THE TREATMENT OF PNEUMONIA.*

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The treatment of pneumonia resolves itself into two sections, specific and general, and in these days when we are all reaching after some new thing in medicine the latter is apt to be relegated to the background. It is, however, of so much consequence that I propose to deal with the most important points of it first.

General Treatment.

Lobar pneumonia is an infectious disease, therefore the need for *efficient ventilation*, both in the wards and private rooms, is essential if the risk of infection is to be diminished in any way. This is a point which is often overlooked.

Next comes *diet*. Pneumonia is a short disease and there is no great need to push food. Milk, well diluted, tea, cereals, thin bread and butter, and eggs, are allowable if the patient fancies them, but the standby in all cases is glucose systematically used. It is well tolerated and helps to protect the heart against the grave toxæmia of the disease. It may be presented in the form of a lemonade, of which the proportions are 7 ozs. of sugar, two pints of water, the juice of two lemons, and of this 4 to 6 pints should be taken in the 24 hours.

Milk is a fruitful source of trouble by causing abdominal distention which may be a serious hindrance to the breathing. The abdomen must be watched, and if it becomes distended the milk should be cut down or omitted. A simple turpentine enema usually suffices for the relief, but 30 minims of the oil, emulsified in 2 drams of mucilage of starch and added to 6 ozs. of a simple soap enema, or ox-bile $\frac{1}{2}$ —1 dram in 2 ozs. of water may be necessary. In severe cases pituitrin $\frac{1}{2}$ —1 c.c. can be tried.

I am not in favour of drastic purgatives at the onset of the illness. A mild aperient, such as senna, is sufficient and later on if necessary a soap and water or glycerine enema.

We physicians are often teased about our bottles of medicine, but the time-honoured use of a saline mixture is justified in lobar pneumonia. Potassium citrate or acetate in 5—15 gr. doses with liquor ammoniacetatis 1 dram given four-hourly is of help in rendering the sputum less tenacious and keeping the skin active. Tepid sponging helps in this, but do not let the nurse be too active in doing good, and so exhaust the patient.

The question of rest is all important, and cough and pain are not the only two factors to be controlled; the patient may be frightened about himself, or his work, or the future prospects of his family. If he is sleepless and restless, chloral hydrate and potassium bromide, 10 grs. of the former and 20 of the latter, may suffice, or a dram or two of paraldehyde, and incidentally, the value of all these is enhanced by alcohol. But where cough and pain predominate opium is called for. Pulvis ipecacuanhæ opiatu (Dover's Powder), is time-honoured

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and when the cough, which is a most exhausting feature, is the chief trouble, just enough opium to keep it quiet will let the hypnotic do the rest.

If pain predominates, then morphia should be used, and I do not think there is any contra-indication, except "a generalised bronchitis with exudate blocking the tubes." Provided it is used in medicinal doses the respiratory centre will not suffer. For the relief of pain the induction of artificial pneumothorax must also be considered. This method was first suggested in this country by W. H. Wynn, and B. Taylor and J. J. Coghlan have both contributed reports on a series of cases. The induction is not difficult, the usual apparatus being employed and the needle is inserted where the friction is loudest. Full local anæsthesia must be used (2 per cent. novocain or the new combination, Novutox gives satisfactory results) and 400—500 c.c. of oxygen should be introduced. Taylor claims that relief commences at once and is complete by the time the operation is finished, when the pulse and respiration slow down and the patient rapidly falls asleep. The artificial pneumothorax lasts for 3 to 4 days and although at the end of this time friction may again be apparent, it is frequently painless. The best results are obtained when the pleurisy is situated where movement is greatest, *i.e.*, the lower axillary region.

Coghlan suggests that not only is there relief of pain, but that also the inflamed lung is kept at rest and consequently the flow of blood through it is limited, with a resulting diminution of the toxæmia. He states that improvement occurs at once, with profuse sweating and relief of cyanosis and dyspnoea in about 15 minutes, and that this persists as long as there is gas in the pleural cavity. He thinks the oxygen is rapidly absorbed and that refills may be necessary, but Taylor has shown, by examination with X-rays, that the artificial pneumothorax persists for four days. This is undoubtedly a procedure worthy of consideration, the chief criticism being that so few of us are expert in the induction of artificial pneumothorax and that lobar pneumonia is not the condition in which to learn.

