Pneumococcus Pneumonia and Its Complications*

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The subject of this essay is pneumococcus pneumonia and its complications as seen in San Francisco over various periods of study from December 1932 to June 1946.

Pneumonia has been ever present in San Francisco though it has been of varying severity and etiology from year to year. Until the 1918 epidemic of influenza and the pneumonias which complicated it, pneumococcus pneumonia is said to have been much more common than in the years which followed the first world war. It is also said that the respiratory flora in the years following the first war was such that most of our serious respiratory infections were due to organisms other than the pneumococcus and many of them were largely concerned with the streptococcus. It was also believed that lobar pneumonia of pneumococcus origin was considerably less prevalent in California than in the Eastern United States and in the midwestern states. Since 1931, there has been a return to the usual varieties of pneumonia and it is apparent now the severity of the disease is essentially the same here as in other parts of the United States though the disease is still probably not as frequently encountered as on the eastern seaboard. Marked variations of morbidity and mortality may occur from year to year, as shown by the paucity of pneumonia in San Francisco during the most recent eleven month's period.

The purpose of this paper is to discuss pneumonia in this area over three widely separated periods starting in 1932. The first study was made at the San Francisco Hospital from December 1932 to June 1933. The tabulation of figures of this period with the figures of the complications, results of treatment, etc., will be followed by the description of a second period in which specific therapeutic agents were used, and which show improvement in the mortality rate; and the last period which shows results of more efficient therapeutic combinations.

In the early figures for 1932 and 1933 the general consideration is about as follows: The average age of this first group was 42 years. The eldest 77, the youngest 5. Males and females were affected in the ratio of 3 to 1. When one remembers this is a city hospital group, one must know that complicating disease was high

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and the commonest chronic ailment was circulatory disease as manifested by hypertension and congestive failure, coronary artery disease, and abnormal cardiac rhythms. Complicating factors were such things as syphilis, tuberculosis, malignancy, alcoholism, etc. With all of these factors taken into consideration, the mortality for the 1932-33 period was approximately 42 per cent. With those individuals who were unfortunate enough to have a positive blood culture on entry, the total mortality was 60 per cent; while of those who had negative blood cultures 19 per cent died.

For the period December 1932 to June 1933, during which time 250 individuals with pneumonia were seen, empyema occurred 7 times with 4 dead and 3 recovered. Pericarditis occurred 5 times, 3 died and 2 recovered. Two of these who died with pericarditis, also had empyema. Pleural effusion without empyema occurred on 31 occasions. On 2 of these occasions, streptococcus was found in the pleural fluid and in the remainder the pleural fluid was sterile. Of these individuals, 9 or approximately 29 per cent died and 22 or 71 per cent survived. Known endocarditis occurred in only 1 of this group of 250 and that individual died; while meningitis occurred 4 times with 4 dead, in each instance due to pneumococcus type IV. Lung abscess occurred 4 times, 2 of these individuals died and 2 recovered. One of these with lung abscess who died also had empyema. Thus it will be seen that there were 52 complications in 49 patients,—that is approximately 20 per cent of the patients in this early series showed complications of a serious nature.

The treatment of this first group was confined to nursing, oxygen, increased fluid intake, the use of alcohol in those chronically addicted to its use, and in a small number specific antiserum was used; and in those individuals who had serious abdominal distention, an increased amount of sodium chloride was used to combat this complication.

The second group of cases comprises 250 patients with pneumococcus pneumonia seen in the same hospital in the 2 years from July 1943 to July 1945. The age range and complicating disease was approximately the same as in the earlier group. It is interesting that in this group those with negative blood cultures had a mortality rate of approximately 11 per cent, while those with positive blood cultures had a mortality rate of 42 per cent. Total mortality rate for the two years was approximately 16 per cent, the total rate being 26 per cent in 1943-44 and 13 per cent in 1944-45.

The treatment of this group in addition to the routine noted above, consisted in sulfadiazine which was used in 70 per cent of the individuals treated and sulfamerazine in 18 per cent, and a few patients only were treated with sulfathiazole. All of these sulfa
drugs were used in the routine fashion with an initial dose of 4 grams followed by 1 gram every four hours of sulfadiazine and 1 gram every 8 hours in the case of sulfamerazine. Those patients who appeared to be in serious condition were given the sodium salt of the sulfa drug in initial dose of 5 grams in 1,000 cc. of lactated Ringer's solution. In addition to this, due to high mortality rate of type VII those individuals with positive blood cultures of type VII were likewise given rabbit serum in doses of about 200-300,000 units.

This group showed 41 complications as previously listed or a really higher rate of complications than in the group of 1932-33; empyema heading the list with 13 cases with 3 deaths or an empyema mortality of 23 per cent compared to the higher mortality of 57 per cent in 1932-33. Let it be pointed out here that the number of cases involved is far too small from which to draw accurate conclusions. All those individuals with endocarditis and lung abscess died. These, of course, remain the most serious complications of pneumococcus infection. In the second period, 1943-45, 16 deaths were attributable to what we choose to call “peripheral vascular collapse.” This cause of death was not listed in our earlier figures, due to failure of classifying deaths in this category. In the 1943-45 period 18 individuals were seen who, we felt, were in this category, and all but 2 died, or 89 per cent.

