

REFRESHER COURSE FOR GENERAL PRACTITIONERS

PRINCIPLES OF PHYSICAL MEDICINE.—I. REMEDIAL EXERCISES

BY

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Remedial exercises have an important place in general practice, as there is now an increasing tendency for the *active* rehabilitation of patients. It is an advantage, therefore, if the general practitioner can advise his patients on what are appropriate exercises for them to perform.

A great deal of time can be saved in convalescence by correct rehabilitation. The day when passive physiotherapy was the mainstay of treatment has passed, and active exercises are now regarded as much the most important part of rehabilitation; other methods are only ancillary. This must be impressed on the patient at all times. He must be made to learn that by his own efforts he can return to normality, and that the onus of doing so lies largely on his own shoulders; the part of the physiotherapist is only to supervise and teach the appropriate exercises, under the direction of the medical practitioner. The slogan of a successful physiotherapy department should be "active movements of the mind and body of the right sort at the right moment," and this is particularly applicable to the cases dealt with by the general practitioner. I have included the expression of "mind and body" in that order intentionally, as a correct attitude to recovery is even more important than the carrying out of exercises.

Prevention and Treatment of Postural Deformity

Patients with postural errors may be grouped into those without any structural defects and those with associated structural alterations. The first group includes patients with postural errors which have been detected at medical examinations. They often occur in schoolchildren, who should have no symptoms from them. These errors of posture may be either static or dynamic.

Static errors are those that are apparent when the patient is stationary, either sitting or standing. Some of the commonest errors of this type are spinal (for example, early scoliosis), others are peripheral (for example, pes planus and valgus ankles). In this type of case it is a good plan, if the children are attending a school where physical training is given, to arrange for the instructor to include simple remedial exercises in the gymnastic period—most instructors have the necessary experience. The instructor can watch the posture of the children and remind them to hold themselves correctly. It is uncommon to find one of these postural errors by itself; usually there will be a variety of small errors and hence the whole posture must be corrected. Details of appropriate exercises are given in the Appendix.

In children remedial gymnastics have to be varied according to age. In infancy, before the child's co-operation can be obtained, it is quite a specialized task to work out a programme of gymnastics depending entirely on reflex movements, and it is advisable to have the assistance of a physiotherapist experienced in paediatric work. When the child is over 1 year or 18

months he may be encouraged to do the right exercises by the use of simple play movements, and this will continue until much later in childhood, when he will be able to co-operate voluntarily in his exercises. It is always important to see that the remedial exercises are interesting enough for the patient; they can be varied in detail from time to time. With children it is especially important that the parents should be taught how to supervise the exercises, as these must be carried out for at least half an hour each day.

The dynamic postural errors are those in which movement is not as good as it should be. This group includes errors of respiration—for example, very poor lower-costal movement and "up and down" breathing—and errors in gait and co-ordination. A programme of re-educational exercises will correct these errors.

If errors of posture are neglected and structural deformities develop, remedial exercises will be of value in treatment in addition to any other orthopaedic measures that may be necessary. Although in these cases the localized programme of exercises is important, it must be part of a generalized programme to restore good posture and normal movement to the whole body.

The Bedridden and the Aged

For patients lying in bed exercises will prevent loss of muscle tone and wasting, and the development of deformities of the joints. Hence, in bedridden patients a general series of exercises should be carried out (see Appendix), within the limitations of their particular disabilities. Breathing exercises are important in preventing pulmonary collapse and hypostatic bronchopneumonia, and are specially useful in surgical patients, particularly before operations on the chest or upper abdomen.

Every effort should be made to keep elderly people active for as long as possible. If practicable, they should be kept moving about and should not be allowed to become bedridden until deterioration of their health leaves no alternative. In those who have become bedridden a programme of exercises designed to keep their joints mobile and their muscles in good tone not only keeps them alive longer but makes them very much happier. In addition to exercises, various forms of occupational therapy can be recommended. There is a wide range of different kinds of handiwork from which to choose; some will find more interest in needlework, some in leather work, others in simple carpentry, for instance. So far as is possible occupational therapy should be productive work, as that offers an incentive of interest to the patient.