Two further items in general treatment need consideration, *viz.*:—oxygen and digitalis. Both have been widely used and both have come under severe criticism. As recently as 1928, oxygen was said to be of no value in pneumonia. With that opinion, however, I cannot agree. Oxygen should be used early and properly and not withheld until the patient is blue and distressed. The old "tube and funnel" is useless. The gas should be given warmed, by means of a nasal tube (a No. 10 catheter) and with a rate of flow of 2 litres per minute. This provides for 30 per cent. oxygen in the inspired air and in the early stages may be administered for a period of 10 minutes every hour. Few patients, and especially children, will tolerate a mask and bag. 5 per cent. carbon dioxide may be added, which gives rise to deeper breathing and thereby renders the administration of morphia safer.

An oxygen tent was described by Yandell Henderson, of Boston, in 1932, and Poulton, of Guy's Hospital, has also devised a similar apparatus. There are certain technical difficulties, including the regulation of the heat in the tent, the absorption of moisture, and a steady flow of the oxygen, and when I add that half-hourly analyses of the contained air are advised, it is apparent that the tent is hardly a contrivance to use in association with the district nurse; but it is undoubtedly a step in the right direction.

With regard to the administration of digitalis as a routine practice many of us are wavering. Ryle, in an address given to the West Herts Med. Soc., in 1933, said: "Digitalis is commonly given, although it is still doubtful whether it has any virtue in the case of a regular tachycardia and embarrassed function due to fever and toxæmia." Langley, speaking to another medical society in the same year, said: "The routine use of digitalis is not regarded as desirable, but the frequency of spasms of auricular fibrillation make this a feature which will always require careful exclusion."

Nates and Wyckoff, in a series of cases (treated and untreated) extending over 2 years, found that the mortality of the digitalis-treated group was higher in both the older and younger age periods, and in 23 cases of auricular fibrillation or flutter the mortality of those treated with digitalis was distinctly higher. The patients were fully digitalised and then kept on a maintained dose and the Committee, of which these two were members, came to the conclusion that the results obtained did not justify the routine administration of the drug. In my own experience the administration of a few minims of the tincture of digitalis every four hours takes too long to get the patient fully under the influence of the drug and appears of little value. When, however, fibrillation does supervene, big doses are useful. The intra-muscular injection of 1/240th grain of Native's Digitalin, which is principally Digitoxin, I have found is as good as any preparation, and may be repeated two or three times at intervals of 24 hours.

Specific Treatment.

Let us now turn to the various sera, vaccines and drugs which have been used as specifics, and the first of these is the much discussed Felton's serum.

(a) *Felton's Serum* is a concentrated horse serum and is only useful in pneumonia due to the pneumococcus of types I. and II. The cost is high, 10,000 units of each, I. and II. (i.e., 20,000 units combined) in 4.5 c.c. costs 33/9d. Burroughs & Wellcome also supply a serum, and of this brand 20,000 units of type I. or II. in 6 c.c. costs 30/-, or 40,000 units in 9.6 c.c. 65/-. As the usual dosage is 50,000 to 120,000 units it is seen that, even using the cheaper variety, it means a cost of £4 10s. to £9 per case.

The serum must be given intravenously and a marked reaction in the form of a rise in the fever is not uncommon. Rigors and collapse have been noted and in one series of cases this could be attributed to one particular batch of serum. The possibility of anaphylaxis developing must be kept in mind and although the conjunctival and intradermal tests may be employed to detect hypersensitiveness they only do so when this is of an extreme degree. Hence the first injection should always be made cautiously and slowly. Take two minutes to inject the first c.c. and 10 to 15 minutes for the remainder. If anaphylactic phenomena do occur, as evidenced by collapse, urgent dyspnoea and poor pulse, one half or one c.c. of adrenalin (1-1,000) should be given under the skin at once. It is said that a teacher of midwifery advised his pupils to tie a catheter to their forceps. It has been advised and with equal wisdom that an ampoule of adrenalin should be attached to every vial of serum and that it should be got ready for use before the serum is injected.

But cost, method of administration, and the danger of anaphylaxis are minor points in considering the use of antipneumococcus serum. The all important

factor is its therapeutic value. Leys holds the view that anti-pneumococcus serum (Type I.) is a highly valuable remedy, and Langley thinks a critical survey of the literature goes to show that it offers very definite help. Ryle, on the other hand, is distinctly in two minds about it, but perhaps the most authoritative words come from the Therapeutic Trials Committee of The Medical Research Council, who hold that the fatality of infection of Types I. and II. is definitely reduced in adults between 20 and 40, but, they add, "The benefits of serum are not so emphatic as to make it desirable that all severe cases of lobar pneumonia, irrespective of type, should be treated with Type I. and II. anti-serum. Moreover, the special technique required for repeated intravenous injections and the cost of the serum, make the treatment unsuitable for universal application."

