Basic Reference Manual *for* Physiotherapists

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Edited by: Terri Steppe

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and by: Terri Steppe

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1. Introduction

Physiotherapy means "treatment of the body", in sesotho we are called "ngaka ea masapo"; but in fact these are incomplete descriptions of our job. A physiotherapist treats the whole patient, not just the body, not just the bones. To treat a patient, we must always include the soul, the psyche. Maybe a disease of the body is just the result of a depression. How can we work with a hemiplegic patient without thinking about his psyche? In our work, we are not using injections or tablets, nor are we opening a body as a surgeon would. Instead, we work mostly with our hands which are trained in the use of hot and cold compresses, bandages, splints, walking aids, pillows and massage ointment. Our work can be described under three main aims: preventive therapy, curative therapy and maintenance of health, or the teaching of self care.

The basic framework of physiotherapy treatment includes the following components:

1. Examination - Before we can treat the patient, we must first carry out an examination to know what treatment to give.

2. Treatment - Based on the examination, we decide how we may best help the patient.

3. Control - We must control the treatment; always observing - Is there improvement or deterioration in the condition of the patient? Is the patient doing the exercises properly?

With this framework in mind, let us now look more closely at some of the specific treatments carried out by a physiotherapist.

2. Movement

For healthy people, movement is so normal that most people do not realize how important it is. But really, normal movement is responsible for much of the daily work of the body such as maintaining good blood circulation, proper breathing, good functioning of the intestines and bladder as well as the development of strong muscles and flexible joints. If a person is immobile for a long period of time, such as during a hospital stay, life can be made even more unpleasant due to the impairment of any of the above mentioned bodily functions. For this reason, mobilization of patients is a key to their quick and complete recovery.

2.1 Passive movement

Passive movements are those done by the therapist with no help at all from the patient. They may be used to passively stretch a muscle or for those patients who are unable to move on their own (paralyzed, unconscious, etc.).

Basic movements of the joints of the lower limb.

Foot - metatarsals & phalanges - dorsiflexion - bend the toes upward
- plantarflexion - bend the toes into a claw shape

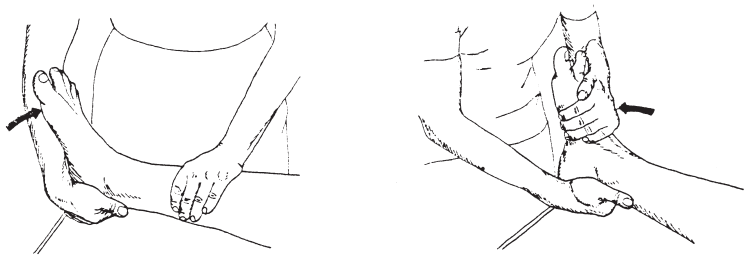
- ankle - dorsiflexion - raise the foot to flex the ankle
- plantarflexion - lower the foot to extend the ankle
- supination - flex the ankle medially (to the centre)
- pronation - flex the ankle laterally (sideward)

Knee - flexion - bend the knee
- extension - straighten the knee

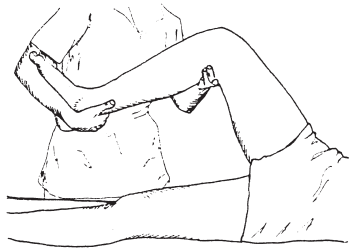
Patella - slide the patella so it moves upward toward the thigh and downward toward the foot, then side to side

Hip - flexion - raise the leg to bend at the hip
- extension - lower the leg to straighten the hip
- abduction - flex at the hip to move the leg laterally
- adduction - bring the legs together
- in-rotation - roll the leg medially
- out-rotation - roll the leg laterally

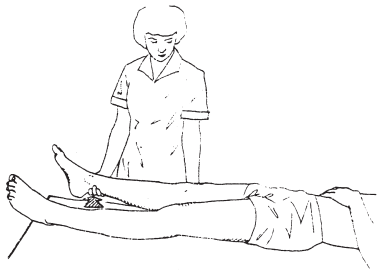
Based on these basic movements, the following procedure provides a complete treatment in passive movement of the lower limb.



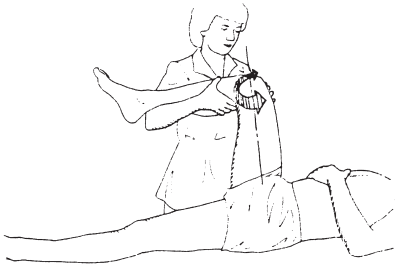
1. Dorsiflexion/plantarflexion of the foot.



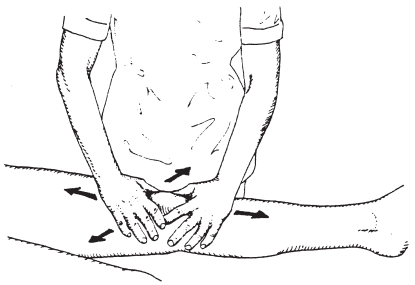
2. In this position, the therapist is able to do dorsiflexion of the foot and flexion of the knee and hip in one movement. This is followed by extension of the same joints.



3. Abduction/adduction of the hip



4. In-rotation/out-rotation of the hip.



5. Mobilization of the patella

Basic movements of the joints of the upper limb.

Wrist - palmarflexion - flex the wrist to lower the hand
- dorsiflexion - extend the wrist to raise the hand
- radialabduction - sideward flexion to the thumb side
- ulnarflexion - sideward flexion to the little finger side

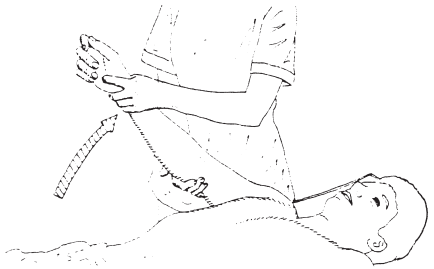
Thumb - flexion/extension
- opposition flexion - the thumb crosses the palm toward the little finger

Fingers - flexion/extension

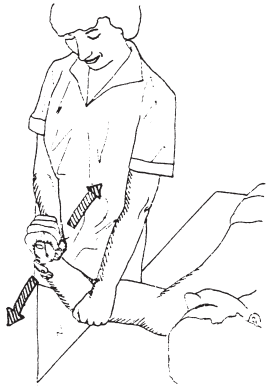
Elbow - flexion/extension
- supination - while the upper arm is stable, rotate the forearm so the palm is turned upward
- pronation - like supination, but the forearm rotates to turn the palm downward

Shoulder - flexion - lift the arm straight up in front of the body to over the head
- extension - lower the arm in front of the body
- abduction - raise the arm to the side to shoulder level
- adduction - from abduction position, carry the arm across the front of the body then to the back
- in-rotation - with the arm abducted to shoulder level and the elbow flexed to 90 degrees, hold the elbow and rotate the shoulder so the forearm moves downward
- out-rotation - like in-rotation, but the forearm moves upward

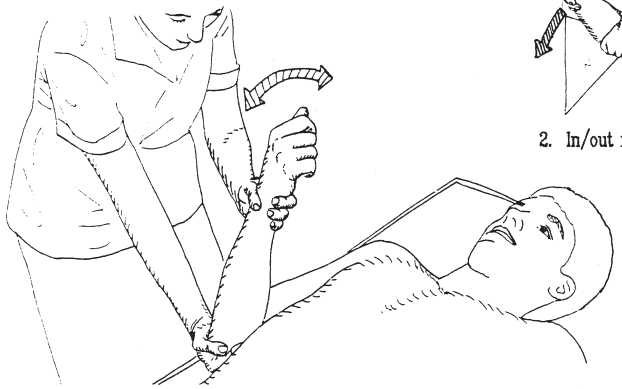
Based on these basic movements, the following procedure provides a complete treatment in passive movement of the upper limb.



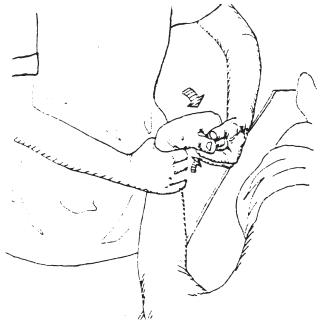
1. Flexion/extension of the shoulder.

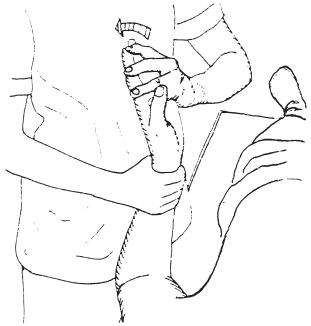


2. In/out rotation of the shoulder



3. Flexion/extension of the elbow.

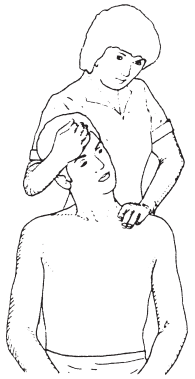




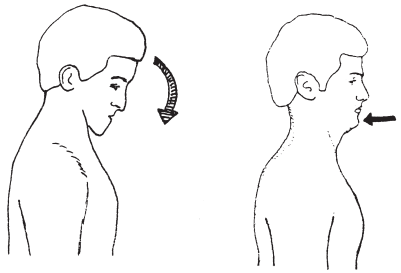
4. Make a fist while doing palmarflexion of the wrist then extend the fingers and dorsiflex the wrist.

The neck and spine should also be included in a passive movement treatment. Following are some basic moves to mobilize these areas.

1. Rotation of the neck.



2. Side-flexion of the neck so the ear moves toward the shoulder.



3. Flexion/retraction of the neck.

4. Rotation of the spine.

5. Lumbar flexion

2.2 Assisted movement

If the muscles are working, but still weak, the patient can be instructed to do the movements described under passive movement with slight help from the therapist. The therapist should always support the limb with both hands to give as much security and confidence to the patient as possible. The patient should do most of the work with the therapist helping only as much as is necessary to complete the movement.

2.3 Active movement

Once the muscles are working well, the patient should be able to carry on with all the movements described under passive movement with no help at all from the therapist.

2.4 Resistive movement

Once the patient is doing well with the active movements, the therapist can begin to offer resistance against the movements. This causes the patient to work harder which will help to strengthen the muscles.

2.5 Isometric movement

In isometric movement, the patient is instructed to contract the muscles without moving the joint. This type of movement is used for strengthening the muscles when no movement of the joint is possible (as in POP), or when the patient is not allowed to move (as in a spinal fracture).

3. Preventive (prophylactic) Therapy

To prevent is always better than to heal!

If a patient is lying in hospital and not moving as in daily life, several complications may occur in his body:

- thrombosis
- contractures of the joints
- bed sores
- pneumonia or other lung disorders
- atrophy of the muscles

There are certain patients who are more likely to develop such complications. A few examples are bed rest patients, patients from major surgery, old patients, etc. A large part of the work of a physio therapist is to look after these patients to avoid the development of complications.

3.1 Thrombosis prophylactic

A thrombosis is an accumulation of blood in a vein of the legs. Since veins are made of less muscle tissue than arteries, and venous blood has to flow against gravity on its way back to the heart; veins depend on muscular contractions to help push the blood toward the heart. Lack of movement can slow the blood flow so that a thrombus (clot) may occur. As a clot forms, it may move with the blood flow and clog up a smaller vessel. This is an embolus. An embolus may stick in the heart to cause a heart attack, in the brain causing a stroke, or in the lungs as a pulmonary embolism. Any of these can result in death.

Patients who are likely to develop a thrombosis include:
- women before and after delivery due to hormonal changes
- patients after major surgery
- old patients whose veins are less elastic
- patients with varicose veins of the legs
- immobile or bed rest patients since lack of movement contributes to poor circulation

Therapy is aimed at maintaining an even flow of the blood. It is very important to keep the limbs moving as they act as the pumps that push the venous blood toward the heart. If the patient can move on his own, he can carry out active exercises even while he is still in bed. The exercises should be done very quickly until the patient is tired and can feel an increase in his circulation.

Active exercises
1. Dorsiflexion/plantarflexion of the ankles.

2. Flexion/extension of the knee.

3. Make a fist and open it several times.

4. Bring the fist to the shoulder then open it and raise the open hand over the head.

If the patient is unconscious or paralyzed, passive movements must be used. Each movement should be done 6 times very quickly, followed by a rest, then 6 times again with another rest, and finally 6 more times.

Passive movements
1. Flexion/extension of the ankles.

2. Flexion/extension of the knee.

3. Flexion/extension of the elbow.

4. Flexion/extension of the shoulder.

If you see that the patient's foot or leg is swollen, hot, red, and painful, this suggests that a thrombosis has already formed. In this case, no movement should be done!!! The patient should stay in bed, cold packs should be applied and a doctor informed.

3.2 Stiffness prophylactic

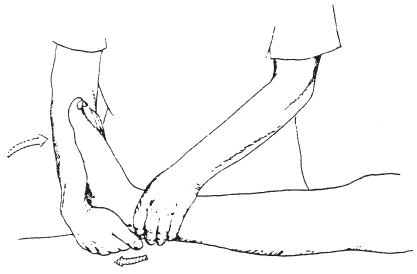
During daily life, a person will move all of his joints into several positions. If this is not possible for some reason, the joints can become stiff very quickly. Each joint is surrounded by a capsule. If it is not stretched by movement, this capsule responds by contracting. After the contraction of the capsule, the muscles and tendons of the joints also contract. The shoulder tends to stiffen very quickly and so should be given regular attention. After the shoulder, it is important to care for the elbow and knee as they have very complicated joint mechanisms. Also, the foot must be watched as it can easily become a drop foot due to gravity and heavy blankets.

Patients likely to develop stiff muscles include:
- unconscious patients
- paralyzed patients
- old patients who refuse to leave their beds
- patients in POP
- burned patients
- mentally ill patients

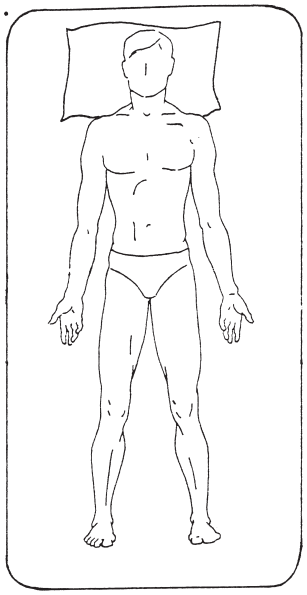
Depending on the condition of the patient, therapy revolves around active or passive movements and positioning of the patient in bed. In passive movement, the movement of the joints must be done slowly and to the full range. At the limit of the range, the therapist should hold the stretch for 10 - 20 seconds to allow the muscle time to relax into the stretch. Each movement should be repeated 3 times.

Because foot drop is a common development, following is an explanation of the proper therapy to help prevent it, or if it is already there, to treat it.

Use the proper position (sec. 2.1) to dorsiflex the foot. Do not try dorsiflexion by holding only the toes! This only flexes the toes and may over-stretch other muscles and ligaments of the foot.



As for positioning of the patient in bed, there are two main positions that should be used and alternated regularly.

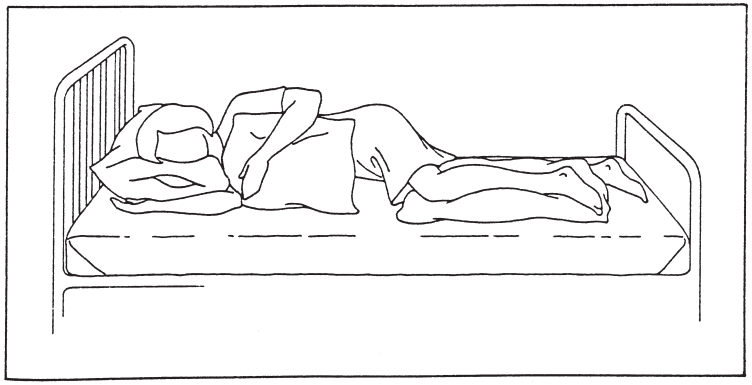


Middle position

In this position the patient is lying on his back with his arms and legs positioned as if he were standing. That is, the arms and legs are in slight abduction with the elbows and knees in full extension. The ankles should be supported at 90° dorsiflexion.

