Clinical Lecture

ON

ACUTE PNEUMONIA IN CHILDREN.

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GENTLEMEN,—In dealing with this subject on the present occasion I propose to arrange my remarks in three groups. The first will deal with the value of a continuous record of the respiration-rate, with illustrative cases. In the second I shall show grounds for my disbelief in the utility of the current classifications of the disease, and, indeed, of any known classification, so far as prognosis and treatment are concerned. The third group will contain a statement of my own experience concerning the complications, diagnosis, prognosis, and treatment of the disease.

I. RESPIRATION-RATE.

The frequency of respiration does not, in my judgement, receive the amount of consideration it deserves. In the case of young children suffering from acute disease of the lungs it is, I believe, of more importance to keep an accurate record of the respiration-rate than of the frequency of the pulse.

The normal respiration-rate varies with age. In healthy infants of 6 months of age, while sleeping or lying quietly in bed, it varies from 30 to 25, and in children of 3 years of age from 25 to 20.

When respiration is disturbed by disease, the influence of age is more easily noticed, both as regards the rapidity of breathing and the constancy of the rate. Thus, a respiration-rate of 60 in a child of 3 years of age is of less favourable omen than a rate of 80 in a child of 6 months. In every case a knowledge of the course of the respiration-rate is of more importance than a knowledge of the actual frequency at any one time.

An increase in the respiration-rate depends upon many factors besides that of age. To some extent it generally increases in proportion to the nature and intensity of the febrile process. The varying influence of this factor renders it probable that it is the action of the toxins rather than the height or duration of the fever which is primarily responsible. It also depends on the extent of lung involved, and on the rapidity with which this is thrown out of work. Furthermore, it is affected by any lack of rigidity in the ribs, by any failure in the vigour of the respiratory muscles, by any obstruction to the entry of air, or by any pain in the pleura or wall of the chest causing the patient to diminish the range of movements. These factors may act singly or in various combinations. Indeed, some of them may be still further resolved. Thus, the vigour of the respiratory muscles may be impaired by febrile states, by diphtheritic or other paralyses, or by the fatigue consequent on long continued overaction.

If the value of the respiration-rate is to be fully utilized, the influence of every one of these factors must be taken into consideration, and the part it plays estimated. The more suddenly any of these factors are brought into action the more marked will be the respiratory disturbance resulting. For example, in severe cases of rickets the respiration-rate is normally high—high, that is, without the presence of any pulmonary complication. In mild cases of rickets the respiration-rate may be absolutely normal, since the slight softening of the ribs does not hinder the efficient expansion of the lung so long as the air passages are free, the lungs normal, and no special demand is made on the breathing capacity. But when frequent spasm of the larynx, bronchitis, or adenoids and enlarged tonsils hinder the free admission of air, the difference between the air pressure outside and that inside the chest during inspiration persists longer, and the soft parts sink in under the weight of the greater pressure. Thus the frequency of the respiration in a rickety child suffering from acute pneumonia is greater than can be explained by the extent of the disease, and when this has disappeared the respiration-rate may remain abnormally high owing to the persistent anatomical defect. But a knowledge that the increased respiration-rate may be as much an indication of the degree to which the softened

thoracic walls affect the efficiency of respiration as of the extent and gravity of the pneumonia, does not render an observation of its course valueless. It is a measure of the defective aëration of the blood, and serves to remind us that a prolonged and considerable rise in the respiration-rate may be followed by a rapidly culminating exhaustion—matters of no small importance in prognosis and treatment.

In the early stages of acute pneumonia, apart from age and from rickets, the extent and duration of the disease are in children the chief factors in accelerating the rate of breathing. It may be as quick in cases of scattered pneumonia as in those of massive consolidation, especially if the case of scattered pneumonia has been unduly prolonged. The high and rising rate in fatal cases is due largely to muscular exhaustion, but if death be due to some complication unconnected with the lungs, such as vomiting and diarrhoea, the rate may be comparatively low.