Rehabilitation of the Injured

Remedial exercises are essential to the restoration of function after any injury. In minor injuries without damage to bone, active movements should be encouraged from the start to prevent loss of function. In most

sprains and strains exercises are required to keep the affected part mobile; in addition, supervision is necessary to ensure that no functional error such as a limp develops. If a joint has been injured and there is a traumatic effusion, the affected joint must be rested, but it is important that the muscles of the limb should be kept in adequate tone. For instance, quadriceps contractions should be introduced early in traumatic synovitis of the knee, as the quadriceps, especially the vastus internus, may start to lose tone and waste within 24 hours of the injury. A simple exercise such as bracing the knee back can be carried out many hundreds of times during the course of the day without disturbing the patient.

Again, if the bones have been fractured, remedial exercises should be started early, once the fracture has been reduced and the bones splinted. The aim of such exercises is to maintain the mobility of the rest of the patient's body and of the damaged limb, without disturbing the position of the bony fragments. A particularly important example of this is the maintenance of shoulder movement in patients with fractures of the forearm; shoulder exercises to maintain all movements, especially abduction, should be carried out from the beginning. The rest of the body should be kept in good tone, and mobility maintained, by a generalized programme of exercises.

Once the fracture has united and there is no longer any need for splinting, exercises to restore the full function of the injured part are instituted. In treating injuries it is of special importance to prevent the formation of adhesions. In many cases of sprained ankle for example, if mobility is not introduced early, restriction of movements soon develops.

Exercises for Asthma and Bronchitis

The aim of exercises for the asthmatic patient is to teach relaxation and to give re-education in breathing. He holds his chest tense, and it becomes more difficult to teach him to relax as his age advances. It is, however, of the greatest benefit to him if he can relax properly, for when an attack starts he will then be able to lessen his discomfort. He has an "up and down" type of respiration, and hardly uses his lower intercostal muscles. He should therefore be taught lower-costal and diaphragmatic breathing. As with all breathing exercises, he should practise these to such an extent that they cease to be exercises and become his normal breathing. The shoulder-girdle and the thorax of asthmatics have a tendency to lose their mobility; in particular, the mid-dorsal spine becomes almost rigid after asthma of long duration. A programme of exercises to mobilize the dorsal spine and shoulder-girdle should be instituted, including exercises to mobilize the costovertebral joints. For details of exercises for asthmatics see the Appendix.

Patients with chronic bronchitis almost invariably have minimal lower-costal movement, and the first object should be to teach them the proper use of these muscles. In long-standing cases postural drainage over the edge of the bed or couch should be instituted for 20 to 30 minutes twice a day; drainage can be helped by the physiotherapist "tipping and clapping" the chest. Patients with bronchiectasis will require chiefly postural drainage, which must be planned so that the affected part of the lung is adequately drained (for details see Pye's *Surgical Handicraft*); exercises to develop the

movement of the affected lung should be included in the general breathing exercises. The same applies to the post-operative treatment of pulmonary abscesses and to any other post-operative chest condition in which respiratory function should be restored.

The Rheumatic Diseases

In addition to the general and specific treatment in articular rheumatism, it is most important to maintain mobility of the affected joints. In osteoarthritis of the shoulders, hips, and knees in elderly people there is a great tendency for the patient to rest the affected joint, and thus relieve the pain which is so marked on movement. This results in limitation of movement or even in ankylosis of the joint. To combat this a careful programme of exercises should be devised so as to maintain the full range of movement of the affected joints. Where restriction of movement is already evident, restoration of function must be attempted by remedial exercises, helped where needed by manipulation. Exercises are a simple way of stretching and breaking down adhesions without undue discomfort or difficulty.

In osteoarthritis of the cervical spine pain can be greatly relieved by neck-stretching exercises. The patient with osteoarthritis of the hip and knee must be taught to walk correctly in order to prevent him developing a limp, and to avoid weight-bearing on the most painful part of the articular surface of his knee or hip. Trick movements may have to be taught to compensate for permanent loss of movement of a joint.

Non-articular rheumatism is a frequent problem in general practice, and it is important to stress that physiotherapy in the form of remedial exercises, helped by massage and heat, is the most successful treatment for this group of disorders. It is important to maintain good muscle tone throughout the body, as fibrositic nodules appear much more often in muscles which are atonic. The high incidence of painful fibrositic nodules in the back muscles of athletic people in middle age is accounted for to a large degree by lack of exercise. Remedial exercises, therefore, have a part to play in reducing the occurrence of such nodules. When massage, heat, or injections are used to relieve fibrositis, the patient should be given a programme of exercises which should be carried out for a quarter of an hour each day (see Appendix).

