Chest physiotherapy

May be harmful in some patients

Chest physiotherapy in the form of postural drainage, percussion, and vibration is carried out in the hope that removing secretions will improve respiratory function and prevent collapse of the lung. One of the earliest papers advocating chest physiotherapy appeared in 1915 and was an uncontrolled study conveying only subjective impressions about the recovery of patients. By the time objective data became available chest physiotherapy was already widely used. Yet several controlled trials have shown that the benefits are far from clearcut and that harm may be done to some patients. The widespread use of chest physiotherapy has thus been questioned, and attempts have been made to clarify its place in patients with both acute and chronic respiratory problems.

Studies that show the value of physiotherapy have usually been conducted in patients who produce excessive sputum—more than 30 ml daily. Postural drainage, percussion, and vibration produced improvements in either lung function tests or the amount of sputum expectorated. Bateman et al claimed that physiotherapy cleared radioaerosol particles from all compartments of the lung, including the periphery. Their use of the term periphery was, however, misleading as it referred to the lateral 40% of the area on an isotope scan and thus included parts of the main bronchi.

Several studies have shown that chest physiotherapy was either not useful or positively harmful in patients who did not produce excessive sputum. For example, patients with an acute exacerbation of chronic bronchitis but without copious sputum production were monitored for changes in the volume of sputum expectorated daily, temperature, and arterial blood gas tensions. There was no difference between controls and those given physiotherapy. Physiotherapy in similar patients either has no effect on lung function tests or causes a fall in the forced expiratory volume in one second. Campbell et al postulated that postural drainage, percussion, and vibration induced bronchospasm, and by giving a β2 agonist before physiotherapy they were able to blunt the decrease in the forced expiratory volume in one second. Wollmer et al used a radioaerosol technique to show that chest percussion did not enhance particle clearance from either central or peripheral lung compartments.

That postural drainage, percussion, and vibration are unlikely to clear secretions from the lung periphery has been confirmed by studies of patients with acute primary pneumonia. Graham and Bradley found no difference in the speed of resolution of signs on chest radiographs or duration of fever or hospital stay between a control group and a group given physiotherapy. In the other study regular chest physiotherapy prolonged the duration of fever and increased the hospital stay of patients when compared with advice on expectoration and deep breathing.

Further evidence that physiotherapy is most effective at clearing secretions from the main bronchi has come from a study of patients with acute lobar collapse. The success rate in regaining lung volume was strongly related to whether there was an air bronchogram: the resolution rate was only a quarter with a bronchogram compared with almost 90% with no bronchogram. The explanation was that with such a bronchogram there was distal collapse but no sputum plug, whereas no bronchogram meant that sputum had blocked a bronchus and caused secondary collapse.

Coughing exercises are as effective as postural drainage, percussion, and vibration in clearing sputum from patients with cystic fibrosis. In patients with chronic bronchitis coughing exercises have been investigated with radioaerosol techniques and have produced as much central lung clearance as physiotherapy and greater total clearance than no treatment. One of the mechanisms by which cough affects sputum clearance is known as “two phase gas-liquid flow”—the transfer of momentum and energy from the high speed flow of air to the mucus that lines the bronchi. The high transmural pressures produced during coughing lead, however, to dynamic compression of the airways, which may inhibit mucociliary clearance. The “forced expiration technique” was introduced to circumvent this problem and requires the patient to expire forcefully from middle to low lung volumes while maintaining an open glottis. In patients with chronic bronchitis who produce copious sputum this technique has led to greater clearance of inhaled radio labelled particles than both regimented coughing and percussion and vibratory exercises. The amount of sputum obtained was further increased when the technique was combined with postural drainage. In this combination the technique also cleared more sputum and in less time than conventional physiotherapy in patients with cystic fibrosis. These patients can practise the forced expiration technique without having to rely on others for assistance.

Enhancing sputum production in patients with respiratory disease is a desirable aim, even though the long term benefits are uncertain. Several studies have, however, highlighted the
Control of meningococcal disease

Chemophylaxis for carriers and some contact groups

Though small, the risk of meningococcal infection in household contacts of a patient with the disease is significantly greater in the general population.1 Two studies published this week (p 555 and p 569) confirm this, adding that, though the risk is greatest within the first few days after contact,1 it may persist for several months.

There are two possible chemophylactic strategies for managing this increased risk. Firstly, phenoxymethylpenicillin is offered to close contacts for seven days. A Norwegian study has shown that, though this regimen was protective for the duration of treatment, subsequent household cases occurred later, presumably because of a continued exposure to the carrier, who may have been the source of infection in the index case.1 Secondly, the alternative strategy (which we recommend) is to try to eliminate the carriage of meningococci in the close contacts to reduce transmission to susceptible people.2,7

Sulphonamides have been used to reduce transmission, but many of the strains producing disease in the United Kingdom are resistant, and consequently rifampicin is the best antibiotic to use (adults 600 mg every 12 hours for two days; children aged over 1 year 10 mg/kg every 12 hours for two days; children below 1 year 5 mg/kg every 12 hours for two days). Ciprofloxacin as a single oral dose of 500 mg is an alternative for adults but is not yet licensed in the United Kingdom for children and adolescents. Ceftriaxone in a single dose of 250 mg intramuscularly is also effective and is not contraindicated in pregnancy.4

Rifampicin should be offered as soon as possible (and ideally simultaneously) to those living with the patient, to anybody who has kissed the patient in the 10 days before admission, and to convalescent patients before discharge from hospital. Contacts receiving rifampicin must be told about its side effects: discoloration of soft contact lenses; interaction with oral contraceptives; and colouring urine, saliva, and other body secretions orange red. These side effects are not contraindications.

Bacterial resistance to rifampicin may emerge after chemophylaxis and, as found by Cooke et al, secondary cases may be due to meningococcal strains resistant to rifampicin. By using this antibiotic to the secure contacts known to be at increased risk. Infection among hospital staff contacts of cases of meningococcal meningitis or septicaemia is rare, and such contacts are considered to be at increased risk and to require prophylaxis only if mouth to mouth contact has occurred. (The possible nosocomial spread from a patient with a respiratory tract infection reported by Eriksen and colleagues (p 568) arose out of an unusual set of circumstances.) School contacts do not require chemophylaxis unless more than one related case occurs in the school. Nevertheless, special circumstances may justify the wider use of chemophylaxis, such as the attendance of the index case in the 10 days before the onset of the illness at a party at which young children or teenagers are present or at a nursery school or day care centre, which may resemble a "household" setting. Taking swabs from the household and

References

2 MacMahon C. Breathing and physical exercises for use in cases of wounds in the pleura, lung and diaphragm. Lancet 1915;i:269-70.

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