Side position

While lying on either side, the patient's lower arm should be straight out in front of him while the upper arm is flexed and supported on a pillow. The upper leg is flexed at the hip and knee and supported on a pillow while the lower leg is straight.



3.3 Bed sore prophylactic

A bed-sore is damaged tissue caused by poor blood flow to that area. Blood flow can be impaired when continuous pressure is placed on one area (as in lying in one position for a long time) thereby blocking the vessels that serve that area. The most common places for bed-sores to develop are the occiput (back of the head), mastoid process (behind the ear), sacrum, side of the hip, ankle (malleolus, side) and heel.

Patients who are likely to develop bed-sores include:
- unconscious patients
- paralyzed patients
- old patients
- mentally ill patients

Bed-sores do not need to develop. The main form of therapy is simply to change the position of the patient on a regular two-hourly schedule. Along with this, a special soft mattress can be used, passive or active movements can be carried out, and vulnerable areas can be given extra support with towels, pillows or sheepskin.

3.4 Pneumonia prophylactic

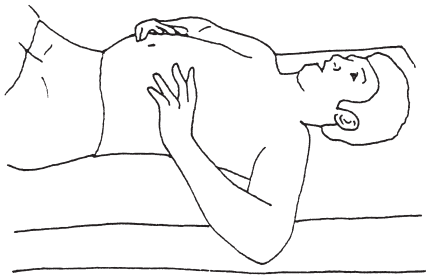
When a patient is only lying in bed, he is not breathing sufficiently; mainly because he is not moving. As a result of insufficient breathing, secretions can begin to accumulate in the lungs. Because bacteria like the warm and slimy conditions provided by the secretions, pneumonia can easily develop.

Patients who are likely to develop pneumonia include:
- patients from major surgery
- old patients
- patients who smoke
- patients with chronic lung diseases like asthma or chronic bronchitis
- patients with a weak immune system

Therapy for the prevention of pneumonia and other lung disorders can take several forms.

1. Deep breathing exercises

Have the patient place his hands on his sides just below the ribs. As he inhales through the nose, he should feel the abdomen expand. Likewise, as he exhales through the mouth, he should feel the abdomen become smaller. This is costal-abdominal breathing. It is only by breathing in this manner that the entire lung will receive oxygen. By using proper breathing techniques, the lungs are forced to expand, which in turn helps to loosen the secretions.

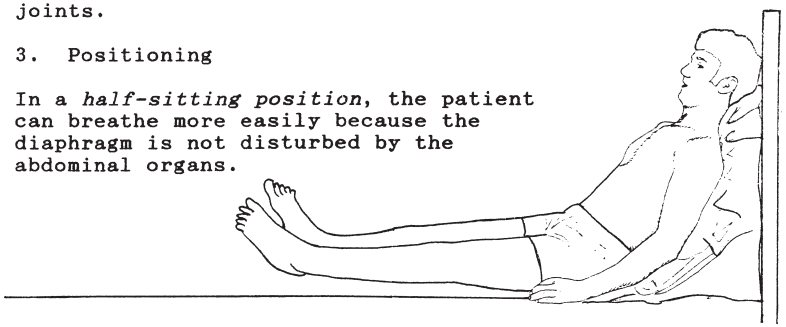


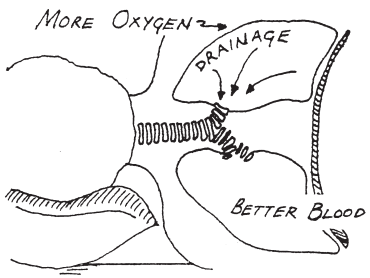
2. Movement

Active - This can be any form of exercise as any vigorous activity causes deeper breathing. Arm movements are especially good to help expand the chest.
Passive - While active movement is always better, when the patient is unconscious or paralyzed, deeper breathing is observed even after the passive movement of the joints.

3. Positioning

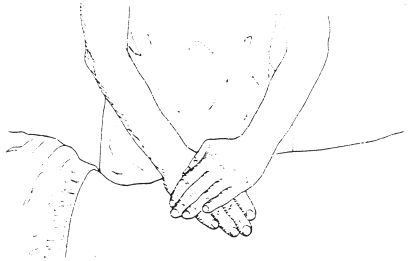
In a *half-sitting position*, the patient can breathe more easily because the diaphragm is not disturbed by the abdominal organs.





In a *side-lying position*, the upper lung will receive more oxygen while the lower lung has a better blood supply. The upper lung is also in a better position for secretions to drain into the trachea for discharge.

4. Vibration and percussion
Both of these help to loosen secretions by direct movement of the chest wall.



Vibration - With the patient in side-lying, the therapist puts both hands on the patient's thorax. With each exhale, the therapist gives quick, short vibrations. This should be done for about 5 minutes on each side.

Percussion - With the patient in side-lying, the therapist gives a clap with her cupped hand at one second intervals covering the chest and back.

5. Coughing techniques

To induce coughing, the patient can be taught the forced expiration technique. In this technique the patient presses his elbows into his ribs during a strong expiration. The therapist can assist by pressing her hands into the patient's thorax during the expiration.
If there is a wound that is causing pain, it should be supported by the therapist's or the patient's hand or a pillow during coughing.

Instead of coughing an unproductive cough, the patient should begin by clearing his throat. Once he feels the mucous in his throat, then he can try to cough it up. This will be productive coughing.
The patient should always cover his mouth when coughing.

6. Manual breathing stimulation
Instruct the patient to place his hands over the part of the lungs that he should try to use. Then tell him to breathe into his hands. Another technique involves the therapist pulling up the skin over the part of the lungs that should be used. The patient should then imagine breathing into the hollow formed by the raised skin. Alternately, the therapist could place her fingers between the patient's ribs on the intercostal muscles and give a strong stroke moving laterally.

7. Postural drainage
If the patient is unable to cough out the sputum after therapy, he should lie for at least 20 minutes on each side to allow time for the secretions to drain toward the trachea. Follow this with the coughing techniques.

3.5 Prevention in general

While the above sections focused on very specific preventive measures, prevention must be considered with all patients. Following are a few main points that can be applied to prevention in general.

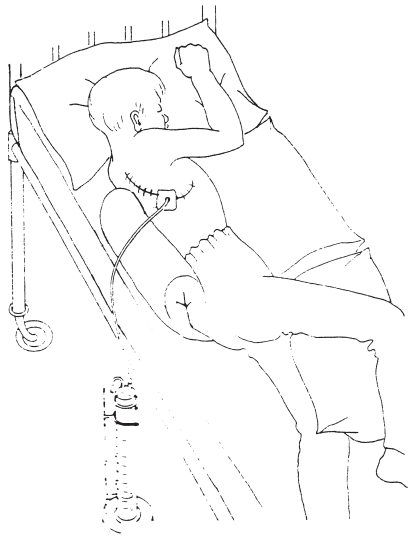
- Mobilization is a key to prevention. Patients should mobilize as soon as possible (24 hours after major surgery, etc.)
- Active movements are better than passive.
- Exercises can be done with the patient standing, sitting or lying. At least 10 - 15 minutes should be spent in an exercise session.
- The patient should be encouraged to carry on exercise and breathing treatments on his own.
- Perhaps a troublesome patient is only nervous or afraid. Take time to be patient with him and give him confidence in himself.
- Perhaps an unconscious patient is aware of what is happening around him. Talk to him and explain the therapy that is being carried out.
- The therapist should always check with the sister or the doctor to see if there are any special considerations before beginning treatment with a patient.

4. Respiratory problems

4.1 Pneumothorax

A pneumothorax refers to an accumulation of air in the pleura. This can be caused in several ways. An open pneumothorax can be caused by a gunshot wound, stab wound, or any perforation from the outside, while a closed pneumothorax refers to a wound to the inner pleura as caused by a rib fracture, rupture of a carcinoma, Tb tubercle, etc.

The main aim of therapy is development of the injured lung. First of all, begin with the standard breathing treatment as discussed in section 3.4. If the patient has difficulty breathing into the injured part, use the manual breathing stimulation techniques to assist him. For percussion, vibration and postural drainage, position the patient in side-lying so that the injured side is the up side (this will be the side with the drainage tube). For an added stretch to the muscles of the chest, have the patient lift his arm over his head while in side-lying position. All of this leads to development of the lung and therefore more oxygen to the injured area.



4.2 Haemothorax

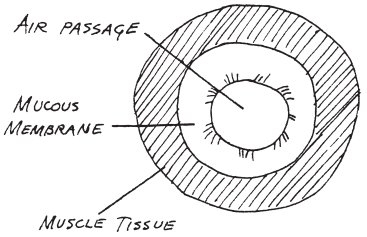
A haemothorax refers to an accumulation of blood in the pleura and can be caused by gunshot wounds, stab wounds, etc.

The main aim of therapy in the treatment of a haemothorax is to transport the blood away as quickly as possible. Begin with the standard techniques of breathing treatment (sec. 3.4) to develop the lung. For postural drainage, the patient must always lie on the injured side, being careful not to interfere with the drainage tube. This is because the lower side has a better blood supply which will transport the haematoma away more quickly. Also, if the injured side were on top, the haematoma would begin to drain through the whole lung causing further complications.

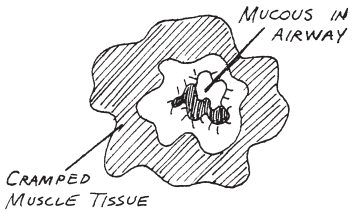
In some cases, you may find a combination of a haemo/pneumothorax. In such a case, there will be two drainage tubes inserted. Carry on as usual with the breathing treatment, but for postural drainage, give priority to the haematoma; that is, have the patient lie on the injured side.

4.3 Obstructive lung problems

Conditions such as asthma, chronic bronchitis and emphysema can be classified as obstructive lung problems. During normal respiration in a healthy bronchial, the bronchiole widens with the inspiration and becomes narrow with the expiration.



Healthy bronchiole



Unhealthy bronchiole

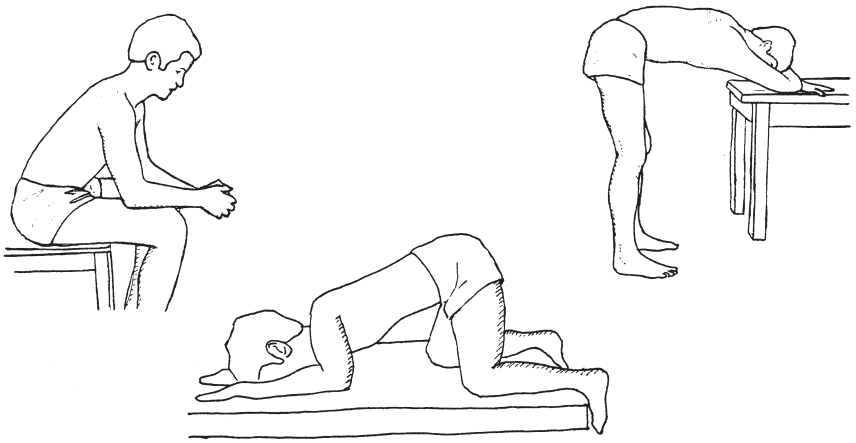
An obstructive lung disease causes the muscles of the bronchiole to cramp, the mucous membranes to swell and an increase in mucous production. This causes the bronchiole to become even more narrow during expiration.

As a result, the following problems may occur:
- high resistance in the narrow bronchioles so that all of the air cannot pass out during a normal expiration
- the patient may try to force out the air, causing further narrowing of the bronchioles
- airways can become completely closed
- excess air remains in the lungs
- an over-blowing of the lungs occurs
- the patient experiences a shortness of breath

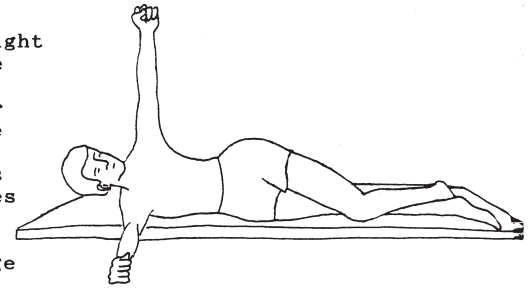
Therapy revolves around proper breathing techniques and exercises to help increase the lung capacity.

1. Breathing techniques
 - Always breathe slowly and calmly, using the costal abdominal breathing technique (sec. 3.4).
 - Inspiration - Breathe in through the nose which will clean the air and avoid irritation to the throat.
 - Pinch the nostrils slightly together and take short sniffs of air as if you were sniffing a flower.
 - Expiration - Breathe out through the mouth so that the cheeks blow out and the air passes slowly through the lightly closed lips.

During an attack, the patient should take a relaxed position that will support the weight of the thorax and help to open the airways.



2. Stretching exercise
The patient lies on his side with his arms straight out in front of him. He lifts the upper arm straight up to the other side while following the hand with his eyes. He should inhale as he does this. Then as he exhales he should bring the arm back down. Repeat this several times then change sides and do it again.



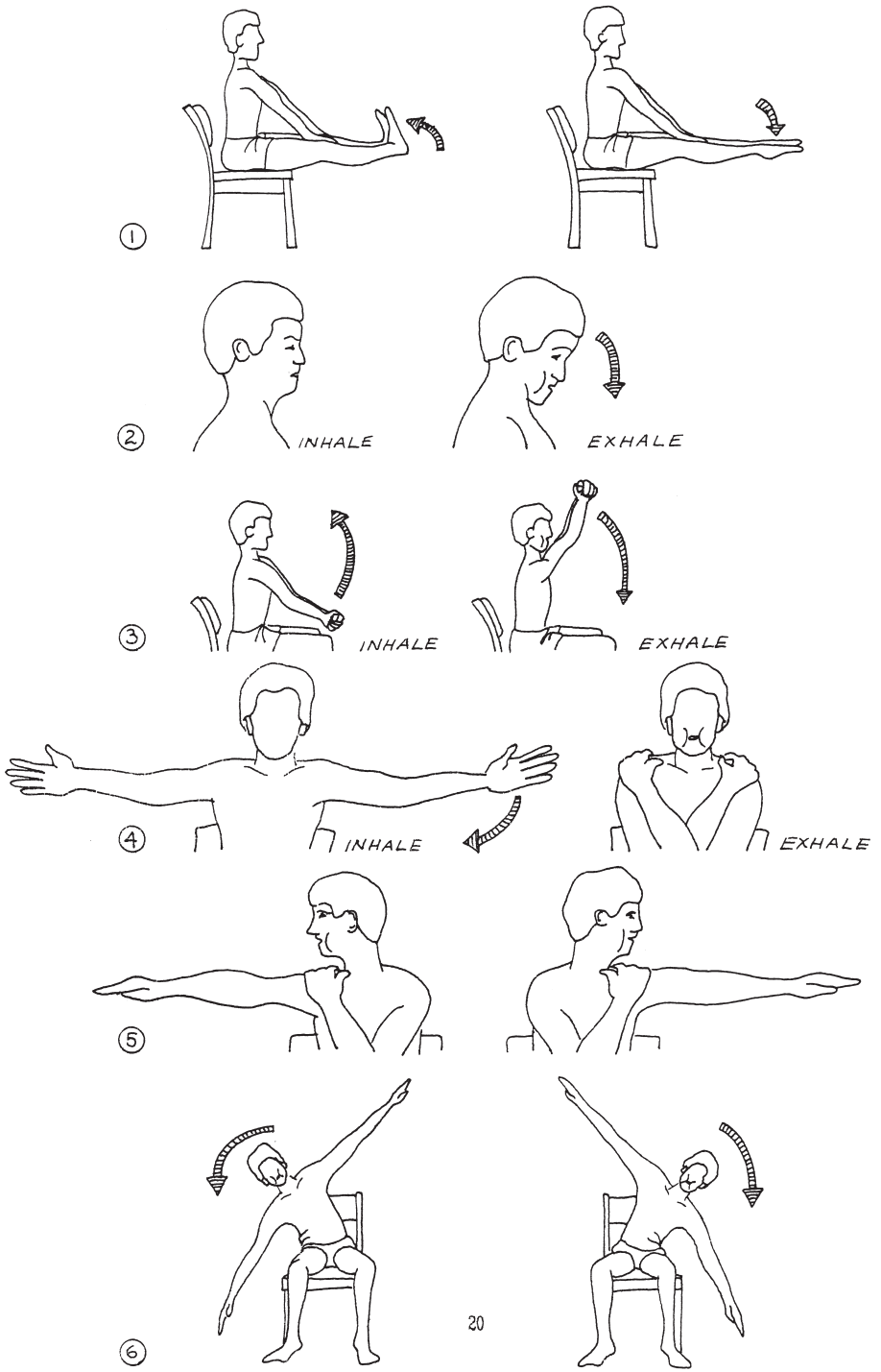
3. Instructions for normal daily activity
- Avoid unproductive coughing by drinking hot tea or sucking a sweet.
- Try to encourage productive coughing by having someone do percussion or vibration.
- Avoid holding the breath while doing things like picking up heavy things, passing stool, etc.
- Move at a suitable pace while doing daily work to maintain a regular rate of respiration.
- While doing hard work, use the technique of breathing in through the nose and out through the mouth.