Neurological Conditions

Re-educational exercises are of great value in the group of congenital deformities classified together as "cerebral palsies." Exercises have been designed for teaching walking and other movements, including feeding and domestic functions of all kinds, but parents must understand the aim of the exercises and be shown how to supervise them at home. The programme will vary according to the clinical condition; the approach, of course, being entirely different in, say a child with athetosis from that in one who is spastic. The teaching of relaxation and voluntary control of tremor is also important in these cases; a specialized programme of exercises to improve co-ordination should also be included. Trick movements may have to be taught to those for whom normal movements are impossible.

The largest group of patients with acquired neurological disease calling for remedial exercises is formed of those with anterior poliomyelitis, in whom muscular re-education should be instituted as soon as the acute stage of the disease is over (see Kidd's *Physical Treatment of Anterior Poliomyelitis*). The usual practice is to chart the voluntary movements and electrical reactions of all the skeletal muscles in the body immediately after the acute stage, and then to plan a progressive programme of muscle re-education on the basis of these results. For paralysed muscles the exercises will have to be graded according to the degree of function present. In the early stages the muscles generally have to be assisted either manually by the physiotherapist or by appropriate slings or pulleys, but as their strength returns exercises in the gymnasium and, finally, active movements against resistance are employed. This whole programme is much easier if the early exercises can be performed in a swimming-pool.

Much can be done by exercises in cerebral vascular disease and after spinal injuries to keep those with paralysis on the move and thus save them from becoming bedridden. In tabes and other conditions in which co-ordination is poor, Frenkel's exercises can be used; these teach the patient to develop a reasonable gait and movement of the lower limbs. (For details of suitable exercises see Kern's *Physical Treatment of Injuries of the Brain and Allied Nervous Disorders*.)

Obstetric Cases

While this is still a rather controversial field, I consider that antenatal and post-natal exercises can be of great value. Antenatal exercises should be introduced when the pregnant mother first attends an antenatal clinic early in her pregnancy. The exercises are planned to teach her voluntary control over the movements of her abdominal and pelvic muscles, so that when labour starts she can co-operate with the midwife by voluntarily contracting the appropriate muscles during her pains, and then relaxing. Exercises to improve the tone of the abdominal muscles will tend to prevent an unduly lax abdomen after labour. Incorporated in this programme of antenatal exercises are some to mobilize the lumbar spine and pelvis. (For details see Randal's *Training for Childbirth*.) Once the patient is in bed for her confinement, she should continue with these exercises.

Post-natal exercises carry on the good work started in the antenatal period, and their primary aim is to restore the muscle tone of the abdominal wall and pelvic floor, and also the general posture. If these exercises are carried out conscientiously every day in hospital or at home the incidence of post-natal backache can be much diminished. These exercises also play an important part in restoring the abdominal contour.

Massage

The role of massage as an ancillary procedure to remedial exercises is fairly limited. It can be used to reduce oedema mechanically when this is indicated—for example, after any injury or thrombosis—by promoting better venous and lymphatic drainage. Massage has a special place in the treatment of non-articular rheumatism, particularly if fibrositic nodules are present, and it helps relaxation if there is muscle spasm, as in lumbago or after injuries when painful limbs are mobilized.

APPENDIX: SOME USEFUL REMEDIAL EXERCISES

Postural Scoliosis

Any cases with major postural defects, especially of the spine, should be referred for specialist advice, but the following table of basic exercises will be useful in treatment.

The aim is to eradicate the faulty postural sense and to replace it by a normal one. The treatment is long and needs the intelligent co-operation of the patient (this can be obtained in quite young children). It is mentally and physically tiring. While it is necessary to move as rapidly as possible through the various stages, care must be taken not to pass on until each stage has been mastered. Through all stages of treatment the patient should be undressed so that the whole of the body and limbs can be observed.

