

PNEUMONIA AT CAMP GREENE: A FEW CONSIDERATIONS FROM A CLINICAL STANDPOINT*

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GENERAL

Pneumonia is by far the most important disease with which we have had to deal at the Base Hospital. The cases began to appear as soon as the institution was opened in September, 1917, but were comparatively few 'till about the middle of December. With the onset of the cold weather, however, they increased until by the end of April, when the cases ceased to come in, there had been admitted 427 cases of lobar pneumonia.

In looking back over our cases, a good many points appear which from a clinical point of view seem to me valuable, especially so, as it has been my good fortune to observe most of these cases.

Of the 427 cases, there were 34 of lobar pneumonia which appeared as a complication of measles. We have to consider them separately. The other 393 were primarily cases of lobar pneumonia sent in from their respective commands or from the regimental infirmaries. They were often referred with a correct diagnosis. At other times there was a variety of different diagnoses so that concentration of pneumonia cases in the wards was at first difficult. But when the diagnosis was established they were ultimately transferred to the pneumonia wards. A very few cases developed in the hospital consequent upon other diseases.

The cases as they appeared from September 'till the end of January did not differ from those one sees in young people in municipal hospitals. During December the cases began to show a tendency to involve more than one lobe. During February they seemed to assume a somewhat different character and were more severe. Besides the multiple lobe involvement, the patients were unusually pale, showed

no herpes labialis, had an increased pulse rate out of proportion to the ordinary cases, and in general they seemed to be in a more or less typhoid state.

HISTORY

In practically all cases there was obtained a history of cold in the head or chest or exposure to cold from a few days to a week before the onset of the disease. The most fruitful source of admission was the rifle range located about thirteen miles from the camp. Following any cold weather new cases were admitted from there.

ONSET

More than half the cases gave a history of onset with a chill and pain in the side. Localization of the pain is important and in a good many cases we watched the area of pain for signs of consolidation which appeared a few days later.

A good many cases did not begin with a chill, but had pain in the side with cough and expectoration. Of these cases there were first the very mild ones, and second some of those appearing during February with more of a typhoid state.

A considerable number had their onset with symptoms of meningeal irritation. They complained of headache, were stuporous, had stiff necks and a Kernig sign. These cases were usually sent in with the diagnosis of meningitis and the necessity of confirming or disproving this promptly led us to tap the spinal canal. The spinal fluid obtained, however, was clear, showed no cell increase, but was under plus pressure. Usually the meningeal symptoms improved with the puncture, but at times they persisted for more than twenty-four hours. Without spinal puncture in these instances it would have been impossible to decide whether or not they were cases of epidemic meningitis. None showed at this stage any signs in the chest, but in a few we were able, after making them cough repeatedly, to obtain rusty sputum and thus save ourselves and the patient the spinal puncture.

Quite a number were first admitted to the surgical service with a diagnosis of appendicitis. These showed the typical localization of pain and tenderness over McBurney's point and were at first rather difficult to differentiate. The points that

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serve us best were: first, repeated and careful examination of the chest; second, the height of the temperature, which in most of these cases was above 103° F.; and third, when obtainable, rusty sputum. That mistake in diagnosis in such conditions is not made only by the novice can be seen from the following. A very distinguished surgeon visiting Camp Greene happened to see a case at one of the regiments and sent the man to the hospital with the diagnosis of acute appendicitis. The Officer of the Day who received the case obtained rusty sputum on making the patient cough and sent the man to the pneumonia ward. Next day all the signs of pneumonia appeared.

SIGNS

The most characteristic and an almost pathognomonic sign is sticky and rusty sputum. It was often the earliest sign. In cases where the physical signs might have been interpreted as either consolidation or fluid, the presence of rusty sputum often led us at once in the right direction and has never failed us. Another early sign was the increased rate of respiration. Of the local physical signs the order of appearance was as follows: (1) diminished breath sounds; (2) increased whispered voice; (3) dullness; (4) crepitant rales; and (5) bronchial breathing.

Of these signs, the most valuable was the increased whispered voice. It was often localized over a small circumscribed area, especially near the angle of the scapula or in the axilla and gave us the earliest indication of the localizing of the pneumonic process.