4.4 Tb group

A patient suffering from Tb may experience one or more of the following problems:
- incorrect breathing
- inability to cough productively
- weakness, lack of stamina
- pain in the chest or mid-back muscles

Along with the regular treatment programme, a Tb patient can benefit greatly from an exercise programme designed to address these problems. In designing an exercise regime for such patients, the following points should be taken into account:
- Start slowly.
- Begin with small movements of the peripheral joints (ankles, wrists, knees, elbows).
- Continue with bigger movements of the hips and shoulders.
- Stand up and increase the pace.
- Always use proper breathing techniques while exercising.
- Help to open the lungs by lifting the arms and rotating the spine.
- Teach self-percussion.
- End with a hard working pace to promote deeper breathing, better coughing,better stamina and stronger muscles
- Teach the coughing techniques.

Following is an example of a standard workout programme.



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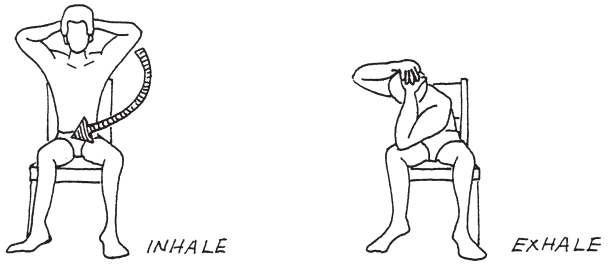

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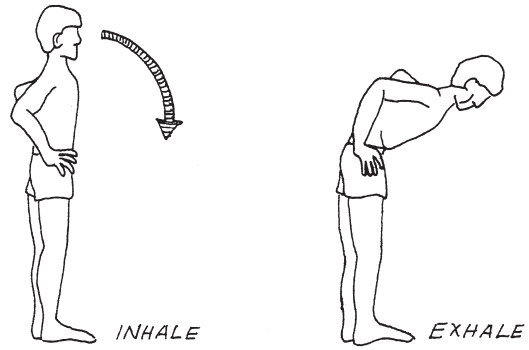

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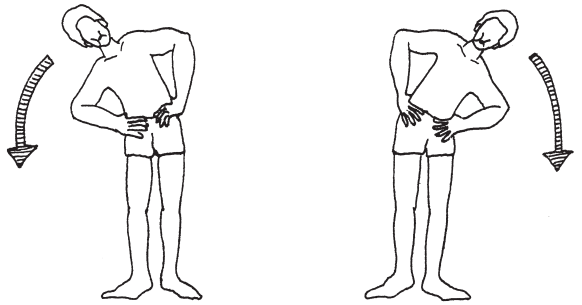

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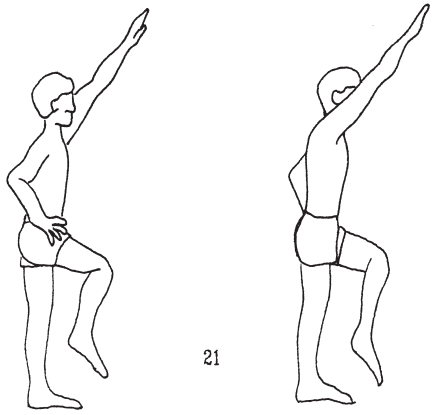


5. Treatment with hot applications

Hot applications are used to warm up the body and relax the muscles. This results in the vasodilation of blood vessels, leading to better blood circulation. All of this should act to reduce the muscle pain.

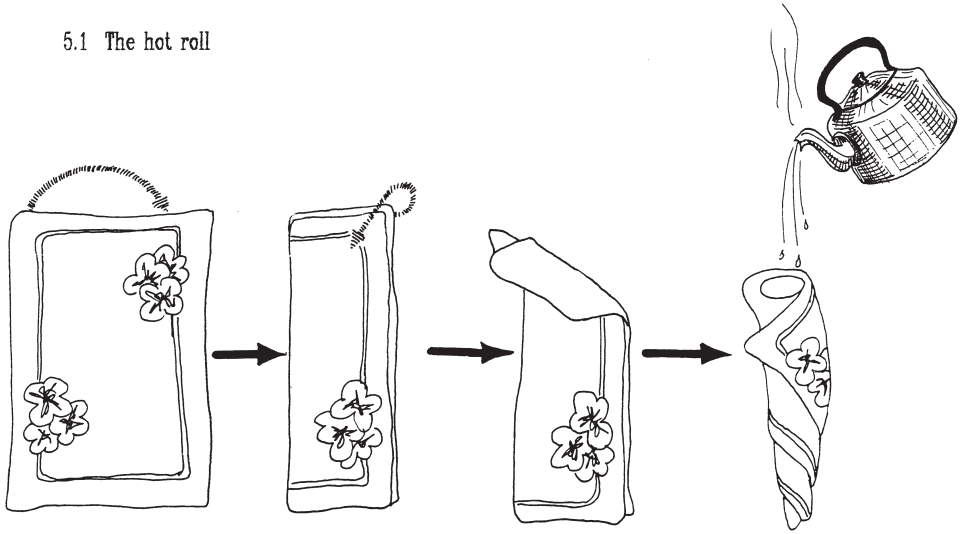
Indications for the use of a hot application include:
- any kind of musculo-skeletal pain
- pre/post-natal menstrual pain
- constipation
- chest pain caused by various lung diseases

You must remember to never put a hot compress on a hot part!!! Contraindications include an inflamed joint, a feverish patient, gastritis, etc.

Hot applications include: hot roll
hot water bottle
blanket
red or white light

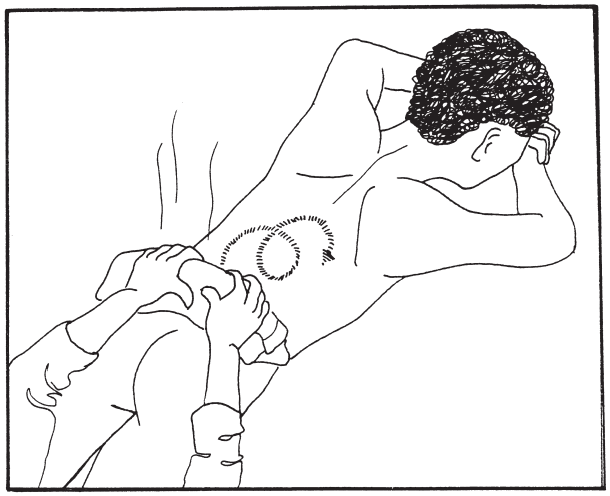
In this manual, the hot roll is the only type of hot application that will be discussed in detail.

5.1 The hot roll



Fold a towel in half lengthwise then roll the folded towel to form a cone and pour hot water into the cone slowly until you the towel becomes wet.

Use this to massage the tense area. As you massage, unroll the towel slowly, keeping the hottest part on the patient. Be sure it is not too hot!! When you have completely unrolled it, put the towel on the treated part until it is no longer hot.



6. Treatment with cold applications

A cold application is used when vasoconstriction of the blood vessels (to slow the blood flow to that area) or a slowing of nerve impulses (to lessen pain) is desired.

Indications for the use of a cold application include inflammations such as of a joint (arthritis), the foot or a vein (thrombosis, phlebitis). Never put a cold compress on an open wound, an infection or an undiagnosed pain!!

Different types of cold applications include: cold towels
cold packs
ice cubes
ice water

6.1 The cold towel

Make a towel wet with very cold water. Wring it out and put it around the injured part very tightly. When the patient says that the towel is no longer cold, replace it with another, already prepared, towel. If the inflammation is high, the towel must be changed several times as it will become warm after only a few seconds. If the towel remains cold for at least 3 - 5 minutes, change it only once. Be sure the injured part is in a relaxed position during the treatment.

6.2 The cool pack

Make a towel wet with cold water and put it around a cool pack from the freezer. Place this on the inflamed part and cover it with another towel or a plastic. The cool pack can be applied for a longer time (20 - 30 min), but keep checking that it is still cool; otherwise it becomes a warm pack!

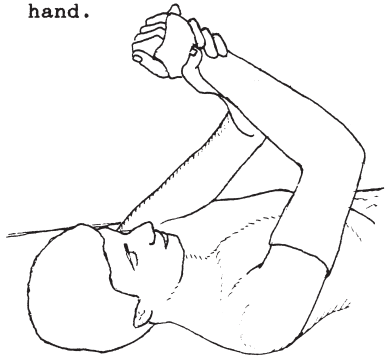
In general, after you have given a cold application, have the patient do active movements. The movement will improve circulation to carry away pain-causing toxins, and since the swelling will be reduced there will be less pain during movement. Teach the patient to continue with this treatment at home. Initially, he should try to rest the injured part, but after about five days he can try to use it. There may still be slight pain, but the movement will prevent adhesions.

7. P.O.P. exercises

While a patient is in POP, exercises must be done to avoid the development of muscle atrophy, oedema, adhesion and stiffness of joints.

7.1 Exercises for an elbow in P.O.P.

1. With the arm elevated, make a fist and open it several times. This will help to prevent oedema in the hand and to begin using the muscles of the forearm and hand.



2. Flexion/extension and abduction/adduction of the shoulder. If this exercise causes pain to the patient, he can support the POP with the healthy arm.

7.2 Exercises for a lower leg in P.O.P.

1. With the leg elevated, flex and extend the toes to help avoid oedema of the foot. If the foot is already swollen, simply elevate it .

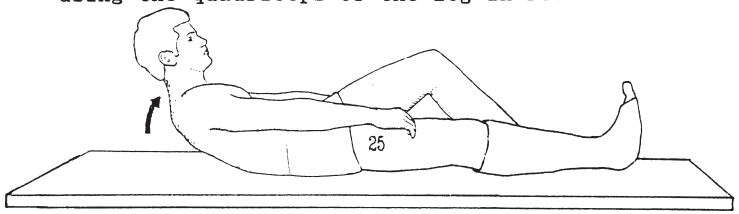
2. If the ankle is not in POP, flexion and extension exercises can be done with it.

3. Quadriceps exercises are very important as these muscles tend to atrophy very quickly and the lack of movement can lead to stiffness in the knee. Following are a few examples of exercises for the quads.

a.) Instruct the patient in isometric exercises of the quadriceps.

b.) With the patient lying on his back, the therapist places her hand under the patient's knee and tells him to press his knee into her hand.

c.) While lying on his back with the healthy leg bent, the patient raises his head and shoulders reaching both hands toward the bent knee. In this way he is using the quadriceps of the leg in POP.



8. Walking with crutches

Just because a patient is given crutches does not mean that he is ready to be discharged. It is the job of the physiotherapist to see that the crutches are the correct size for the patient and that the patient is using a proper gait when walking.

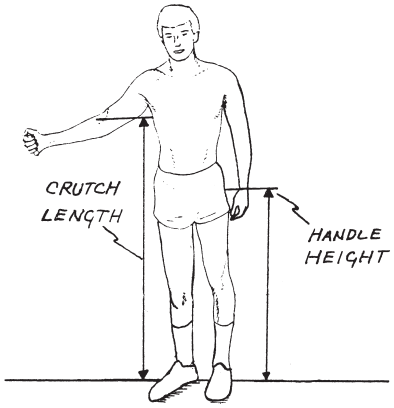
8.1 Measurement for crutches

Before teaching a patient to walk correctly on crutches, the therapist must make sure that the crutches are the right size for the patient. Properly sized crutches allow the patient to stand straight with the top of the crutch just below the armpit (not touching). When he grasps the handle, the patient's shoulders should be down and relaxed and his elbow should be slightly bent.

For correct crutch sizing, measure a patient as follows:

1. *Crutch length* - Place three fingers under the patient's armpit. Measure from this point to the patient's foot.

2. *Handle placement* - With the patient standing straight with his arms at his sides, measure from the floor to the patient's wrist. Place the bottom edge of the handle at this height.



8.2 Various gaits for crutch walking

1. *4 point walk* - This gait is used when the patient is allowed to put weight on both legs, but still needs the support of the crutches. In this gait, the right crutch moves forward, followed by the left leg. Then the left crutch moves forward, followed by the right leg.

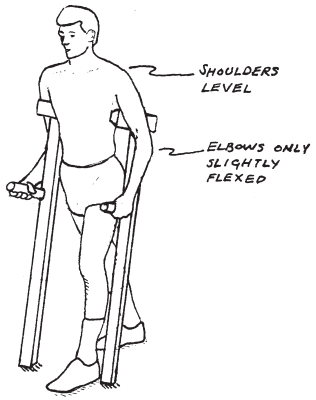
2. *3 point walk* - In this gait, both crutches move forward at the same time, followed by the injured leg, and then the healthy leg. Even if the patient is not allowed to bear weight on the injured leg, he can use this gait because as the injured leg is carried forward, the crutches are supporting his entire weight. A patient must always be thoroughly informed if he is not to bear weight on the injured leg.

3. *2 point walk* - In this gait, both crutches and the injured leg move forward at the same time, followed by the healthy leg.

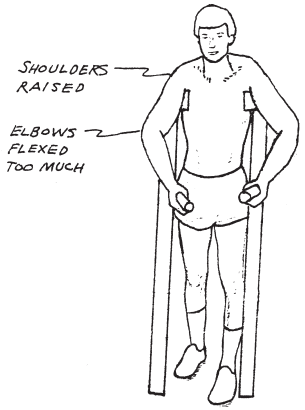
4. *Going up a step*
a.) The healthy leg climbs the step, followed by the injured leg, followed by the crutches.
b.) The healthy leg climbs the step, followed by the injured leg and the crutches at the same time.

5. *Going down a step* - Both crutches go down the step first, followed by the injured leg, then the healthy leg.

When using any of the above techniques, it is important to observe that the patient is walking with a straight back and that his shoulders are down and relaxed, not up toward his ears.



Correct crutch size



Incorrect crutch size

9. Muscle stretching

Stiff and shortened muscles need stretching. A stretch should be held at its maximum range for at least 10 - 20 seconds so that the muscle can begin to relax and lengthen. Never stretch a muscle to the point of extreme pain. This would cause the muscle to react by contracting even further. Proper stretching should be done several times a day to help relax a stiff muscle.

The basic procedure for muscle stretching that you will notice in each of the following stretches is as follows:

- Contraction of the muscle to be stretched for about 10 seconds. This will tire the muscle.

- Relaxation of the muscle.

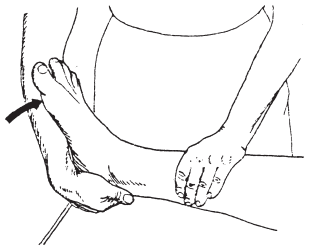
- Stretch of the muscle by the therapist; once the muscle is tired and relaxed, it will not work against the stretch so much.

