

## BREATHING EXERCISES—PLEASE!

BY GLADYS M. STOREY, S.R.N., F.C.S.P.

(Istituto di Patologia Chirurgica della Università di Torino.  
Centro di Chirurgia Toraco-Polmonare)

Many years ago, someone (not a chest physiotherapist) said to me: "Chest physiotherapy . . . How dull . . . Fancy telling people to breathe in and breathe out all day long. . . ." She was rather surprised when I said that I found it one of the most rewarding branches of our work and pointed out that without a limb, for example, we can live reasonably normal lives, but without breath we are in a sorry state!

The work of the chest physiotherapist falls into two main groups—Medical and Surgical—but both of these revolve round the problems of abnormal bronchial secretions and associated inefficient respiration.

There are several factors which may influence the patient's ability to breathe properly. Briefly they are:

1. The costo-vertebral joints may become stiff with age or disease.
2. The bronchial tubes may become narrowed or obstructed by diseases such as asthma or neoplasm or by excessive bronchial secretions.
3. There may be a reduction in the amount of available lung tissue as in pulmonary collapse due to pleural effusion or pneumothorax, or to the pathological changes which may occur in conditions such as emphysema or silicosis.
4. There may be a paralysis of the muscles of respiration, which, if not fatal, may cause serious difficulty. If the diaphragm is paralysed the paradoxical movement produced will lead to inadequate ventilation, on the other hand, if the muscles of the chest wall are paralysed, the diaphragm, assisted by the abdominal wall, may maintain adequate ventilation in spite of a certain amount of abnormal movement. If all the muscles of respiration are paralysed the abdominal muscles can be trained to maintain adequate ventilation, but it is purely a voluntary movement and will never become involuntary.
5. Paradoxical movement produced by a loss of stability of part of the chest wall following thoracoplasty or chest trauma, when several ribs have been fractured in more than one place, results in a to and fro movement of the mediastinum, causing serious embarrassment to the heart and great vessels as well as the displacement of air from one lung to the other. A similar state of affairs occurs when an open pneumothorax is present.
6. Tension, produced by fear or pain, reduces the ability of the patient to let his muscles of inspiration relax and so allow expiration to take place.

### THE MEDICAL PATIENTS

The patient with respiratory insufficiency, whether due to asthma or emphysema, with its frequently associated chronic bronchitis, presents, in varying degrees, the classical picture: short frequent respirations at the upper limit of inspiration—each inspiration being achieved with the aid of the accessory muscles of inspiration; the hands are usually on the knees or the arms of the chair with the elbows in such a position that the pectoral muscles, working with reversed origin and insertion, are able to assist the elevation of the upper ribs and sternum. Often these respirations are associated with the opening of the mouth during inspiration and the closing during expiration (rather like a fish out of water). The antero-posterior diameter of the chest is increased, the

abdominal wall is lax and there is general lack of muscle tone—apart from the neck and shoulder girdle muscles which are invariably in tension.

Such patients with breathing difficulties present problems of varying degrees of severity, which may be classified under the headings—psychological, social and medical.

**Psychological.** The person who, while sitting quietly in a chair, appears to be a reasonably healthy individual but becomes dyspnoeic on the slightest exertion or says that he is unable to do even odd jobs is often considered by his, so-called, friends to be person who does not want to work—with all its psychological disturbances—because the majority of these patients would be very willing to work if they had the breath to do so. It is very degrading for a comparatively young person to be dependent on other people for both physical and financial help.

**Social.** The asthmatic or emphysematous patient who lives in an upper floor flat where there is no lift, finds himself confined to his flat or else starts seeking other accommodation with its associated additional expenditure.

The slightly less disabled person, who is still able to work, begins to get into difficulty with the arrival of Autumn and the colder, damper weather. With recurrent colds, influenza, bronchitis or even pneumonia, the number of days per month when he is capable of working diminish, and he eventually finds that he cannot be employed on a permanent basis. The subsequent loss of earning power will lead to loss of prestige, increase of nervous tension and, in many cases, to actual malnutrition.

**Medical.** The medical problem is an acute, but at the same time, a chronic one, because these patients—apart from the young asthmatics with no permanent lung changes—cannot be cured, but with the aid of various bronchodilators, anti-spasmodics and suitable antibiotics the patient may be helped enormously; but medicines alone are not enough—the patient must be re-educated in correct breathing.