A good many showed on admission dullness over a lower lobe with diminished breath sounds. In such cases it was at first difficult to determine whether they were cases of pneumonia or pleurisy with effusion, especially when they gave no history of a chill, had no herpes and showed only a moderate dyspnea. Usually after making them cough repeatedly, upon auscultation, the characteristic increase in the whispered voice could be obtained over a localized area.

The dullness in pneumonia was usually moderate. Rarely was there complete flatness and the dullness usually stopped half an inch or so short of the vertebral

column, never reaching the median line; while the cases of fluid were nearly always flat on percussion over the vertebral column and the dullness usually crossed to the other side.

Bronchial breathing, we found, when indistinct or absent in a case of pneumonia, could frequently be brought out by making the patient cough repeatedly.

COURSE

We have had all kinds of variations, from the very mildest cases, lasting not more than three days, to the most severe. A few showed on admission to the wards all the physical signs of consolidation without any elevation of temperature. The signs then gradually disappeared. Evidently these had had a short pneumonia with the crisis before admission. The duration of fever in our cases was most commonly from five to eight days. We had a few lasting from ten to twelve days, and one case in which the temperature remained high for two weeks and then began a lytical descent on the fifteenth day. We suspected empyema and made several exploratory punctures without finding pus. The patient made a complete recovery and was sent back to duty.

The pulse was our best guide as to the condition of the patient. As long as it remained below 110 to 120, we felt fairly safe. A rapid pulse, one above 140, bespoke grave prognosis. During February we had a number of cases which were characterized by a rapid pulse, pale color instead of the flush which one notices ordinarily on the faces of pneumonia patients, a somewhat typhoid state and a tendency to involvement of both lungs. A good many of these recovered, but their course was usually long.

TREATMENT

As soon as pneumonia cases began to appear in the hospital, pneumococcus type determination was requested from the laboratory. This was ascertained by injecting the washed sputum into the peritoneal cavity of a mouse. The mouse was killed in eight to twelve hours and an emulsion of the organisms obtained from the peritoneal fluid of the mouse was tested for agglutination with standard sera of the various types. Unfortunately we had a fire on the morning of December

30 which completely destroyed our laboratory and x-ray rooms. Not willing to forego for our patients the benefit of the serum treatment, we used serum without any previous type determination in cases considered dangerously ill, in the hope that among those treated there would surely be many of pneumococcus Type I who would be benefited by it.

An intradermal skin test was first made to see if the patient was hypersensitive to horse serum. When positive he was desensitized, according to the method recommended by the Rockefeller Institute publication, before being treated intravenously. When negative he was at once given 150 c. c. of anti-pneumococcus serum intravenously. This was repeated two or three times at an interval of 8 to 12 hours, and if no benefit was noted the serum treatment was discontinued.

Altogether up 'till May 1 ninety-five cases were treated with serum. Of these, 22 cases were unquestionably benefited by it. Eighteen more cases showed improvement, but the improvement came at a time when we could not be sure that it was not due to the natural course of the disease. The other 55 cases showed no improvement. In those that were benefited the effect was characterized by a drop in temperature and by subsequent mild course or by early termination by crisis or lysis.

The rest of the treatment was mainly directed toward the nutrition and comfort of the patient. Digitalis and strychnine were given in moderate doses when thought necessary. When the weather permitted the pneumonia cases were kept on the porch running along the side of the ward. The nutrition being an important factor, we felt that as long as the patient could be coaxed to take nourishment, he was doing well. Emphasis was laid upon fluid ingestion and most nourishment was given in liquid form, milk and eggs serving as the principal constituents. Alcoholic stimulants were used only in small amounts as flavoring, never for physiological action. Morphine and codeine were given when necessary to control pain, cough or extreme restlessness, but with care to avoid doses larger than were required to accomplish the desired results. Sponges were given for excessive fever. Special attention of nurses was

directed to the care of the mouth. Carefully adjusted chest swathes were found efficient in most cases to relieve pain.

