Current Practice

RESPIRATORY TRACT DISEASE

Diagnosis and Management of Pneumonia in the Aged

ELUNED WOODFORD-WILLIAMS,* B.SC., M.D., F.R.C.P.

Whether old people who become seriously ill can be treated at home or should be admitted to hospital depends on social circumstances as well as medical considerations. Most of them prefer to stay at home, and many become confused when taken away from their familiar surroundings; the confusion may need to be treated by sedation, which aggravates most illnesses of the aged and especially pneumonia. Another major hazard of institutional care is the exposure of these patients to unfamiliar and virulent organisms, such as *Staphylococcus aureus*, which may cause dangerous secondary infections. On the other hand, though many old people lack relatives or friends willing to nurse them during a serious illness, a doctor with a thorough knowledge of the local statutory and welfare services¹⁻³ can usually arrange for some of them to be treated at home, for with modern therapy the crisis may be over in two or three days.

In pneumonia in the aged early diagnosis is especially important, because the slow mobilization of defence mechanisms results in rapid advance of the disease process. Since pneumonia often occurs as an exacerbation of previous chronic pulmonary disease, and since the early symptoms may be slight or atypical, the basis of early diagnosis is an understanding of the natural history of the condition.

Aspiration Pneumonia

Though all types of pneumonia occur in old age, "aspiration pneumonias" are the most common. The secretions found in the upper respiratory tract or in the bronchi are not eliminated so efficiently in old age because of: (1) poor function of the cilia of the respiratory mucosa secondary to senile atrophy, prolonged low-grade infection, toxæmia, or as a side-effect of medical preparations such as some nasal sprays; (2) diminution of the cough and swallowing reflexes as part of the generally reduced reaction to stimuli in old age; and (3) ineffective expectoration due to weakened expiratory power caused by loss of elasticity of the lungs, calcification of the costal cartilages, and diminished muscular power.

Thus any condition which further interferes with or damages these already weakened defences will cause retention of aspirated fluids or of mucous secretions. There may also be retention of secretion behind an obstruction of a bronchus by a carcinoma or an inhaled foreign body. The accumulated secretions fill and block the bronchi, causing lobular or segmental collapse of the lung, which readily becomes infected. The broncho-pneumonic lesions so formed may be diffuse or localized.

Patients who are particularly vulnerable to this form of pneumonia include those suffering from chronic bronchitis, from disease of the heart, kidneys, or cerebral blood-vessels, or from malnutrition; those in whom consciousness is depressed

from any cause, including hypothermia and heavy sedation; and patients in a severe state of shock, or suffering from any condition resulting in immobilization. Other predisposing factors are local limitation of chest movement due to rib injuries, and the greatly increased risks of aspiration of food and mucus which are associated with mechanical or functional disorders of swallowing, such as occur in bulbar palsy and Parkinsonism.

In aspiration pneumonias the organisms responsible are usually those which are commonly saprophytic in the upper respiratory passages such as pneumococci, *Haemophilus influenzae*, or streptococci; secondary invasion by *Staph. aureus* is an ever-present danger in elderly patients, with the highest risk in institutional cases.

Specific Pneumonias

Lobar pneumonia caused by a specific organism, such as *Streptococcus pneumoniae*, is not seen as frequently in old age as is aspiration pneumonia, but when it does occur the course is atypical. Staphylococcal invasion usually follows an infection with *H. influenzae*. This combination is very dangerous in old people, and in the debilitated causes severe shock with cyanosis and prostration: lung abscess is not unusual if the patient survives.

A rare virulent pneumonia occurring in old age rather than in youth is that due to Friedländer's bacillus. It is characterized by cherry-red sputum, lobar suppuration, and necrosis with cavity formation. Tuberculous pneumonia, not quite so rare, should be suspected in any patient who fails to respond to treatment, particularly in old men who have suffered for years from chronic cough or peptic ulceration. Old people who have been on antibiotic therapy sometimes develop pneumonia due to *Candida albicans*. The history and the presence of thrush in the mouth and pharynx should lead one to suspect this possibility.

Symptoms and Signs

Except in robust individuals it is unusual for pneumonia in old people to follow the classical course seen in the young. The illness usually follows a complex pattern, which is due to the presence of multiple disease and senile alteration of the physical responses. Breakdown in the pulmonary system not infrequently tips the balance between compensation and failure in another system, so that the presenting features of pneumonia in the aged are often those arising in another organ. Thus the onset of decompensation in pre-existing heart, renal, or central nervous disease may completely overshadow the causal pneumonia, which is suspected only later when the patient fails to respond to treatment or produces purulent sputum.

