Pneumonia Problems in Washington

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Pneumonia is an acute inflammation of the parenchyma of the lung and may be either lobar, bronchial, interstitial or combined in form. The traditional distinction has been between lobar pneumonia and broncho pneumonia. However, the etiologic diagnosis is much more important, since the intelligent treatment of a patient depends on it.

Most of the lobar variety and about one-half of the bronchial variety are caused by pneumococcic infection; most of the remainder results from infection with one or more of the following: streptococcus hemolyticus, Friedlander bacillus, staphylococcus aureus, influenza bacillus, or possibly, a filterable virus. Occasionally cases may be caused by other non-bacterial agents.

In 1934 there were 1,100 cases of pneumonia reported in this State; 1935—1,318; 1936—1,304; 1937—1,261 and 1938—1,086, or a yearly average of five years of 1,214 cases reported. These reports cover all forms of pneumonia. During the same five year period there were 5,353 deaths reported or a yearly average of five years of 1,070 deaths giving a mortality rate of 65.5. It is apparent at once when the deaths so nearly approximate the total cases reported that reporting of cases is far from complete. It is, therefore, not possible to gain an accurate picture of the incidence of pneumonia in this State until reporting of cases of the infection is more nearly completed. However, assuming the mortality picture is more nearly accurate, we may conservatively estimate that approximately 4,280 cases occur annually. This estimate is based on the conservative mortality ratio of one death to four cases which has been found rather close in a number of studies.

If the average experience of the past with respect to the incidence of the various types of pneumococci holds true then a high percentage of the total pneumonias will be due to pneumococci of Types I, II, V, VII and VIII. Since specific therapy is now recognized for these in addition to others of the pneumococci types and further since the physician looks to the laboratory for aid in the determination of type or bacteriological diagnosis, I shall limit my remarks today to the problems due to pneumococci pneumonias.

There are thirty-three types of pneumococci. Certain of these types occur more frequently than others in human disease. About one-half of all the cases of pneumococci lobar pneumonia are caused by Types I, II, V, VII and VIII. The Type I pneumococcus alone is responsible for about one-quarter of all cases of lobar pneumonia. In infants and children the common types have been reported as XIV, VI, XIX and I in the order of frequency named.

Types I and II pneumococci are rare, and Types V, VII and VIII relatively uncommon in the throats of normal individuals, or in individuals who are suffering from ordinary upper respiratory infections. These types are not infrequently present in the throats of many at the time of type specific epidemics or in direct contacts of pneumonia cases of these types. Types III, VI, XVIII and many of the types above XX are commonly found in normal throats.

It is often difficult to determine in cases of these latter types associated with symptoms of pneumonia whether the pneumococcus found is the etiologic agent of the disease or whether it represents a type harbored in the upper re-

spiratory tract of these patients. The differentiation rests largely on a careful study of good sputum specimens by a competent bacteriologist and on the results of blood culture.

Typically the onset of pneumonia is characterized by chill, pain in the chest, cough with expectoration of rusty or bloody sputum and elevation of temperature. Actually, the presenting symptoms may be any one or combination of these, and the occurrence of such should arouse the suspicion of pneumonia. A careful bacteriologic examination of the sputum should be carried out at once, since early therapy offers the best chance of recovery for the patient.

It is considered advisable to obtain material for typing before chemotherapy is started, since it is said that these drugs occasionally alter the pneumococcus so that typing may be very difficult if not impossible.

A blood culture taken prior to the onset of serum or chemotherapy may serve as a check on the sputum typing. It is also valuable in prognosis and as a guide to therapy in any given case.

So far in this presentation I have referred to the laboratory responsibility in the pneumonia problem only from the standpoint of bacteriological diagnosis. This aid from the laboratory is equally important whether the case is to be treated with sulfapyridine or type specific anti-pneumococcic serums.

I feel it desirable to emphasize at this point that laboratory technicians assume a position of extraordinary importance in the conduct of pneumonia programs. Accuracy in bacteriological diagnosis, pneumucoccus typing and blood culture work is absolutely essential for the successful control of pneumonia mortality by specific serum therapy. It is, therefore, necessary for any laboratory serving the medical profession to be properly equipped and competent to give such assistance to the physician in the handling of pneumonia patients.

Recently the advance of chemotherapy in pneumonia through the use of the drug sulfapyridine has materially assisted in the reduction of pneumonia mortality. However, this form of therapy introduces additional problems for which the physician again looks to the laboratory for assistance. There can be little doubt but that the introduction of sulfapyridine in the therapy of pneumonia represents a great advance in the treatment of this disease. There are certain obvious advantages in the use of the drug in cases where serum therapy is used with hesitation, such as in patients with "known allergy" to horse or rabbit, with congestive cardiac failure or with cardiac arrhythmia and in the extremes of life. On the other hand, patients with hepatic or renal disease, granulocytopenia, severe vomiting or in post-operatives where vomiting should be avoided, ought to be treated with serum rather than sulfapyridine.

Sulfapyridine therapy has certain unfavorable aspects. The absorption, excretion and degree of acetylation of the drug are very irregular in different patients and these factors cannot be predicted. There is reason to believe that the optimum dose is that which results in a concentration in the blood of 4 mg or more per 100 cc of the non-acetylated form of sulfapyridine.

Acetyl-sulfapyridine. the combined form of the drug, is not therapeutically effective and is more toxic than the free form of the drug, but its formation to some degree always occurs. Hemolytic anemias, both the severe acute type or the milder delayed type, may occur following use of the drug. Agranulocytosis has been observed, usually after ten days or more of treatment, however, it may occur early.