COMPLICATIONS

Empyema.—Of the complications the most important was empyema. We had besides the empyemas complicating lobar pneumonia, a great number of empyemas complicating the purulent bronchitis following measles, and some empyemas secondary to other infections. Up 'till March 1 we had:

1. Empyemas following broncho and lobar pneumonia after measles. Total cases, 14; deaths, 10; mortality, 71.4 %.

2. Empyema after measles without pneumonia. Total cases, 29; deaths, 18; mortality, 62 %.

3. Empyemas without measles or pneumonia. Total cases, 14; deaths, 4; mortality, 28.5%.

4. Among the 393 cases of primarily lobar pneumonia we had 45 cases of empyema, a percentage of 11.4. Of these cases 21 died, that is 46.6 % of the 45 cases.

As there was a good deal of similarity among these various empyemas, it is well to consider them together. Clinically they presented themselves in three varieties.

In the first class were the empyemas following our early cases of pneumonia. They were usually of a mild degree. There were only about half a dozen of these. They did not show very marked prostration. The pus was thick and creamy and showed in the aspirated diagnostic sample either no organisms or mixed pneumococci and streptococci.

In the second class were the cases of empyema in which the clinical picture was not so mild. Among these were cases which developed during or following the course of pneumonia or measles or were admitted as such. They were of various grades of severity. They presented on aspiration a brownish or milky-white, purulent, rather thin fluid, containing in a thin smear of the non-centrifuged specimen a moderate number of short-chain streptococci, which the laboratory classified as either hemolytic or viridans. Often the fluid was so clear that it was repeatedly aspirated before the case was sent to the surgical service. But in every case

where clear fluid showed the presence of organisms, and where we had hoped that operation could be avoided, the fluid eventually became purulent and drainage had to be resorted to.

In the third class we have to put the very severe cases. These often appeared after the pneumonia had subsided; they appeared also in the course of measles, bronchitis and in a few cases secondary to a tonsillitis or without any apparent cause. They presented a clinical picture totally unlike any other cases of empyema that the writer ever saw.

The onset was with a sudden sharp pain in the side or in the abdomen. The most striking cases were those after measles in which normal convalescence had seemed established and the patients were up and about the wards with normal temperatures. The pain was intense, the most intense I have ever seen, and in at least one case where the pain was in the abdomen we suspected acute peritonitis in addition, which, however, was not found at the autopsy. The face assumed a grayish color, was pinched and anxious, the pupils moderately dilated. The temperature rose promptly to 103 or 104°. The pulse was rapid, usually about 140 to 160. Breathing was shallow and rapid and the breath sounds on the affected side were diminished or absent. The prostration was extreme. Within four to six hours after the onset, fluid could be obtained on aspiration over the base of the lung. The fluid increased rapidly and in twelve to eighteen hours could be percussed above the angle of the scapula. Dyspnea and prostration were present; pulse rate increased to a marked degree; the pupils became completely dilated; the patient sweated profusely; and death often resulted within 24 to 48 hours.

The fluid was thin, of a brownish color, cloudy and contained in a thin smear a great number of short-chain streptococci, and practically amounted to a pure concentrated culture of streptococci. Our greatest mortality was among these cases, many of which were entirely too sick for a rib resection, so that repeated aspiration was resorted to. A few cases received anti-streptococcus serum intravenously, but without benefit. Most cases were operated upon and quite a few recovered.

From this it can be seen that empyema was the most serious condition we had to deal with.

A special problem occurred in those cases in which the pus had become encapsulated, either before or after rib resection. Of these encapsulations the most difficult to detect were collections of pus between the heart and the lung, which were practically inaccessible to diagnostic puncture. In other cases the pus was localized over an upper lobe anteriorly or had burrowed underneath the great vessels. In attempting to find pockets of pus, the presence of which was made probable because of fluctuations in temperature, the chief of the medical service, Major Palfrey, as well as myself, have come to the conclusion that the best and perhaps the only sign of value is the localized area of dullness obtained on careful percussion. The pus, when accessible to diagnosis at all, can be percussed out and then found with the aspirating needle. During January and February 'till the middle of March, that is, during the time of our greatest activity, we did not have the benefit of the x-ray laboratory, which had burned down on December 30. Of course the x-ray in these cases is of the greatest help.

We had several cases of bilateral empyema. One of our patients, who was operated upon on both sides, recovered. He is still convalescing in the hospital.