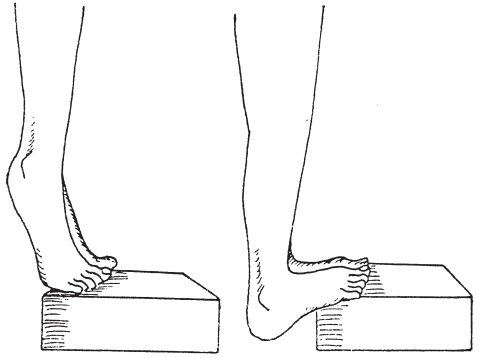
Never try to stretch a muscle in an acute situation such as extreme pain or inflammation around the muscle.

9.1 Stretching of the gastrocnemius

This stretch is indicated in the case of a drop foot.

As the therapist grasps the patient's heel, so that the foot rests against the forearm, the patient must push against the therapist's arm. The patient relaxes and the therapist pushes the foot into dorsiflexion.

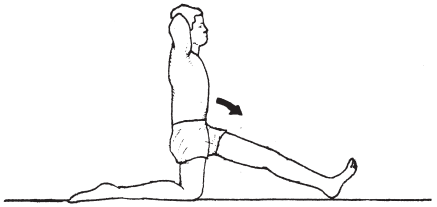




For self-treatment, the patient can stand on the edge of a step and raise himself to stand on his toes. The patient then lowers himself so his heel drops down over the edge of the step and the foot is in dorsiflexion.

9.2 Stretching of the hamstring

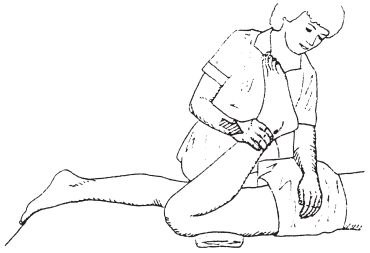
The patient's leg is resting on the therapist's shoulder. With one hand, the therapist holds the knee in extension while the other holds the foot in dorsiflexion. The patient pushes his leg into the therapist's shoulder for about 10 seconds, then relaxes. The therapist then lifts the leg for the stretch, maintaining the extension and dorsiflexion.

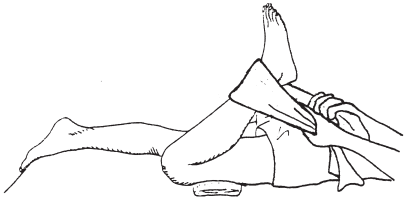


For *self-stretching*, the patient sits on the floor with the leg to be stretched straight out in front of him. He presses this leg into the floor and then relaxes before trying to reach with his nose to his knee. It is important that the patient keep his back straight during this exercise to obtain the maximum stretch of the hamstrings.

9.3 Stretching of the quadriceps

With the patient's knee flexed, the therapist grasps the ankle to give resistance as the patient tries to extend the knee. This is held for 10 - 20 seconds. Then the muscle is relaxed and the therapist gently pushes the knee into flexion.

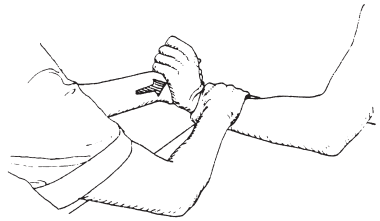




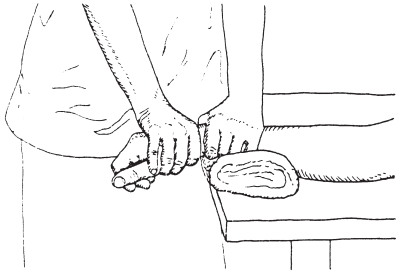
In the same position, the patient can do *self-stretching* by holding his own ankle with his hands or a towel to first resist extension, then to pull the knee into flexion.

9.4 Stretching of the hand flexors

The patient tries to flex the wrist against resistance given on the palmar surface. After relaxing, the hand can be pulled into dorsiflexion. This can be done by the therapist or the patient himself.



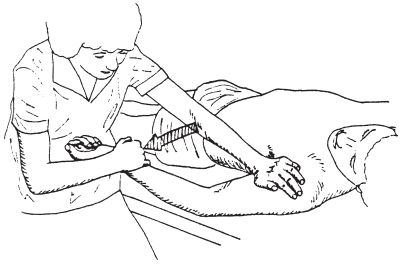
9.5 Stretching of the hand extensors



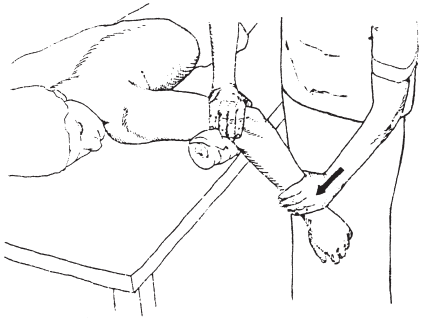
The patient tries to extend the wrist against resistance given on the dorsal part of the hand. After relaxing, the hand is pulled into palmarflexion.

9.6 Stretching of the biceps

The patient tries to flex the elbow against resistance. Then after the patient relaxes the muscle, the therapist extends the elbow .



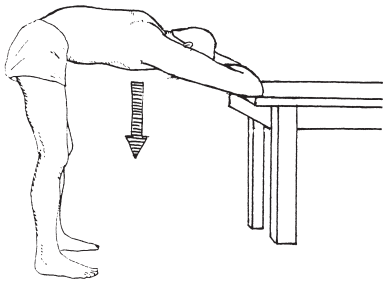
9.7 Stretching of the triceps



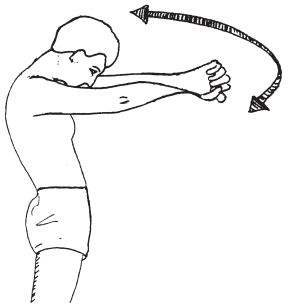
The patient tries to extend the elbow against resistance. This is followed by relaxation of the muscle and then flexion of the elbow.

9.8 Stretching of the pectoralis major

With his hands resting on a table, the patient pushes them into the table. After relaxing, he keeps his back straight and, still holding onto the table, pushes his torso toward the floor.



9.9 Stretching of the rhomboids



With his arms crossed in front of him, the patient turns his hands so that he can grasp them palm to palm. He should bring his shoulders forward to round his back. Instruct the patient to pull both arms across to the right then to the left until he feels a stretch between the shoulder blades. Be sure that he pulls from the shoulders and does not turn at the waist.

9.10 Stretching of the trapezius

The patient places his right hand over his head to his left ear and pulls his head slowly to the right side and a little bit forward. This is then repeated on the other side.

10. Deep friction

Deep friction is used to treat lesions or cramps of the tendons, ligaments or muscles. The technique is to press two fingers on the cramped part until a resistance is felt, then rub the structure transverse to (across) the fibres. The aim of friction is to work against adhesions and to improve blood circulation to the cramped part. The patient may experience more pain during treatment, but later this pain should subside. If the pain continues, he can place an ice pack on the painful area.

11. Treatment of a stiff joint

A stiff joint is treated in several different ways.

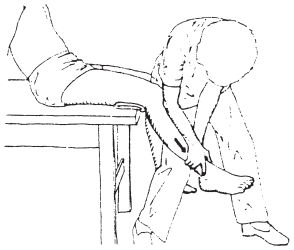
- The contracted muscles are massaged.
- Deep friction is done on the tendon of the cramped muscles.
- Distraction of the joint (gentle traction to create more space between the bones of the joint) can help to prevent adhesions and allow more space for movement.
- Stretching techniques are applied.
- Passive mobilization is carried out.
- If the muscles are atrophied, resistive movements may help to strengthen them.
- The patient should be taught exercises to do at home.

These treatments should be applied in the order listed to stiff joints in general. Following are a few specific points to consider in the treatment of stiff elbows, knees and hips.

11.1 Mobilization of a stiff elbow

After massage and deep friction, distraction of the elbow joint is a useful technique. To do this, hold the upper arm of the patient steady with one hand while the other hand holds the forearm very close to the joint, then keeping the elbow flexed, pull the forearm away from the patient. Follow this up with stretching of the biceps and triceps and then slow, passive mobilization of the joint into flexion and extension.

11.2 Mobilization of a stiff knee



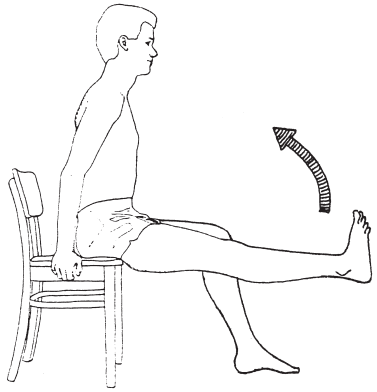
In working with the knee, it is important to remember to mobilize the patella. After massage and deep friction, apply patella mobilization techniques (sec. 2.1). Then as the patient lies on his stomach with his knee flexed, hold the femur with one hand and with the other hand, pull the lower leg upwards to distract the bones of the knee joint; or, with the patient sitting on the edge of a table, pull the lower leg downward. This is followed by stretching of the quadriceps and hamstring muscles and passive or active mobilization of the joint.

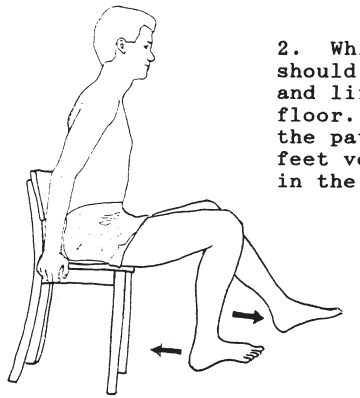
In treating a knee, it is important to know that it is more useful to the patient to have full extension than to have full flexion. This is because walking with a straight leg is easier and causes less side-effects than trying to walk with a bent knee which could lead to an arthrosis of the joint. For this reason, treatment should stress extension.

11.3 Quadriceps exercises

After a knee problem or long immobilization of the leg, it is very important to strengthen the quadriceps so as to provide full support to the joint. Following are a few exercises aimed at quadriceps strengthening.

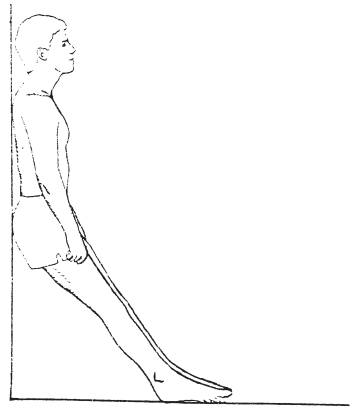
1. While sitting, the patient extends one leg out in front of him. He lifts this leg upward and then lowers it to the middle position. He then lifts it several more times quickly from this position. This should be repeated several times with both legs.

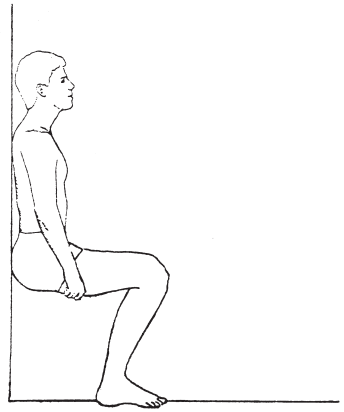




2. While sitting, the patient should contract both quadriceps and lift his feet from the floor. With his legs raised, the patient begins to move his feet very quickly as if walking in the air.

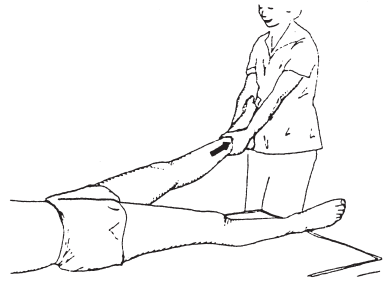
3. With his back against a wall, instruct the patient to flex and extend his knees to cause him to slide up and down the wall.





11.4 Distraction of a stiff hip

With the patient lying on his back, the therapist stands at the patient's feet and holds his heel with one hand and his ankle with the other then gently pulls the leg toward her and holds for about 10 - 15 seconds. Repeat this several times. With this distraction, blood flow to the area will be increased and the



12. Treatment of burns (contraction prophylactic)

The main aim of physiotherapy for burns is the prevention of contractures in the involved tissues. This is accomplished by carrying out passive or active movements of the burned areas to their full range of motion. Movement should be done slowly and carefully as it will cause pain and sometimes bleeding in the patient. Because of the open wounds and the bleeding, the therapist should be sure to protect herself by wearing plastic gloves. These movements should be done daily when the patient is in the bath or is having his dressings changed. After treatment, support the joint in the end position of its range with pillows, splints, etc.

12.1 General points about burns

In the treatment of burns, there are a few general points to consider:

- As a main aim of therapy is to make the patient as independent as possible as quickly as possible, the therapist must always think functionally - What must the patient do in his daily life? - and plan the treatment around that. Priority must be given to the arms and hands as they are so necessary to daily activity. Shoulders and elbows tend to form contractures very quickly so special care must be taken to prevent this. As for the legs, just by changing the patient's position from sitting to lying to standing, contractures can be prevented.

- Exercises should be active as soon as possible and should include neighbouring joints as well as the burned area.

- If smoke inhalation has occurred, breathing exercises will be important to clear the lungs.

- Sometimes the patient will develop oedema. If this happens, there should be no movement as it will be impaired by the oedema. The oedema may have to be relieved surgically by the doctor.

- If there has been construction of a skin graft, there should be no movement of the grafted part for five days. After this time, the wound will be unwrapped to see if the graft has been successful or not. Therapy should still continue on the parts unaffected by the graft even during this five day period. After five days, if the graft has been successful, therapy can be resumed (preferably twice a day) to mobilize the burned part. If the graft has not succeeded, the burn must be scrubbed thoroughly to remove the necrotted skin and increase blood circulation to the area. After this, therapy can continue.

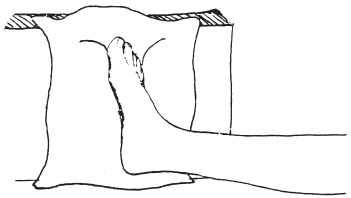
12.2 Proper positioning of a few major joints

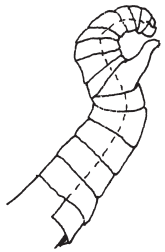
1. *Neck* - The head and neck should be in a middle and straight position. A piece of foam rubber can be fixed with a bandage to support the head.

2. *Axilla* - It is important to avoid contractures that would inhibit flexion or abduction of the shoulder. The arm should be raised and supported by a splint.

3. *Wrist, elbow, knee* - These joints should be kept straight. This is easily accomplished by POP splints.

4. *Ankle* - The foot should be supported in a 90 degree angle.





5. *Hand* - The hand should be elevated to prevent oedema and supported in a functional position (as if to grasp something). Useful exercises for the hand include:
 - making a fist
 - opposition of the thumb across the palm
 - precision grasp of the thumb to every finger

6. *Chest* - Proper breathing techniques and thoracic mobilization exercises are important in the case of burns to the chest area. These help to keep the lungs functioning properly and avoid muscle contractures.

13. Rheumatic problems

Very often patients come with various body aches. These are most often caused by poor posture in standing, sitting, walking, working, etc. which lead to cramped muscles or inflamed joints. By teaching correct posture and a few specific exercises, it is possible to alleviate these aches and prevent them from occurring again in the future.

13.1 General points about treatment

In treating a patient with such aches and pains, there are a few general steps that can be followed before focusing on the specific treatment techniques for that particular part.

1. Observe the patient's normal posture.
2. Find out the type of work this person does daily.
3. Observe closely the part that is painful (is it a cramped muscle, an inflamed joint, etc.).
4. Try massage and deep friction on the cramped muscles and tendons.
5. Stretch the tight part. (chapter 9)
6. Try mobilization techniques for a stiff joint. (chapters 2 and 11)
7. Teach exercises for strengthening the weak muscles. The patient can do these at home as well as during his physio treatment.
8. Teach correct posture.