Even when other organs are not grossly affected the disease may still present atypically with symptoms of cerebral anoxia

* Consultant Physician, Department of Geriatric Medicine, General Hospital, Sunderland.

such as mental confusion, restlessness, reversal of sleep rhythm, and cerebral irritation; or with transient weakness in the upper or lower limbs, or even hemiplegia. The onset may be heralded by a fall, particularly out of bed at night, or a feeling of faintness or dizziness. Sometimes the old person just feels tired and retires to bed with no specific complaints, or he may merely go off his food. In cold weather the patient may present with a hypothermic state. Only rarely is there complaint of cough or pleuritic pain, but breathlessness is more common. Sometimes there is pain in the shoulder due to diaphragmatic pleurisy, and when this pain is referred down the arm it may be confused with angina.

The physical signs are characteristically minimal and tend to be obscured by the signs of other disease; but there is usually an increase in respiration rate, which may indeed be the only clue to the presence of pneumonia. It is important to look for this sign, which together with an increased pulse rate, slight cyanosis, or the appearance of toxæmia with a dry tongue, is sufficient to point to a diagnosis. The temperature may never rise much above normal throughout the whole illness. Physical signs in the chest may be obscured by emphysema, so that the signs of consolidation are usually absent, though a few crepitations both fine and coarse may be present. These are of greater significance if scattered throughout the lung fields.

Management in the Home

Treatment of the Bacterial Infection

This must be prompt and vigorous if it is to be effective. Bacteriological examination should be made of the sputum if available, or, if not, of a post-natal swab; and the sensitivity of the organisms against antibiotics should be assessed. It is usually necessary to start treatment before the results are available 48 hours later. Penicillin G is still the safest and most effective antibiotic to use against most organisms found in people living at home. It is important always to inquire whether the patient has had penicillin before with adverse effects, because of the danger of allergic reactions. Large doses of crystalline penicillin should be given: 1–2 mega units intramuscularly four times daily. If such frequent injections are impossible a combination of crystalline penicillin with procaine penicillin (procaine penicillin injection fortified B.P.) may be used in a dose of $\frac{1}{2}$ –1 mega unit twice daily. Additionally, in severe cases, streptomycin, 0.5 g. intramuscularly twice daily, should be given for four or five days—in this dosage damage to the eighth nerve is rare. If the patient is clearly responding to treatment after two or three days' penicillin V (phenoxymethylpenicillin) tabs., 250 mg., four-hourly may be substituted. Should there be no response to penicillin within three days the organisms are probably resistant. In this case the report on the sputum sensitivity should now be available and should indicate which antibiotic to use. If the sputum examination has been postponed until this stage, the delay of a further 48 hours could prove fatal.

Patients with chronic bronchitis who have had penicillin before or those who have been previously treated in hospital often harbour resistant organisms. In this event tabs. tetracycline, 250 mg., four times a day should be prescribed at the onset. In severe cases intramuscular injection of oxytetracycline and procaine, 100 mg. four times a day, is more effective, but has the disadvantage of having to be kept at a temperature not exceeding 4° C. and having to be used within five days of preparation. Suppression of the normal intestinal bacteria by broad-spectrum antibiotics may provoke enteritis due to *C. albicans*. To prevent this it is usual to change the flora of the intestinal tract by giving a preparation containing lactobacillus, such as yoghurt, or one of the proprietary alternatives available. The combination of tetracycline, 250–500 mg., with nystatin, 250,000–500,000 units, four times daily, is a useful

preparation in debilitated subjects where diarrhoea would be dangerous. While giving tetracycline there is some degree of suppression of vitamin-B formation in the intestine, so a vitamin-B preparation should be added. The synergistic action of tetracycline and novobiocin (250 mg. of each) three to four times daily is also well established, particularly in epidemic influenza complicated by staphylococcal pneumonia. The chosen regimen should always be continued for at least five days when the response is satisfactory. It is at present undesirable to use chloramphenicol or the newer penicillins cloxacillin and ampicillin, erythromycin, lincomycin, or fusidic acid unless they are specifically indicated by sensitivity tests. In cases of previous lung damage or when the patient's recovery is slow the antibiotics (except chloramphenicol or streptomycin) may be continued for a further few days to prevent relapse. If there is no response to a drug to which the organisms are sensitive the possibility of carcinoma of the lung, tuberculosis, or suppuration in the chest should be considered. If the antibiotic is being given orally lack of response may simply be due to failure to take the tablets consistently. When shock is present intramuscular injections are not efficiently absorbed and the antibiotics must be given intravenously.