Drainage in practically all of these cases was performed by rib resection. Only the first few cases were done under general anesthesia. All the rest were operated upon under local anesthesia.

Pericarditis.—Among our 427 lobar pneumonias we had eight cases of pericarditis. Among these there were three cases of dry pericarditis that recovered. The rest were hemorrhagic or purulent, all containing short-chain streptococci. Pericarditis is among the most difficult complications to detect, as the stridor and the loud rales of pulmonary edema often hide the pericardial friction rub.

We had one case with acute endocarditis.

Hospital case No. 5161, age 26, was admitted January 19, 1918, with lobar pneumonia of the left upper lobe. Temperature became normal on January 27. Pericardial friction rub heard February 6. Pericardium aspirated February 10.

On February 13, a diastolic murmur was first heard over the aortic area and a systolic murmur over the mitral area. The autopsy showed large vegetations on the aortic and mitral valves.

Peritonitis.—Of this complication we had five cases. All died. The organism obtained from the peritoneal cavity upon autopsy was a streptococcus and not a pneumococcus. Clinically the cases were characterized by the absence or lack of prominence of abdominal pain. The symptoms which called our attention to the peritoneal involvement were distention, stoppage of all bowel movement and of flatus, followed by persistent vomiting. In cases of distention not due to peritoneal inflammation, so frequently occurring in lobar pneumonia, there was no vomiting. The autopsy in these cases revealed a thin, purulent fluid in the peritoneal and pleural cavities. Thin smears showed the presence of organisms.

Meningitis.—We had three cases of pneumococcal meningitis complicating lobar pneumonia. The meningitis appeared relatively late in the course of the pneumonia, and was characterized by irregular pupils, stiff neck, a Kernig sign, and a stuporous and restless condition. The pneumococcus was recovered from the spinal fluid. In one case anti-pneumococcus serum was injected into the spinal canal, but without any benefit. All three cases died.

Other Complications.—We had two cases of pneumonia occurring two months or more after recovery from empyema. Both came to autopsy and we had a chance to view the end result of a cured empyema. It was not at all encouraging. The pleura was markedly thickened, densely adherent, and it astonished us all to see to what an extent the lung had shrunk.

Two cases were complicated during their convalescence by abscess of the abdominal wall. This was drained in each case and a pneumococcus was obtained from the pus.

Two cases were followed by suppurative parotitis, which necessitated drainage.

One case of pneumonia, which was complicated by one of the fulminating empyemas and which died within twenty-four hours after the onset of the empyema, showed several areas of gangrene in the lung.

We had one case complicated by gangrene of the right leg.

Hospital case No. 6487, age 23, was admitted February 10, 1918, with lobar pneumonia of the right middle lobe. February 18 consolidation appeared in the right upper lobe. February 21 signs of gangrene of the right leg were discovered, beginning about 10 cm. below the knee. The night before the patient had complained of very severe pain in his right leg. The same day there was noted a purulent otitis media on both sides. March 3 the right thigh was amputated just below the middle third. The stump healed promptly. Unfortunately, he developed a mastoiditis, which, in spite of operation on April 3, resulted in his death on April 9. The pathologist who examined the amputated limb was unable to determine whether the occlusion of the popliteal artery was due to a thrombosis of the vessel or to an embolus derived possibly from the pulmonary veins. Gangrene of the leg is an exceedingly rare complication of lobar pneumonia.

Recurrent Pneumonia.—Of special interest were the cases of recurrent pneumonia. The following three are examples:

Hospital case No. 4818, age 25, was admitted January 14, 1918, with lobar pneumonia of the left lower lobe. Temperature became normal on January 15 and remained normal till January 31. On the first of February he had a rise in temperature with consolidation of the right lower lobe, and on February 6 consolidation of the right upper lobe. Temperature became normal on February 15. February 18 he developed consolidation of the left upper lobe. This last consolidation was followed March 6 by signs of an abscess in the left upper lobe. Elastic tissue was found in the sputum. He died on March 14. No autopsy.

Hospital case No. 6702, age 19, was admitted February 13 with acute bronchitis. February 17 he developed signs of consolidation of the left lower lobe. Temperature dropped to 100° F. on February 19 and continued irregularly between 99 and 100° till March 1, while the left lower lobe was gradually clearing up. On March 2 he had a sudden rise of temperature to 104°, with signs of consolidation of the left upper lobe anteriorly. Temperature became normal on March 8, with the left upper lobe beginning to clear up. On March 10 he had a rise of temperature to 105° F., and the next day signs of consolidation of the right upper lobe. Crisis occurred on the 14th. Temperature was subnormal and in a few days became normal. Returned to duty.

Hospital case Nos. 6295 and 7406, age 20, had a chill on February 5, 1918, followed by fever and pain in the left side. Admitted February 7 with lobar pneumonia of the left upper lobe. Crisis on the 9th. Uneventful recovery. February 26, returned to duty in good condition. The same night he had a chill followed by fever and was readmitted to the hospital the next day, February 27, with signs of consolidation of the left lower lobe and part of the left upper lobe.

Temperature became normal on March 4 and remained normal. Discharged to convalescent camp on March 24.

Serum Sickness.—As a sequel of the serum treatment there occurred in about three-fourths of our cases the so-called serum sickness. It occurred anywhere from a few days to two weeks after the last dose was given, most often after eight to ten days. There was a slight rise of temperature, lasting for a few days, while at the same time there appeared urticarial wheals of varying intensity all over the body. The patient complained of headache, itching, and pain in the joints, often very marked. Of special note was the pain in the joints of the lower jaw and the inability to open the mouth, which, with varying degrees, occurred in practically all cases of this serum sickness. In one case this led the ward surgeon to suspect tetanus. The symptoms lasted from three to five days. The pain in the joints was relieved by acetyl salicylic acid, and the itching and urticaria could be relieved a good deal with adrenalin.

Pneumonia Following Measles.—We had 34 cases of lobar pneumonia following measles. Of these, 17 died, that is, 50 %. Contrast with these figures the mortality among the other cases of lobar pneumonia. Of the 394 cases, 68 died, that is, 17.2 %. Of the 34 cases mentioned above, 11 had empyema, four among which recovered. Here the problem was somewhat different. The course of events was as follows: The patient was admitted for measles and developed during the course the ordinary mild bronchitis accompanying measles. This gradually increased in severity, and after a time became purulent, involving every bronchus and bronchiole in both lungs. This was followed by consolidation of one or more lobes. Empyema complicated the pneumonia or occurred without the pneumonia.

The difficulty in these cases was the purulent bronchitis. The patients coughed up pure pus for days and weeks. They became intensely dyspneic, cyanotic, and exhausted from the coughing. The absorption of toxic products from the bronchi must have been enormous and certainly must have contributed to the severity of the disease. When consolidation of

a lobe supervened, this still increased the dyspnea and cyanosis and of course added to the severity. Often these consolidations were difficult to detect, as the sputum remained purulent and did not become rusty, and the stridorous breathing and numerous rales of pulmonary edema made it impossible to detect any bronchial breathing. As long as the patients coughed and brought up the purulent material there was still some hope for them, but as they became exhausted they gave up coughing and of course blocked all the air tubes in their lungs. The purely mechanical element, I believe, was a great factor in these cases.

On the autopsy table the lungs showed besides the consolidation, which was of the lobar type, all bronchi and bronchioles filled with a thick yellow pus, which could be squeezed out under the slightest pressure.

We were fortunate in not having more lobar pneumonia complicating the hundreds of cases of measles. The purulent bronchitis itself we considered much more dangerous than the average case of lobar pneumonia we had to deal with. A good many cases of purulent bronchitis came to autopsy without any signs of pneumonia. The mode of death seemed to be that of suffocation.

We have learned one thing and that is that it is practically impossible to recognize clinically whether these cases of purulent bronchitis are accompanied by broncho-pneumonia or not. Two cases of purulent bronchitis that died the same day had shown identical clinical pictures and had both been diagnosed broncho-pneumonia. At autopsy one showed areas of broncho-pneumonia in both lungs with the purulent bronchitis. The other showed the purulent bronchitis with not even the slightest trace of broncho-pneumonia.

In conclusion, I wish to say that I have tried to cover the important clinical points as they presented themselves to us in studying these 427 cases of lobar pneumonia. The lesson of these cases has been a valuable one for us in dealing with future epidemics.