By beginning with these points of observation and treatment, the therapist can have a good idea of the patient's problem and the best treatment approach. Following is a more detailed look at certain procedures and body parts.

13.2 Correct posture

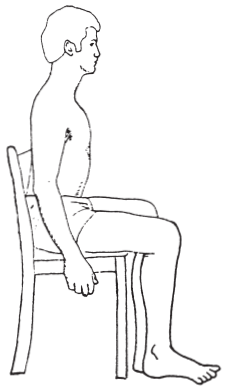
It is a physiological fact that our spines have a double S-curve. Because of this curve, the proper posture is to stand in the lordose position with the pelvis moved forward. Often though, we can observe people standing and sitting with a round back. In this position, the ligaments, tendons and muscles of the back are over stretched and inflammation of the joints between the vertebrae may occur. Also affected may be the muscles of the neck and the abdomen. Because the back is involved in virtually every move we make, it is important to instruct patients in the correct postures for standing, sitting, walking and working.

Correct standing posture includes the following points:

- the feet are slightly apart with a slight out-rotation
- the knees are slightly flexed to avoid overextension of the joint
- the pelvis is flexed forward
- the chest is lifted as if two ropes were pulling upward on the clavicles
- the neck is straight with the chin pulled in

Correct sitting posture includes the following points:

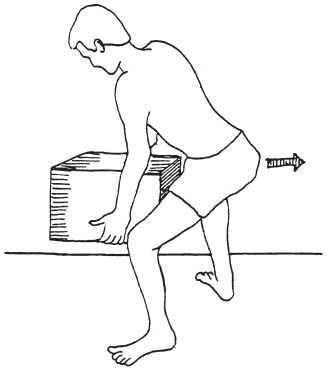
- the back is straight (the low back can be supported with a pillow to bring the pelvis forward)
- the knees are slightly apart and straight above the feet
- the chest is lifted as in standing posture
- the neck is straight with the chin pulled in



Correct walking

The proper way to walk is based on correct standing posture. While walking, the leg and foot muscles must be used properly. This means that the heel touches the ground first on each step and then the foot rolls smoothly onto the toes

Correct lifting

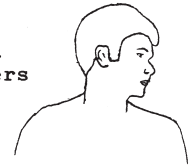


When lifting heavy things, the legs must be apart with the knees flexed. The low back should be extended so that the buttocks are pushed backwards. In this position, the back muscles are contracted to support the spine and the knees do the main work of lifting. To lift the object, hold it close to your body and then stand up by straightening your knees. Never try to lift and turn at the same time!!!! This is sure to strain the muscles of the lower back.

13.3 Neck problems

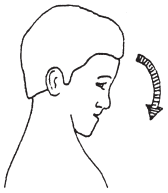
After doing the general treatment (sec. 13.1), it is important to stress the proper posture for the neck. Many people carry the neck forward, but they must be taught to retract the neck so that the chin is pulled in. Following are a few exercises to stretch and strengthen the muscles of the neck and to reinforce proper neck posture.

1. Rotate the neck to look to the left then to the right. Be sure the shoulders are down and relaxed.

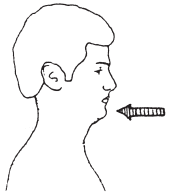


2. Flex the neck from side to side bringing the ear toward the shoulder. Be sure the patient is not bringing the shoulder to the ear!

3. Flex the neck bringing the chin to the chest.



4. Retract the neck to bring the chin in.

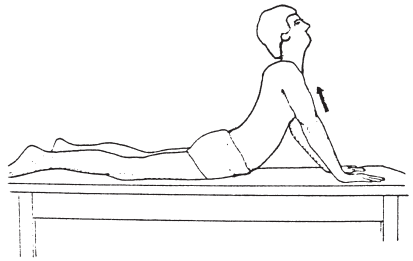


4. Stretch the trapezius (sec.9.10).

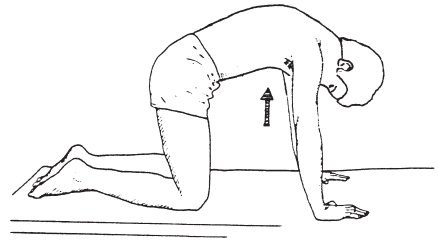
13.4 Spinal problems

There is often pain in a stiff spine. Therefore it is important to stretch and mobilize the entire spine.

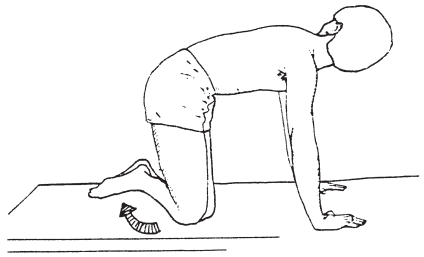
Exercises to mobilize the spine.



1. The patient lies on his stomach with his hands under his shoulders, then he pushes up slowly, one vertebra at a time, to curve his back into extension. He should stop at the point of too much pain. Repeat this extension several times.

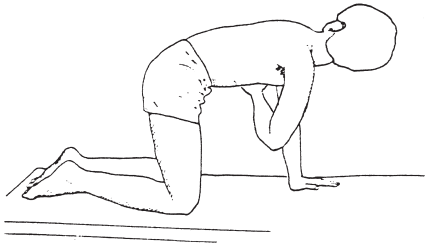


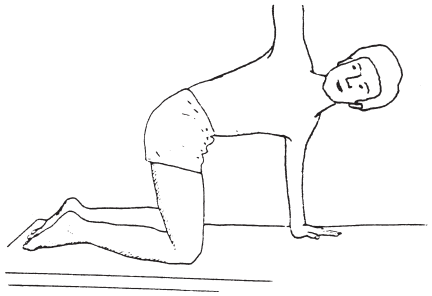
2. Flexion/extension of the spine. With the patient in a crawl position, tell him to raise his back as much as possible to make it very round.



3. Lateral flexion of the spine. Still in a crawl position, the patient should turn his feet to one side and his head to the same side until he can see his feet. This should be repeated several times on both sides.

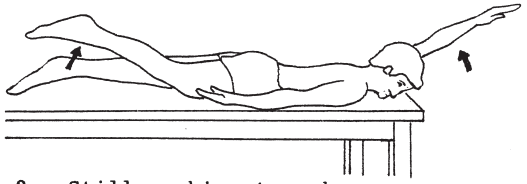
4. Rotation of the spine. In the same crawl position, tell the patient to carry one arm under his chest to the opposite side then back to the other side and straight up. He should watch the movement of his arm so that his head is turning from side to side. Do this on both sides.

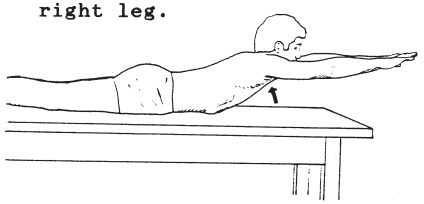




Exercises to strengthen the back muscles.

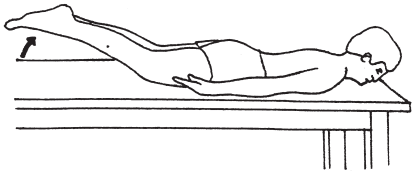
1. While lying on his stomach, the patient should alternately raise the right arm and the left leg and then the left arm and the right leg.





2. Still on his stomach, tell the patient to raise both arms at the same time while the legs relax.

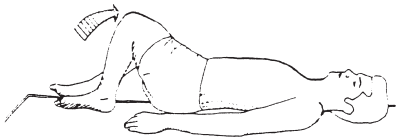
3. In the same position, the patient now raises both legs at the same time while the arms are relaxed.



13.5 Problems of the lower spine

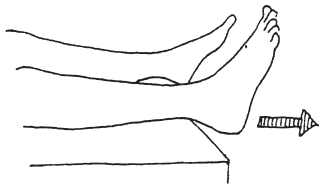
The following exercises are specifically for mobilization of the lumbar region of the spine.

1. Flexion/extension of the spine. While lying on his back with his knees bent, the patient presses his lower back flat against the floor then arches it upward.



2. Rotation of the spine. Still lying on his back with knees bent, the patient carries both knees to one side then to the other.

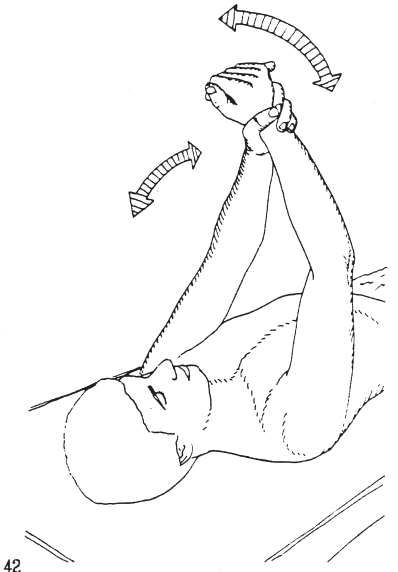
3. Lateral flexion of the spine. Lying on his back with his legs extended, the patient stretches one leg downward as if someone were pulling on his heel. Then he relaxes that leg and stretches the other one in the same manner.



4. The general back exercises described in the previous section can also be helpful for the lower back.

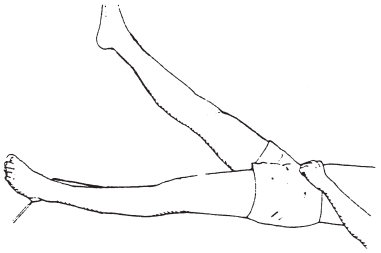
13.6 Shoulder problems

While doing the general treatment for rheumatic complaints, it should be realized that massage and deep friction are very useful to the many tendons of the shoulder capsule. It is helpful to use these techniques before trying the mobilization exercises described in section 2.1. Also, if only one arm is injured, the healthy arm can be used as a helper when exercising. Be sure that the shoulders are in a down and relaxed position during the exercising.

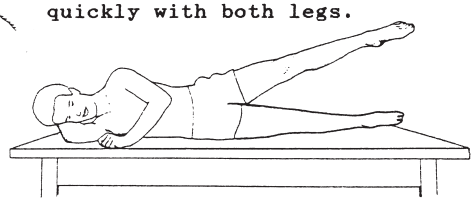


13.7 Hip problems

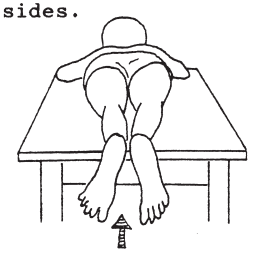
After active exercises (sec. 2.1) and hip distraction (sec. 11.4), the following exercises can be applied for strengthening of the muscles around the hip.



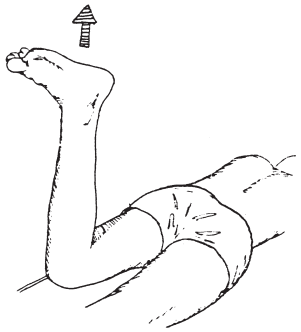
1. While lying on his back, the patient lifts one leg without bending the knee. Tell him to lower it to about middle position then raise it again. Repeat this several times quickly with both legs.



2. While lying on his side, instruct the patient to raise and lower the top leg several times. Repeat on both sides.



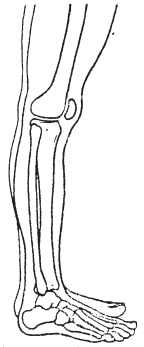
3. Lying on his stomach, the patient presses his heels together then raises both legs together several times.



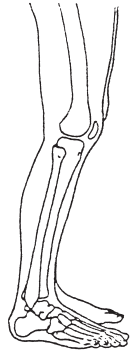
4. Still on his stomach, the patient flexes one knee then raises the leg straight upwards toward the ceiling. Repeat several times on both sides.

13.8 Knee problems

Often, knee pain is the direct result of poor posture. Overextended knees are very common, but in this position the quadriceps are not supporting the knee and there is too much of a load on the joint. In the proper posture, the knees are slightly flexed so that the quadriceps are working to support the joint. When instructing the patient to stand in this position, it may be necessary to exaggerate the flexion of the knees in the beginning until he becomes accustomed to it.



Overextended knee



Slightly flexed knee

Another potential problem is the position of the patella. When standing correctly, the patella should be directly over the foot and not rotated to either side. To avoid stressing the patella, instruct the patient to keep the knees at a 90 degree angle when sitting and not to tuck the lower legs under the chair. It is also not good to sit in a cross legged position or to sit with the legs tucked under as these positions press the patella into the joint and can impair the circulation through the joint.
With these points in mind, after following the general treatment plan, quadriceps exercises (sec. 11.3) can be added to help maintain a healthy knee.

13.9 Foot problems

Foot problems are common in heavy women after menopause. The change in the hormonal balance can weaken the ligaments and the weight can stress these weakened structures. Such stress can also be caused by the wearing of high-heeled shoes.
This stress may lead to the falling of the two arches of the foot (longitudinal and transverse). A flat foot or possibly a hallux will be the result. Both of these lead to pain in the foot. Treatment will revolve around the strengthening of the muscles of the foot. As overstretched ligaments cannot be shortened, except surgically, only strong foot muscles will give renewed support to the fallen arches.

Foot exercises

1. The patient contracts his toes into a claw shape as if trying to pick up a small object with the foot.

2. Remind the patient of the correct way to walk, that is, heel down first then roll onto the toes.

Club foot

Another common problem of the foot is Club Foot. This is a condition often seen in new-borns but, with proper early treatment, can quite often be resolved without surgery or casting. While the cause of a club foot remains unknown, it is suspected to contain a genetic element.

The characteristics of club foot are:

- plantarflexion of the ankle,
- inversion at the ankle, and
- supination of the forefoot.

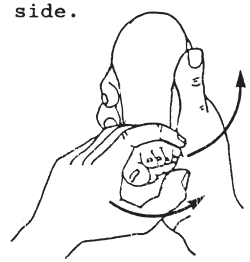
There is shortening of the tibialis (anterior and posterior), and the ligaments and the joint capsule on the medial side of the ankle and foot.

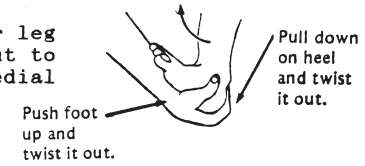
Opposite to the shortening, there is a lengthening on the lateral side of the leg of the peroneus as well as the ligaments and joint capsule.

Therapy should begin early, even on the first day of life! To be completely effective, therapy should be continued until the child walks. Therapy begins with over-correction of the deformity by manipulation. This is followed by maintenance of the correction by splinting and active use of all the leg muscles, especially the peroneus. Severe cases, or if the child is older than one year, may need surgical correction. If full over-correction is seen within the first two or three weeks of treatment, prognosis for a full recovery is likely.

Mobilization exercises should be taught to the mother so that she can do them several times throughout the day (at least every time she changes the baby's nappy).

1. With the knee flexed and the lower leg held firmly, pull the heel down and out to stretch the tendo-calcaneus and the medial side.





2. With the knee still bent, maintain dorsiflexion of the ankle with one hand while pronating the forefoot with the other.

3. Stimulate the peroneus by stroking along the outside of the leg. The child should respond by turning the foot to the outer side.

4. In an older child, try to have him kick sideward. Also, encourage him to stand.

Splinting should only be done on the advice of a doctor.

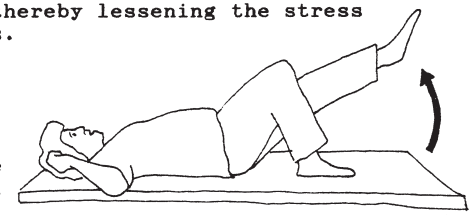
The importance of continued treatment must be stressed to the mother. Even if the foot looks normal, it could return to the incorrect position if treatment is stopped too soon. In the case of splinting or strapping, stress the importance of keeping the leg dry as wet strapping could lead to skin problems. Also about splinting, the mother must constantly check for discolouration or swelling of the child's toes. If this is noticed, the child should be taken immediately to hospital.