First Phase.—This consists in teaching the correct lying position, first on the back, later on the face. The patient is placed in position and is then corrected by verbal instructions. The following points must be observed: (1) Feet against the wall in a normal position, and the patient feeling as if he is elongating the whole of the body. (2) Muscles of legs braced. (3) Abdominal and gluteal muscles contracted to hold the pelvis straight—that is, no lordosis. (4) The patient must not hold his breath but breathe freely. (5) Shoulders level and in line with the iliac crests and relaxed. Arms lying naturally by the sides of the body. (6) Neck in midline of shoulders, with the chin over the sternal notch. (7) Ears level. (8) Chin in when the patient tries to eliminate the cervical curve, thus getting the feeling of stretching out. When this position has been learnt, add simple arm, leg, head, and trunk movements, taking care that the starting position is held correctly.

Second Phase.—Teach correct sitting position on a stool. Correct verbally. Later the position should be assumed automatically. The following points must be observed: (1) Feet held in normal position, with the foot at right angles to the leg. (2) Legs at right angles to the thighs. (3) Whole of thighs supported on stool. (4) Trunk erect. (5) Shoulders level, not braced back. Arms hanging naturally. (6) Neck in midline. (7) Ears level. (8) Chin in, as previously described. Add simple head, arm, leg, and trunk movements. Again the starting position must be maintained correctly.

Third Phase.—Teach the correct standing position. This is much more difficult than the previous positions, as more joints are required to hold the position. (1) Standing erect, with feet apart. (2) Feet, with arches lifted, facing forwards along a straight line. (3) Pelvis controlled by abdominal and gluteal muscles. (4) Shoulders level over pelvis, relaxed. Arms hanging naturally. (5) Head balanced on shoulders as previously described. As before, add arm, leg, trunk, and head movements, progressing to a programme of vigorous gymnastic exercises.

Lordosis

1. Lying on the back in bed with knees bent and feet on the bed, lift both knees on to the chest and lower slowly, making quite sure that the whole of the back touches the bed and there is no hollowing in the lumbar spine.

2. Standing with feet apart and hands on hips, contract the abdominal and gluteal muscles so that the pelvis is tipped, thereby eliminating the lumbar curve. Great care must be taken that the upper trunk does not move.

Kyphosis

1. Sitting with legs straight out in front (or with the knees bent and feet on the floor, or with the legs crossed), elbows bent, fingers resting on the shoulders, and arms tucked into side, lift the arms forwards, upwards, backwards, and downwards, so that the contraction of the muscles between the shoulder blades and the stretching of the pectoral muscles can be felt.

2. Lying on the face, hands by the side, turn the palms of the hands outwards so that the elbows point inwards. This should produce a strong contraction between the shoulder blades. The exercise is then made harder by the head and shoulders being raised. (The chin should be well tucked in and only the shoulders and head raised; if more movement is allowed to occur, a lordosis will be produced.)

Flat-feet in Children

The objects are to strengthen all the muscles of the feet and to teach agility and spring. For this the following exercises should be practised daily: (1) picking up marbles with the toes; (2) writing on the floor with the big toe; (3) walking on tip-toe; (4) all simple dancing steps in which the toes are pointed; (5) all games in which the child is alternately standing on the toes and changing to ordinary standing; (6) walking up an incline; and (7) climbing with bare feet.

Flat-feet in Adults

The objects are to loosen the stiff joints, strengthen the weakened muscles, and restore co-ordination between the muscle groups. Each is important, and one should not take precedence over the other. If the joints are loosened before the muscles are strong enough, more pain will be produced.

The patient should learn to stretch and loosen all the joints in the feet. He should try to mould the foot as near the normal as possible with his hands. (1) With the feet on the floor and at right angles to the legs, attempt to move the big toe away from the remaining four. (2) Spread the toes apart and relax. (3) Lift the transverse arch, without shortening the foot. The object is to exercise the lumbrical muscles. Care must be taken to avoid raising the arch by other muscles.

When these intrinsic muscles have been strengthened, give exercises and movements that will help co-ordination and quickness of action, such as skipping, walking along a chalk line, walking with a bouncing action using all the muscles of the feet and legs, and standing correctly with feet facing forward and ankles maintained in a corrected position.

The Bedridden Case

The bedridden patient should be encouraged to move freely about the bed. He should help himself on and off the bed-pan, and attempt to feed and wash himself and to do his own hair. He should move his legs and feet about many times during the day: the bedclothes must therefore be light and not weighed down. The following exercises should be performed twice daily.