The physician with an understanding of these patients' problems will select his words carefully and not tell the breathless patient to "run along to the gymnasium and do some breathing exercises"—the mention of the words 'gymnasium' and 'exercises' are enough to frighten some patients away from a most valuable adjunct to the drug therapy.

The physiotherapist whose duty it is to rehabilitate these patients must observe, analyse and clearly understand the abnormalities of the respiratory cycle, in order that she may be able to help the patient correct his mistakes and control his dyspnoea during the course of his everyday life without attracting the unwelcome attention of other people to his distress.

In any condition in which breathing is difficult, the natural tendency is to use the accessory muscles of inspiration, and this reduces the ability of the patient to breathe out. This must be carefully explained to the patient so that he may understand why he is being asked to relax and breathe out when he feels that he "cannot get his breath".

In conjunction with this relaxation the patient must be taught to control the movements of the various parts of his chest. First the upper part must be allowed to sink down as the air is sighed out through slightly pursed lips, then the lateral diameter of the chest is decreased; the physiotherapist placing her hands gently over the area where the movement is to take place. Thirdly, an upward movement of the diaphragm is achieved by the retraction of the abdominal wall during expiration. During the performance of these movements it is essential that the physiotherapist should keep a careful watch to ensure that the patient retains the relaxation previously obtained. Once the patient has learned to control the movements of expiration he should be taught to substitute basal expansion for the typical apical movement of inspiration.

These early instructions in relaxation and breathing control are given in the half-lying position, but the patient should be progressed as quickly as possible to control his breathing in as many different positions as possible, including lying and standing, and he should be encouraged to adapt them to the needs of his everyday life.

Exercises should then be given to mobilize the thorax and make the patient slightly breathless, followed immediately by breathing control in the position in which he finds himself breathless. Finally the patient must be taught to control his breathing while walking. Remembering that the expiratory phase in these patients is always longer than the inspiratory phase, the rhythm of their respiration must be adjusted accordingly.

The patient who has excessive bronchial secretions due to bronchiectasis, chronic bronchitis or, in a more localized form, a lung abscess, will be ordered postural drainage.

The object of *postural drainage* is to employ gravity and vibration to assist the excessive secretions from the insensitive periphery of the lung to the area of cough reflex from whence they may be cleared by coughing and expectoration. To achieve this, the patient is placed in such a position that the bronchus draining the affected segment is vertical (the exact position is determined by bronchography), then percussion applied to the posterior and lateral parts of the chest wall, followed by vibrations during prolonged expiration. The patient is then encouraged to cough. Over the anterior chest wall, only vibrations are given. Each of the affected segments is treated in turn and finally a brief treatment is given to unaffected side to ensure that there has been no 'spill-over'.

As soon as the "bronchial toilet" has been completed the patient must be given the breathing exercises as previously described.

All patients must be instructed to perform this selective postural drainage in their own homes at least twice a day and the physiotherapist must help the patient to adapt his furniture in order to obtain the correct position.

As most chronic bronchitis patients and many emphysematous ones have excessive bronchial secretions it is advisable to give a modified form of postural drainage, most usually in the side-lying position, before starting the relaxation and breathing exercises—there is no better way of destroying relaxation than a bout of coughing!

The postural drainage technique for the treatment of a *lung abscess varies slightly from that given to a patient suffering from chronic bronchiectasis*. The exact position must be selected with the aid of suitable X-rays and the bronchoscopy report. In the acute phase, vigorous percussion is contra-indicated; gentle vibrations are applied over the affected area during long expirations. As the acute phase passes, gentle percussion may be introduced, and increased in intensity as the condition improves. It may have to be continued for several weeks. Localized breathing exercises are of vital importance to maintain the mobility of the chest wall and underlying lung on the affected side.

### THE SURGICAL PATIENTS

*Before operation* the physiotherapist should get to know the patient, gain his confidence and instruct him in the breathing exercises, the coughing and the movements which he will be required to perform during his post-operative treatment. The breathing exercises will consist of exercises to improve the mobility of the various parts of the chest wall and consequently the efficiency of the underlying lung.

