pneumonic lungs of influenza. Dr. Fisher, our pathologist, has this year repeated these researches, and in sections of lung stained by the method of Gram and triple-stained with picro-carminate of lithium, according to the method of Orth, has demonstrated numerous small cocci and diplococci, and great numbers of short, rather thick bacilli, the nature of which he has not fully determined. It is, therefore, evident that if even there be other micro-organisms in these influenza lungs of a kind still unsettled and possibly pathognomonic, there are also in it the ordinary ones of croupous pneumonia. The anatomical lesions where the consolidation is marked are those present in croupous pneumonia,—namely, air-vesicles loaded with large round epithelioid cells enclosed in a delicate fibroid reticulum and distended capillaries. We find, then, the same lesions as in pneumonia, only they are far from invariable in the influenza lung, and there may be other and more constant elements present which have still eluded research. There can be no question that there is a connection between influenza and pneumonia. But what it is is uncertain, and the more I study the question the more certain I am that the poison most generally acts without producing the hepatization characteristic of croupous pneumonia, and expends itself in general congestion, with only a slight tendency to consolidation.

The *diagnosis* is generally easy. The onset of the symptoms, the character of the fever, the fact that the disease does not pursue a frank course, the great tendency to pulmonary congestion, the slow and often imperfect lung-consolidation, usually suffice to make the diagnosis clear. Only in one case of persistent fever, with fine rales through the chest, and much respiratory distress, was there any doubt about the cause. The fever was extremely high, remaining at about 105° for the week the patient was in the hospital; the lung-condition was nowhere one of consolidation. He died, and we found miliary tuberculosis. Whether this followed an attack of influenza or not, I cannot say. He was a young man, and, apparently, had had good health until influenza came on, which was, he stated, scarcely two weeks before his admission into the hospital. The persistent high temperature, so unusual in catarrhal fever, even with pulmonary complications, was throughout regarded with much suspicion.

In cases in which marked consolidation happens, it may not, in individual instances, be possible to distinguish them from ordinary cases of croupous pneumonia, such as are met with at all times. But generally there is little difficulty. The sputum, of pure blood or frothy,

and not characteristically rusty, the slowly-forming consolidation, the pain in the bones and the other symptoms of influenza, the early occurrence of albuminous urine, often with tube-casts, the general depression from the onset, indicate a peculiar type of malady. That you may learn something of this pneumonia associated with influenza, I will present you the records of a case recently in the ward, and show you the post-mortem results.

CASE V.—*Croupous Pneumonia following Influenza; Delirium; Death from Pulmonary Œdema; Autopsy.*—Wm. U., a German newsman, a large, red-faced man, with soft muscles, thirty-four years of age, was admitted December 28, 1891. His family history and personal history were good; he had never been sick before, and was not intemperate. Nine days before admission he was taken ill with pain in the back, headache, muscular soreness in the legs, and general prostration, with more or less cough. He did not go to bed at once; but on the 24th he became worse, and the expectoration contained blood. On the 27th he experienced pain in the right side, in the shoulder, and about the nipple. The blood-stained expectoration continued until the morning of admission, but was after this not constant.

The examination on admission to the hospital showed the tongue much coated in the centre, but clean at the edge. He complained of pain in the right chest upon moving or coughing. About the angle of the right scapula there was impairment of resonance, and tubular breathing extended downward from this point, but not as far forward as the axillary line. The voice-sounds were well transmitted in this area. No evidence of consolidation was observed in the front of the right chest nor in the left lung. A few friction rales were heard in the right axilla, and some sibilant rales in both sides of the chest. The heart-sounds were normal, and the liver and spleen were not enlarged. The temperature was 102°, the pulse 108, the respirations were 34. The urine was acid, its specific gravity 1028; it was turbid, with an excess of urates, contained a moderate amount of albumen, and a few casts.

The following day he was much the same; the cough was not excessive, and he felt less pain. The expectoration was free and blood-tinged; but on the 30th the dyspnœa increased and numerous fine rales in the chest were heard. The pulse was 120, weak and jerky; the face and lips were livid. His treatment consisted in ten-grain doses each of carbonate and of muriate of ammonium every second hour; in strychnine one-fortieth of a grain three times daily, which was stopped on the 30th; and in eighteen grains of quinine daily. He was dry-cupped on the 29th, and took half an ounce of whiskey

every fourth hour. On the 30th he got oxygen two gallons every half-hour, whiskey every second hour, and ten minims of digitalis every fourth hour, the quinine and ammonium being continued. In the afternoon wet cups were applied and about ten ounces of blood drawn, with evident relief, the pulse falling from 140 to 112, and the respirations from 48 to 38. The temperature, however, was not reduced; in fact, was half a degree higher than on the night previous. After this he became delirious and passed a sleepless night, although not troubled with cough. The breathing gradually increased in frequency, and was labored, as if the lungs were growing more congested. The pulse was weak and small, and increasingly rapid. Marked cyanosis occurred about three o'clock in the afternoon, and, in spite of hypodermic injections of strychnine and inhalations of oxygen, he died three hours later. Oxygen was freely used in this case,—almost continuously towards the last,—but not the slightest beneficial effect could be noticed.