In most febrile states, as I have already said, the rapidity of breathing increases as the temperature rises; and when the latter falls by rapid crisis the respiration also falls, but only partially. In cases of acute pneumonia the respiration-rate falls in two or three recognizable stages. The first is that accompanying the drop in temperature, and is the measure of the extent to which it was due to the same cause as the fever. A second and less marked fall sometimes occurs two, three, or four days after the first; while the last fall, or return to normal, does not occur until a week or ten days after the temperature has fallen—not until the inflammatory products are removed, the damaged portion of the lung becomes capable of its normal functions, and the muscular power is restored. The return of the respiration-rate to normal is a practical sign that the risks of extension of the disease, of sudden cardiac failure and of general exhaustion, are over. In cases of relapse—or, more accurately, of secondary extension of the disease—the respiration-rate does not usually fall below the first stage, remaining at that level until it rises again with the return of the febrile state.

Other practical uses of a knowledge of the respiration-rate may be mentioned. In cases with a very gradual onset it may afford the earliest indication of a pneumonia complicating bronchitis. In late stages, when the fever is remittent, it may be the first sign of an extension of the disease. A secondary rise in the temperature without an accompanying rise in the rapidity of breathing is reliable evidence that the rise in temperature is not due to an extension of the disease, and will likely enough disappear on the administration of an aperient. In general terms, a rise in the respiration-rate accompanying a rise in the temperature suggests the spread of the disease, while a rise in the respiration-rate without a rise, or with a fall, in the temperature suggests muscular exhaustion and cardiac failure, and is, therefore, an extremely grave sign.

I now wish to direct your attention to four illustrative cases, represented by the charts I have had prepared. The black line indicates the temperature record, the broken line that of the respiration-rate.

CASE I.—A. H. was a well-nourished girl, aged 2½ years, admitted under my care on January 5th, 1907. About a week previously she had vomited, begun to cough, and complained of pain in her abdomen. During the next few days she was feverish, drowsy, constipated, and tender on handling. We learned that she had had bronchitis for several weeks, and that she had never had any acute specific fever. When first seen her face was flushed and her breathing rapid. There was a slight cough, and the alae nasi were acting vigorously, but there was no expiratory grunt. At the right base, below a horizontal line 1 in. above the angle of the scapula, there was impaired resonance and distant bronchial breathing. Mucous râles were audible at both bases, and a few scattered rhonchi could be heard over the right upper lobe.

During the next four days the physical signs of consolidation at the base became more marked, and extended over a rather larger area, and rhonchi became audible over both lungs. During the next week, that is, from the eleventh to the eighteenth day of the illness, the following changes occurred: redux crepitations developed over the dull area; the right upper lobe lost its resonance, and the breathing over it became bronchial; and, last of all, the upper part of the lower lobe and the middle lobe became similarly involved. By the twenty-first day redux crepitations could be heard in both these places. At the end of another week a few scattered bronchitic rhonchi were the only abnormal sign.

From these notes I think we may draw three conclusions:

1. That the consolidation of the lung was preceded by

Case 1.

bronchitis which persisted after the consolidation had disappeared.

2. That the disease began near the root of the lung, and thence spread by radiating paths to the surface. These paths would probably be the bronchial tubes. This conclusion is based on the facts that the consolidation developed slowly, and that the different parts of the lung were attacked in a very remarkable order: (1) Lower part of lower lobe, (2) upper lobe, and (3) lastly, the intermediate portion of the lung. If this conclusion be correct, then we have a case of pneumonia which is a broncho-pneumonia on its anatomical and a lobar pneumonia on its clinical side. To this point I shall refer in my second section.

3. That the resolution followed the consolidation more quickly and proceeded more rapidly in the parts last affected, suggesting a diminishing virulence on the part of the organisms, or a more effective resistance on the part of the tissues.

The case also illustrates what I have already said about the delay in the fall of the respiration-rate.

CASE II.—G. S. The next chart represents the course of the temperature and of the respiration-rate in a child 9 months old, admitted for pneumonia. It was her first illness, and began about a week before admission (January 11th, 1907) with cough and vomiting. When seen the child was fairly nourished. The face was dusky, the dyspnoea extreme, and the expiratory grunt constant. The upper half of the chest moved freely, but there was so much inspiratory recession round the diaphragmatic arch that but little air actually entered the chest. Bronchitic râles and rhonchi were audible all over, and at the bases there were impaired resonance, faint bronchial breathing, and loud, consonating râles. It was clear that there was considerable collapse in addition to the pneumonia. The

dyspnoea was so great that for thirty-six hours it seemed impossible that the child could live. Ammonia, brandy, oxygen, and plenty of fresh air were the remedies employed, and on the night of the 12th some improvement in the breathing was noted. Next morning the recession was less and the air-entry better, but the dullness at the left base gradually extended in area and degree. By the 23rd, however, nothing abnormal but a few bronchitic sounds remained, and by February 1st all the pulmonary signs were normal. The value of the respiration-rate during the first week was very marked. During the first two days it was the best measure of the severity of the case, and during the next three it furnished the grounds for a hopeful prognosis. Again, as in the last case, the respiration-rate did not fall to normal until about eleven days after the fall of the temperature, and this final fall corresponded with the complete disappearance of all abnormal physical signs.

CASE III.—E. M. This case was recently under the care of my colleague, Dr. Mott, to whom I am indebted for the notes. It illustrates two of my statements concerning the significance of the respiration-rate. (1) On the fourth day after admission the temperature had fallen to normal. The respiration-rate, however, remained at a high level, showing that convalescence was not established. Soon after, the rising temperature and rising respiration-rate indicated an extension of the pneumonia. (2) A few days later, after the temperature had again fallen, a third rise occurred, but this time without any serious interference with the declining respiration-rate, showing, as the sequel proved, that the rise in temperature was not due to any further extension of the disease.

CASE IV.—E. R. The fourth chart is that of an infant, aged 1 year and 10 months, who had suffered from bronchitis and vomiting for three weeks before admission. The child was much wasted and both lungs were involved. I want to draw

your attention to the rise in the respiration-rate and the fall in the temperature which marked the onset of the exhaustion of the respiratory muscles and the failure of the right side of the heart, furnishing the grounds for a fatal prognosis.

II. MODERN CLASSIFICATIONS OF ACUTE PNEUMONIA IN CHILDREN.

A few years ago all acute pneumonias were placed in one of two definite groups. The first of these varieties of pneumonia was a disease of adolescence or of adult life, with a mortality varying at different ages from 12 per cent. to 5 per cent. It was characterized by a sudden onset, and by continuous and considerable fever terminating by crisis. The physical signs were those produced by

Case 2.

Case 3.

the complete consolidation of the whole or of a large portion of one or more lobes. This was known as lobar or croupous pneumonia.

The second variety of pneumonia was a disease of childhood and of old age. It was preceded by bronchitis or by one of the acute specific fevers, and had a much higher mortality than the lobar variety. The onset was sudden or gradual, the temperature remittent, and the fall by lysis. The disease was bilateral and the consolidation scattered. As a consequence of these peculiarities, any extensive area of dullness was unusual, though there were often present patches of impaired resonance; but the most constant and important physical sign was the existence of loud consonating râles on both sides, especially at the bases. This was known as catarrhal or broncho-pneumonia. It was stated that (1) lobar pneumonia was rare in infants and very young children; and (2) that the clinical signs of lobar pneumonia were liable to but little variation. In effect, all cases that did not conform to the characteristic case of lobar pneumonia as it is met with in the adult were placed in the second, or broncho-pneumonic, group.

There is now but little doubt that this old classification is too rigid and not really in accord with clinical observations. Writers on pneumonia have accordingly shown an increasing tendency to subdivide the broncho-pneumonic group into two or more varieties, one or more of which closely resemble the lobar form. Thus Holt divides acute pneumonia as it occurs in childhood into:

1. Broncho-pneumonia { Primary
- Secondary
2. Lobar
3. Pleuro-pneumonia

and calls attention to the similarity of the clinical signs in primary broncho-pneumonia, lobar pneumonia, and pleuro-pneumonia. West divides broncho-pneumonia into three varieties, of which two correspond to Holt's varieties, while the remaining or intermediate variety serves as a refuge for those cases which cannot fairly be placed in either of the other groups.

My own observations have led me in an opposite

Case 4.

tubes, and "lobar pneumonia" pneumonia that spreads by a fairly even advancing line: in this sense, and in this sense only, is broncho pneumonia a far commoner disease of childhood than lobar pneumonia; but my contention is that we should endeavour to estimate the individual value of each sign and symptom on the prognosis and treatment rather than, by means of them, to place the case in some hypothetical group and deal with the prognosis and treatment of that group as a whole.

I propose now to place before you some of the evidence on which I base this opinion. I have taken 54 consecutive cases that were under my care at the Victoria Hospital for Children. Fifty-four cases are, of course, too few to prove anything; I merely wish to use them as illustrations of a larger experience.

I have prepared a table which shows the ages of the 54 patients, as well as the number, ages, and condition of nutrition of the fatal cases. Of the cases that recovered, two were rickety and one was wasted.

I may remark incidentally that these figures illustrate the frequency of pneumonia under 3 years of age; and that they cast doubt on the statement that the heavy

direction. The more closely I follow the clinical phenomena the greater difficulty do I find in devising any classification of clinical utility. The symptoms and signs are so variable and are met with in such different combinations that the cases do not lend themselves to classification. Ultimately, no doubt, a satisfactory pathological classification will be found, but at present this is impossible. Young children do not expectorate, and swabbings from the throat cannot furnish sufficiently reliable evidence of the causal parasites at work in the lungs. We have more to hope from a careful comparison of the opsonic indices to the various suspected organisms; but this subject is still in its infancy, and we must perforce wait awhile before we can safely erect any elaborate superstructure on this foundation. To me at present "broncho-pneumonia" simply means a pneumonia that in spreading seems to follow the distribution of the bronchial

mortality in children under 2 years of age is mainly dependent on age. The figures suggest, I believe rightly, that the high mortality is largely confined to wasted infants—infants, that is, who are not only likely to be less resistant than well-nourished children, but also less able to assimilate nutriment during the illness.

Age.	No. of Cases.	No. Fatal.
Under 1 year ...	10	4 (wasted 3)
Between 1 and 2 years ...	13	6 (wasted 4)
.. 2 and 3 years ...	15	1 (wasted 1)
.. 3 and 4 years ...	4 (wasted 1)	0
.. 4 and 5 years ...	5	0
.. 5 and 11 years ...	7	0

Mortality in wasted infants (under 2 years of age), 7 out of 7.
Mortality in well-nourished infants, 3 out of 16.

If the wasted children are omitted the figures would be:

Age.	No. of Cases.	No. Fatal.
Under 1 year ...	7	1
Between 1 and 2 years ...	9	2
.. 2 and 3 years ...	14	0
.. 3 and 4 years ...	3	0
.. 4 and 5 years ...	5	0
.. 5 and 11 years ...	7	0

There is a rule limiting the number of cases under 2 years of age that are admissible to any one ward, and, while room would nearly always be found for a case of pneumonia, the rule tends to lessen the number of cases admitted under 2 years of age, and may partly explain the rise in the third year; it also leads to a selection of the worst cases.

The features of the disease on which I base my statement concerning the uselessness of classification are: (1) The onset, (2) the physical signs, (3) the site, and (4) the course of the fever.

1. ONSET.

Under this heading I include rapidity of onset, initial vomiting, convulsions, pain and preceding bronchitis.

1. *Rapidity of Onset.*—The onset of the disease may be said to have been sudden in 35 out of the 43 cases that recovered and in 6 out of the 11 cases which ended fatally. The more definitely localized the pneumonia, or, in other words, the more nearly it approaches the lobar pneumonia of the adult, the more likely is the onset to be sudden. It is, however, impossible, with any degree of accuracy, to divide the 54 cases into the two old groups, and it is, therefore, impossible to express this result in figures. My impression is that a sudden onset is almost invariable in the localized cases, and that it occurs in rather more than half of the scattered cases.

2. *Vomiting.*—Vomiting is unquestionably the most constant of the early symptoms. Out of the 41 cases of sudden onset it was present in 28—that is, in about 70 per cent. In only 2 cases is it definitely stated that the child was not sick; so that, allowing for the forgotten instances, it is probably correct to say that in 4 out of every 5 cases of pneumonia with sudden onset vomiting is an initial symptom. On the other hand, vomiting at the beginning of any febrile disorder, or as a result of dietetic indiscretions, is so common that this symptom is of little diagnostic significance.

3. *Convulsions.*—Convulsions, on the contrary, are a rare initial symptom even in those cases in which the onset is extremely sudden. Only 2 of my 54 cases began with convulsions. The first was a boy aged 2½ years, in whom the attack began with vomiting, convulsions, and delirium. There was never any clearly-defined dullness, but scattered consonating râles were heard over both lower lobes. A crisis occurred on the eleventh day, and convalescence was rapid. The second case was that of a well-nourished boy, aged 5 months. His attack began with vomiting, dyspnoea, and convulsions. The right base was solid by the third day, and on the evening of the same day crepita-

tions were heard at the left base. The patient died on the fourth day. These facts favour the view that the occurrence of convulsions is no evidence of any special type or variety of pneumonia.

4. *Pain.*—Pain, an important and prominent symptom in the adult, is rarely of significance in early childhood. It will be readily understood that local pain, even if present, is not likely to be an available symptom in a patient under 3 years old. But out of 12 cases over 4 years of age local pain was only present in 2. Both of these were boys; their ages were 6 and 9 respectively; only one of them had initial vomiting, both were delirious, and both recovered. Four other children complained of pain. One, aged 6, complained of pain in the neck and shoulders; another, aged 5, of abdominal pain; a third, aged 2½, of pain in the side opposite to that affected; the fourth, aged 4, also of pain in the opposite side, but in his case the pain did not appear until the fourth day of the disease.

5. *Cough and Bronchitis.*—In nearly every case, whether the onset was sudden or gradual, there was a history of cough. When this had existed for several weeks or months, as it did in 9 cases, the disease generally (6) ran the characteristic course of a case of so-called secondary broncho-pneumonia, and in no case ended with a crisis. In 2 others, in which the cough had lasted from ten to fourteen days, the course was less characteristic, and 1 of these 2 cases ended in crisis.

Those cases which were preceded by definite bronchitis were generally slow in convalescence, the signs in some instances persisting for a month or six weeks.

2. PHYSICAL SIGNS.

Out of the 54 cases, 24 presented easily and clearly defined areas of complete consolidation, with physical signs similar to those met with in the adult—increased fremitus (whenever ascertainable), dullness, tubular breathing, bronchophony, and later on *redux* crepitations. In many of these, secondary patches of similar consolidation occurred on the same side or in the opposite lung, the secondary patches, in some cases, resolving almost as soon as the original areas.

In another 24 cases there were signs of consolidation, but the limits of the consolidated areas were less certainly defined, and consonating râles were heard throughout so much of the course of the disease as came under observation. The consonating râles were as a rule limited to the vicinity of the consolidation, but were occasionally audible over other parts.

In 7 cases there were no definite areas of consolidation, but only slightly impaired resonance with consonating râles.

The physical signs in these cases cannot be said to justify any arrangement into defined groups; nor did the temperature charts suggest any definite correlation between the course of the temperature and the physical signs. In almost every case, the oscillations of temperature during the fastigium were sufficiently marked to have justified the use of the term "remittent"; moreover, a definite crisis occurred in as large a proportion of the 7 cases of the third group as in the 24 cases of the first.

3. SITE.

A few words on the site of the lesions will suffice, since it bears but little on my present contention. In those cases in which the consolidation was most clearly defined the

Right upper lobe was affected in 11 cases, of which 1 was fatal.	
Left " " " " " "	6 " " 0 "
Right lower lobe " " " "	14 " " 3 "
Left " " " " " "	8 " " 1 "

These figures really count for very little; since in a few cases a definitely localized lesion was followed by scattered bilateral signs. They support the usually accepted statements that the right side is more frequently affected and that apical pneumonia in children is proportionately commoner than in adults, and that it has a better prognosis. Furthermore, they illustrate the statement that the less definite the area of consolidation the worse the prognosis. The 4 fatal cases in which there was consolidation of lobar type were aged 5 months, 6 months, 15 months, and 15 months respectively; the second and third of these were much wasted, and the fourth was complicated with uncontrollable diarrhoea. On the other hand, out of 17

cases in which the scattered signs predominated there were 7 deaths.

4. FEVER.

The feature which is most difficult of all to classify is the fever. It is altogether impossible to group the cases into those of "continuous fever" and "remittent fever." Of course instances of each of these can be found; but the range and character of each case is so different that no classification which is not absurdly artificial is possible.

For example, out of the 43 cases that recovered, there were in 4 a gradual onset, a remittent fastigium, and a fall by lysis; in 4 a sudden onset, a remittent fastigium, and a fall by lysis; in 7 a sudden onset, a remittent fastigium, and a fall by crisis; in 8 a sudden onset, a fairly continuous fastigium, and a fall by crisis. These four groups contain 23 of the 43 cases. There remain 20 cases which defy any sort of classification—that is, nearly 50 per cent.

The fatal cases were still more difficult to classify, since in some of them the patients were moribund on admission, while most of the others died within forty-eight hours. In my experience the type of fever is of extremely little importance either in diagnosis or prognosis.

In 23 out of the 43 cases the fever may be said to have terminated by crisis. The day of the disease on which this usually occurs is not so easy to ascertain as in the case of adults, since the day of onset is not so definitely known; but, apart from this error, there seems to be in young children a greater average range. In 9 out of the 23 cases the crisis occurred within a week. In 1 case the crisis did not occur until the twentieth day. In 14 out of the 23 it took place between the sixth and tenth day, the average working out at the ninth day. The actual duration of the crisis was generally less than twelve hours, and in 1 case as short as two. Pseudo-crises are not common; many instances are met with in which it is impossible to say whether the term "crisis" or "lysis" more fittingly describes the character of the fall of the temperature.

III. COMPLICATIONS.

Concerning the complications, diagnosis, prognosis, and treatment of the disease, I have but little to add to what you will find in the ordinary textbooks, and therefore shall not detain you long.

Empyema and pericarditis have the reputation of being somewhat common complications. In no one of my tabulated cases did either occur. This, I think, is an exceptional experience.

Vomiting and diarrhoea in very young children are such fatal complications that every effort should be made to avoid and to check them.

Relapses are, in my experience, always due to direct extension either from the original focus or from some other patch of consolidation.

Delayed resolution is a phenomenon of frequent occurrence. It often happens that after an attack of acute pneumonia defective resonance and moist crepitations persist at one apex or base, the temperature oscillating between 100° F. and normal. If the condition is confined to one apex the possibility of tuberculosis at once suggests itself. Sputum for examination is rarely available, and a serious prognosis, based on the physical signs, is often given. In the majority of such cases this turns out to be incorrect. The temperature gradually falls, the appetite returns, strength and weight are recovered, and, last of all, the physical signs gradually disappear, though sometimes not till two or three months or more after the original disease began. In the absence of sputum containing tubercle bacilli, it is hardly ever wise to diagnose tuberculosis unless the signs have persisted for more than three months or are accompanied by fever and wasting. Local fibrosis with bronchiectasis can sometimes be traced to a case of pneumonia followed by delayed resolution.

IV. DIAGNOSIS.

Two distinct problems confront us: (1) The recognition of the pneumonia, and (2) the classification of the special instance of the disease.

1. The difficulties in the recognition of the pneumonia vary with the stage of the disease. At the outset it has to be distinguished from an acute specific disorder or even from meningitis, especially if headache and delirium are

marked symptoms. In a few cases the existence of abdominal pain may raise a suspicion, even in a child, of some acute abdominal lesion. The most reliable positive signs of pneumonia at this stage are undue acceleration of the respiration-rate, and the discovery in some part of the lung of a few fine crepitations. In a case of pneumonia the signs of meningeal or of abdominal disease will soon diminish, and the characteristic rashes of the acute specific fevers will fail to appear.

When the pneumonic condition of the lung is fully developed, the principal difficulty lies in the interpretation of the physical signs. In scattered pneumonic infection the consolidated areas may be of small size. The defective resonance which they produce may be easily missed, and loud consonating râles may be the only trustworthy sign of their existence.

When a large area is involved, the condition has to be distinguished from infarction, collapse, and pleural effusion respectively. Infarction in children, apart from mitral stenosis, is very rare. Moreover, the evidence of the heart disease, the haemoptysis, and the rapid development of the signs of consolidation soon clear up all difficulties. Collapse, like pneumonia, may occur in the course of bronchitis in a weakly child, but the dyspnoea and cyanosis at the outset are more urgent, and, like the physical signs, may come on with absolute suddenness, and disappear with almost equal rapidity. In these cases, too, retraction of the chest is generally very noticeable. The difficulty in distinguishing pleural effusion from consolidation is sometimes very great. The most important distinctions are that in fluid the dullness is absolute, and the percussion note wooden in character; that the heart's apex is displaced, and that no râles or other adventitious sounds are present. Moreover, the physical signs remain unaltered for several days. The age of the patient often prevents vocal fremitus from being an available sign. Nor is the character of the breath sounds always of much value. Bronchial breathing in its most characteristic tone is often heard over the site of a pleural effusion, and a large area of bronchial breathing at a base, without any adventitious sounds, is more suggestive of effusion than of consolidation. In only exceptional cases is there any sputum available for purposes of diagnosis. The cough in pleural effusion is slight, dry, and frequent.

The second problem in diagnosis is to classify the various instances of the disease. I think I have shown that the various manifestations of pneumonia are so curiously intermingled, that there are great difficulties in the way of those who seek to frame a useful classification of pneumonia in children. It is certain that pneumonia resembling clinically the acute pneumonia of the adult is far commoner in children than was generally believed a few years back. But there seems to be little use even in insisting on this. Three children in one family were simultaneously attacked by measles, and all three subsequently suffered from acute pneumonia. In one it seemed to be of true lobar form, in another of the scattered sort, while in the third it began as a typical instance of the localized kind, and subsequently spread into what ten or twenty years ago would without any hesitation have been labelled broncho-pneumonia.

If we ascertain the character, extent, and spread of the consolidation, and the various other symptoms and signs of the disease, we shall have sufficient information to forecast the future and to determine the treatment better than by using this information to put the case into some hypothetical group, the exact nature and tendencies of which we are ignorant. This, as I said at the outset, is the conclusion to which I have myself arrived.

V. PROGNOSIS.

The extent to which the various clinical signs affect the prognosis has already been referred to. It may be laid down as a general rule that the two most important factors in forming a prognosis are *age* and *nutrition*. Out of the 54 cases I have tabulated only 4 were under 9 months of age, and all of these died; whereas no case of localized pneumonia in which the patient was more than 15 months old proved fatal. Rickets is a serious factor, especially in the prolonged cases. If a child is less than a year old, ill-nourished, and rickety, the prognosis is bad. The more sudden the onset and the more localized the consolidation, the better are the patient's chances.

Complications are infrequent, but when present greatly increase the gravity of the case.

VI. TREATMENT.

The importance of wasting and of continued vomiting in the prognosis suggests that special attention should be paid to the diet. To maintain an adequate state of nutrition and to conserve the patient's strength, feeding must be carried out with the utmost regularity, and will need the most untiring patience and tact. A careful record of the food that has really been taken should always be kept, especially when the mother is the nurse. Nasal or rectal feeding is rarely necessary. The food should be diluted too much rather than too little.

There is so much doubt concerning the value of external applications in pneumonia, and so many obvious disadvantages connected with the use of some of them, that no measure calculated to disturb or fatigue a patient should be adopted without serious consideration. Poultices are, in my judgement, an unmixed evil. A child has enough to do to raise its ribs sixty times a minute without being obliged to raise a heavily linseed meal poultice sixty times a minute as well. It has been said that this objection is removed if the poultice is only applied to the back. This is true, provided that the patient simply lies in the poultice, which is not fixed to it in any way. There cannot be many to whom this procedure will commend itself.

The use of ice-bags and the abstraction of blood are measures which also have their advocates. Whatever may be their value in the case of adults, I never employ them in children who have sound cardiac muscle and whose chief danger lies in respiratory, not cardiac, muscle-exhaustion, and who, as Sir James Barr remarks, may die from failure of the respiratory muscles to secure adequate entrance of air into the chest.

A free supply of fresh air is of prime importance. I believe that one reason why a larger proportion of cases recover in a hospital than in the homes of the lower and lower middle classes is that there is always a free current of air in the ward, and too often a stuffy, used-up atmosphere in the home. Inhalation of oxygen may be a substitute for this, but it is a poor one. Oxygen is probably of most use in those cases in which respiration is very feeble, and the possibility of introducing enough fresh air on the one hand, or too much oxygen on the other, is therefore small. In a few cases it appears to be of service; more often it fails. When employed it should be warmed and diluted. Three yards of tubing and a reservoir bag should be used. Part of the tubing should lie in a basin of warm water, and the nozzle should not be held close to the mouth. Steam-kettles are worse than useless. The room should not be lighted by gas, since its products aggravate the cough.

Drugs have little influence over the course of pneumonia in childhood, except so far as they act as stimulants to the circulation or the respiration. These are needed at the first suspicion of respiratory or circulatory failure, as shown by the occurrence of cyanosis or an increase in the rapidity of breathing. They are especially needed in prolonged cases of the scattered pneumonic type. They comprise strychnine, ammonium carbonate, spirits of ether, sparteine, and alcohol. Expectorants are only of use when the accompanying bronchitis is an important feature of the case; otherwise they should be avoided.