If the patient has much sputum it may be necessary to give a prolonged course of postural drainage in conjunction with the breathing exercises. Some surgeons like to have these patients in the position of selective postural drainage for 23 hours a day—they only sit up for meals—until the secretions expectorated have reached a consistently low level and the quality has improved and they are considered fit for surgery. Vigorous postural drainage should again be given

immediately before the anaesthetic to reduce the risk of 'spill-over' before intubation, and to provide the surgeon with an operation field as clean as possible.

A patient who is to have *bronchography* should be given postural drainage immediately before the examination to ensure that bronchial secretions do not impede the passage of the radio-opaque medium. As soon as the patient returns from the X-ray department he should again be given vigorous postural drainage to assist the expectoration of the medium which might otherwise mar future X-rays.

Patients suffering from pulmonary tuberculosis are only taught such breathing exercises as are necessary to acquire control of the movements of expiration with perhaps limited expansion movements of the unaffected lung. A careful record of these exercises must be kept in case there should be a deterioration in the condition of the patient.

*Some cardiac patients* may not be able to tolerate the increase in circulation rate produced by intensive breathing exercises and the treatment of such patients demands a full understanding of the cardiac lesion and the effects of the physical treatment.

The physiotherapist should realise that most patients fear chest surgery and appreciate the effect of his fear and tension on the individual. No two patients respond alike to this situation and the physiotherapist who can adapt her approach to suit the individual is the one who will be able to help the patient most.

The most important function of the physiotherapist in the *immediate post-operative period* is to try and restore efficient respiration as soon as possible. As a result of anaesthesia and retraction of the lung during operation, the quantity and viscosity of the bronchial secretions may be increased. The breathing exercises, previously taught, concentrating on expiration are of value in assisting these secretions from the insensitive periphery towards the area where the cough reflex will be effective. Coughing and expectoration are then encouraged and finally breathing exercises to increase expansion to all, especially basal, areas are performed.

After a thoracotomy, the physiotherapist should satisfy herself that, if an intercostal drainage tube has been inserted, it is functioning satisfactorily before and after treatment, since failure to drain the pleural space would embarrass respiration.

Following a thoracoplasty the stability of the chest wall must be controlled by means of some form of external splinting, such as a plaster of Paris splint moulded to fit the contour of the chest and held in place with strapping, or a weighted bag placed over the unstable area, so that the paradoxical movement may be reduced and ventilation improved.

The first physiotherapy treatment should be started as soon as possible after the patient's return from the operating theatre and repeated as often as required, in addition to the deep breathing exercises being encouraged by the nursing staff.

From this time onwards the physiotherapist's routine may be divided into four parts.

1. The maintenance of the correct posture.
2. The increase of respiratory efficiency.
3. The establishment of coughing and expectoration.
4. The maintenance of mobility and restoration of function of all parts of the body.

1. The postural deformity which may occur as a result of a *lateral thoracotomy* incision is a scoliosis with the concavity on the side of the incision.

The deformity following a *thoracoplasty*, when the structure of the chest wall has been altered, is more complicated. Owing to the removal of the first two ribs, the scaleni on that side have a mobile lower attachment and the unopposed scaleni cause the neck to flex, in the lower part, towards the unaffected side: the head is then straightened to produce an "S" bend in the cervical spine. In order to maintain his

balance the patient then sits with his weight on the hip of the thoracoplasty side, thus producing a scoliosis with the convexity towards the side of the incision.

2. The increase of respiratory efficiency and establishment of coughing and expectoration are so closely allied that they can be described together.

The act of coughing is both painful and frightening to the patient and a good deal of encouragement and reassurance may be needed to obtain an effective cough. There is no value in ineffective worrying efforts. The physiotherapist may help the patient by supporting the area over the incision, in a thoracotomy, to give a feeling of security. Following a thoracoplasty, she should support the chest wall in order to prevent undue paradoxical movement, placing the palm of one hand over the unstable area on the anterior chest wall and, with the other, apply counter pressure over the scapular area.

A modified form of postural drainage should be used if the patient is being nursed in the semi-recumbent position; the patient being placed on the unaffected side (except after a pneumonectomy when he MUST lie ON the affected side) and diaphragmatic and lower costal expiratory breathing exercises given and coughing encouraged. Gentle vibrations may also be given.