One of the most important complications of sulfapyridine therapy concerns the renal function. Hematuria has been

noted with considerable frequency and has often been associated with symptoms suggesting renal colic. Nitrogen retention and edema have been observed. The acetylated form is less soluble than the non-acetylated form, resulting in the percipitation of crystals which have been found in the urinary tract of fatal human cases. Frequently crystals may be seen in voided urine.

I have covered the treatment and complications resulting from sulfapyridine very sketchily to serve as a background for the laboratory portion of responsibilities in chemotherapy of pneumonia.

First, a determination of blood level of the drug. The Marshall test or a modification of it is perhaps most widely used. At least one blood determination is desirable (12-18 hours after institution of therapy) since individual variations in absorption, acetylation and excretion are common and may require a dosage adjustment depending on free level in the blood.

The occurrence of blood dyscrasia makes it desirable to have a frequent examination of red cell count, Hemoglobin and differential. The knowledge of excretion of the drug in the urine will assist the physician in evaluating therapy adjustment.

Laboratories equipped and staffed to assume responsibility for their part in the control of pneumonia mortality can be of inestimable assistance to the physicians and are indispensable to an adequate control of the disease.

In summary, I have pointed out the following: First, that a definite pneumonia problem does exist in this State; and, secondly, that if existing laboratory facilities were made available for typing, blood level determinations, blood picture analysis and urinary determinations as a means of evaluating chemo-therapy, the physicians of the State would be materially assisted in the control of this disease. Although this subject has been covered very briefly, and only a few of the facts relative to the therapy and courses of the disease have been brought to your attention, many more will be found in the literature.

I trust this briet outline will serve to arouse your interest for further reading and study of pneumonia particularly as to the part you may share in the efforts made to reduce the mortality from this disease.

Mycetozoa: Fungus-Animals

By WALTER FLOWERS

These are slimy, filmy, mould-like masses, of visible, and often considerable, size, which live in damp places, and creep over rotting wood, decaying leaves, humus soil, etc. Later they become converted into spores and spore cases which are often elaborate and beautiful. Over four hundred species are known and scattered all over the world. And are to be found in the arctic zone as well as in the tropical countries. Some species are to be found in nearly every country where man is to be found.

The ordinary plant body, called the PLASMODIUM, is a mass of protoplasm, much like the white of egg in consistency, lacking walls but containing many nuclei. In some species it is compact in form and only a few millimeters in diameter; in others it is a loose open network, as pictured in the interesting slides you will soon see. Sometimes they form irregular films or sheets several inches across. The lack of walls and the relatively great size of these plasmodium render them very favorable subjects for extensive investigations upon the characteristics of the plasmodium. In color they are typically

white or yellowish, but are also pink, violet, and other tints, though they never display the green substance of chlorophyll. Ordinarily the protoplasm lives upon some damp organic substratum upon which it feeds saprophytically, often ingesting, like an animal, solid pieces of substance from which it later digests the nutrient materials. Commonly it exhibits active streaming and other movements, whereby it creeps over the substratum like an animal, e. g. the Amoeba. It becomes quiescent in times of dryness, and renews its activity during humid intervals. Ordinarily it keeps away from light, and hence it is to be found in crevices, or under damp objects. But when about to produce spores, the plasmodium moves out from the shelter, rises to the summit of the object beneath which it formerly lay, and there these proceed to convert its entire substance into sporangia, one or a cluster, containing asexual spores. The sporangia, easily visible to the naked eye, have usually a supporting stalk, a firm wall, and an interior lacy-delicate framework, called the CAPILLITIUM. This capillitium by its swelling hygroscopic movements, pushes out the spores, which are thus removed by the wind. It differs greatly in form in the different species, and often, like the sporangium wall, is brilliantly colored. Thus the sporangia exhibits a diveristy and beauty of which the plasmodium contains little suggestion. In the formation of the spores occur certain nuclear fusions which suggest fertilization, the lowest traces thereof known among plants.

The spores possess thick cellulose walls, and are true resting spores. After dissemination, they germinate in water and form unicellular free-moving swarm spores, which recall the Flagellata. They swim about for a time, living saprophytally; then they come to rest and form amoeba-like bodies, which multiply by fission. Ultimately the creep in groups, and these into larger groups, until they form a new plasmodium. Morphologically, therefore, the plasmodium is a kind of colony, in which the individuality of the original members has become completely merged. The plasmodia reproduces also in other minor ways, notably from separate hard fragments, or sclerotia, which, on access of water, produces new plasmodia. The most striking of all the Myxomycetes, in regard at least to its plasmodium, is (Aethalium septicum). Its favorable home is old tan bark (whence its name "flowers of tan") and its yellowish slimy plasmodium often reaches a foot in diameter, though the spore formation is inconspicuous. Mostly the group has no particular ecomic to man's interests, but one parasitic form produces the damaging "club root" of the cabbage.

The Myxomycetes exhibit relations to animals so close that some biologists have placed them in that group, and this position is expressed in one of their names (Mycetozoa: the Fungus-animals"). The free locomotion of their amoeboid plasmodium, and the free ingestion of solid food, are animal characteristics, but their elaborate sporangia and cellulose-walled spores are wholly plant-like.

Ecologically the Myxomycetes are free-moving saprophytes. Phylogenetically, they show closest affinities with the Flagallata, of which they perhaps represent a highly specialized and peculiar colonial development; and thus we tentatively rank them. It is not impossible, however, that the colonial habits is primitive, the subdivision into unicellular members being subsequent.