When this study was undertaken, it was thought that for the period July 1945 to June 1946 we would have commensurate figures to present, but the year failed to produce a great number of pneumonias so that for this last period, 1945-46 we have only 45 pneumococcus pneumonias to report. In addition to there being but few cases on our service this year, the pneumococcus pneumonias were also quite mild, there being only 4 deaths among the 45 patients or a mortality of about 9.5 per cent. As further evidence of the mildness of the infections, only 18 had positive blood cultures or a positive blood culture rate of 40 per cent, but 3 of the 4 deaths recorded were among those with positive blood cultures, the positive blood culture mortality thus being 16 per cent, or the lowest positive blood culture mortality rate which we have recorded. Let it be again noted that the numbers are too small for accurate statistical data. Of those individuals who failed to show a positive blood culture only one died, and that one was moribund on arrival on the ward.

The complications, including so-called peripheral vascular collapse numbered only 12 or about 28 per cent, but queerly enough among the patients with complications, only one person died, and he was the single one who had peripheral vascular collapse. None of the 5 persons with empyema, the 5 with pleural effusion, or the
1 person with lung abscess died. In this last eleven months there was no case of either meningitis or endocarditis. One individual who had a positive blood culture with type VIII pneumococcus, and who also had an empyema was treated with sulfadiazine, penicillin, and rabbit antiserum, and survived.

It seems almost without purpose to break down further the figures of the last eleven months, since the cases are too few for accurate statistics, yet it may be mentioned that of the 18 persons treated with sulfadiazine or sulfamerazine alone, none died. Obviously they responded well to this drug, or in these days they would have had further help from both penicillin and/or serum. We believe it should also be mentioned that those persons seriously ill were treated with sulfonamides and/or penicillin. Twelve persons were treated with penicillin alone and two died, both of whom were moribund on entry to the ward; one being unconscious on entry, living only 7½ hours and the other, aged 63 with a leucocyte count of 4,600 per c.m.m. lived less than 48 hours. Fifteen persons seriously ill were treated with both penicillin and sulfadiazine, 2 of whom died, both having positive blood cultures and one having had several ribs broken before entry, and both of whom were seriously alcoholic and developing delirium tremens in the hospital. The person with the broken ribs survived eleven days. Any recital of statistics on pneumonia is useless unless some conclusions may be drawn, as to the cause of the variation in the figures presented.

All of the patients presented in these three groups, as well as all of those seen in the interim years not reported had certain basic therapeutic procedures used upon them. These consisted of bed rest, nursing care, fluids orally or parenterally, liquid of soft diet, alcohol when indicated, sedatives and drugs for relief of pleural pain, surgical relief for collections of fluid in the chest, salt restoration and whatever drugs were indicated for the cardiac conditions arising during the disease or present on entry.

In the early years the use of specific serum was a factor in the treatment, but not a great one with us even though the mortality rate was somewhat lowered by its use.

In the years after 1938 sulfonamides were used almost universally, with definite reduction in the mortality rate, but not until 1942 were they used in all cases, so that the 1943-45 period was a good one in which to estimate the mortality rate with this therapy; and of course, this was with a great reduction from the earlier years. It is our impression, that the use of these drugs alone is responsible for the saving of many lives in this disease and even though the rate of complication is not lowered by the use of these drugs the mortality from complications is lowered.
It is also our impression that if sufficient dosage of these drugs can be maintained over a sufficient length of time, certain of the complications such as pneumococcus meningitis which were almost hopeless before the advent of the sulfonamides may be favorably influenced, while the combination of sulfa drugs and penicillin together, wisely used, may also prevent some of the serious complications or at least make them less serious.

Our present ability to go directly to the seat of trouble in empyema or meningitis with such a potent drug as penicillin was the dream of our forbears, and only since the advent of penicillin is this possible. Three of the empyemas seen in 1945-46 (total seen, 5 in number) were treated by the closed method, i.e., by tapping one or more times and instilling penicillin directly into the chest cavity in doses of from 50,000 to 100,000 units, and in each instance cessation of the empyematous condition resulted. Recurrent drainage by needle or trocar was all that was necessary in 2 other cases.

Pleural effusion, which may or may not have resulted in empyema under earlier conditions, so-called rather than empyema because of failure of growth of organisms from the chest fluid, was present 5 times and treated with instillation of penicillin 3 times, with cure on two occasions without further treatment, and with further drainage in one instance. On two other occasions, small amounts of pleural fluid were evacuated without the necessity of further tapping, as the fluid was sterile on culture and did not recur.

SUMMARY

1) Statistics on a relatively small number of cases of pneumococcus pneumonia in San Francisco have been presented. While our statistical data are small, it is in accord with the figures presented in larger series.

2) There has been a constant reduction in mortality rate consistent with the introduction of newer therapeutic agents.

3) Complications may be less and certainly the consequences of complications are less severe with the employment of the newer drugs.

4) The high mortality rate formerly accompanying the positive blood culture have been drastically reduced by the use of these newer drugs.

5) We must not overlook the fact that marked variations in the severity of infection and variation in morbidity influence the statistics in pneumococcus pneumonia to a large extent.

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RESUMEN

1) Se han presentado datos estadísticos sobre un número relativamente pequeño de casos de neumonía neumocócica en San Francisco. Nuestros datos estadísticos, aunque son pocos, están de acuerdo con las cifras presentadas en series más amplias.

2) Ha tenido lugar una reducción constante en la mortalidad, consistente con la introducción de agentes terapéuticos más modernos.

3) Puede haber menos complicaciones e, indudablemente, las consecuencias de estas complicaciones son menos graves cuando se emplean las drogas más modernas.

4) La alta mortalidad que antes acompañaba a los casos en los que el cultivo de la sangre era positivo ha sido reducida en extremo con el uso de estas nuevas drogas.

5) No debemos pasar por alto el hecho de que marcadas variaciones en la gravedad de la infección y variación en la morbidad influyen en sumo grado los datos estadísticos referentes a la neumonía neumocócica.