An atelectatic segment of the lung following a thoracoplasty for the treatment of tuberculosis is a grave source of danger owing to the high risk of tuberculous bronchopneumonia or a spread of the disease. The risk of spread due to the measures employed to prevent this atelectasis is completely outweighed by the risk of spread in the atelectatic segment.

4. The maintenance of mobility and the restoration of function of all parts of the body starts immediately after the operation and continues until rehabilitation is completed.

If the sputum is unduly tenacious the physiotherapist should request an inhalation of one of the vapours which will have the effect of facilitating expectoration.

When a *tracheostomy* has been performed to reduce the "dead space" following chest trauma or when there is so much bronchial secretion that the patient is unable to expectorate it by his own efforts, the physiotherapist must teach the patient to perform a modified form of coughing by producing a series of abdominal contractions—similar to a hearty laugh. The secretions thus brought to the upper part of the trachea should then be aspirated.

Before a *chest aspiration* to withdraw fluid or air from the pleural space the patient should always be encouraged to cough and expectorate any bronchial secretions so as to avoid them being sucked further into the lung as it is drawn towards the chest wall by the removal of the cause of the collapse.

### CONCLUSION

The physiotherapist who can evolve ways and means to make both willing and unwilling patients relieve themselves of unwanted bronchial secretions, and teach the breathless patient to control his dyspnoea without attracting the attention of other people, will find that when breathing exercises are ordered it becomes an interesting and rewarding rather than an unpleasant treatment.

### SUMMARY

1. Factors which influence breathing are enumerated.
2. Breathing exercises for medical and surgical patients are described.
3. Postural drainage is discussed.
4. Some special points in certain conditions are noted.

## World Confederation of Physical Therapy

### A VISIT TO SOUTH AFRICA

By The Secretary-General, Miss M. J. Nielson, M.B.E.

The longer one works in the international field the more one realises how little one knows of other countries, and the state of physical therapy in them. I was therefore fortunate to be invited to visit South Africa, from 14th February to 18th March 1964, as the guest of the South African Society of Physiotherapy. The itinerary arranged for me covered almost the length and breadth of the Republic—to the main towns on which the ten Branches of the Physiotherapy Society are centred. It was a very full programme, but every part of it was instructive and enjoyable. Talks on the work of W.C.P.T. were given at thirty meetings and informal gatherings. Some of these meetings were for physical therapists and students, others were open meetings to which doctors, members and allied professions and representatives of organisations, such as the Business and Professional Women and the National Council of Women had been invited. Broadcasts and many press interviews were arranged by the Branches. I hope that my conversations with Government, University and Medical authorities were as helpful to the local physical therapists as they were informative for me.

Physical Therapy is by no means a new profession in South Africa. Indeed, the South African Society of Physiotherapy is now in its fortieth year, and has every reason to be proud of its traditions and the high standard of practice of its members.

As in most other countries, there is a great shortage of physical therapists and the demand will obviously increase as complete medical coverage becomes available for more and more of the country's sixteen million population and as the educational, social and vocational stages of the rehabilitation become more widely available. Lack of physiotherapy teachers prevents the immediate increase of training facilities beyond the four existing schools in Johannesburg, Pretoria, Cape Town and Bloemfontein, and the new school for non-European students just opened in Durban.

Visits to hospitals and centres for disabled children and adults enabled me to talk with physical therapists "on the job". Everywhere the staff took immense pains to see that I got a representative picture of physical therapy and other medical facilities available for the many races which comprise the population of South Africa—European, African, Coloured and Asian.

The country is fortunate in that at present it has a rapidly expanding economy, thus providing means for new medical services and hospital buildings. Uitenhage Hospital, just outside Port Elizabeth, is a notable example of a fine building in beautiful surroundings offering modern medical services for European and non-European patients. An impressive medical service is provided for African, Coloured, and Asiatic patients at the enormous Baragwanath Hospital, Johannesburg, which has 2,000 beds and 10,000 out-patient attendances a month. Here, and at other centres such as those for injured mine workers, members of the South African Society of Physiotherapy, and students from the schools of physical therapy under supervision, provide the physical therapy service. South African physical therapists are loyally observing the W.C.P.T.'s International Ethical Principles.