The autopsy showed recent pleuritic adhesions and lymph in both lungs, but principally in the right. They were heavily congested, especially posteriorly; considerable portions of the right lower lobe showed red hepatization and sank in water. The pericardium contained some effusion, one ounce; heart smooth; there was considerable fatty deposit on right ventricle, and chicken-fat clot in right cavities. The left side of the heart was contracted and empty; the right was dilated. The valves were normal and competent. Liver large; weight, five and a quarter pounds; on section, the structure appeared healthy. There were small concretions in gall-bladder. Spleen appeared rather long; the capsule was adherent, and the substance soft; its weight was ten ounces. The kidneys were large and rather flabby, but nothing unsound was detected upon microscopic examination. The intestines were normal.

With reference to *prognosis*, the following report of cases made by Dr. M. B. Miller, our resident physician, may interest you. We have had in the last few weeks in the male medical wards forty cases of influenza; twenty-eight of these were affected simply with slight pulmonary complications, such as bronchial or laryngo-bronchial catarrh, and all recovered. In ten the grave complications existed to which I have called your attention. In two rheumatic symptoms were mixed with the influenza, and there were slight pulmonary symptoms. The prognosis is certainly not so favorable when marked lung-involvement exists as in ordinary pneumonia. Those which present symptoms of œdema of the lungs are particularly in danger. In the ten cases with extreme congestion, or with this and pneumonia, œdema was present in six, and five of these were fatal cases. This shows you how fright-

ful this complication is, and how much it is to be dreaded. Next to the œdematous lungs, the cases with croupous pneumonia, if at all extensive, give the least favorable prognosis.

The *treatment* of the lung-conditions in influenza I have indicated in the course of the clinical histories detailed to you. It has consisted chiefly in the administration of large doses of salts of ammonium, with quinine, with most carefully sustained nutrition, and in many cases with digitalis and with stimulants. What you must always look to most closely is to keep the heart as quiet and as steady as possible. You must insist upon absolute rest. I am rigid about this. I could tell you of a case seen in private practice of a gentleman suffering from the pneumonia of influenza, who got up in bed to expectorate, and whose pulse, from an effort seemingly so slight, became extremely feeble, and great danger of heart-exhaustion was manifest. I will not even allow those who have these influenza lungs to rise to take their medicine; they are made to take it through a tube. It is needless to say more on the subject when you yourselves have seen a case prove fatal here (Case IV.) in raising himself to use a bed-pan.

Looking after the heart and the circulation being of great importance, we naturally think of such agents as digitalis and strophanthus. Digitalis is a remedy which is often used in a routine manner and much abused. Nevertheless, I think it of extreme value. It helps us to strengthen the right heart as much as the left, and that is often what we most want. Its action must, however, be closely watched. Its employ requires skill and watchfulness, and an adaptation of the dose to each patient. I always stop it as soon as the pulse goes down in the eighties or shows the least tension. But I have seen so often the irregularity of the pulse disappear and a general improvement take place under its use that I do not allow myself to be deterred from employing it by theoretical considerations. Strophanthus I have sometimes resorted to where digitalis did not seem well borne. And I have also in many a case used strychnine, about one-fortieth of a grain, every fourth hour, sometimes alternating with digitalis, sometimes alone. It is slower in its action than digitalis, and I think, on the whole, not its equal. But as an adjunct to treatment, and to help the cases in which the heart is flagging, it is very valuable; and it is an admirable tonic to continue with after the acute strain is over. In all cases in elderly people with atheromatous vessels it is a safer remedy than digitalis. I have, indeed, known an instance in which this used freely so increased the arterial tension that the brittle vessels gave way and an extensive cerebral apoplexy resulted.

We ask ourselves, naturally, if we possess any remedies that will control the extensive congestion and prevent its passing into lung-consolidation. I have been concerned in cases in which iodide of potassium was freely used, but with disappointing effect. Iodide of ammonium is, I think, worthy of larger trial. I have read of tincture of iron being tried, but I have had no experience with it. The most valuable agent I know of, the one always applicable except in instances of great prostration, is extensive dry-cupping. It is wonderful what relief it affords, and I believe it has an influence on the congested lungs themselves; nor does it fail to be of some service even where the lung-tissue is hepatized. The usual counter-irritants, mustard and turpentine, may be employed. Of other local means I cannot speak favorably, especially of poulticing and the wrapping in huge layers of wool or cotton. The patient is rendered thereby hot and uncomfortable to an extraordinary degree, it is impossible to learn what is going on within his chest without disturbing him greatly, and there is not the slightest influence exerted on the disease itself. Only in instances with pleurisy or in lingering consolidations would I recommend the use of poultices.