To my mind, the real difficulty lies in the fact that to obtain any benefit, the serum must be used within 72 hours of onset, and preferably earlier; and it is just during this time that it is most difficult to say what will happen to a pneumonia. Of each hundred some 80 get better, and 20 die, but in very few cases can a sound prognosis be given in the first three days and yet it is these three days that matter. Blood cultures and leucocyte counts give no definite clue and, personally, I do not think that any criterion exists. Nevertheless, given the opportunity, serum should be used in appropriate cases. These are patients between 20 and 40 years of age and of Type I. or II.

The peritoneal mouse method holds the field in typing and the material used is sputum, and this takes time. Direct typing, as suggested by Armstrong, is not as yet sufficiently accurate and lung puncture and blood culture offer obvious drawbacks. The Therapeutical Research Council consider typing can be done in 5 to 6 hours and serum may be withheld for that time, but Leys, in his series of cases, found 16 hours elapsed between admission of the patient to hospital and the giving of serum.

In an emergency 20,000 units each of Type I. and II. serum can be given followed by the appropriate one, if found later, but it is better if possible to ascertain the type and then give 20,000 units of the correct serum, followed by a second 20,000 units in 8 hours. This is repeated the next day but if there is no obvious clinical improvement within these 48 hours, serum treatment is stopped. Usually a total of 80,000 units are required, with rather more for Type II. The increase in cost by using the emergency method must not be overlooked: the first dose will cost double the amount of that of the usual routine, and this £3, or £3 5s., will be entirely wasted if the infection, on typing, proves to be III. or IV.

(b) The use of *vaccines* is also supposed to shorten the duration of the disease.

Vaccine treatment requires patients who are in a condition to respond to the stimulation by the active production of antibodies, and fortunately this is true of the majority of patients in the early stages of pneumonia.

As with serum, the vaccine must be employed early. It is, I think, a sound dictum that the fate of the patient with pneumonia is settled during the first 48 hours.

The vaccine used by W. H. Wynn, the advocate of this method of treatment, is a plain emulsion, made from young primary cultures, and sterilized by heat, and consists of equal parts of pneumococci, streptococci and influenza bacilli,

several strains of each, but it is held that it should have a strong antigenic rather than a specific power. In other words the vaccine is non-specific and depends on stimulating the rapid production of non-specific antibodies.

Wynn, in a series of 320 patients treated with vaccine, whose mortality rate was 11.5 per cent., shewed that of the 180 who were treated during the first three days the mortality was 5 per cent. It is unlikely that this result will ever be improved upon.

The usual dose is 100 millions of each, 300 million in all, but two or three times this amount is often given; the dose may be repeated after 24 to 48 hours and if treatment is begun later, a third dose may be necessary. The majority of patients injected within the first 24 hours shew a normal temperature after 24 to 48 hours, but when the inoculation is delayed until the second or third day the results are not so constant; even so, however, they are often good.

In addition to these promising clinical results it can be said that vaccines of this type have certain advantages; being stock vaccines, they are always ready at hand and treatment can be commenced at once; they are cheap to use, there are no ill effects from anaphylaxis, and administration is simple, all important points from the view of the general practitioner.

(c) The last form of treatment to which I would draw attention is with *Optochin Base*—*Ethyl-Hydrocupreine*, a quinine derivative.

As far back as 1922, the late Professor W. E. Dixon, drew attention to this substance "which destroys the bacteria in pneumonia, and even the blood from patients so dosed will destroy pneumococci, our only instance of specific drug therapy in acute general bacterial disease."

In this country it has not been largely used, for toxic qualities have been noted which have made it unpopular and optic atrophy is said to have resulted as a sequel. These toxic effects may be avoided (a) by using the base, which is insoluble and, therefore, slowly converted into the hydrochloride; (b) by limiting the dose to 4 grains 5-hourly (day and night) for three days only, with a total dosage not exceeding 50 grains. Treatment should be commenced during the first 48 hours and each dose of *Optochin Base* should be given with 5 ozs. of milk. This should be the only food given during the use of the drug. More milk may be given and small amounts of water, all other medication being hypodermic. If visual or auditory disturbances develop, treatment must be stopped.

It is claimed that the course of the disease is shortened and is milder and that fever abates rapidly.

The drug has recently been advocated by Dr. Leitner in Germany, for the use of broncho-pneumonia in childhood. He gives $\frac{1}{3}$ rd gr. to infants under a year, $\frac{1}{2}$ gr. to those aged 1 to 2 years in the form of a suppository 3 to 4 times daily, the administration lasting 3 days.

But when all is said and done, the most important part of the treatment of pneumonia is a good nurse who will keep the room well ventilated, limit the visits of relatives and not "fuss" the patient.