

REPORT
OF THE
DIRECTOR OF THE HOSPITAL
TO THE
BOARD OF SCIENTIFIC DIRECTORS
OF THE
ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH

JANUARY 19, 1918

Volume VI January, 1918 - October, 1918

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REPORT OF THE WORK IN THE HOSPITAL.

Dr. Cole.

During the past quarter investigation has been largely handicapped owing to the fact that many of the workers have left to engage in army activities. Most of these men were ^{also} engaged in the actual care of patients, and with the opening of the pneumonia season it became evident that it would be necessary to obtain some kind of substitutes to carry on this part of the work. It also seemed of importance for us to instruct as many army medical officers as possible in the methods of serum treatment in pneumonia.

Consequently, acting upon the authority of the Board of Scientific Directors, I invited the Surgeon General of the Army to send to the hospital "a limited number of medical officers to assist in the treatment of patients with lobar pneumonia, in order that the officers could become thoroughly familiar with the methods of treatment employed." The Surgeon General has availed himself of this opportunity and up to the present time has detailed thirteen men to this hospital. They have remained here for from three to six weeks before being called to service elsewhere. Six to eight ^{of} these men have been resident in the hospital most of the time. It has been possible to give them a very satisfactory practical experience in the methods of etiologic diagnosis and serum treatment. An important part of the work has

been to teach them how to avoid serum reactions and to recognize them when they occur. Most of the officers sent have been capable young men and we feel that the plan has worked out satisfactorily, both for the hospital and the army. During the past quarter, 99 patients suffering from pneumonia have been treated in the hospital. This is a much larger number than we have ever treated before in the same time. Eighty of these patients were soldiers, twenty-three civilians. Most of the soldiers were from Camp Mills. This camp has now been practically abandoned. Consequently the number of soldiers being sent here has been greatly reduced and for a supply of material we are again depending upon civilian sources.

The results from the study of the pneumonia cases among the soldiers have been of interest as throwing light on the situation in the army camps where pneumonia is prevalent, but it is obvious that our experience has been much too meagre to permit any final conclusions to be drawn. Moreover, it has been impossible to study the cases in the same careful way that has previously been done. So far as pneumonia among the civilians is concerned, nothing striking was observed either in the clinical picture or in the relative frequency of infection with the different types of pneumococci. Of the 23 cases of pneumonia, 8 were due to Type I pneumococci, 6 to Type II, 3 to Type IIx, 2 to Type III, and 2 to Type IV. The relative number of Type IV cases is very small compared with our previous experience, but in this small

series of cases this might well be due to chance. In addition to these 21 cases, all of which were characteristically lobar pneumonia, there were two cases of pneumonia in adults which were associated with the presence of non-haemolytic streptococci and staphylococci respectively. The staphylococcus case died on the 7th day but no autopsy was obtained. The non-haemolytic streptococcus case recovered. Both of these cases occurred in previously healthy men 53 and 62 years of age respectively. In both cases the onset was fairly abrupt, though in neither instance was there a chill. In both of these cases the process in the lung may very well have been a broncho-pneumonia, though in the streptococcus case there was well marked consolidation at one base, with, however, numerous rales in the other lung.

Such cases, however, have not only occurred this year - there have been a few every year in our previous experience. In the absence of autopsy, it is frequently very difficult to differentiate such cases clinically from acute lobar pneumonia. The symptomatology may be quite similar and the physical signs may give no conclusive information, since the most marked involvement may be in one or more lobes, and on the other hand, in acute lobar pneumonia, there is not infrequently a complicating bronchitis in other parts of the lungs. The important fact is that these cases are not peculiar this year.

Among the cases in soldiers, 70 were due to pneumococci. Of these 26 were due to Type I, 5 to Type II, 16 to atypical Type II pneumococci, 1 to Type III, and 22 to Type IV pneumococci.

The only striking thing about this distribution of cases is the large number of cases due to atypical Type II pneumococci. These organisms, however, were distributed throughout the several sub-groups. Our experience, therefore, has not given any indication of an epidemic occurrence of pneumonia of any one type. In addition there were six cases of pneumonia due to streptococci and staphylococci. These, with the similar civilian cases, makes a strikingly large percentage of such cases in our experience for this quarter. Of these cases four were due to haemolytic streptococci and two were due to staphylococci. All of the streptococcus cases were associated with empyema and two of them died. An autopsy was obtained on one of these. The lungs in this case showed an irregularly distributed patchy pneumonic process, the areas bearing some relation to the bronchi, but the entire picture, however, not being a characteristic broncho-pneumonia. In certain places small areas were seen where the entire lung tissue failed to stain. In other words, there was beginning necrosis or abscess formation. It is evident that these cases should not be considered identical with acute lobar pneumonia. The two cases of staphylococcus infection of the lungs also died and autopsies were performed on both. In one case there was an irregularly distributed patchy pneumonia, largely in the peribronchial areas; no areas of necrosis or abscess

formation, however, were seen. The other also showed a diffuse purulent bronchitis and broncho-pneumonia.