The congested appearance of the patient, the tendency to cyanosis, the evident obstruction of the circulation, and the distention of the right heart, suggest the abstraction of blood. We bled a stalwart German (W. L., Bed xii.) whose lungs were deeply congested on admission, and who developed a right apex pneumonia with much delirium; we bled him on the fifth day of the disease, when he began to be cyanosed, taking by wet cups, by which we got but little blood, and then by the lancet, twenty-three ounces of blood. There was relief to his breathing, but the fatal result was not averted. In another case, also in a large, broad-chested man, that I saw in consultation, wet cups were made use of early and freely: though here too there was some relief, the disease went on to gray hepatization, with a fatal issue. On the whole, we may get from bleeding some amelioration of the symptoms, but will be disappointed in any influence on the disease.

I must say the same of oxygen. Everything points to its applicability as a therapeutic means; yet I have witnessed but little real effect from it on these pulmonary affections of influenza. In the case just referred to that we bled from the arm, we subsequently administered oxygen, two gallons every hour, and finally continuously. Only in two cases did I think it so beneficial that I believed it to have contributed to the recovery. One of these was the case of a middle-aged lady seen with Dr. J. G. Allen. In the many in which I have used it, here and

elsewhere, or advised its use, it was only palliative and rather agreeable, but had no influence whatever on the result. Indeed, in the three worst cases of influenza with pneumonic consolidation, one catarrhal and the other two lobar pneumonia, in which recovery took place, seen lately in private practice, and all in elderly people, oxygen was not used at all.

While discussing the value of remedies tested in this epidemic in the school of experience, I will tell you that I have also tried ergot and atropine. I have done this in cases with much congestion, and in cases also where this existed passing into either form of pneumonia and showing a tendency to spreading and to œdematous effusion. I am sorry to add that neither made any decided impression. They certainly did not give as good results as the large doses of ammonium, the watchful employ of digitalis and strychnine, the dry-cupping, and the free use of stimulus when indicated. Let me say, with reference to the latter, that I have treated many a case without it, or with but very little stimulus. The case of the Italian whom I first presented to you (Case I.) may be cited as proof. On the other hand, I have often used it very freely, giving six drachms of whiskey every hour for several days in cases that terminated favorably. In the influenza lungs complicated with lobar pneumonia, free stimulation has seemed to me especially beneficial.

To one more remedy I will call your attention,—to nitro-glycerin. Seeing so many cases in this epidemic with lungs seriously congested made us reflect on the agents we possess to affect the circulation. Nitro-glycerin came naturally to mind, and, moreover, on beginning to use it systematically, I remembered an excellent paper of Dr. Andrew H. Smith, in the *American Journal of the Medical Sciences* for October, 1890, advocating its administration. I tried it in a number of instances, and I certainly think that where the element of congestion was marked it was of benefit. We generally gave one drop of a one-per-cent. solution every fifteen minutes for six doses, then at intervals of three hours; in most of the cases observed we also employed strophanthus rather than digitalis to steady the heart. The effect of the nitro-glycerin was to dilate the vessels and to cause an easier flow of the blood. It seemed as if the arteries had emptied themselves into the superficial veins, and in one case the veins of the whole surface of the body became greatly swollen, while the breathing was distinctly easier, the face very flushed, and the pupils dilated. I have not used this treatment with nitro-glycerin, or nitro-glycerin at the same time that strophanthus is directed, long enough to have

formed a definite opinion as to its really curative powers, but I have seen enough of it to think it worthy of a fuller trial.