14. Ante-natal care

14.1 Exercises to prevent thrombosis and swollen legs

Because of the changes in the hormonal system during pregnancy, the connective tissue and the vessels of the legs may become weak and enlarged. This is the reason why pregnant women often suffer from varicose veins and swollen legs. The following exercises work to maintain good blood flow to the legs, thereby lessening the stress placed on the weakened vessels.

1. With the patient lying on her back with both knees bent, she should lift and extend one leg and then the other several times.

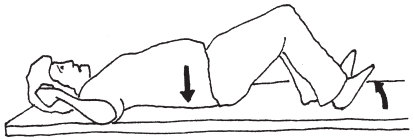


2. In the same position, the patient should lift and extend one leg and then flex and extend the ankle several times very quickly. While still flexing and extending the ankle, the patient should slowly lower her leg to the floor then repeat the entire exercise with the other leg.

14.2 Exercises for the pelvic floor muscles

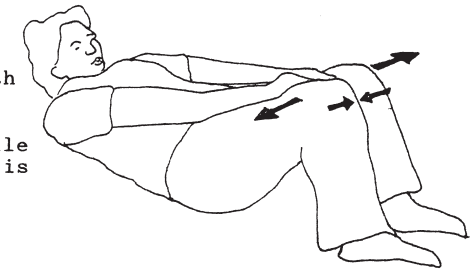
The pelvic floor muscles are two plate-like muscles (the pelvic diaphragm and the urogenital diaphragm). These muscles contain the orifices of the urethra, vagina and anus. The following exercises are done to prepare the muscles for their work during pregnancy and for a quick recovery after delivery.

1. Lying on her back with both knees bent, the patient presses her spine into the floor for 6 - 10 seconds then relaxes.

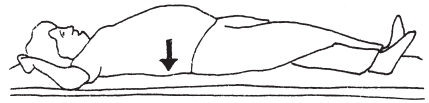


2. In the same position, the patient dorsiflexes her ankles and presses both knees together while at the same time pressing her back to the floor.

3. Still on her back with bent knees, the patient uses her hands to try to force her knees apart while with her leg muscles she is trying to hold the knees together.

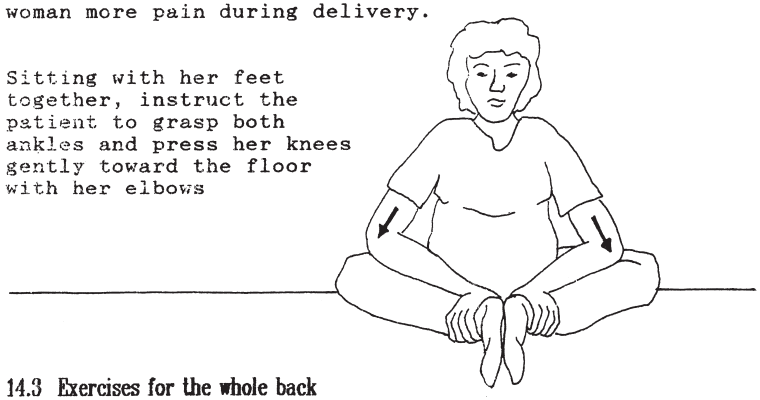


4. While lying on her back with her legs extended and crossed at the knees, the patient presses her knees together and her back into the floor. At the same time, she should tense her pelvic floor muscles as if trying to hold urine.



While the above exercises strengthen the pelvic floor muscles for their work during pregnancy, it is also important to stretch them so that they do not get injured during delivery. Tight pelvic floor muscles will give a woman more pain during delivery.

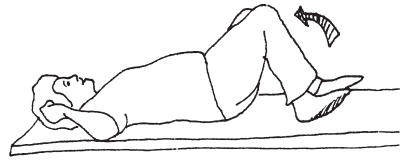
Sitting with her feet together, instruct the patient to grasp both ankles and press her knees gently toward the floor with her elbows



14.3 Exercises for the whole back

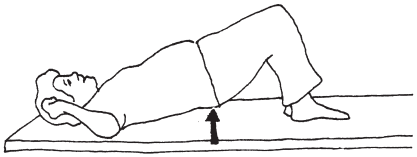
These exercises will mobilize the spine and strengthen the muscles of the back as well as of the abdomen.

1. Lying on her back with her knees bent, the patient presses her lower back into the floor then relaxes.



2. In the same position, the patient rotates her lower spine by lifting her legs and carrying them to either side.

3. While lying on her back with both legs extended, instruct the patient to stretch one leg at a time as if someone were pulling it down by the heels.

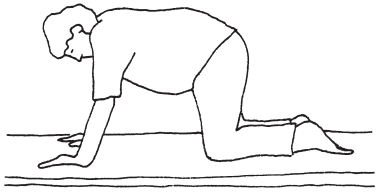


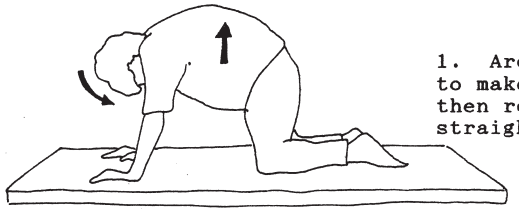
4. Lying on her back with her knees bent, instruct the patient to use her leg muscles to raise her pelvis.

The following exercise begin with the patient in a crawl position.

Basic crawl position

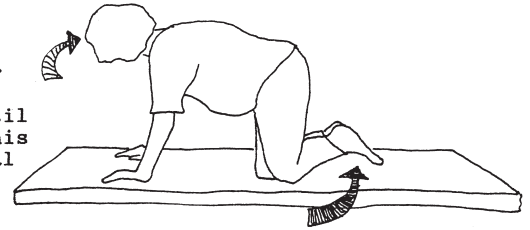
- back and neck are straight
- stomach muscles are tight
- hands are facing forward
- elbows are slightly flexed
- knees are directly under hips





1. Arch the spine upward to make the back very round then relax so it is straight again.

2. The patient turns her feet to one side and her head to the same side until she can see her feet. This should be repeated several times from side to side.



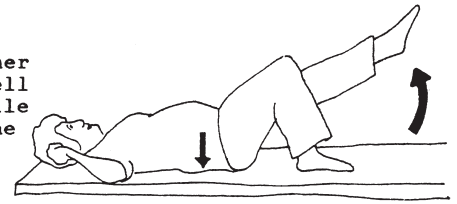
3. The patient carries one arm under her chest to the opposite side and then back again and straight up to the ceiling. She should watch the movement of her arm so that her head turns from side to side. Repeat on both sides.

14.4 Correct posture

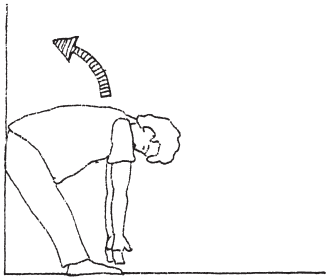
Most often women suffer from back-ache during pregnancy because of incorrect posture. The added weight of the child can lead to a compensation of several of the muscles involved in proper posture. For this reason the woman should be reminded of how to stand, sit and walk properly.(see sec. 13.2)

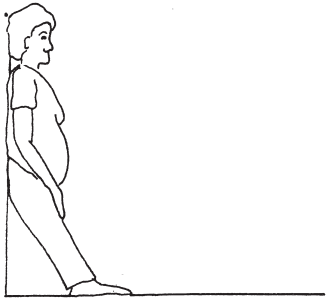
The following exercises can be taught to improve standing posture.

1. The patient lies on her back with bent knees. Tell her to extend one leg while pressing her back into the floor. This should be repeated with the other leg.



2. With the patient standing against the wall with her feet a little bit forward, tell her to lean forward by bending at the waist. Then she should come up slowly, trying to touch every vertebrae to the wall, until her entire back is against the wall.





14.5 Care for the breasts

The following exercises help to strengthen the pectoralis major muscles which help prevent the breasts from sagging.

1. The patient presses both hands together with her elbows pointing out to the sides, then she clasps her hands and pulls outward.

2. With the ~~left~~ right hand under the left breast, the patient gives a firm stroke up to the right clavicle. This helps to improve circulation to the area. The skin of the breasts should be smeared with lotion regularly to help maintain its elasticity.

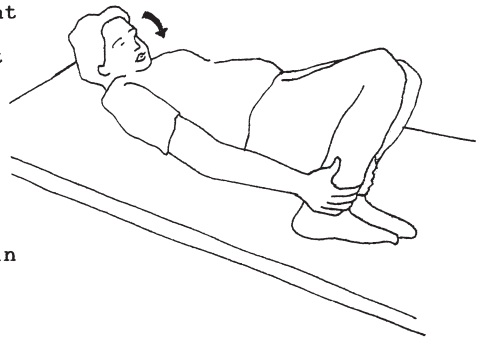
14.6 Care for the belly skin

To avoid developing stretch marks, pregnant women should take care of their belly skin so that it remains elastic and well-nourished. To do this, tell the patient to brush with a towel or brush from the sides to the middle. This helps to improve the circulation. Also, when smearing with lotion, it is good to rub in this direction. Another technique is to lift the skin of the belly. This helps to prevent adhesions and to improve circulation.

14.7 Breathing techniques

During her pregnancy, it is important for a woman to learn proper breathing techniques. These will help her later during labour and delivery. An important technique to learn is costal-abdominal breathing (sec 3.5). As she breathes into her abdomen and sides, she can imagine she is giving air to the child. During labour, this will help her to breathe into the pain and to imagine she can open her vagina to breathe the child out.

To practice the breathing techniques to be used during labour and delivery, the patient lies on her back holding her ankles while her knees are bent and her feet are on the ground. She should breathe in through her mouth, then lower her chin to her chest. Holding her breath, she should push in the direction of the vagina for about 20 seconds. After this she should keep her abdomen tight, lift her head, breathe in again, and push for another 20 seconds. This should be repeated several times. This exercise can also be practiced while passing stools.



14.8 Delivery

Delivery is divided into three stages. The first stage begins when the woman feels the first contractions and ends when the cervix has opened to 10cm. During this stage, the mother can go about her daily work, but she should not work too much and should rest often and practice costal-abdominal breathing. She should not lie for long on her back as this could cause the fetus to suffer from a lack of oxygen due to pressure on the abdominal artery. Side-lying is better.

In the second stage, the head of the child is in position and is pressing on the pelvis. This gives the mother the feeling to push, but she should wait until the midwife or doctor tells her to push. If she begins pushing too soon, she will become too tired too early in the process. Between pushing, she should use costal-abdominal breathing.

The third and final stage of delivery is the expulsion of the placenta.

15. Post-natal exercises

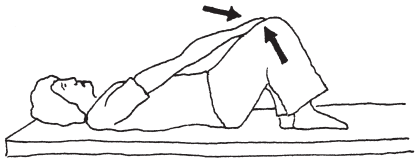
Post-natal exercises are done with several goals in mind:

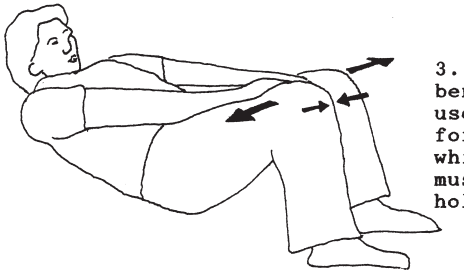
- avoid circulatory problems.
- avoid swollen legs.
- avoid the sinking of the abdominal organs.
- bring the uterus back to its normal size.
- strengthen the abdominal muscles.
- mobilize the entire body.

For the first three points, the pelvic floor exercises discussed earlier (sec. 14.2) are very useful. Following are a few other exercises that can be helpful to a woman after delivery.

1. While lying on her back with her knees bent, have the patient press her back into the floor. This is using the abdominal muscles.

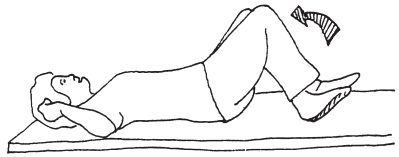
2. In the same position, the patient's right hand presses against the left knee as she tries to lift that leg. The same is done on the other side.





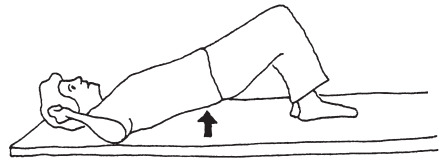
3. Still on her back with bent knees, the patient uses her hands to try to force the knees apart while, with her leg muscles, she is trying to hold her knees together.

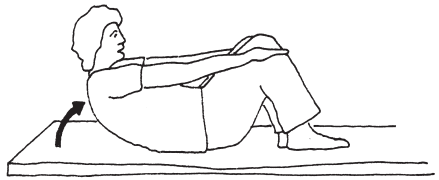
4. From the same position, but with her hands clasped behind her head, the patient raises her head and shoulders and her left leg so that her right elbow touches her left knee. This is then repeated so the left elbow touches the right knee.



5. While lying on her back, the patient carries her legs, flexed at the knees, from side to side.

6. In the same position, the patient uses her leg and abdominal muscles to raise her pelvis.

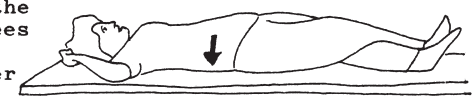




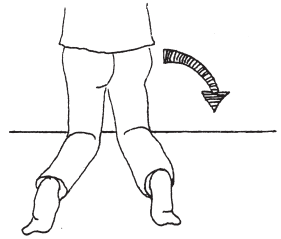
7. Still on her back with her knees bent, the patient raises her head and shoulders and reaches her arms toward her knees.

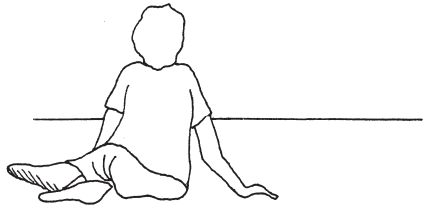
8. Like the exercise described in number 7, but the patient reaches both hands first to the right knee, then to the left.

9. While lying on her back with her legs extended and crossed at the knees, the patient presses her knees together, tenses her buttocks and presses her back into the floor.



10. Beginning by standing on her knees, the patient lowers herself to sit to the right of her legs, then raises herself before sitting to the left of her legs.





16. Treatment of a hemiplegic patient

There are ten factors involved in normal movement. These are - sensation
- selective movement
- coordination
- muscle power
- balance
- memorized movement
- visuality
- motivation
- comprehension

When working with a hemiplegic patient, we have to think about these ten factors. Do not be impatient when a patient does not want to walk; maybe his balance is not good and he is afraid of falling. Do not shout at him when he is doing an exercise; perhaps he does not comprehend the command or maybe the movement is no longer memorized in his brain.

Also, it is important that the therapist and visitors should remember to stand on the hemiplegic side of the patient. The patient tends to ignore this side, but by feeling touch on that side or turning to that side to look at people, he will begin to be aware of it again.

16.1 Developmental considerations

To work with a hemiplegic patient involves re-teaching him the basic movements of daily life, This follows much the same pattern as a child who is just beginning to learn about his world.

The development of a child involves the following stages:

- 1st month - lifting up the head while lying on the stomach
- 6th month - rolling from the stomach to the back and vice versa
- 8th month - sitting independently
- 12th month - walking

With this in mind, the following considerations are important in working with a hemiplegic patient.

1. The therapist must help the patient to progress from one step to the next as in the development of a child. It would be wrong to start therapy with walking if the patient is still unable to sit independently. The therapist must assess the patient to see just where he is on the developmental scale, and then plan the therapy accordingly.

2. When the level of the patient is known, the therapist's work is to facilitate movement appropriate to that level, always keeping an eye on the next step. For example, if the patient is able to sit, the therapist can assist with hip flexion that will lead to standing. Or if the patient is not yet sitting, the therapist works to get him to actively roll from side to side.