Amongst the 76 cases of pneumonia among soldiers, therefore, there were 6 which should probably be considered as broncho-pneumonic in type.

During the time these patients were being sent to the hospital measles were prevalent in the camp, but since we did not desire to admit patients suffering from measles, an attempt was made on the part of the army officers to send us no patients that were suffering from measles or were in early convalescence. Nevertheless, three of the patients were found to have had measles very recently. Two of them had typical lobar pneumonia, one due to pneumococcus Type IV and one to an atypical Type II pneumococcus, the other case was one with a staphylococcus broncho-pneumonia, and this patient died.

This experience of pneumonia among soldiers, while not extensive, has afforded us some information which, taken in connection with the observations made by Dr. Stillman at Camp Wheeler and Dr. Dochez at Camp Bowie, and in the light of observations made by others in the army camps, is quite suggestive.

Early in November, learning from Major Weil that pneumonia was becoming prevalent in Camp Wheeler, I asked for and obtained permission from the Surgeon General to send Dr. Stillman there to make some observations. Accordingly, Dr. Stillman went to Camp Wheeler on November 10, but the conditions were not suitable

for making accurate studies; it was evident that the problem was a much more complex one than had been anticipated, and he therefore remained only a week. However, from the studies made there and from the study of the material he brought home with him, it has been possible to make etiologic diagnoses on a series of cases, though in the absence of clinical and post mortem studies, ^{these} observations are not of such great value as they would otherwise be.

Moreover, owing to technical difficulties, determinations were not completed on a considerable number of specimens obtained so that the figures do not represent the actual conditions in a continuous series of patients. The specimens of sputum studied were obtained from cases considered frank lobar pneumonia, the number of them that were convalescent from measles is not known.

Specimens of sputum were obtained from 98 cases of pneumonia. In these specimens pneumococci were isolated and the Type determined in 51 instances.

These pneumococci were distributed in the various groups as follows:

Type I	30	-	59%
" II	6	-	11
" IIx	2	-	3
" III	3	-	5
" IV	10	-	19

In this brief study no attention was paid to the occurrence of streptococcus pneumonia, and it is quite possible that a number of the cases suffered

from this form of infection.

On December 4 Capt. Dochez was ordered to Camp Bowie, Fort Worth, Texas, to assist in studying the pneumonia situation there. He was joined there by Dr. Jobling who brought with him one of the Red Cross laboratory cars. Dr Dochez's work consisted in determining the types of pneumococcus responsible for the lobar pneumonia prevailing in this camp, in trying out in the field the method devised by Dr. Avery for determining types of pneumococcus, and in introducing into the laboratory the methods of making such type determinations.

The Avery medium was shown to be satisfactory and the men in the laboratory were all instructed in its use.

Type determinations were made by Dr. Dochez on 78 cases of lobar pneumonia

as follows:

Type	No.	%
Type I	31	39.7
" II	0	0
" II (atyp.)	10	12.9
" III	2	2.5
" IV	35	44.8

The clinical diagnosis, however, was uncertain in some of these cases, and in 47 cases in which the clinical diagnosis was definitely established, over half were demonstrated to be due to Type I.

In addition to these cases there prevailed at the camp a large number of cases of broncho-pneumonia or cases of pneumonia running an atypical course. Many of them were associated with or followed measles, but in some no such association was present. Autopsies were performed on 27 such cases, and in 23 empyema was present. Bacteriological examinations of 16 fluids showed in 13 the presence of a haemolytic streptococcus.

It is obvious that all of our evidence is so far very fragmentary, as is also that obtained by Dr. Zinsser at Camp Wheeler, whose report I have had the opportunity of seeing.

It is quite certain, however, that in the camps where pneumonia is prevalent, at least two kinds of pulmonary infections exist; first, typical lobar pneumonia due to pneumococci of the various types, and second, an atypical or broncho-pneumonia due to streptococci and possibly also to pneumococci. In most of these camps measles is largely prevalent at the same time.

A number of points require immediate solution:

1. Is the occurrence of measles responsible for the great prevalence of both these forms of pulmonary infection or only of the broncho-pneumonia.
2. In the cases of pulmonary infection associated with measles is the infection autogenous or does infection from without play a rôle.

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3. Is contact infection of importance in the spread of acute lobar pneumonia in the camps or is exposure, with consequent autogenous infection, the chief factor.