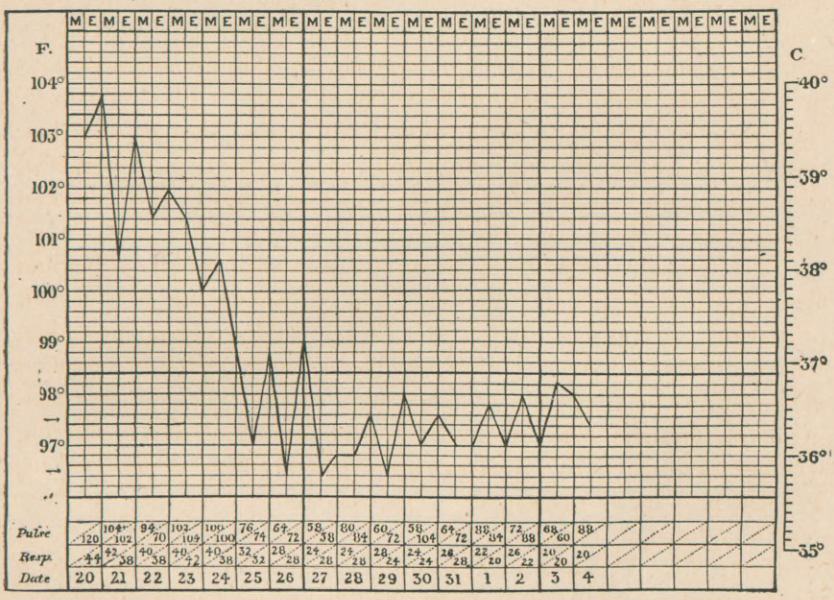
When reviewing the symptoms, I told you particularly of the sleeplessness and the delirium that are apt to be prominent features. The remedies on which I have most learned to depend are paraldehyde, sulphonal, and hyoscine. Paraldehyde is excellent, but its unpleasant taste makes it less available than it would be otherwise. Hyoscine I have learned to value even more than sulphonal. We have used it a great deal in the cases here in the hospital in doses of one one-hundred-and-twentieth of a grain of the hydrobromate of hyoscine at night, which, in one case, was repeated the same night. I have seen it efficient in a case in private practice in a dose of even one two-hundredth of a grain. It is a safer remedy than chloral, which the tendency to cardiac weakness contra-indicates, but which would be otherwise very applicable. In a few instances we have used hypodermics of atropine and morphine, but not in many; indeed, morphine, on account of the lung-condition, is always a remedy to be avoided if possible. Sometimes a diffusible stimulant taken at night answers an admirable purpose, as in a case seen with Dr. George S. Gerhard, where a glass or two of champagne at night proved the best of anodynes. Let me say that, speaking generally, whatever influences the sleeplessness is beneficial to the delirium, but that the delirious cases are mostly also benefited by stimulus.

There remains for me to speak of the cases with rapidly-extending bronchitis and œdema. I wish I could say something to you that proved that we had much power over them,—that we can do more than I have already told you. Unfortunately, no one remedy is certain, and in these overwhelming cases we may stand at the bedside with a feeling of helplessness, with our trusted agents failing us, and wondering whether the teaching of all experience, all knowledge, has deserted us. Yet it is well never to despair. You may learn from this case that even in a desperate malady there are still chances.

Case VI.—*Influenza with Intense Congestion of the Lungs and a Slowly-Developing Apex Pneumonia; Œdema of the Lungs; Crisis and Rapid Recovery.*—Manuel G., twenty-six years of age, a Spanish cigar-maker, was admitted December 20, 1891, having been confined to his bed for three days previously. He had been affected with a cough, with mucous expectoration, for two weeks. On physical examination the face was seen to be flushed, the lips dry, and the tongue heavily coated, but moist. The temperature was 103°, the pulse 120; the respirations were 48, and labored. The lungs were congested posteriorly, many dry rales

being heard, as also some fine ones, with a few friction-sounds in the right axillary region. There was no consolidation and no tubular breathing. The urine was neutral, of specific gravity 1022, and clear; phosphates were found in excess, but no albumen. On the 23d the pulmonary congestion was very marked; not only was the upper lobe of the right lung engorged, but there was also some consolidation, with tubular breathing, and his whole condition was one of great gravity. He was delirious. The expectoration was slightly blood-tinged, thin and profuse. Fine rales appeared all over the chest; the breathing was extremely labored, the nails bluish. After dry-cupping the chest several times he was much relieved, but there was a struggle for life until the 24th, when the temperature fell steadily. At noon on the 25th it was 96.8°. (Chart V.) It did not subsequently rise above normal, and he

CHART V.




entered upon convalescence. His chief treatment consisted of chloride of ammonium and carbonate of ammonium, ten grains of each every second hour, and quinine three grains every fourth hour, for nearly two days, part of the 23d and on the 24th, without any effect on the pulmonary condition. From the 24th to his discharge on January 4, 1892, strychnine, beginning with one-fortieth of a grain every fourth hour, was advantageously employed, as was whiskey six drachms, which was

gradually increased to six drachms every second hour, a quantity he continued with from the 25th to the 28th. Ergot was tried in half-drachm doses of the fluid extract every fourth hour from the 21st to the 24th, without any effect; then atropine one one-hundred-and-twentieth of a grain was used three times daily. It, too, showed no result.

The recovery in this case was, I think, due to persistent dry-cupping, to the free administration of the ammonium salts, to quinine, to strychnine, to stimulants. This is also the treatment much used in the other conditions. But, after all, the states so merge into one another that they are phases of the same disease rather than essentially different morbid conditions. I have tried, indeed, to make it plain to you that the influenza lung has the essential element of marked congestion as its basis, and that it tends to fine bronchial catarrh, to pneumonia, mostly of the catarrhal kind, and to œdema, yet that these are not separate affections, but the outcome of the same general cause.