

REFRESHER COURSE FOR GENERAL PRACTITIONERS

BRONCHOPNEUMONIA IN INFANCY

BY

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The introduction of the sulphonamides cannot be said to have revolutionized the treatment and prognosis of bronchopneumonia in infancy in the way it has affected lobar pneumonia. It is true that the outlook has been materially improved both by sulphonamides and penicillin, but bronchopneumonia is still a serious condition and warrants a guarded prognosis, particularly when it is secondary to measles or whooping-cough. It is important never to forget that our real aim should be to treat infants with bronchopneumonia and not bronchopneumonia in infants; the infant is so much more important than his lungs.

Diagnosis

The stethoscope plays but a small part in the diagnosis or prognosis of bronchopneumonia in infancy. It is the eye which determines the diagnosis—and the prognosis also. The decubitus, the facies, the cyanotic tinge, the working of the alae nasi and the other accessory muscles of respiration—these are the clues, and beside them the auscultatory findings are almost insignificant. If, with treatment, the infant's general condition improves and he becomes brighter, if he can smile and take his feeds, what does it matter whether bronchial breathing or rales persist in his chest or his temperature has still not fallen below 100° F. (37.8° C.)? If his general state is satisfactory his lungs may be left to look after themselves. This is of great importance when treatment is being considered, for there is still a tendency to continue chemotherapy as long as physical signs are present or there is pyrexia, irrespective of the general condition, and this may give rise to serious toxic complications.

Aetiology

The frequency of cystic fibrosis of the pancreas as a cause of recurring bronchopneumonia is being increasingly recognized, at least in hospital practice. It is well to bear this condition in mind, for the coeliac picture with fatty stools and distended abdomen may not appear till later—or, indeed, may not appear at all. Any infant with repeated attacks of bronchopneumonia should therefore be sent to hospital for investigation. Often more than one child in a family is affected, and a common misdiagnosis is that of tuberculosis. The clinical differentiation between these two conditions may be extremely difficult unless a Mantoux test is done and proves negative.

Differential Diagnosis

Atelectasis.—In the newborn period atelectasis is common and can rarely be differentiated with certainty from bronchopneumonia; in fact, they are often combined. Aspiration of amniotic fluid or of milk is the usual cause, particularly in premature infants.

Inanition Fever.—There is another condition occurring at this age-period which particularly needs to be recognized. That is dehydration fever, or inanition fever, for it may mimic bronchopneumonia very closely, and intensive treatment directed to the supposed bronchopneumonia may well lead to death. An infant aged 3 or 4 days suddenly develops high fever, grunting respirations and cyanosis,

and appears extremely ill. Signs in the chest are notoriously difficult to elicit clearly at this age, and the unwary may well think it advisable to play for safety and assume the presence of a bronchopneumonia and treat it accordingly. Sulphonamides or penicillin, or both, are prescribed, and probably added warmth is provided in the cot. As the temperature does not subside therapy is applied with increased vigour and the condition deteriorates rapidly. All that is required for treatment is water; chemotherapy is certainly contraindicated. The important diagnostic points are: first, to bear in mind that there is such a condition as dehydration fever occurring at this time, and that it occurs especially in big babies; secondly, that the fontanelle is depressed instead of bulging, as it tends to be in septic conditions; thirdly, that evidence of dehydration is present—the mouth is dry and the skin elasticity diminished; and, fourthly, there is always marked loss of weight. Giving water *ad libitum* by mouth, and glucose saline subcutaneously if necessary, will cause an immediate improvement in the condition.

Acidosis.—In later infancy acidosis from alimentary toxemia may present a differential diagnostic problem, but the type of breathing—the continued, deep, pauseless respiration—is not the same as in bronchopneumonia, and a history of preceding diarrhoea may be elicited.

Meningitis.—This condition, especially the sudden severe meningococcal invasion, is not infrequently mistaken for bronchopneumonia, and lumbar puncture may be necessary before the diagnosis can be determined with certainty.

Treatment

Home or Hospital?—The first thing to decide is whether the infant can be nursed at home or should go to hospital. There is seldom any question in a case of lobar pneumonia in a child, for that can safely be treated at home. In infancy, however, when bronchopneumonia predominates the decision is not so easy. It will depend of course on the home conditions and on the quality of nursing assistance available, but the age of the infant and whether he is breast-fed or weaned must also be considered. The severity of the illness should be taken into account, for oxygen is of the greatest value in the treatment of severe bronchopneumonia, and if it cannot be given in the home admission to hospital should be arranged.

If home treatment is decided upon, there is one important detail to be borne in mind. If possible, every infant who has had bronchopneumonia should have his chest radiographed before being considered "cured." So many cases of bronchiectasis in later childhood date back to an attack of bronchopneumonia with incomplete resolution. The only sure way of diminishing the incidence of this distressing condition is to see that every infant with bronchopneumonia has a radiologically clear chest at the conclusion of his treatment. In cases following whooping-cough or measles this is even more important.

Feeding.—The infant's general condition is the outstanding consideration. His feeds, therefore, play a prominent part in his treatment. They should be small in

volume and given at frequent intervals. If he is breast-fed he may continue, if not too ill. If he was previously on a four-hourly regime, however, it may be wiser to make this three-hourly, as feeding will necessarily be for a shorter time, perhaps only five minutes. If he is breast-fed but too ill to go to the breast the milk should be expressed and given by bottle, spoon, or gavage; if he is artificially fed a similar regime may be used. In any case, extra water may be offered between feeds if the infant is awake and restless or thirsty. The actual caloric intake is of less moment than the total fluid intake.

Hygiene.—Two important prognostic points are the state of the mouth and the state of the abdomen—a dirty mouth or a distended abdomen renders the outlook extremely grave. The oral condition facilitates the aspiration of further bacteria, and a distended abdomen embarrasses the heart, raises the diaphragm, lessens the thoracic capacity, and tends to produce collapse of the lung. Either state is more easily prevented than cured, so that great care should be taken to ensure continual cleanliness of the mouth and to prevent abdominal distension. The earlier the treatment is begun the less likelihood there is of distension. At the first sign an enema should be given, and if this does not bring prompt relief “prostigmin” 0.5 to 1 ml. of a 1:4,000 solution should be given subcutaneously and repeated in three hours if necessary.

The posture to be adopted may be determined by the infant himself. Some are more comfortable when propped up, others when lying flat. There is no “routine position” to be employed in every case. Abundant fresh air night and day, without draughts; loose clothes, both on the infant and on the bed; the avoidance of anything which will tend to embarrass respiration, such as poultices or pneumonia jackets, are all important practical points in nursing.

Drugs.—“Medicines,” in the lay sense of the term, play little part in treatment. Expectorants are valueless. Occasionally, if the cough is troublesome and the infant restless, relief may follow a sedative linctus such as

Linctus Scillae Opiatus }
Syr. Cocillanae Co. } āā 5–10 min. (0.3–0.6 ml.)

according to age, given as often as necessary. “Opening medicine” is contraindicated. If the bowels are constipated a small enema may be given. The risks, in infancy, of causing diarrhoea by giving a purgative are much more serious than allowing constipation to continue. Castor oil should never be given. If an analeptic is necessary, “transpulmin” in doses of 5–7 min. (0.3–0.62 ml.) four-hourly or p.r.n. is perhaps the most valuable cardio-respiratory stimulant.

Chemotherapy

Because of the difficulty of getting sputum from an infant it is seldom practicable to have the infecting organism typed. Therapy must therefore be based to some extent on the presence of the most likely organism, because in severe cases treatment is a matter of urgency and to wait for bacteriological confirmation is to waste valuable time. The pneumococcus becomes the most frequent organism as age advances, but in early infancy the staphylococcus is almost as common, and in the neonatal period *B. coli* is frequently responsible. The first will respond to sulphonamides, the second to penicillin, and the third to streptomycin. *Haemophilus influenzae* is sometimes the causative organism. This responds either to sulphadiazine or to streptomycin, and is best treated by a combination of the two.

Choice of Drug.—A selection of chemotherapeutic agents is thus available. Which to choose? The sulphonamides

offer the obvious advantage of being effective by mouth, but they are of little value in staphylococcal infections. If cough is troublesome these drugs are liable to be vomited and the quantity absorbed becomes uncertain. With the newer penicillin products injections need not be given more often than twelve-hourly. If the penicillin depot technique is used, one injection daily of procaine penicillin G in 2% aluminium monostearate in oil may be found sufficient. On general principles, therefore, penicillin would seem to be the drug of choice.

Whatever drug is selected, it is most important to give the maximum dose at the earliest possible moment. In lobar pneumonia the whole treatment may be given in one dose with very successful results, but unfortunately in bronchopneumonia this ideal has not yet been reached. It is possible to give the greater part of the treatment in the first twenty-four hours, however, and this should always be the practitioner's aim.

Penicillin.—Penicillin is relatively non-toxic, so that it is better to give too much than too little. At 1 month of age 100,000 units, at 3 months 250,000 units, and 500,000 units at 1 year are adequate doses for severe infections. They may be repeated in twelve hours if necessary and continued at the same interval on the second day. If the infecting organism is sensitive this dosage should be sufficient to overcome the infection. The infant's own powers of resistance now come into play and the natural phagocytotic processes will complete the cure. If the infant's general condition improves and continues improving the treatment has been successful and further injections are not necessary, even if his temperature is not absolutely normal. It takes the body three or four days to overcome the infection completely, but it can do this perfectly well without the aid of drugs if the initial dosage has been adequate.

Toxic effects of sulphonamides and antibiotics are seldom seen in this intensive therapy; it is when they are continued that complications arise. Drug fever, for example, which does not occur with this method, may be a cause of trouble if smaller doses have been given over longer periods. Skin rashes are more often encountered if treatment is prolonged, and the organism then has a greater chance of developing resistance to the drug. *H. influenzae*, for instance, may become resistant to streptomycin in a matter of hours.

Sulphonamides.—If sulphonamides are used they may well be mixed. Sulphadiazine, sulphamerazine, and sulphathiazole may be given in equal parts, and renal complications are then less likely to arise. It is important to watch for oliguria, which may often pass unnoticed in infancy.

The dose should vary with (1) the age of the infant and (2) the severity of the infection. The more severe the infection the larger will be the dose necessary to overcome it. At 1 month of age 0.25 g. of each of the above sulphonamides, 0.5 g. of each at 3 months, and 0.75 g. of each at 1 year would be adequate as an initial dose and may be repeated in two-thirds of these amounts in twelve hours if indicated. One-third of the initial dose may be given four-hourly thereafter for a further twenty-four or forty-eight hours. It should seldom be necessary to continue treatment after the third day.

Streptomycin.—In the presence of an epidemic of influenza, and when it may be fair to assume that *H. influenzae* is the infecting organism, an infant with bronchopneumonia should be given sulphadiazine in doses of 0.5 g. at 1 month, 1 g. at 3 months, and 1.5 g. at 1 year, together with 100,000–500,000 units of streptomycin as an initial dose,

followed by half this amount of sulphadiazine and one fourth of the amount of streptomycin at four-hourly intervals until improvement occurs. For the treatment of infection in the newborn, streptomycin is probably the drug of choice. An initial dose of 50,000 units (for a seven-pound (3-kg.) infant) may be followed by 25,000 units four-hourly. Improvement should be noticed within twenty-four hours, and the length of time that treatment should be continued after this will depend on the response and condition of the patient.

Aureomycin.—Further experience with aureomycin will probably lead to its inclusion in the group of chemotherapeutic drugs of particular value in the treatment of bronchopneumonia in infancy. Recent reports suggest that it is also of use in the prevention of the pulmonary complications of cystic fibrosis of the pancreas.

A routine course of treatment should not be prescribed. Each case varies, and dosage and frequency of treatment must be changed with the individual infant according to the severity of the infection, his reaction to it, and his response to treatment. A course of tablets or injections to be given four-hourly, irrespective of the response, is not a correct procedure. Any infant ill with bronchopneumonia should be seen at least once a day until he is judged to be out of danger. Any change of therapy or dosage may then be considered and put into effect till the next visit.

Complications.—A daily examination will also bring to light at the earliest moment any complication that may have arisen. Empyema or lung abscess may occur, though both are much rarer since the introduction of chemotherapy. The changes in the infant's general condition and in the physical signs in the chest are usually obvious. Acute otitis is less uncommon and should be borne in mind if the temperature rises a few days after the conclusion of the treatment. Apart from the temperature the only signs indicating this condition may be vomiting and diarrhoea, and their occurrence should immediately lead to an examination of the ears.

CAPITAL PUNISHMENT

THE B.M.A.'s EVIDENCE

The British Medical Association submitted evidence orally and in a memorandum on February 3 to the Royal Commission on Capital Punishment. The memorandum, which has been approved by the Council of the B.M.A., was prepared by a special committee appointed by the Council and comprising the following members: Dr. R. G. Gordon (chairman), Dr. E. A. Gregg, Sir Cyril Burt, Dr. Denis C. Carroll, Mr. Neville Faulks (barrister-at-law), Dr. J. A. Gorsky, Dr. T. Rowland Hill, Dr. H. L. Glyn Hughes, Dr. W. G. Masefield, Dr. Doris M. Odium, Dr. W. W. Sargent, Sir Sydney A. Smith, Dr. E. B. Strauss, and Dr. J. G. Thwaites. The following evidence was given in the memorandum, which is summarized here.

The M'Naghten Rules

According to the M'Naghten Rules, to establish a defence on the ground of insanity in a criminal case, "it must be clearly proved that, at the time of the committing of the act, the party accused was labouring under such a defect of reason, from disease of the mind, as not to know the nature and quality of the act he was doing, or, if he did know it, that he did not know he was doing what was wrong."

This formula has often been attacked on the ground that it takes account only of the cognitive faculties and is therefore based on an antiquated and outworn conception of mental disease. Instead of criticizing the M'Naghten Rules as embodying a conception of insanity which is obsolete, the Association

prefers to criticize them as embodying a conception of irresponsibility which, in the light of modern psychological knowledge, must be regarded as incomplete.

There are two arguments proposed by those who would retain the Rules in their present form. In the first place, it is suggested that they are not hard-and-fast rules which cannot in any way be extended in their application. This argument was used by the Lord Chancellor, Viscount Haldane, in the debate on the Criminal Responsibility (Trials) Bill, introduced in the House of Lords by Lord Darling in 1924. "I have never heard," he said, "of these rules embarrassing any judge who really had a case before him in which justice required an acquittal, or preventing him from giving such direction to a jury as would enable them to apply these rules in cases where they ought to be applied—in cases, for instance, where the impulse was so dominant as to deprive a person of freedom or of any realization of what he was doing."

It is true that, in varying degrees, judges have departed from the literal interpretation of the M'Naghten formula. An outstanding example is the case of Ronald True (1922), in which Mr. Justice McCardie said in his charge to the jury: "Even if the prisoner knew the physical nature of the act and that it was morally wrong and punishable by law, yet was by mental disease deprived of the power to control his actions, then the verdict should be 'Guilty, but insane.'" The learned judge found no support for this pronouncement when the case went to the Court of Criminal Appeal. There is no doubt that judges differ, and differ widely, in their use of the formula, some applying it rigidly in its literal meaning and others altering the meaning to such an extent that they may be said to ignore the formula rather than to interpret it.

What is open to doubt is whether the elasticity claimed by the Rules is an advantage. The contrary view was expressed by Mr. (later Sir) Fitzjames Stephen in commenting on the evidence given by other witnesses before the Select Committee on the Homicide Law Amendment Bill, 1874:

"Baron Bramwell thinks that the law of England is such that insanity hardly ever, under any circumstances, excuses a man from crime. . . . Mr. Justice Blackburn says, on the other hand, that the section drawn in the Bill pretty nearly represents the existing law as it is, and, if it errs, it errs in defect, because it does not take in certain cases which ought to be taken in. He adds that, in a particular case which he had to try, thinking that the existing law was, I suppose, in a very elastic condition, he took upon himself to tell the jury that there were exceptional cases which came under no rule, and that they ought to acquit the woman who was on her trial on the ground of insanity, although no authority could be found for it and although Baron Bramwell, an equal authority, considers that the woman under such circumstances ought not to be acquitted, as it was perfectly certain she was by law guilty. . . . When you find two learned judges of the highest eminence directly contradicting each other on matters of first importance, matters on which the life and death of persons tried before them might depend, and one of them praising that state of things as a proof of the elasticity of the common law, I can only say that I feel surprised, and cannot agree with that learned judge's praise of its elasticity."

The second argument advanced in opposition to any proposal to revise the M'Naghten Rules is that, when the Rules fail to exonerate a person who ought not to be held responsible to the law, the position is rectified by the statutory inquiry subsequently ordered by the Home Secretary, so that no injustice results. This argument seems to imply the view that it is just to condemn an accused person to death although the prisoner may be the only person in the court to whom it is not evident that the sentence will never be carried out.

Inexactitude of Rules

In neither of these arguments is it claimed that the M'Naghten Rules constitute an exact and unequivocal and complete statement of the conditions of criminal irresponsibility. In the first case the inexactness of the Rules is acknowledged, the claim being that, by reason of their inexactness, the judge can extend their application at his discretion to meet the circumstances of the individual case. The second argument frankly admits the imperfections of the Rules and claims merely that the resulting errors are subsequently rectified outside the court.