3. If an exercise is not working, the therapist must find out why - Is the level too high? Too low? Does the patient understand the instructions? Does the patient feel unsafe in this position?

4. Movements must begin slowly. Quick movement requires more advanced control of the central nervous system.

5. It is best to work practically as opposed to abstractly. That is, it is better to give the patient a glass of water to drink than to simply focus on flexion of the elbow.

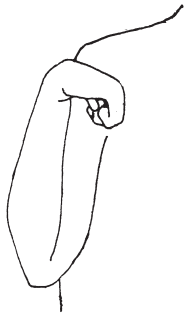
6. Tactile stimulation is very useful. Touching the patient while supporting a movement adds to his sensory input. This is like a child who is just learning - he wants to touch everything.

7. The aim of therapy is to re-teach the patient the movements of daily life. The patient should be reminded of the points of therapy at all times of the day. He should always stand with correct posture, not just when the therapist is around.

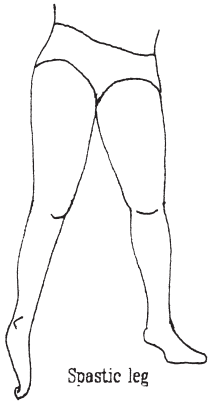
16.2 Hypertonia (spasticity)

Hypertonia literally means too much muscle tone. A spastic muscle is in constant contraction and, depending on its location, will pull a joint into one tightly held position. A common pattern of spasticity in a hemiplegic patient is as follows:

Arm - scapula - medial, caudal retraction (toward the spine, downward)
- shoulder - retraction, in-rotation
- elbow - flexion
- wrist - palmarflexion, pronation
- fingers - flexion
- thumb - flexion, opposition, adduction



Spastic arm



Spastic leg

Leg - pelvis - cranial, medial retraction (upward, toward the spine)
- hip - flexion, in-rotation
- knee - extension
- ankle - plantarflexion, pronation
- toes - plantarflexion

Sometimes the pattern is the opposite of this with extension in the arm and flexion in the leg. But that is seldom seen.

Treatment of a spasm is based on opposing the spastic pattern. Before beginning therapy, the patient must be as relaxed as possible. This can be accomplished with a gentle rotation of the spine that helps to relax the spastic muscles. To do this, the patient should be lying on his back with his knees bent. The therapist can assist him to roll his knees first to one side and then the other. This exercise should be repeated until a relaxation of the spastic muscles is noticed.
After this rotation, the therapist can attempt to release the limbs from their spastic pattern by moving them in the opposite direction to the spasm. (ie; if the spastic pattern is that the elbow is flexed, the therapist gently moves it into extension, etc.) During treatment, the therapist should not touch the palm of the hand or the metatarsal head of the big toe as this can initiate the spastic pattern. While working with a hypertonic patient, the aim is always to initiate movement while inhibiting spasm.

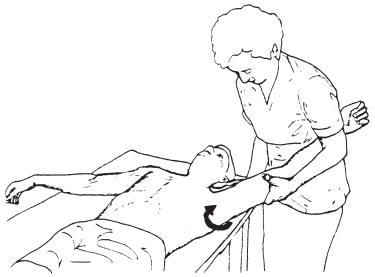
16.3 Hypotonia (floppy limbs)

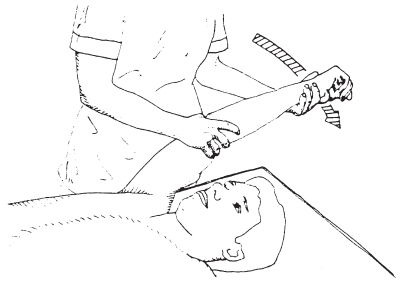
Just the opposite to spasticity, hypotonia refers to too little muscle tone. A hypotonic muscle gives the appearance of being "floppy", that is, the patient is unable to move it on his own and, during passive movement, the therapist feels little or no resistance.

Treatment of a floppy limb is concerned with providing continual input to the nerves supplying that area, to maintain proper circulation, and to prevent muscle atrophy and joint stiffness.

Floppy arm

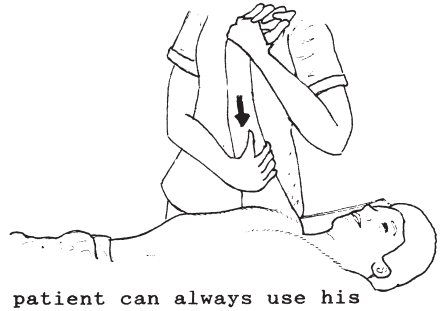
1. With the patient lying on his back, the therapist hold the patient's shoulder blade with one hand and pushes it in a small circular motion, stressing the upward and lateral positions to oppose the spastic pattern. At the same time, the therapist's other hand is supporting the patient's elbow and flexing the arm at the shoulder.





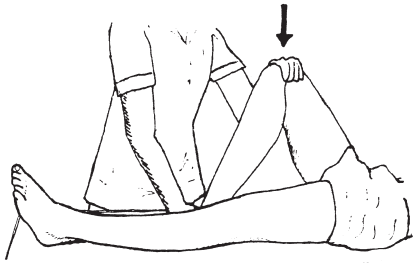
2. The therapist moves the patient's arm completely into shoulder flexion. It is important to reach the entire range of flexion to prevent adhesions that could cause shoulder pain and a limited range later on. To support the floppy arm during this movement,one hand should support the patient's elbow while the other hand presses the hand and fingers into dorsiflexion.

3. With the arm flexed to shoulder level, the therapist now gives tactile stimulation by giving little pushes toward the shoulder. This stimulates the proprioceptors in the joints which give information about the placement of the body.



4. For self-treatment, the patient can always use his healthy arm to assist the weak arm. By clasping both hands, he can practice flexion and extension of his shoulder and elbow. He can also use both hands to grasp a cup for drinking.

Floppy leg

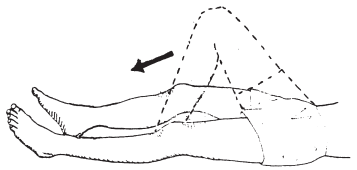


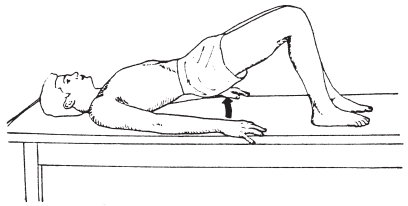
1. With the patient lying on his back, the therapist supports the floppy leg in a flexed knee position. With one hand on the patient's knee and the other on the foot, the therapist gives tactile stimulation by giving little pushes on the knee and the foot into the bed.

2. The patient should try to hold his weak leg in a flexed-knee position without letting it fall inward or outward.

3. When the patient can successfully hold this position, he should try to bring the knee inward and outward in a controlled manner. The therapist may offer tactile stimulation by lightly tapping or stroking the inside and outside of the thigh.

4. After this exercise, the patient should bring the flexed leg slowly into extension. He must be able to control this movement and hold it at any position so as to avoid the spastic pattern which is extension of the knee.





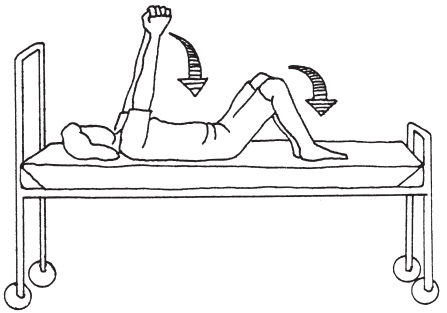
5. With the patient lying on his back with both knees bent, the therapist instructs the patient to lift his pelvis. (It may be necessary to support the weak leg.) Using this position, the patient can more easily use a bed-pan.

16.4 Positioning and transfers

When moving a patient, it is important that the patient try to do as much of the movement as possible on his own. Also, the therapist must know and practice the proper techniques so as to avoid injury to herself and the patient.

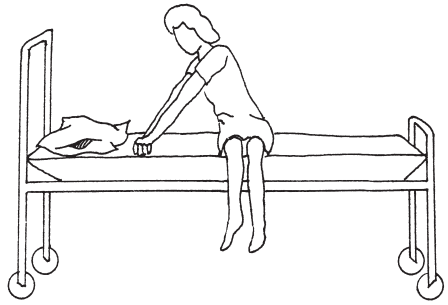
From back to side

The patient should fold his hands and raise his arms in front of him and bend both knees. By taking his arms and knees to one side, the patient automatically rolls to that side. For rolling from his side onto his back, the patient uses the same position but may need some assistance with the floppy knee.

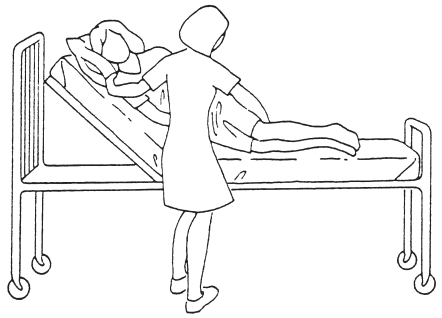


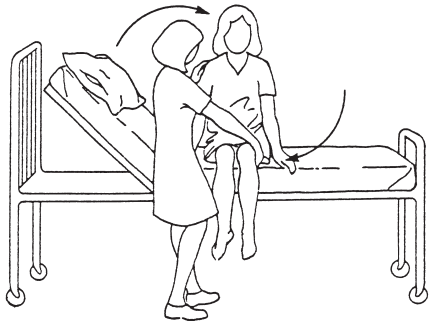
From side-lying to sitting

After the patient has come onto his side, he can bring both legs down from the bed and push himself up into a sitting position with his folded hands.



If the patient is unable to do this on his own, the therapist can easily help him. Once the patient is lying on his side, the therapist wraps one arm over the patient's knees and the other under his neck to grasp the upper shoulder.

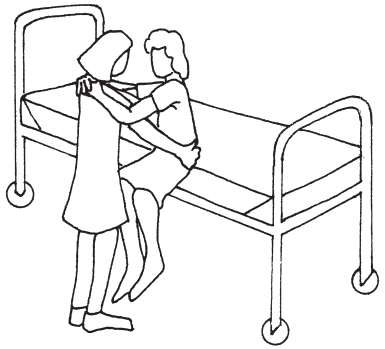


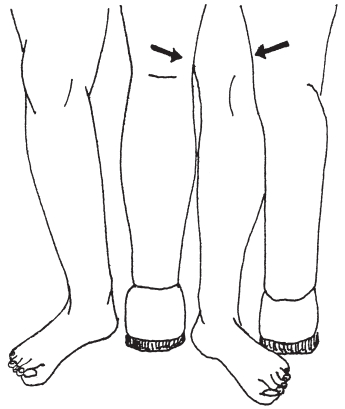


From this position, it is easy to lower the patient's legs from the bed and raise his shoulders at the same time so that he is sitting on the edge of the bed.

From sitting to standing

With the patient sitting on the edge of the bed and the therapist in front of him, the patient clasps his hands and places them around the therapist's neck as the therapist holds the patient at the hips. The therapist then pulls the patient to the edge of the bed until his feet touch the floor.





At this point, the therapist places her knees against the patient's weak knees and pulls him into a standing position. It is important the therapist's knees continue to support the patient's knee in the proper position.

From bed to wheelchair

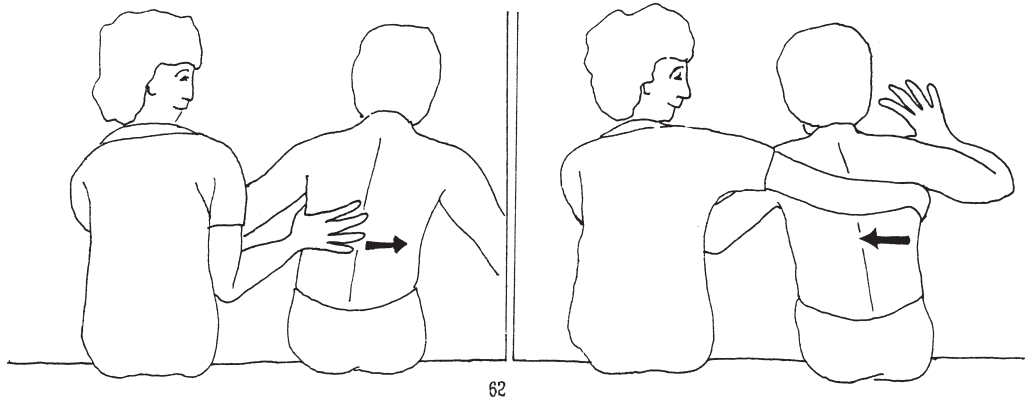
Before the patient is out of bed, the therapist must place a wheelchair securely next to the bed.
Then, once the patient is standing in the position described above, the therapist can easily pivot the patient toward the wheelchair.
When the patient is just in front of the wheelchair, and the therapist is certain that the chair will not roll away, she bends her knees to lower the patient into the chair.

16.5 Exercises to do while sitting

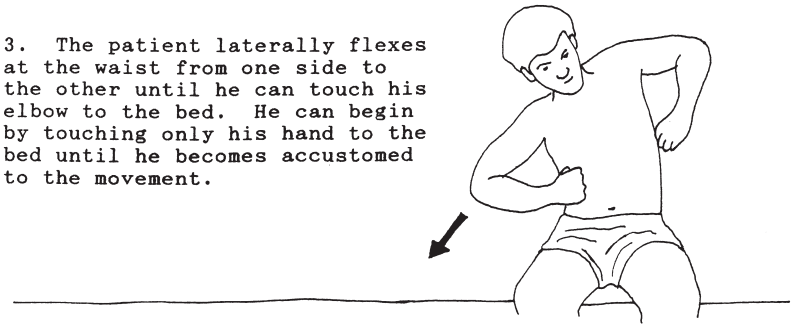
1. With the patient sitting on the edge of the bed, he moves forward and backward by walking on his buttocks. The therapist can place her hands under the upper thighs or behind the hips to assist in the movement if necessary.

2. With the therapist sitting on the hemiplegic side of the patient, one hand holds the hemiplegic hand while the other hand is under the hemiplegic arm and pushing the patient away from the therapist.

This is repeated on the other side as the therapist, still sitting on the hemiplegic side and holding that hand, places her other hand under the patient's healthy arm and pulls the patient toward her. This exercise works on the patient's sense of balance.

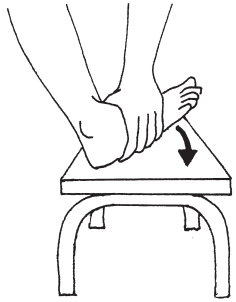


3. The patient laterally flexes at the waist from one side to the other until he can touch his elbow to the bed. He can begin by touching only his hand to the bed until he becomes accustomed to the movement.



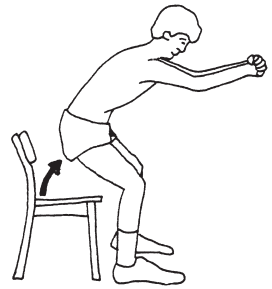
4. To activate dorsiflexion of the weak foot, the patient should sit as the therapist places one hand on the patient's knee and the other on the toes. The patient must try to lift up the leg to place the foot on a footstool. As the foot comes down on the stool, the heel must touch first then the foot rolls onto the toes. The therapist gives no resistance, but gives tactile stimulation by pressing down on the foot and knee once it is on the stool.

This exercise is important in the prevention of drop foot. It can also be done while the patient is standing.



5. Once the patient has good balance, he can try to come from sitting to standing in the following manner.

The patient folds his hands and points them forward as much as possible while bending at the waist. Then he lifts up his buttocks and raises his body until he is standing straight. The therapist may stand at the hemiplegic side of the patient and support him around the waist and at the knee to prevent hyperextension of the knee.