Anoxia

The vital organs of most elderly patients with pneumonia become depressed because of anoxia. This results in confusion or cardiac or renal failure. Oxygen and packs containing a flowmeter and a disposable polythene mask to provide up to 40% oxygen concentration should be prescribed (on E.C.10). Usually rates of about 4 litres per minute are required. Most chemists who supply this equipment provide a personal service and will give instruction to relations on the use of oxygen in the home.

In subjects who develop bronchopneumonia secondary to chronic bronchitis cyanosis and carbon-dioxide retention may be extreme because of the co-existence of emphysema with the pulmonary consolidation. The respiratory centre may become depressed by bacterial toxæmia, by the severe anoxia and gross retention of carbon dioxide, and perhaps by sedative drugs. Respiration is then kept going by the response of the aortic and carotid oxygen receptors to anoxia. In these circumstances oxygen must be used with care, for the sudden relief of anoxia reduces the stimulus to these oxygen receptors and so depresses respiratory movement further; the blood CO₂ then rises to even higher levels despite oxygenation being temporarily improved. Such an increase in blood CO₂ leads to increased cerebral blood flow, raised C.S.F. pressure, papilloedema, headache, and restlessness, proceeding to coma and death. The combination of a comatose state with cyanosis in bronchopneumonia is often indicative of this extreme retention of CO₂. This disaster can be avoided if oxygen is first given at rates of flow of two litres/minute (25–30% O₂) so that the anoxia is only partly relieved. Respiration is then maintained by the aortic receptors till the respiratory centre has time to recover. Ventilation also may be improved—except in extreme cases—by stimulating the respiratory centre with nikethamide 5–8 ml. intravenously. Though this adverse reaction to oxygen therapy is not very common, it is important because of the fatal result of failure to recognize it. This possibility must be remembered in severely cyanosed patients if, during administration of oxygen, the respiratory rate and depth decrease without improvement in the other symptoms of respiratory impairment. A special disposable mask with an open centre or Venturi device should be prescribed in these cases (on E.C.10) to allow low rates of oxygen flow by using air instead of rebreathing to make up the required respiratory volume.*

Dehydration

Water deficiency develops very rapidly and insidiously in elderly subjects and when the patient will not take adequate amounts by mouth tap-water should be given by rectum or by intragastric tube. Between three and four litres is needed each 24 hours till rehydration is complete. A useful container for rectal infusion is the disposable Sterilon enema bag. Once the patient will accept fluids by mouth they should be given at least two-hourly—it is not enough to leave a supply by the bedside. Elderly patients run considerable risk of developing renal failure when dehydration is combined with anoxia and a fall in blood-pressure due to cardiac failure. The uraemia which follows is likely to overwhelm the defence mechanisms.

Bronchospasm

Bronchospasm also increases hypoxia and may be especially troublesome in sufferers from chronic bronchitis. When it is severe an intravenous injection of aminophylline, 250 mg. in 10 ml. of water, should be given over a period of ten minutes. Two aminophylline suppositories *B.N.F.* can be tried in milder cases, but these may cause rectal irritation and cannot be used for long periods. After the initial injection of aminophylline it is often possible to control the bronchospasm with choline theophyllinate, which has the advantage over ephedrine in males of not causing retention of urine. Bronchospasm may also be diminished by steam inhalation with benzoin or other inhalations, and one must be guided by the patient's previous experience with these methods. When pneumonia is associated with status asthmaticus, or where there is prostration, hydrocortisone hemisuccinate, 100 mg. intravenously, may tide the patient over the journey to hospital. In such cases it is particularly important to inform the hospital what treatment has been given. Tracheostomy or the introduction of a cuffed endotracheal tube is necessary on rare occasions.

Heart Failure

When heart failure occurs it should be controlled with digoxin and diuretics immediately, because the decompensation aggravates the effects of respiratory failure. Because of increased sensitivity and decreased elimination in old age, the dose of digoxin needs to be reduced to 0.25 mg. three times daily for two to three days, then twice daily, or daily, according to the response.

Sleeplessness and Confusion

The derivatives of chloral hydrate, dichloralphenazone, 1,200 mg., or glutethimide *B.P.* tabs., 250–500 mg., are the safest hypnotics in aged patients with pneumonia because they have little effect on the respiratory centre. Alcohol is a useful sedative if the patient is used to it, and is strongly indicated in alcoholics because they may develop delirium tremens if suddenly deprived while they have an infection. Barbiturates, bromides, and morphine are contraindicated because they depress the respiratory centre and aggravate the confusion and restlessness by increasing the hypoxia.

Once the heart failure, infection, and bronchospasm are under control, the anoxia should be relieved and the confusion usually clears up, particularly when the patient is in his own surroundings. If sedation is still needed paraldehyde, 5–10 ml., or chlorpromazine, 25–75 mg., should be given intramuscularly.

Pain and Cough

Pleuritic pain is not often severe and usually requires only a simple analgesic such as paracetamol, 500 or 1,000 mg., and

the local application of heat. An irritating ineffective cough preventing sleep can also be relieved by simple means such as linctus codeine *B.P.C.*, linctus squill opiate *B.P.C.*, or Dover's powder. Where the mucus is tenacious sodium chloride compound mixture *B.P.C.*, $\frac{1}{2}$ fl. oz. (14 ml.) in a tumblerful of hot water, should be taken slowly first thing in the morning and at night. This is particularly useful for stimulating expectoration.

General Nursing Care

It is important that the patient should have as much physical and mental rest as possible. He should be nursed in a semi-sitting position, which means that a bed-rest must be supplied or improvised. Here the local health authority district nurses and health visitors can be of great help, not only in advising the family on how best to nurse the patient but also by ensuring that the equipment required is made available. Occasionally some patients are more comfortable in an upholstered chair than in bed. This is a great advantage in very obese patients, as it facilitates attention to the bladder and bowels. In whatever position they are nursed they should be moved regularly to avoid bed-sores and pulmonary stasis. The heels should be protected from pressure on the mattress by placing them on Lennard's pads,⁵ and from the bedclothes by using a bedcage. A urinal or commode can be borrowed from the local authority or one of the voluntary organizations.

The diet should be easily digested and not bulky. It is more important to ensure that enough fluid is taken to maintain a good urinary output than to force food on a reluctant patient. The patient should be encouraged to cough and take deep breaths at regular intervals. He may be allowed out of bed for short periods as soon as possible after the antibiotic has controlled the infection, usually about the third day. When he is able to travel an x-ray examination should be made, and this is especially important when improvement has been slow. Sputum examination for tubercle bacilli or malignant cells may also be indicated at this stage.

Late Complications

Late complications of pneumonia are uncommon if the condition is treated promptly. A pleural effusion should be suspected when the patient's breathing becomes laboured, even in the absence of an impaired percussion note; empyema is uncommon when antibiotics have been given.

Pericarditis with or without effusion is a serious complication in patients with cor pulmonale. These patients usually suffer precordial oppression, gross cyanosis, and tachycardia, and are usually too ill to complain of symptoms. When such a subject comes to necropsy a haemopericardium may also be found.

Late heart failure may also occur about the third week of convalescence, and is often associated with the development of an arrhythmia. Sometimes a demonstrable cardiac infarction occurs, and cerebral infarction with hemiplegia is also seen at about this stage of convalescence. These complications seem usually to arise when there has been much toxæmia and the blood-pressure has been low. It is important to keep watch on the blood-pressure throughout the illness; only when the level is well sustained should the patient be allowed to do much for himself. Prolonged dehydration may be presumed to increase the tendency to infarction and should be avoided for this and other reasons.

Watch should also be kept on haemoglobin levels, which fall in any infection in old age. A rise is a good indicator of recovery, while continued fall should draw attention to the possibility of persistent infection or renal failure.

Statutory and Voluntary Services Available for the Elderly at Home

Most old patients with pneumonia treated at home will clearly require help from outside the immediate family circle, which may indeed consist only of the elderly spouse. Friendly neighbours are often prepared to assist for two or three days while help is being sought from the statutory and voluntary services available locally. Some local authorities issue useful booklets detailing the services provided by their health and welfare departments. Services vary from one authority to another, but those which are generally provided are as follows:

Health visitors, who pay routine visits to the elderly at home and may also be called upon to advise on any special problems of nursing the elderly sick at home.