1. Lying flat in the bed with a very small pillow under the head and the bedclothes removed except for a very light blanket, straighten the whole of the body, contracting as strongly as possible the buttock muscles, abdominal muscles, and all the leg muscles, the feet being held at a right angle. Then relax completely and repeat the whole performance several times. Finally, lie on alternate sides, again straightening the whole of the body, especially the hips and the back.

2. Sitting comfortably with the back well supported and a small pillow under the knees, drop the head forward and back four or five times (or more if capable); then turn the head to the right and left four or five times. Get the maximum amount of movement, stretching all the muscles round the neck.

3. Sitting as above, lift the arms up over the head, out to the side, and down. Repeat four or five times, or more often.

4. Sitting as above, bend and stretch the arms vigorously in all directions five to ten times.

5. Sitting as above, bend and stretch the fingers ten times. With the hands clenched, bend and stretch the wrists ten times.

6. Sitting as above, bend and stretch first one leg and then the other. If possible, do this in the lying position.

7. Sitting as above, point the toes down, then turn the foot in, then pull the foot up as far as possible. Repeat the performance several times. This should be done quickly and vigorously.

8. Breathe deeply in and out, trying particularly to move the lower ribs and also the back of the ribs where they rest on the

pillows. These breathing exercises can be assisted if the instructor's hands are placed on the part of the ribs where movement is needed, gentle pressure being exerted on breathing out. The hands remain in position when the patient breathes in, this indicating where movement is required.

9. Move the trunk in all directions, especially turning as far round to the left and right side as possible. Bend the back backwards to counteract the tendency to forward flexion of the spine.

Daily General Exercises for Improving Physique after Fibrositis

1. Standing with the feet apart and the body held erect, fingers touching the shoulders, elbows bent, arms touching the side of the body, bend the arms vigorously upwards, forwards, sideways, and down, returning to the starting position after each movement.

2. Standing with the feet apart and the hands on the hips, move the head forwards and backwards.

3. Standing as above, lift the heels and bend the knees as far as possible, keeping the trunk absolutely upright; straighten the knees and lower the heels.

4. Standing with the feet apart and the arms hanging loosely, drop the trunk forwards, rotate to the right, arch backwards; rotate to the left, drop forwards, and return to the starting position.

Exercises for Asthmatics

Relaxation.—Lie on the bed with the feet resting on the bed and the knees bent and the head slightly raised on a pillow. Aim to get complete relaxation of shoulders, arms, hands, and thorax, especially the upper part of it. This needs concentration by the patient and is not easy to do. Also this should be taught with the patient lying on the side, with the knees bent and the head bent forward to relax the thorax. The patient breathes out and takes a small breath in, using the lower thoracic region. If the patient can acquire the art of relaxing and correct breathing, asthmatic attacks can be prevented or considerably lessened.

Breathing Exercises.—(1) The patient lies on his back with the feet on the bed and the knees bent, and relaxes as explained above. He breathes out, first collapsing the upper costal region, then the middle region, and finally the lower, contracting the abdominal muscles to expel the utmost amount of air. On breathing in, the upper parts of the abdominal muscles should be relaxed and the diaphragm contracted. The upper region of the thorax should not move and the shoulder and neck region should remain relaxed. (2) Lying in the position described above, the patient breathes out as before, but, on breathing in, the lower ribs should be expanded. This can be assisted if the hands are placed over the lower ribs and slight resistance given as the patient breathes in. The resistance should not be too great, otherwise it will defeat its object. (3) When the patient is proficient in these exercises, the two should be combined, so that the lower ribs and the diaphragm act together.

Mobilizing Exercises.—(1) The thorax is often very stiff and must be loosened before effective breathing can be taught. With the patient in a correct sitting position, the trunk should be turned quickly and vigorously many times in the following directions: forward; backward, splaying out the lower ribs; sideways (this is not a big movement; the patient "tucks in" the ribs on the bending side, keeping the legs and pelvis in a good position); and rotation to alternate sides (again the legs and pelvis must be held in the correct position). (2) The shoulder-girdle will also require mobilizing. In the sitting position, lift the shoulders up towards the ears and then let the shoulders drop (the downward movement is the more important). Sitting, move the clavicles forwards and backwards. With the arms bent and the finger-tips touching the shoulders, move the elbows forwards, upwards, backwards, and downwards.