In order that these questions may be solved, our experience, which I have related, indicates:

1. That all cases of acute pulmonary infection should receive an accurate clinical diagnosis. To make this possible a thorough clinical study and careful pathologic investigation of the cases ending fatally is necessary.

2. So far as possible the etiologic agent concerned in every case should be determined.

3. The association with measles or the absence of such association should be established in all cases of acute pulmonary disease.

When such knowledge (even in one camp) is obtained - epidemiologic studies to establish the association of cases of similar etiology with each other, the occurrence of healthy carriers of infection, etc., can be carried out with some hope of success.

It may be expected that so far as acute lobar pneumonia due to the specific types is concerned, its occurrence is largely independent of outside factors and that contact infection is of very great importance as it is in civilian life, though direct evidence should be obtained to establish this.

Treatment of Type I pneumonia with immune serum. The results in cases treated in the hospital and in cases under our immediate supervision continue to be excellent. In the hospital during the past quarter 29 cases have been treated and all have recovered but one. In most cases the effect of administration of the serum has been prompt and unmistakable.

In a number of the army camps treatment is being carried out, but in an unscientific and unsatisfactory manner. Until prompt and accurate clinical and etiologic diagnoses are generally made, the employment of serum in the army camps will not yield important information as to the value of this method. The conditions, however, are improving and it is hoped that during the winter such information may be obtained. So far the results reported to me have all been favorable, some of them brilliant, but most of them must be accepted with reserve.

Antipneumococcus Vaccination. Theoretically, vaccination against infection with Type I and Type II and possibly Type III pneumococci should yield favorable results. The preparation of the vaccine necessary to inject large numbers of men will be difficult. We have undertaken to establish the technique of antipneumococcus serum of various types. If a practical method is obtained for such manufacture and Capt. Austin has been ordered to the hospital to assist us and Miss Pauli has also been employed in this work. This work is progressing satisfactorily and considerable amounts of vaccine are now being prepared. Preliminary

inoculation of certain members of the staff have shown the vaccine to be more toxic than was expected. The method therefore will have to be modified before it can be extensively employed. It is hoped and believed that this can be done without destroying the effects.

New method for the determination of Types of pneumococcus present in sputum. The scarcity of mice has been a serious matter, as it has made the general application of the former method of etiologic diagnosis in pneumonia difficult. Dr. Avery has succeeded in devising a medium and a method which renders the use of mice unnecessary. The fact that pneumococcus grows very luxuriantly and rapidly in sugar containing medium, especially if blood be present, is made use of. A portion of sputum is added to a 1 per cent glucose broth containing 5 per cent of blood. In five hours the pneumococci have usually grown profusely while the other organisms present have not multiplied to any considerable extent. A small amount of bile is then added to dissolve the pneumococci present. The mixture is then centrifugalized to remove the other bacteria and cells, and the clear supernatant fluid then contains the dissolved pneumococci. When portions of this are added to samples of antipneumococcus serum of various types, if a precipitate is obtained with any of the sera it is known that the pneumococci are of the corresponding type. The method has proved

of great value and in most cases a diagnosis can be made more rapidly than by the older method.

Dr. Dernby has been working in the chemical laboratory determining the optimum hydrogen ion concentration and optimum salt content of medium for the growth of pneumococci. The preparation of a very favorable medium for the growth of these organisms is a practical and important matter. This work is still in progress.

Dr. Cohn.

At the request of the Naval Recruiting Station in New York, and of the British Recruiting Mission, I undertook to examine certain candidates for the U. S. Navy and for the British Royal Flying Corps. The men referred here are those who present difficulty in estimating the condition of the heart and circulation from the point of view of service. The men have been studied by a fixed method of physical examination and in addition by the X-ray and by the electrocardiograph. The latter method has been interesting in showing the degree to which the findings are useful in defining normality. I have found men, who would not under ordinary circumstances be rejected, but who showed electrocardiograms which would now be regarded as abnormal. The curves of these men are being collected for study. These findings should, if possible, later be reviewed in the light of the service these men have been able to render.

Stimulated also by the needs of the war we have worked out a new form of electrode for use in electrocardiography. The new form is much less cumbersome than the old one and consumes much less time in its care and in its adjustment.

In conjunction with Dr. R. A. Hatcher of Cornell University, we are making studies on the dosage of a preparation of the tincture of digitalis, designed for use in the army, in the hope that the new preparation may be substituted for the unsatisfactory preparations now in use. Our part of the work consists in comparing Dr. Hatcher's preparation with the one (digipuratum) we have used, in its effect on the electrocardiogram in normal individuals and in pneumonia. As the result of this study we should be able to give its dosage as precisely as we are now able to give that for digipuratum.

Dr. Allen.

Dr. Allen has continued the studies previously reported as in progress. These studies are being made on dogs and on a limited number of patients admitted for treatment and study.