Home nurses or district nurses, who will provide in the home specific treatment such as injections and enemas or help with the patient's general care and perform such duties as bathing. Provision is also made by local authorities for the supply of home-nursing equipment such as bed-rests, bed-pans, rubber sheeting, and other items which may be specially requested. Some also provide laundry services or a laundry allowance.

Home helps, who will cope with household duties. A standard charge is usually made, but this may be reduced or cancelled according to the patient's financial circumstances. There is usually a shortage of home helps because of difficulty with recruitment.

Good neighbour schemes are run by some health departments, and "meals on wheels" or an "invalid meals" service may be available.³

There are powers under Section 47 of the National Assistance Act, 1948,⁶ for compulsory removal to hostel or hospital, on a magistrate's order, of any patient who is neglected and living in insanitary conditions. The powers of this Act are more widely interpreted in some areas than others, but their existence is certainly worth knowing of when a patient refuses to leave his home in spite of the impossibility of providing adequate treatment there.

The National Assistance Board may give additional grants for extra coal, bedding, clothing, special diets, and other requirements of the sick. Officers of the board will visit the home if

requested, and usually give very sympathetic consideration to such financial problems.

The level of voluntary effort naturally varies even more than that of local authority assistance, and doctors should inform themselves about the services available. They are in a strong position to stimulate the introduction of new services where they find that the needs of the sick are not being met. The value of voluntary work is that it is more flexible and more personal than statutorily provided services. When the latter prove unable to cope with any specific problem help may be obtained by asking old people's welfare committees, the Red Cross, the W.V.S., the Salvation Army, the local churches, or bodies such as the Chest and Heart Association, which deal with special disabilities. The Animal Welfare League will help with the common problem of caring for pets while their owner is sick.

The circumstances of the aged patient with pneumonia provide the general practitioner with an opportunity to give a service which is specially valuable to his patient and rewarding to himself. If he decides to treat his patient at home he will undertake a considerable burden which he might be able to avoid by simply telephoning the hospital-bed bureau, but he will certainly enjoy a personal relationship and an exercise of his skills which will to some extent balance the petty frustrations of so much of his other work.

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"Health Centres and Group Practices."—This booklet (price 3s. 6d. including postage), based on recent articles in the *B.M.J.* and with an introduction by Lord Cohen of Birkenhead, is now available from the Publishing Manager, *British Medical Journal*, B.M.A. House, Tavistock Square, London W.C.1.

ANY QUESTIONS?

We publish below a selection of questions and answers of general interest.

Hypoventilation Syndrome after Head Injury

Q.—Have any cases of hypoventilation syndrome as a result of head injury been described?

A.—Two meanings could be given to the term "hypoventilation syndrome." First, an acute condition following directly after a head injury, or, secondly, a chronic condition persisting indefinitely and becoming obvious only when the patient had otherwise apparently recovered from the trauma.

The first condition is part of the well-recognized hazard of respiratory insufficiency resulting at the time of the accident. A recent leading article in this journal,¹ which summarized the anaesthetist's role in early management of head injuries, stressed the need for facilities for measuring arterial oxygen and carbon dioxide tensions in centres dealing with head injuries, so that this serious complication was not overlooked.

The second condition is presumably the one to which the question refers—namely, a state of chronic alveolar underventilation in patients who are not obese and who have no obvious lung disease to account for their underventilation. McNicol and Pride² reported four such patients who tended to have periods of drowsiness and episodes of apnoea, but in none of them was there a previous history of head injury. McNicol and Pride reviewed the literature and showed that their patients resembled about 10 others previously described, all but one of whom had been men between the ages of 30 and 60 years.

The aetiology of the syndrome is probably diverse, but there is probably good clinical reason to suggest a neurological lesion in the medulla. I would think, on first principles, that such a lesion must occasionally arise as the result of head injury. However, although I and four or five experts in this field whom I have consulted think this must be so, none

of us knows any specific published reference to such a case.

Gillam and Mymin³ describe a similar patient who was rather obese and who had a head injury in childhood, but the causal relationship was not convincing. In neither McNicol and Pride's review nor in the other review by Fraser, Sproule, and Dvorkin⁴ can I find any specific mention of head injury as an aetiological agent in this interesting condition, though I presume it must be a cause of occasional cases.

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Convalescence after Infectious Hepatitis

Q.—Does the nature of the patient's work affect the length of convalescence recommended after infectious hepatitis? When may most patients resume drinking alcohol?

A.—Like any other disease, infectious hepatitis may be accompanied or followed by