Save your patient every possible source of alarm and fatigue. Caution the friends against exciting and exhausting the patient by new toys, and all the other attentions which, in their ill-informed devotion, they love to bestow. So large a proportion of cases recover that recourse should never be had to measures of doubtful utility. Be always on the look-out for the earliest sign of any complication. The desire to avoid worrying a patient is often a temptation to be slovenly in one's examination of an affected organ. I learned from Sir William Jenner an aphorism I never lose an opportunity of repeating: "More mistakes are due to want of examination than to want of knowledge."

By Ministerial decree, an inquiry has been ordered into the prevalence of measles and whooping-cough at German health resorts and watering places, with the object of formulating a system of preventive measures that will prevent outbreaks of these diseases during the bathing season.

Remarks

ON COMPLETE VOCAL REST DURING THE SANATORIUM TREATMENT OF LARYNGEAL TUBERCULOSIS.

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In a recent issue of the *BRITISH MEDICAL JOURNAL*,¹ Sir Felix Semon drew attention to the great value of absolute rest of the voice in the treatment of laryngeal tuberculosis. Since the date of the opening of the King Edward VII Sanatorium (July, 1906), all patients admitted suffering from laryngeal tuberculosis have been treated on the lines suggested by Sir Felix Semon, and, in view of the considerable proportion of consumptives who have laryngeal complications* and the measure of success which has resulted from our trial of complete vocal rest in their treatment, we think that the following report may be of interest.

The six patients whose progress under treatment we now record, had all well-marked tuberculous disease in the lungs, in addition to tuberculous disease in the larynx. They were all treated, generally, on the usual sanatorium principles; the laryngeal disease was especially treated by complete vocal rest, and in three cases periodic local applications of lactic acid were made.

As the possibility of carrying out the complete vocal rest treatment in sanatoriums. Considerable doubts have been expressed by many as to the possibility of persuading patients faithfully to carry out such an irksome treatment as complete silence for a period of several months continuously. The treatment, certainly, is very irksome to many, but in practice we have found that patients carry this out much better than might be expected. Several observers have stated that it is best to keep laryngeal cases, treated in this way, apart from other patients under treatment in a sanatorium. They have advised that a room be set apart where laryngeal cases can have meals together, and have recommended that these patients should always be sent out for their walks, either alone, or in company of each other, so that they should be less exposed to the temptation to talk. These measures, though necessary in some instances, are not in our experience indicated for the majority of patients with laryngeal disease. A tendency to introspection, depression and analysing of symptoms, which is apt to arise when consumptives are aggregated together in any number, is much lessened if patients are kept occupied and cheerful, and it is in practice found inadvisable to cut off certain patients from the general social life and amusements of the sanatorium if it can possibly be avoided. We allow most of our patients on the silence treatment to take their walks with patients who have no laryngeal disease, and also to have their meals at the general tables. Considerable care must, however, be exercised in this. The companions of the laryngeal cases on their walks, and their neighbours at meals, must be carefully chosen, for on them, almost as much as upon the laryngeal patients themselves, depends the efficient carrying out of the treatment. Companions of sound common sense are, indeed, a valuable asset to the patient on vocal rest, and to secure success the sanatorium physician must pay some particular attention to these patients' friends as well as to the patients themselves.

The silence treatment, carried out on these principles, is, we find, much less irksome than when the laryngeal patients are isolated, for these patients can, by signs and gestures, and with the aid of scribbling books or slates and

* Of the first 150 admissions to the King Edward VII Sanatorium 33 patients (or 22 per cent.) had some abnormal condition of the larynx. Of these 33 patients 21—that is, 14 per cent. of the first 150 admissions—had definite tuberculous disease of the larynx. The remaining 12 patients were suffering from general catarrh of the larynx, relaxation of the vocal cords, or some other abnormal condition not due to local tuberculosis—for example, one patient had complete paralysis of the left vocal cord, probably due to pressure of a gland on the recurrent laryngeal nerve. The proportion of patients suffering from definite laryngeal tuberculosis in the sanatorium at any one time has fluctuated between 10 per cent. and 20 per cent., the average number working out at 14 per cent.