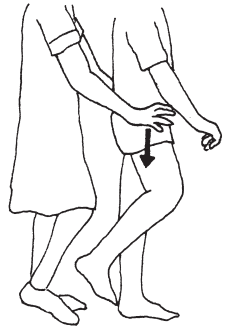


16.6 Exercises to do while standing

1. The patient stands on his healthy leg and lifts his weak leg onto a footstool. The therapist can support him at the waist and the weak knee or, in order to help him to lift the leg, she can support him at the knee and toes.

2. Exercise (1) should then be repeated on the other side. It is important the patient puts his whole weight on the weak leg without hyperextending his knee.

3. The patient stands on his healthy leg and takes a big step forward then backwards with his weak leg. This is then repeated on the other side. The therapist may offer support at the waist if necessary.

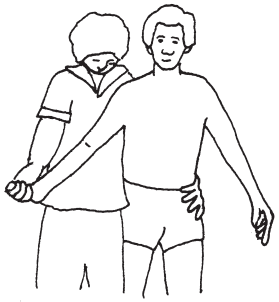


4. Normally, when trying to flex his weak hip, the patient will lift the entire pelvis. If this continues, the patient learns to walk by circumducting his hip instead of flexing it. While the patient is trying to do hip flexion, the therapist should put her hands on the patient's waist and press down on the spastic hip to prevent it from coming up.

16.7 Walking

1. The therapist stands on the hemiplegic side of the patient with both hands on the patient's waist and her hip against the patient's hip. When the patient is standing on the weak leg, the therapist pushes the entire weight onto that leg. When the patient is stepping forward with the weak leg, the therapist pushes down on the sacrum to initiate hip flexion.

2. Once the patient is relatively safe with his walking, the therapist can stand behind the patient with her hands on the patient's shoulders. She then helps to initiate the proper rotation of the spine as the patient walks. Proper rotation is to move the right shoulder forward as the left leg is coming forward and vice versa.



3. While walking, the patient's arm may go into the spastic pattern. To prevent this, the therapist should hold the patient's spastic arm so that the elbow is in extension while the hand is in dorsiflexion.

16.8 Treatment of the hand

If the hand is floppy, dorsiflexion can be stimulated by stroking on the dorsal part of the hand and forearm while the arm is slightly elevated on a pillow.

To stimulate the fine-motor movements of the fingers, the patient can be given the following exercises:

1. To pick up small stones or needles between the thumb and each finger.

2. To touch each finger to the tip of the thumb.

17. MASSAGE

Massage may be the oldest and the simplest form of physiotherapy. It can be done lightly to help reduce stress and superficial muscle pain, or it can be used in a more therapeutic way to work out deeper tensions found in the muscles and connective tissues. This section will focus on the therapeutic use of massage.

17.1 Contraindications to massage

Before describing how to massage, it is important to be aware of conditions in which massage may not be advised. Following are a few conditions in which it is necessary to consult the doctor before beginning massage.

Osteoporosis, Tubercular joints - Both of these conditions cause the bones to be weak and brittle. Heavy pressure on a weak bone could cause a fracture.

Osteoarthritis - In this disease, spurs may form on the bones. Heavy pressure could cause a spur to break off.

Infections, fever, inflammation - These are signs that the body is working on itself. It is not wise to interrupt the process.

Torn tendons, ligaments, muscles or broken bones - Recently injured tissues should be left alone.

Hypertension, heart conditions - A relaxing massage may be helpful, but any strenuous, heavy work should be avoided.

Aneurysms, Varicose veins - These are dilated and weakened blood vessels. Direct pressure could cause them to burst.

Thrombosis - This refers to a blood clot. Massage could dislodge the clot and cause it to move to an area (like the heart, lungs or brain) where it could impair blood flow and cause serious problems or death.

Diabetes - Due to the inadequate processing of glucose, the tissues are weakened and could be damaged by massage.

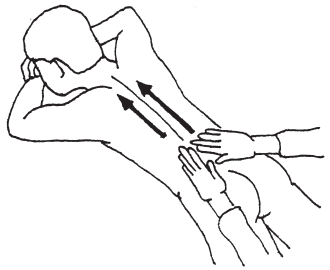
Cancer - Each case varies. Consult a doctor before massaging a patient with cancer.

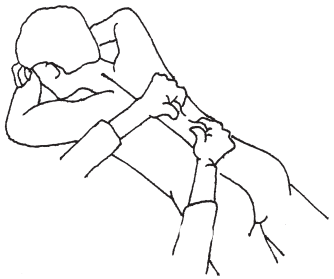
17.2 Massage strokes

An important part of massage is in knowing how to use the hands effectively. The stroke that is used will vary according to the desired effect. The amount of pressure to use will be different for each patient. A general rule is to watch that the patient stays relaxed during the massage. If he becomes tense, try using less pressure until he can relax. As the patient tries to relax, instruct him to breathe deeply to assist in the relaxation.

Following are a few examples of basic massage moves.

Stroking
Stroking movements generally move toward the heart in the direction of the muscle fibres, or in a circular motion covering the length of the muscle. The stroke can be either light or deep depending on the problem. The therapist can use her thumb, fingers or the base of her palm for a light stroke, or her fist or forearm to work more deeply.





Kneading
In this move, the therapist uses both of her hands together to lift the tissue and roll it between her hands.
A variation on kneading is for the therapist to begin by lifting the tissue, but then shaking it until it slides from her grasp.

Friction
In this move, the therapist places the tips of her fingers or the base of her palm over a particularly tight muscle and then rubs vigorously across the fibres of that muscle.

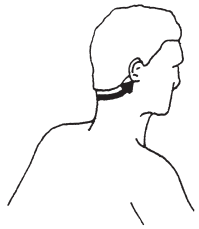
Pressure points
Once a tight spot is located in a muscle, it can be held for up to 10 seconds with either the thumb, fingers or elbow.

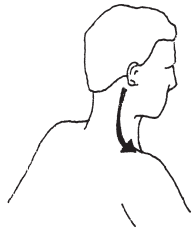
17.3 Neck and shoulder massage

The neck and shoulders cannot be separated when it comes to muscle pain. If a patient comes with neck pain, the therapist should also check for tension in the shoulders. Likewise, a patient with shoulder pain may also be suffering from tension in his neck. Following is a basic massage procedure to assist in finding and treating the source of muscular tension in the neck and shoulders.

For this procedure, the patient should begin by lying on his back.

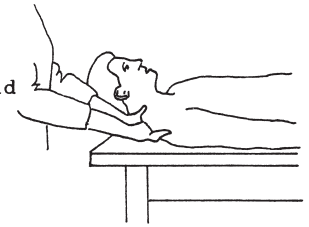
1. With her hands on either side of the patient's head, the therapist begins by making small circular strokes with both hands along the base of the skull moving from the centre to the ears. Care should be taken to not press just behind the ears as this is a tender spot.

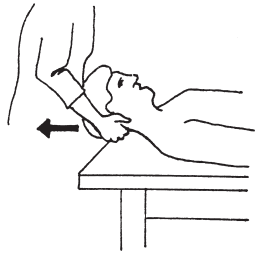




2. Beginning behind the ears and using the thumbs, a long stroke is made toward the shoulders. If spots of tension are found, thumb-pressure or friction can be used over the tight area.

3. Working on one side at a time, the muscles of the shoulders should be kneaded and jostled.

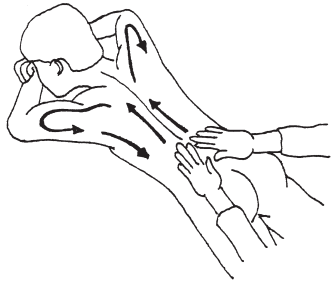




4. With her hands in a claw shape, the therapist hooks her fingers under the patient's occiput and gives gentle traction.

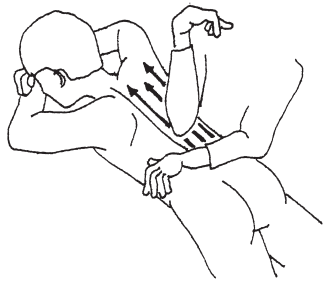
At this point, the patient rolls over to lie on his stomach with his arms raised so he can rest his forehead on his hands.

5. The therapist uses her palms to make a long stroke from the sacrum, up over the shoulders and back down to the sacrum.



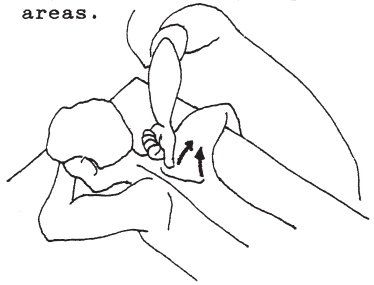
6. Standing to one side of the patient, the therapist kneads the patient's entire back.

For these next moves, the therapist works on one side at a time, beginning on the side where she is standing.



7. With one forearm resting on the patient's sacrum, the therapist uses her other forearm, near the elbow, to make long strokes from the sacrum to the shoulders. Several strokes should be made, moving from the centre to the side, to cover the entire area. Pressure points or friction may used over any tight areas.

8. The therapist cradles the front of the shoulder in her palm and uses her other thumb to stroke the muscles over the scapula moving toward the shoulder.

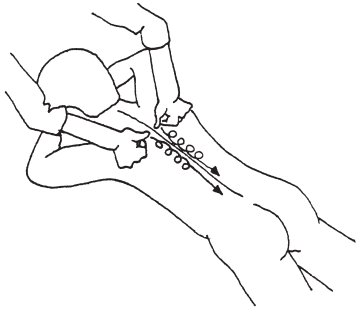


9. The therapist bends the patient's arm behind his back to raise the scapula. Then, with one hand holding and lifting the shoulder from the front, the other thumb can easily reach under the scapula along its medial edge to massage those muscles that are underneath.

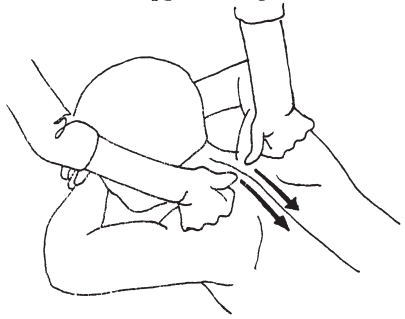
10. Range of motion exercises should be done at this point to thoroughly stretch the shoulder joint.

Moves 7 - 10 should be repeated on the other side, then the therapist moves to the head of the table for the next moves.

11. Standing at the patient's head, the therapist uses her thumbs to make small circular strokes from the neck to the sacrum.

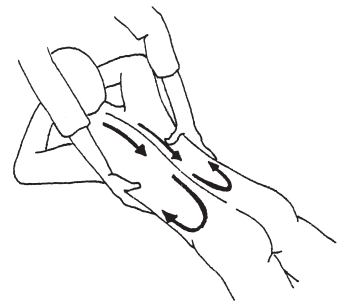


12. The upper trapezius should be kneaded and jostled.



13. A deep stroke is made from the base of the neck to between the shoulder blades. Pressure points and friction can be used over any tight areas.

14. Light strokes are made with the thumbs on either side of the spine from the neck to the sacrum, then the open palms stroke the sides of the body back up to the shoulders.



15. To finish, the patient rolls over to lie on his back and the therapist again hooks her fingers under the patient's occiput to apply gentle traction.

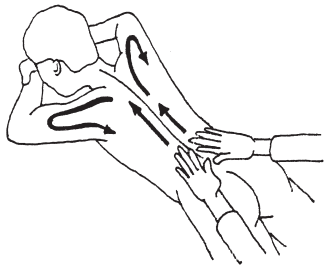
After a massage treatment, the patient should be warned that he may feel more pain later on. He can apply hot compresses or, if there is inflammation, cold compresses and do stretching exercises to help the muscles to relax.

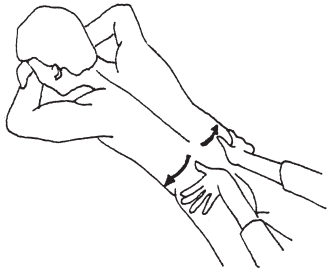
17.4 Low back massage

Low back pain can involve any of the large muscles of the back and buttocks as well as nerves that extend down the legs. If the patient complains of pain from only a light touch, deep massage should be avoided until he can tolerate it. The following procedure can be done lightly in the beginning and then more deeply as the pain subsides.

The patient lies on his back with his arms raised so that he can rest his forehead on his hands.

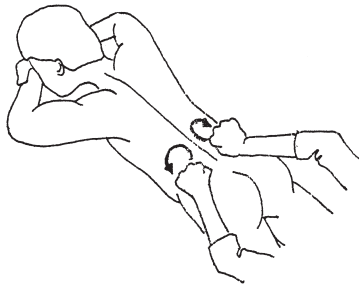
1. The therapist begins by making long strokes from the sacrum, up over the shoulders and back down to the sacrum.

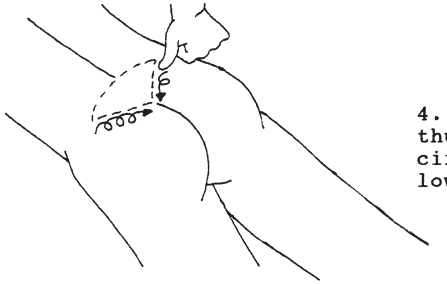




2. After this, she should use the base of her palms to stretch from the spine to the sides over the lumbar region.

3. Using her fist, the therapist makes short circular strokes on either side of the spine covering the lumbar region.

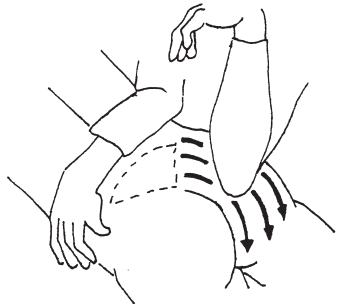




4. The therapist uses her thumb to make small circular strokes along the lower edges of the sacrum.

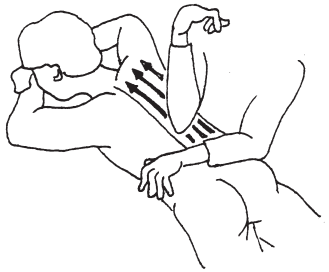
5. The entire area of the buttocks should be kneaded.

The next moves are done on one side at a time, beginning on the side where the therapist is standing.



6. With one hand or forearm resting on the sacrum, the therapist uses her other thumb or forearm to make long strokes over the gluteals from the sacrum to the leg. Pressure points or friction may be necessary over tight areas.

7. With one forearm resting on the patient's sacrum, the therapist's other forearm moves up along the spine to the shoulders. The entire side should be covered by moving laterally on each new stroke.



Steps 6 and 7 should be repeated on the other side.

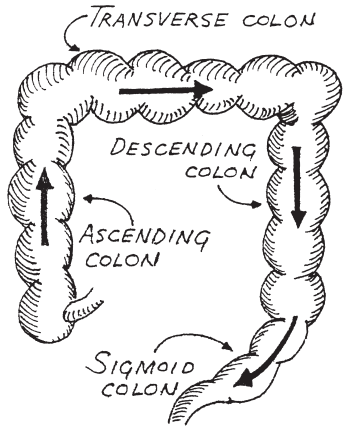
After the massage, the patient should be taught self-stretching exercises for the hamstrings (sec. 9.2) and strengthening exercises for the back (sec. 13.4-13.5). He may also need advice concerning his posture (sec. 13.2)).

17.5 Abdominal massage

A patient suffering from constipation can benefit from a simple massage that stimulates the muscles of the colon.

The patient lies on his back for this massage. It may be more comfortable for him if his knees are flexed and resting on a pillow or blanket.

1. The therapist begins by kneading the entire abdominal region.



2.. After the kneading, she begins at the *sigmoid colon* to make small circular strokes in a downward, diagonal direction.

3. Then she moves to the upper corner of the *descending colon* to make circular strokes toward the feet.

4. Next, circular strokes are made over the *transverse colon* moving from left to right.

5. Finally, the *ascending colon* is massaged with circular strokes toward the head.

6. This sequence should be repeated several times and then a long stroke can be made over the entire colon from the ascending to the sigmoid colon.

Notes: