Clinical Practice of Orthotics in Germany

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The 8th World Congress for Cripples and the Assembly of the American Orthotics and Prosthetics Association are convincing evidence of the firm intent of all participants not to spare any effort to help the disabled and those suffering from accident injuries in all countries of the world to the utmost extent. The large place allotted at these sessions to the technique of orthopaedics indicates the extent of this profession's participation in the care of the crippled.

I was most gratified to be invited to this session of your Association and have gladly accepted. May I take this opportunity of conveying again the heartiest greetings of the German Federal Association of Orthopaedic Mechanics and Bandage-Makers who wish good luck and success to this session. I am happy to have been enabled to join you in these days as the representative of the German Orthopaedics-Technicians.

In the following report on the development of the clinical technique of orthopaedics in Germany I shall endeavour to convey to you a general view.

The medical prescribing of orthopaedic equipment, corsets and bandages is preponderantly done by clinics and orthopaedic surgeons respectively. An orthopaedic-mechanical aid is only applied if according to medical considerations it corresponds to the aim of treatment, if this cannot be obtained by other measures.

The general therapeutic measures of the physician and the orthopaedic specialist respectively have widened and consequently offer considerably more possibilities. Surgical technique especially has become considerably more important for orthopaedics; it follows that the range of technical orthopaedics may have been restricted but has become more intricate. The character of mechanical orthopaedics has changed increasingly in recent years. No more general orthopaedic provisions are made, but a defined therapeutic result is aimed at according to strict medical and mechanical view points.

In the German technique of orthopaedics, *Hessing*, besides other important workers, especially had a decisive influence on the development of the technique of orthopaedic devices and corsets, seen in the many appliances still used today in a similar form. It is the task of all mechanical apparatus to achieve with as little expenditure in material and technique as possible the greatest possible effect. This principle is applied to the greatest extent in the mechanical care of paralysis. Patients, e.g. suffering from poliomyelitis used to be cared for principally by orthopaedic-mechanical means. Today, however, mechanical orthopaedics often takes last place within therapeutic planning.

Even so, before producing a device, the absolutely minimum mechanical aid is first tested with the aid of provisional, quickly producible means such as e.g. plaster sleeves, plaster splints, etc. in the most varied forms. This is at the same time a very efficient exercise-treatment for the patient and reveals soon the basic characteristics of construction of the orthopaedic appliance to be manufactured. It is often surprising how little extraneous aid the patient requires for enabling him to stand and walk.

The observation of the patient in conjunction with his physician is a typical example of ideal collaboration between physician and technician. After thorough discussion the final design of the appliance is agreed upon.

As mentioned previously, no more mechanical support than is strictly necessary should be given, since by extensive rigid fixations compensatory movements required by the patient for ambulation are impeded or arrested. It is possible to make any paralyzed person stand up by extensive appliances for the trunk, by encasing him firmly from top to bottom. Hereby, however, he will stand like a statue and will be unable to move. There are many patients who are able to progress fairly well, although in positions and gait which to the eye trained in the normal order of locomotion appears to be unbearable. However, when supplied with too little mechanical support in order to avoid faulty postures and attitudes they immediately lose their security of motion. It is often very difficult or even impossible to analyze these processes in detail.

The weight of the orthopaedic appliance is a further important point. In earlier days it happened only too frequently that especially children with severe poliomyelitis of both legs were supplied with extensive appliances; by the loss of their muscle power, however, they were unable to progress, simply because the appliances were too heavy. The development of light splints is invaluable especially for patients with poliomyelitis. In this field much valuable work has been done here in America, facilitating ambulation for the paralyzed patient by light appliances.

At present orthopaedic technique has at its disposal splints made from various materials, e.g. plexidur, nirosta, light metal and plastics. They all have the advantage of reducing considerably the weight of the orthopaedic appliance, some more, some less. Partly, these light splints possess a springy, elastic property. There are cases of disablement permitting elastic torsion of the splints and in which this property is desirable. For supportive appliances these splints, however, are not utilizable. Devices for correcting faulty postures, of course, also do not permit the use of flexible splints.

Taking as an example a paralyzed leg I would like to discuss some variations in respect of the construction of appliances.

For securing the chain of joints of the leg the dorsal fixation of the ankle joint is of greatest value. It is not only used in the loss of the triceps but also for extension action of the knee joint, as e.g. in paralysis of the musculature of the thigh, thus chiefly of the m. quadriceps. This means in the construction of the appliance that by dorsal fixation of the ankle joint the knee joint can be prevented to a certain extent from flexing. This, however, induces hyper-extension of the knee-joint in the sense of genu recurvatum, which requires a thigh piece in the appliance. The mechanical knee-joint should be adjusted in such a way as to permit only as much hyper-extension as is absolutely necessary for safe-guarding the incapacitated knee-joint. (Fig. 1)

The dorsally-fixed ankle joint impairs in the same way the hip joint. The greater the pes equinus position, the greater the security of the knee. The patient, however, compensates this situation by hyper-extension in the hip joint and by pushing the pelvis forward until the line of gravity reaches again the point of support and the tip of the foot respectively. (Fig. 2)

When the entire sole of the foot carries the weight, the leg leans backwards and the pelvis, with the trunk, leans forward in order to maintain balance. This position is unnatural and bad for the patient, since the gluteus maximus muscle normally is unable to compensate for this posture. (Fig. 3)

In the case of simultaneous paralysis of the gluteus maximus muscle an extreme dorsal fixation of the ankle joint should be reduced and the knee joint secured in normal extension against hyper-extension. In this position the upper part of the trunk and the pelvis respectively can be raised and then extension of the hip is secured by the forefoot and the dorsiflexion stop. If necessary raising the pelvis can be assisted by traction on the gluteus muscle. (Fig. 4)

This example shows the individual interrelations between foot-knee-and-hip joints; they are important for the function of the appliances.

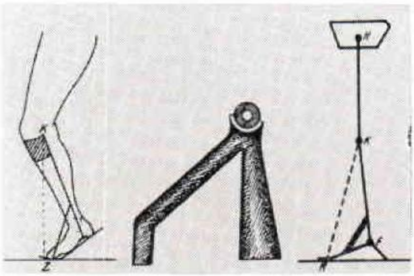


Fig. 1. This picture illustrates the knee-securing effect of the dorsally locked ankle-joint. In the construction of appliances this is mechanically achieved by means of a split stirrrup which supports the sole plate with a front piece in the rolling motion of the foot.

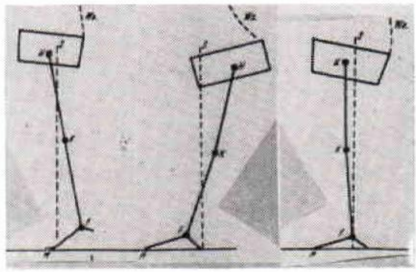


Fig. 2 Fig. 3 Fig. 4

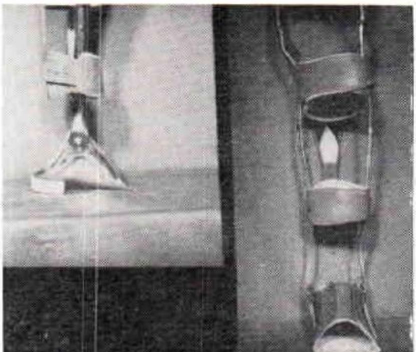


Fig. 5. The foot part of a device with dorsally locked ankle-joint. It clearly shows the sole plate of hammered metal with attached joint parts.

b. A molded shoe of leather makes possible the correction of deformities of the foot.

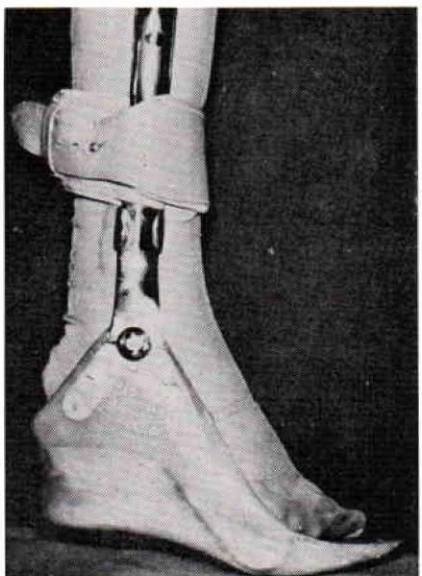


Fig. 6. The foot part is moulded of synthetic material, joint parts as well as contraction compensation are worked in.

The construction of the ankle joint with fixed dorsiflexion has cosmetic disadvantages. The forces developed through the lever action of the foot are very powerful and for the time being do not yet permit the use of light metal or similar light materials. To date steel has proved to be best.

A combination of steel and laminated plastic yields a pleasant shape, the ankle joint being enclosed in the mould of the foot piece. Progress in the use of modern materials allows us to hope for even better solutions. (Fig. 5, 6, 7)

It is not always necessary to limit ankle joint movements dorsally since it happens frequently especially in poliomyelitis that the ankle joint—as a residual of the illness— has a natural buffer or that it was produced by a surgical measure—arthrodesis. Such an operation allows a simpler and lighter construction of the appliance.

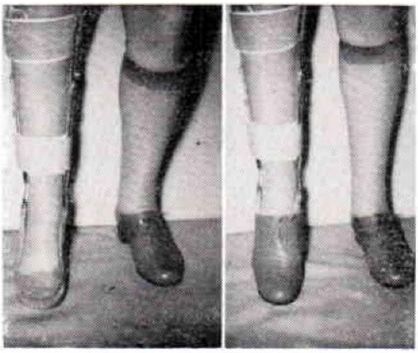


Fig. 7

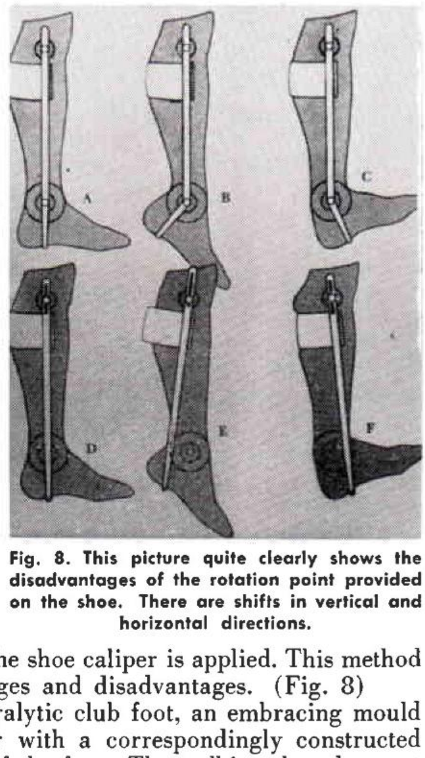


Fig. 8. This picture quite clearly shows the disadvantages of the rotation point provided on the shoe. There are shifts in vertical and horizontal directions.

In Germany, too, the principle of the shoe caliper is applied. This method however, as we know, has its advantages and disadvantages. (Fig. 8)

In deformities of the foot, e.g. paralytic club foot, an embracing mould of the sole made of plastic or leather with a correspondingly constructed metal sole permits a better correction of the foot. The walking-shoe does not permit individual correction of the foot, nor is the shoe-caliper suitable for dorsal ankle joint fixation. On the other hand there are numerous cases for which the caliper is the simplest and most adequate solution.

In many cases it is necessary to fix the knee joint of an appliance for paralysis by a lock. By an ingenious arrangement of the joints of the appliance the knee joint can be secured even without fixation. If the freely moveable ankle joints of the appliance are placed extremely forward and the fulcrum of the knee joint extremely backward, it may be possible to do without a knee joint lock, especially in a case of partial paralysis of the leg muscles. For this case we have special brace designs in light metal which have proved very efficient. There is a great difference to the poliomyelitis patient whether he can walk with an appliance with a stiff knee or with one with a freely moveable knee joint. (Fig. 9)

The extending effect can be aided by elastic traction at the knee or by special springs. The main problem in all these measures is the accurate knowledge of the degree of the paralysis; in our observations only general guiding principles can be stated. Before the manufacture of an appliance for paralysis the orthopaedic technician, however, should always ask for accurate information from the physician in charge as to the muscle condition of the patient, and in collaboration with the physician discuss the extent of the mechanical aids.

All brace joints have the disadvantage that the mechanical stop—with ankle joint braces for dorsal fixation, with knee joints for limiting the extension—lies before and behind respectively the joint axis. The joint pin is wrongly stressed from a mechanical viewpoint. Shearing stress develops, leading after a short period to premature wear and defect respectively of the mechanical joint and joint pin. The arrangement of two joint stops lying opposite one another is much more favorable, the shearing stress being completely eliminated. (Fig. 10)

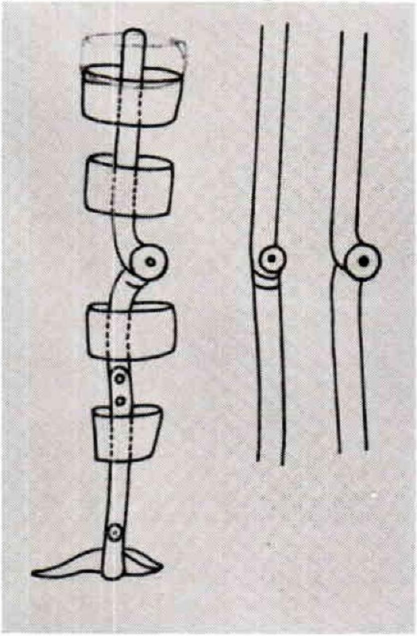


Fig. 9. Increased knee-security often sufficient in the case of partial paralysis is achieved by arranging the rotation point of the ankle-joint far to the front and by the rearward location of the rotation point of the knee-joint.

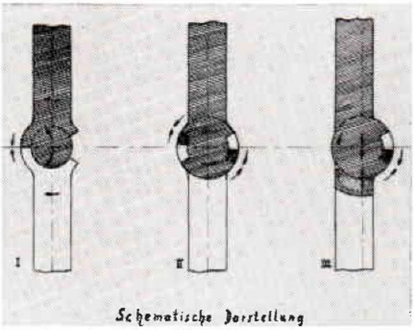


Fig. 10

In which cases the appliances should be constructed with lacers or with cuffs is a question to which there is no general answer. A combination of lacers and cuffs has proved very satisfactory. So far as I was able to ascertain, this method is also used in the United States. In the case of loss of the knee extensors accompanying a flexion contracture of the knee joint a calf cuff for the leg is insufficient. A short lacer for the leg, extending with its proximal border close to the knee joint space is preferable in such cases. (Fig. 11, 12, 13, 14)

In conclusion of my considerations on appliances for paralysis I would like briefly to discuss the indication for ischial bearing. For the paralyzed the preservation of the feeling of being in touch with the ground is valuable, he should not be deprived of it, since otherwise he feels insecure. Only in special cases, therefore, should use be made of ischial bearing tuber mount. Unfortunately there are many cases with a marked tendency towards flexion of the knee joint. In this case a short thigh lacer with ischial seat is indicated in order to diminish the thrusting force in the flexed position of the knee. In most cases a support is sufficient. The feeling of being in touch with the ground must be preserved in the patient. The band reaches approximately to the middle of the thigh and should be closed in front i.e. no lacing. Only a closed band guarantees an accurate ischial seat. It should, however, be

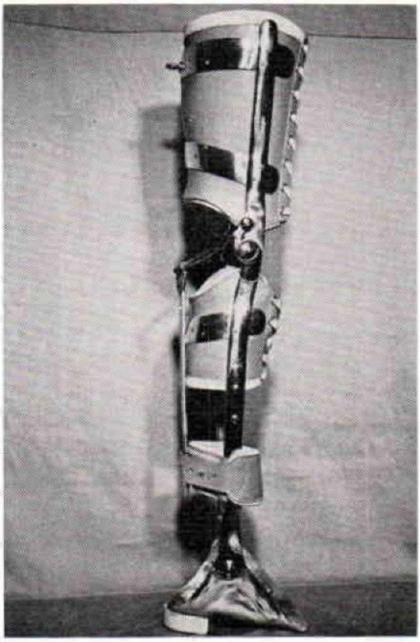


Fig. 11. Appliance with light metal splints, dorsally stopped ankle-joint, knee lock and short lower-leg cuff.

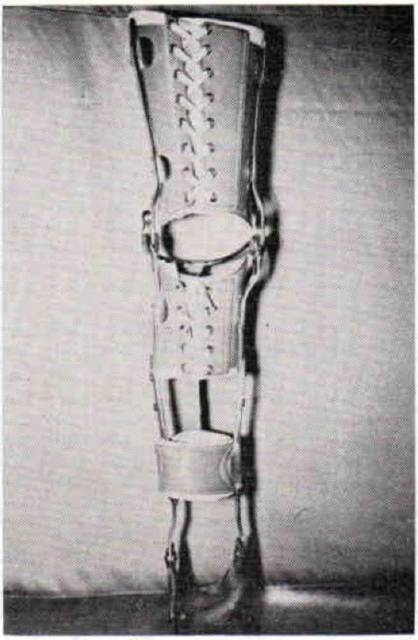


Fig. 12. The same appliance in front view, the lacers being made of leather.

taken into consideration that the ischial tuberosity lies behind the horizontal hip axis and the connecting line of both hip joint centers respectively, around which the forward and backward bending (flexion and extension) of the pelvis takes place. Consequently the pelvis supported at the ischial tuberosity will tilt forward, producing hip flexion, the consequence of which being a compensatory lordosis of the lower spine. The problem cases for which an ischial seat should be prescribed must, therefore, be answered individually and always require careful consideration.

It is not possible to demonstrate all the possible variations of the technique of appliances in the short time available. I think it is important to find the best possible appliance for each patient, in order to make him capable of carrying out his occupation with only minimum mechanical aids.

I shall say only little about providing appliances in disorders of the hip joint. In coxitis a reinforced partial mould is supplied in the recuperative phase which, above all, takes the weight from the hip joint, i.e. with ischial seat and dorsally fixed ankle joint. For immobilizing the hip joint a pelvic girdle fitting closely to the iliac crests, is attached to the appliance without a hip joint. The knee joint, too, is fixed rigidly at first, to be unlocked for movement only if recovery is satisfactory. All other disorders of the hip joint such as Perthes and epiphysiolisis yield excellent results with the *Thomas-splint*. This splint guarantees excellent relief of the weight from the hip joint and its simple construction and firmness renders it especially suitable for the young.

As an ischial ring we use about an 8-mm thick steel wire fitted individually to each patient. The ischial seat is enlarged by a suitably formed plate welded on to it. The ring is lined with foam rubber and leather and is thus well tolerated by the patients if the fitting is correct. (Fig. 15, 16)

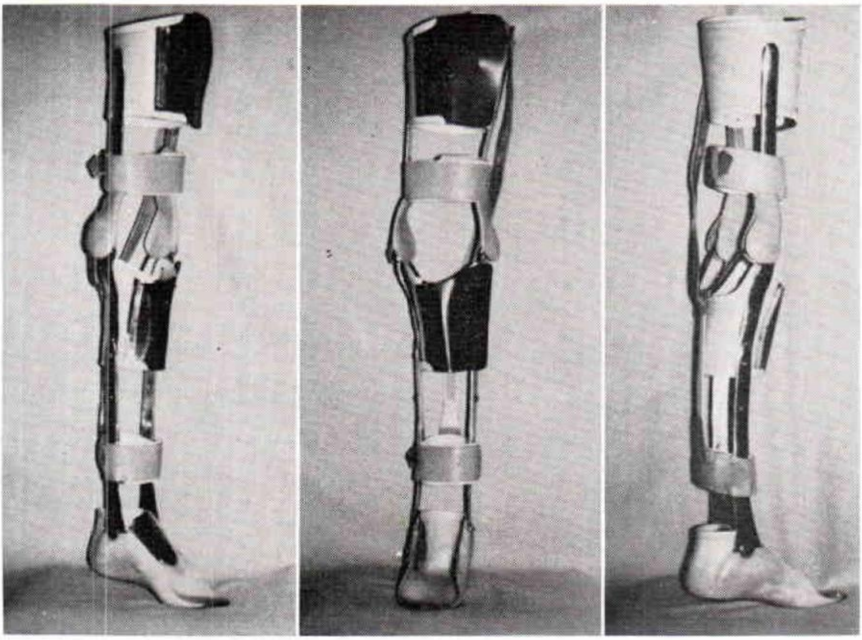


Fig. 13. Paralysis appliance with light-metal joints, foot plate and leg lacers are made of synthetic material. The lacers are fastened with synthetic flaps which are secured on studs.

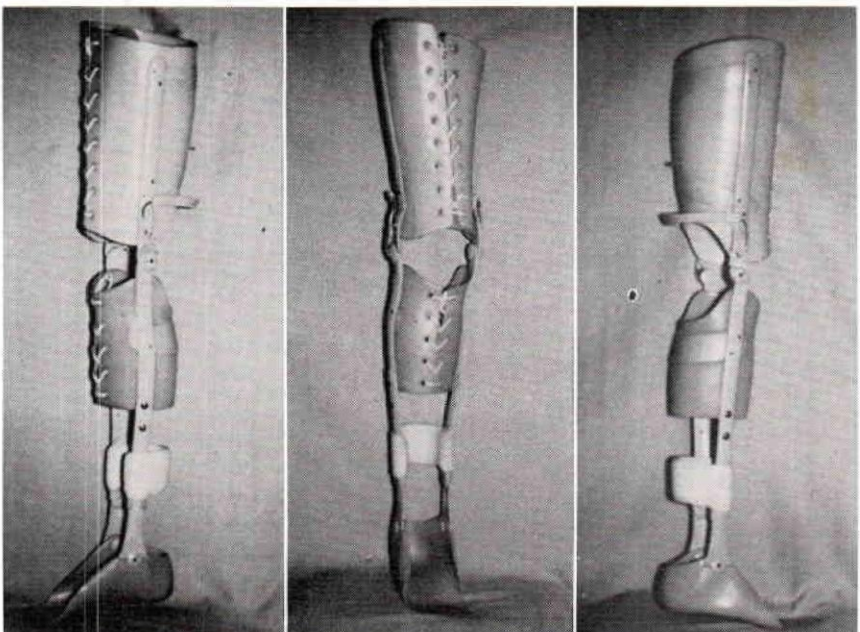


Fig. 14. Paralysis appliance with lacers and cuffs. In sitting the knee-joint lock is automatically released by this U-shaped piece.

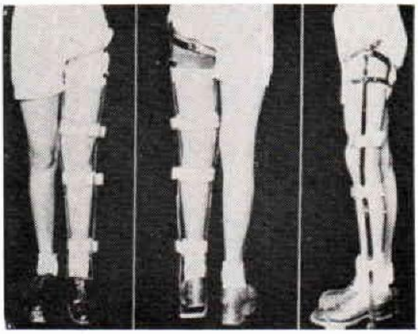


Fig. 15. Thomas-splint with short thigh cuff. This construction is in common use.

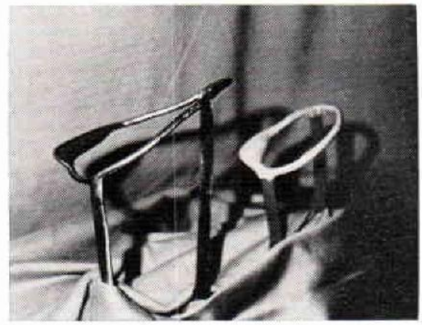


Fig. 16. Instead of the short thigh cuff, here an ischial ring only is made of wire which is widened by a plate at the tuberosity. In manufacturing the ring and seat are cushioned with foam rubber and coated with soft leather.

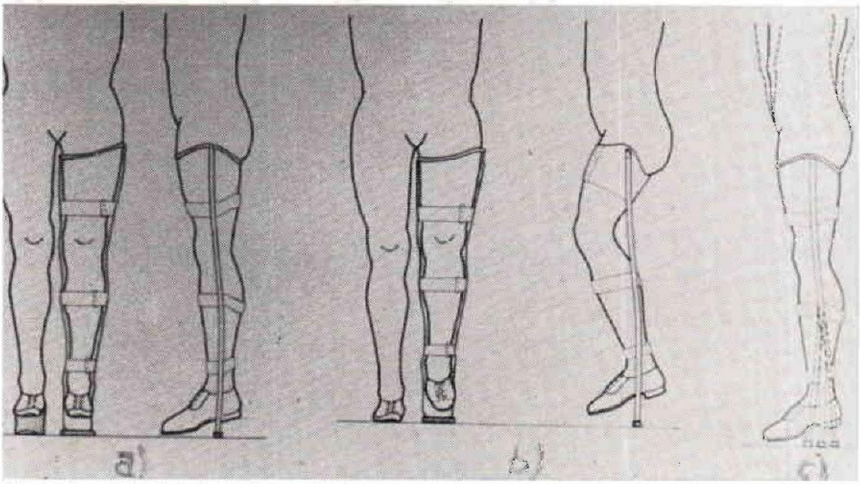


Fig. 17. a. Usual design. Through the extension, compensation by shoe is required on the sound side.
b. In this design the leg is in angled position in the splint. Shoe compensation not required.
c. The position of the tread surface may also influence the position of the pelvis. If the tread point of the splint is lying far to the front, a compensatory pelvic tilting in forward direction will take place. If the tread point of the splint is located to the back, there will be an erection of the pelvis.

In another construction the leg hangs in a flexed position in the splint; this avoids compensation in the shoe of the healthy side. (Fig. 17)

In exceptional cases the *Thomas-splint* is also used in old people, e.g. when a fracture of the thigh needs quick action. This splint may have an additional knee joint which can be fixed, also a simple pelvic girdle. Because of its numerous possibilities of variations the splint can be universally utilized.

For stiffening of the hip and for fixing residual loose movements the hip spica made of moulded resin is the most suitable. A good plaster model is a prerequisite for this, since after it is finished no major alterations are feasible. Laminated resin on account of its firmness and because it is light and hygienic is the most suitable.

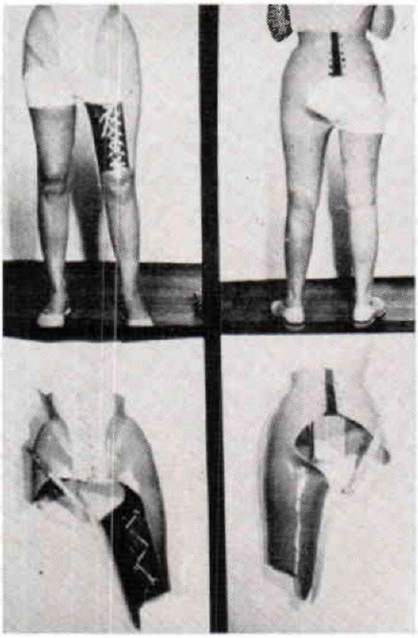


Fig. 18. This sleeve made of synthetic material encloses pelvis and thigh, it extends medially to the knee, and on the opposite side far up on the hip to ensure precise fixation with simultaneous abduction position. At the back a flexible part is cast into the pelvic portion. This renders the tightening of the hip part easier. At the front it is fastened on the pelvis and thigh by means of laces. The perineal strap is also important.

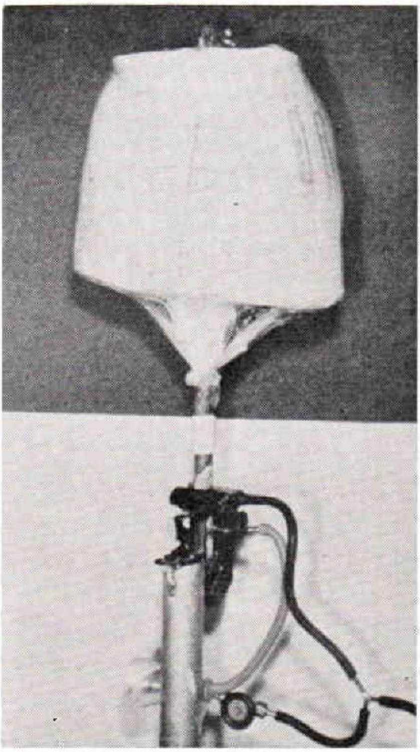


Fig. 19. Manufacture of the hip spica. On the parting film the metal parts which will be cast in later on are indicated.

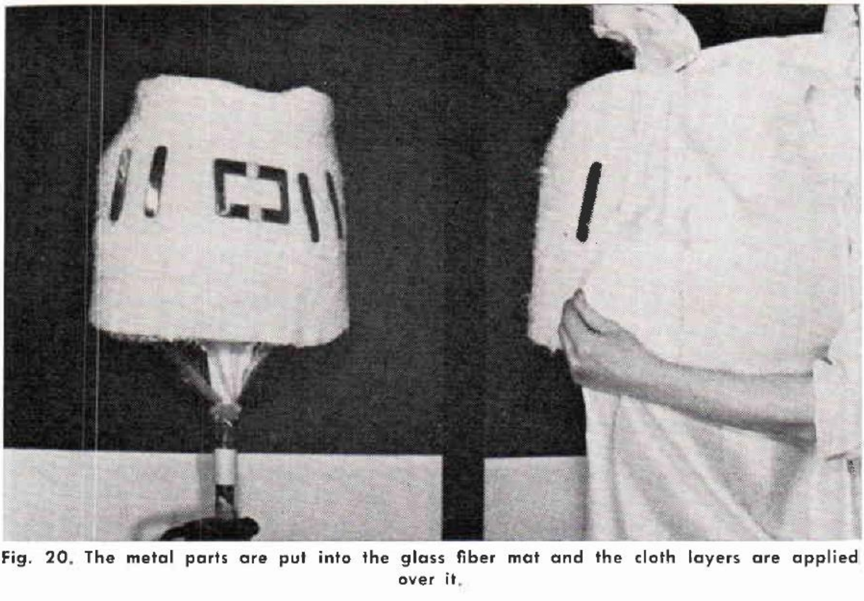


Fig. 20. The metal parts are put into the glass fiber mat and the cloth layers are applied over it.

For adequate fixation of the hip joint against any movements it is necessary that the entire pelvis be enclosed by the spica and above all that the iliac crests are specially modelled. The part for the thigh should reach to the knee, however, it must not restrict the flexion of the knee, since a free knee function is of greatest importance for compensating a stiffened hip. (Fig. 18, 19, 20, 21)

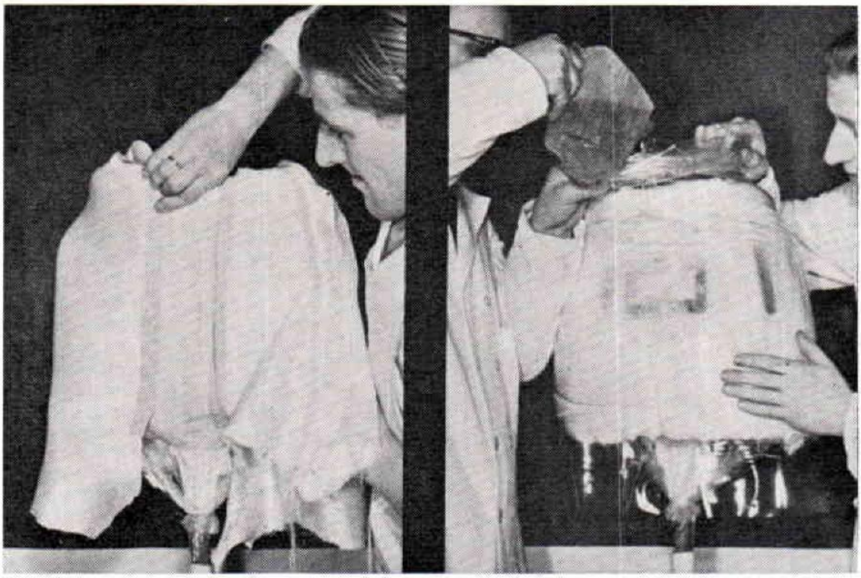


Fig. 21. After having made the final preparations, laminating can be started.

The mechanical appliance for chronic deforming arthrosis of the hip is much more difficult. This is a degenerative change in the joint with atrophy of the cartilage, constriction of the articular space, with atrophy of the joint capsule, as well as a faulty posture of the hip joint in the sense of hip flexion and hip adduction contraction. These morbid changes in the hip joint cause considerable discomfort, often with marked pain when weight bearing. The patient in this case walks with the hip joint rotated outwardly and holds the leg in an adducted position. This faulty posture of the leg induces at the same time statically conditioned muscle pain. (Fig. 22)

For this syndrome Prof. Hohmann has recommended a brace which, although it cannot cure the disorder, when properly applied considerably reduces the discomfort. The function of the hip joint brace consists in mechanical control of the movements in the hip joint, it corrects as far as this is still possible, adduction, flexed position, and outward rotation of the hip joint. At the very least however, it counteracts these faulty postures and prevents deterioration.

The brace consists of a pelvic ring, enclosing the pelvis from behind and extending anteriorly to include the anterior superior iliac spines. This ring is built-in in a modfied corset. A leg brace wth hip joint extends laterally along the thigh up to above the hip joint enclosing there, by a well-fitted pad, the femoral head including its medial portion. This construction permits an influence on the outward rotation of the leg and counteracts adduction. A new model permits constant abduction by a spring action at the hip fulcrum. (Fig. 23, 24, 25)

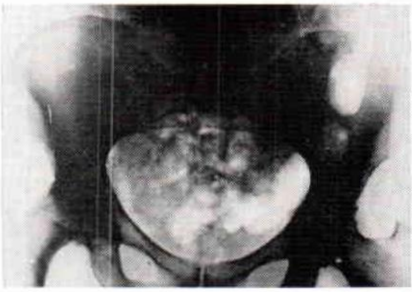


Fig. 22. X-ray picture of an iliac arthrosis. The degenerative changes of femur-head and socket of the hip-joint are clearly shown. The narrowing of the joint-gap and the jagged protuberances at the socket rim and femur-head and the mushroom changes of the head restrict the mobility of the joint and cause serious pain in walking.

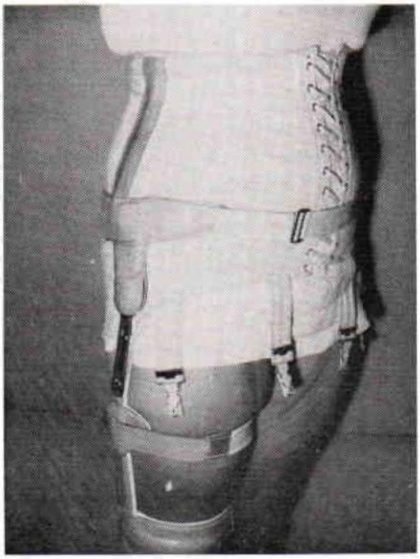


Fig. 23. This picture shows the hip-joint brace according to Prof. Hohmann. Corset and thigh brace must fit well.

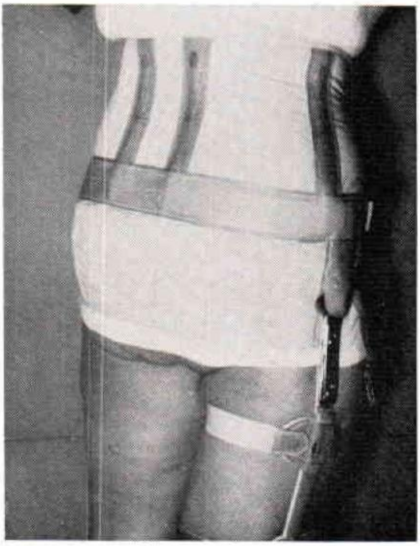


Fig. 24. Back view of the same brace. The cloth corset extends far down to give good support to the pelvis and thus to the hip as well.

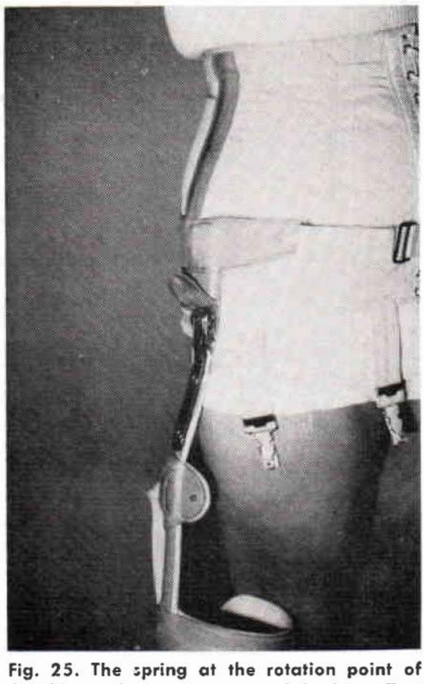


Fig. 25. The spring at the rotation point of the hip makes a constant abduction effect possible, thus favourably influencing the tilting of the leg towards the position of abduction.

In addition, the hip flexion position can be counteracted by a gluteus-extension pull strap also designed by Prof. Hohmann. This strap liberates hip extension, and prevents hip flexion according to its adjustment. The fulcrum of the brace joint is placed behind the hip fulcrum so that during extension a releasing and extending action respectively is exerted on the hip joint.

The mechanical care of scolioses, critically assessed, appears to be as problematic as the purely medical treatment. True success can only be obtained in the initial scoliotic changes in posture, i.e. thus by early treatment. Once growth changes at the individual vertebrae have occurred, all there is to be done is prevent deterioration. Especially in puberty, in the course of a period of rapid growth a greater pressure is exerted on the concave portion of the vertebral body, causing the growth of the side of the vertebral body under higher pressure to stop. This results in progressive oblique growth. There is a true chance in the treatment when a scoliotic position in the initial stage can be brought to a posture opposite to the pathological curvature by physiotherapy, positioning or other mechanical aids.

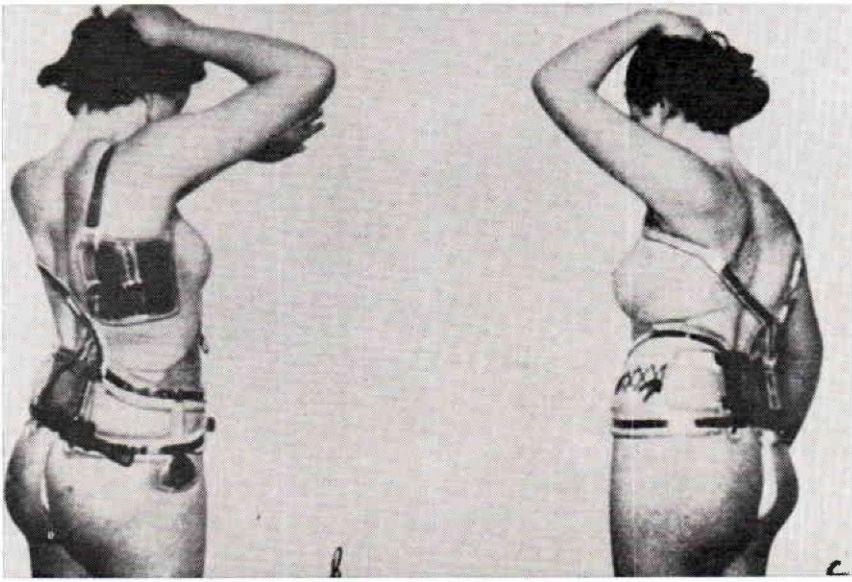


Fig. 26. This corset design is bad. The pelvic portion, above all, is much too short and consequently does not provide any basis for correction of the spine.

Supplying scolioses with adequate corsets can only prevent further deterioration since in most cases the scoliosis is already in the stage of oblique growth. The indication for a scoliosis-corset is consequently very limited. It should only be applied if a controlled improvement of the scoliotic posture can be truly achieved. For the treatment of early scolioses the fixation of the pelvis is the basis of all correcting measures. The pelvis portion, therefore must be shaped according to the scoliosis, i.e. the supporting faces must be adapted to the load pressure. Correction is carried out by the lateral lever and pad pressure respectively inducing the shift of the trunk towards the concavity of the chief curvature. This principle becomes especially effective when the scoliosis is still mobile and hyper-correction can be achieved thereby. Active auto erection via the pad pressure finally induces extensive correction of the chief curvature. It is expedient in many cases to suspend the lever of the pressure pad by firm, dosable elastic traction. The forces arising thereby necessitate in addition the application of a thigh-splint with hip joint for fixing the part of the pelvis. The construction of the active scoliosis-corset is based on considerations initially formulated by Prof. Schede, since this type of corset is used in the most varied forms.

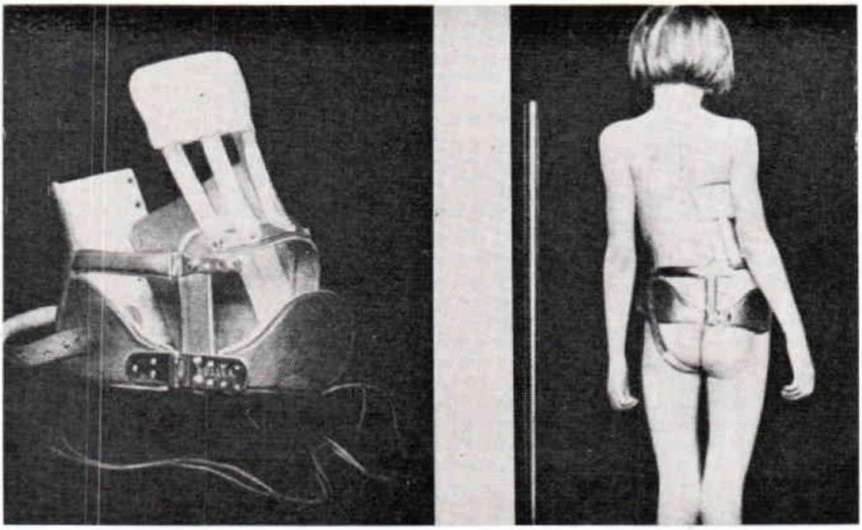


Fig. 27. This picture illustrates the active scoliosis corset. It is a right convex scoliosis which is overcorrected by the pressure pad. To maintain the balance, the patient actively raises himself above the vertical point of curvature.

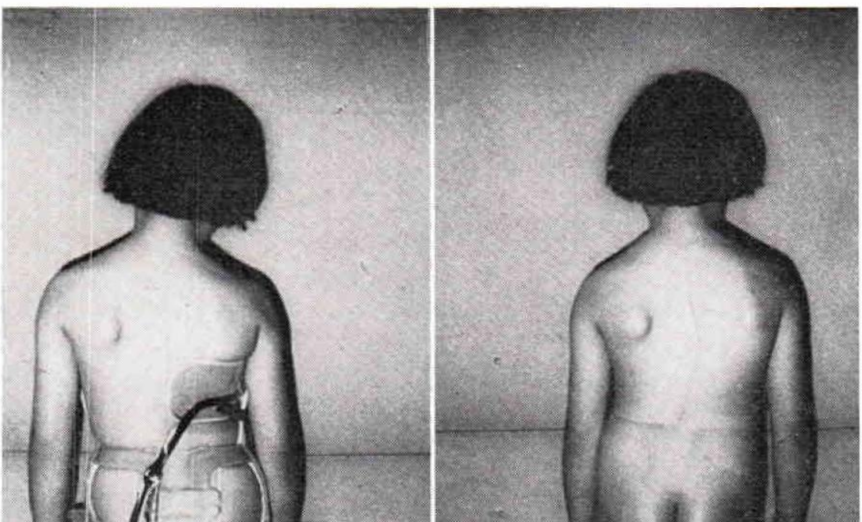


Fig. 28. A lever corset as it is now frequently used. Important is the correct location of the turning point for the lever. The leg splint is absolutely necessary for fixing the pelvic portion.

As mentioned earlier, this method is only suitable for still mobile scolioses in the young where there is a chance of correcting them. Naturally energetic physiotherapy should be carried out simultaneously. (Fig. 26, 27, 28, 29, 30, 31)

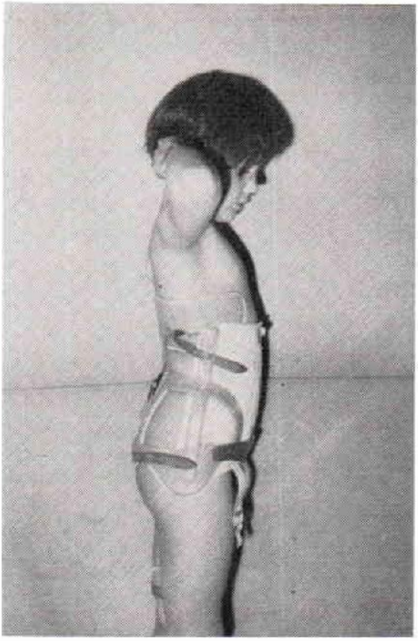


Fig. 29. The side view illustrates the extension of the pelvic portion over the trochanter major to avoid a sliding of the corset on the scoliotic side.

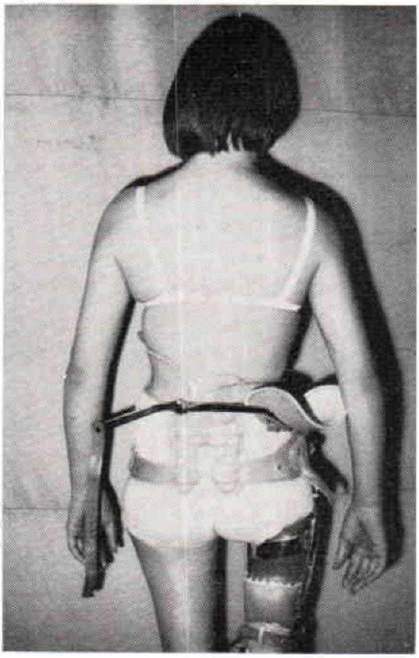
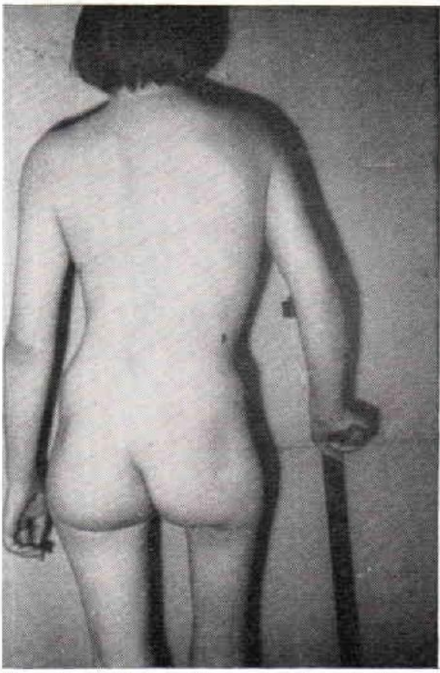


Fig. 31. The lever is swung down; very clear is the shifting of the spine into the right convex curvature.



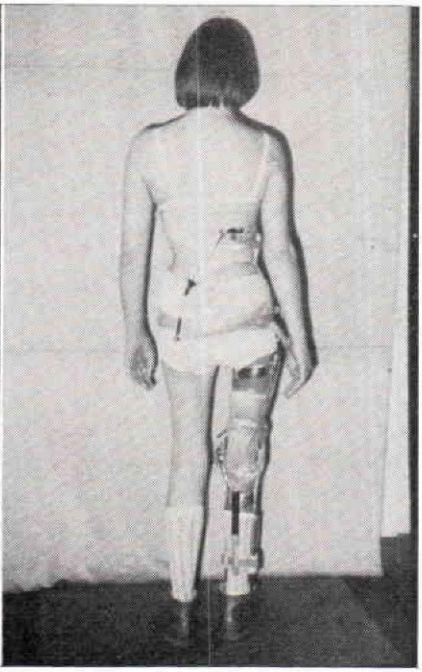


Fig. 30. Scoliosis with overhanging tendency. The leg brace is superfluous, as the corset is connected with an appliance.

The surgical stiffening of the spine, also recently adopted increasingly in Germany, is a new method of treatment, partly requiring preparation by corsets with extension. I assume that these are so well known in this country that I do not intend going into details. I would like only to mention the *Milwaukee*-brace which is used in similar form in Germany. The future will show whether surgical stiffening of the spine in the intervertebral joints will improve the lot of scoliotics.

Other morbid changes of the spine, as e.g. osteochondrosis, spondylosis, spondylarthrosis or spondylosisthesis, induce the specialist to prescribe adequate corsets. We know of a great number of more or less effective types of corsets. I, therefore, do not think it timely to discuss in detail the constructions commonly used in Germany. This alone would supply material for a discussion. As a specially good construction I would, however, designate the *Williams*-corset which is particuarly suitable in cases in which the tilting of the pelvis should be raised mechanically and simultaneously increased lumbar lordosis reduced. For this the *Williams*-corset is most suitable and I use it frequently and always successfully. (Fig. 32, 33)

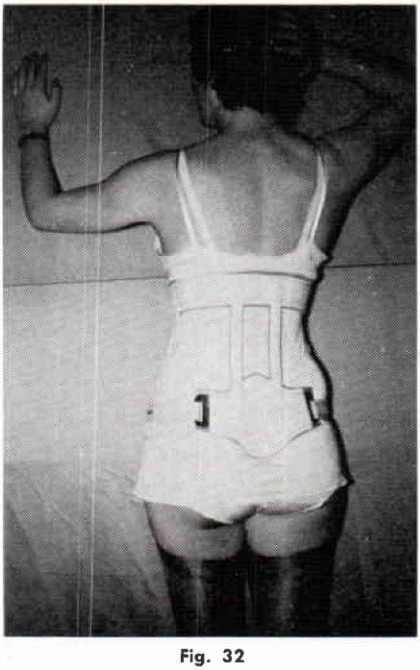


Fig. 32

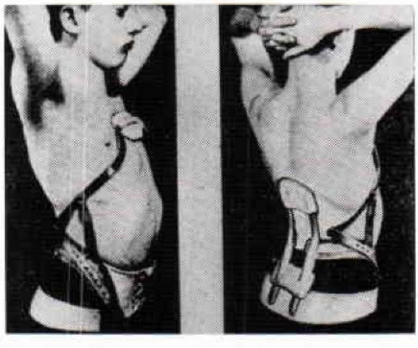


Fig. 34. This corset is designed to recline the thoracic kyphosis. But the result is only a reclination of the upper part of the body, which is compensated by an increased lumbar lordosis.

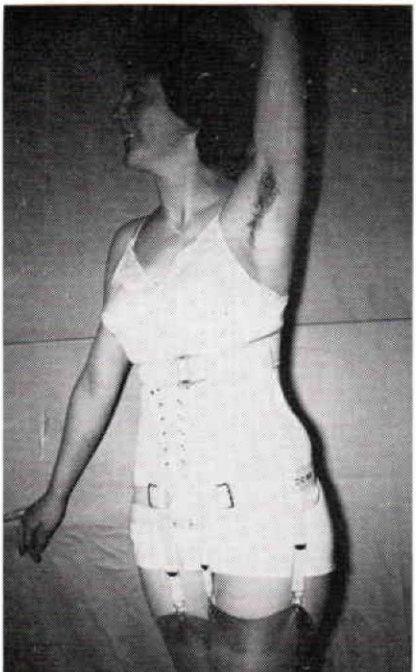


Fig. 33

For the treatment of Kyphoses of adolescents there are also a number of types of corsets aiming mainly at straightening thoracic kyphosis. It is frequently overlooked though that this apparent reclination of the thoracic kyphosis actually induces an increase of the excessive lumbar lordosis already present. (Fig. 34)

In the treatment of kyphosis in adolescents care therefore should be taken that only after raising the pelvis and fixing it in this position reclination of the thoracic kyphosis is performed. The corset designed by Prof. Hepp is very effective. Laterally above the iliac crests joints are mounted allowing the pelvis when sitting down to tip backwards, the lumbar spine being expanded. In the upright position buffers at these joints prevent lordosis of the lumbar spine, the pressure on the anterior reclination-pads being thereby increased, since a backward deflection of the thoracic spine in the sense of a kyphosis is prevented by a strong elastic strap. (Fig. 35, 36)

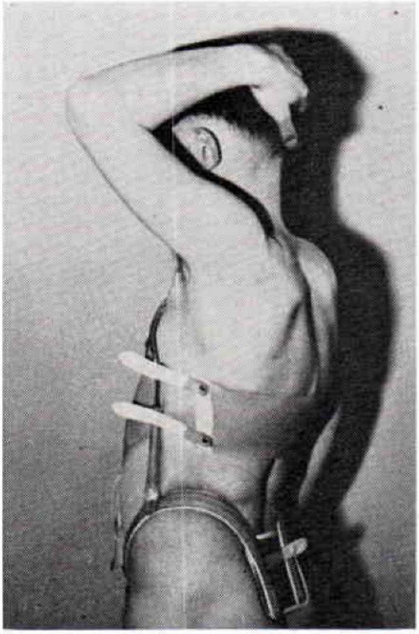


Fig. 35. Reclination corset as designed by Prof. Hepp. Real reclination of the thoracic kyphosis is accomplished and the lumbar lordosis is reduced at the same time.

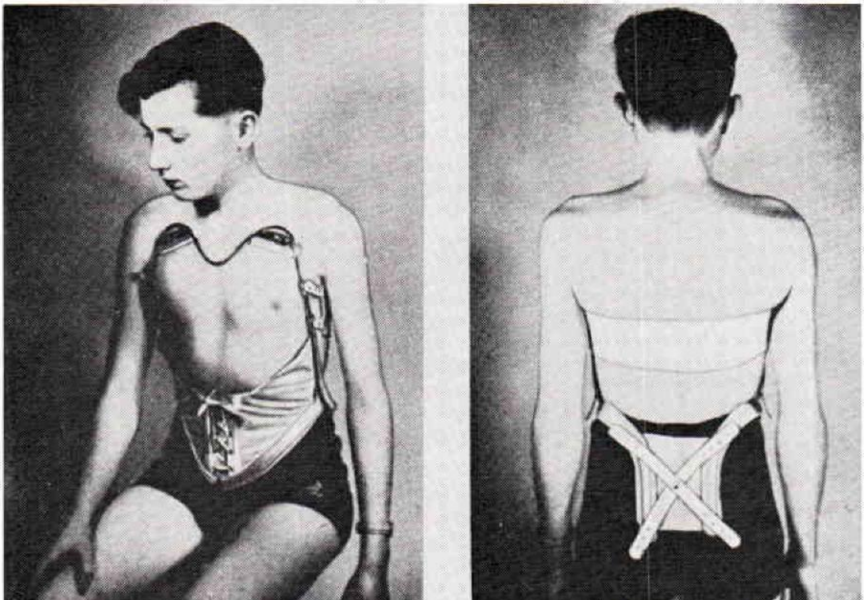
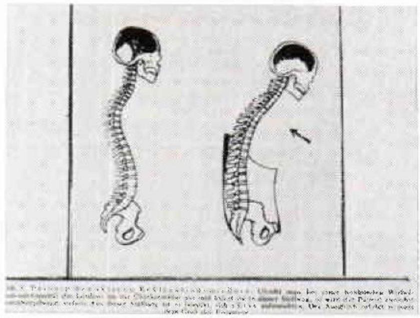


Fig. 36. The joint at the crest of ilium facilitates the sitting with the corset; the pelvis can be tilted to the back and thus reduces the lumbar lordosis, but the reclination of the thoracic kyphosis is increased. It is a very efficient design.



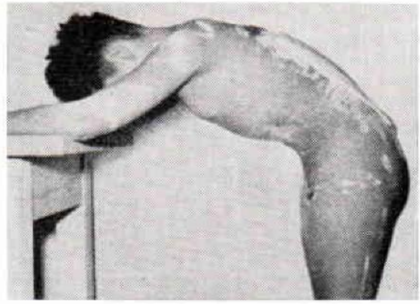


Fig. 37. Schematic illustration of an increased thoracic kyphosis with compensatory lumbar lordosis.

Fig. 38. In this posture the plaster corset is applied. Complete compensation of lumbar lordosis.

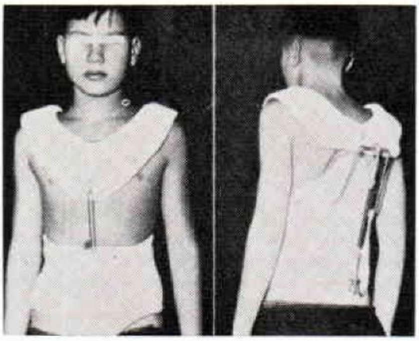


Fig. 39. Reclination plaster corset.

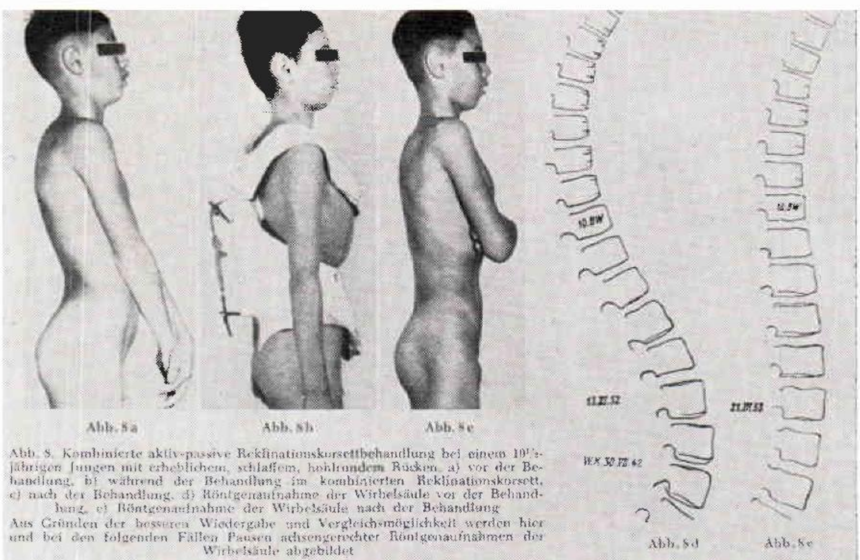


Fig. 40. These three pictures give an example before the treatment, with reclination plaster corset, and finally the success of the treatment. On the right X-ray films show the spine before and after treatment.

Another method of treatment according to Dr. Curt Becker, initially mostly by clinical treatment, the lumbar lordosis is extensively kyphosed by a plaster corset. At first the patient is standing in a forward-leaning position according to the degree and the fixation of his thoracic spine-kyphosis, from which he tries to raise himself actively. If the actively raising forces are insufficient despite breathing exercises and general physiotherapeutic treatment of the back, a horse-collar is placed over the shoulder girdle which assists by backward traction in a horizontal direction the active raising of the thoracic kyphosis. In order to maintain the success of treatment an orthopaedic corset is applied for some time; this, however, is confined to the raising of the lumbar lordosis compelling the patient by this position to active reclination of the thoracic kyphosis. (Fig. 37, 38, 39, 40, 41)

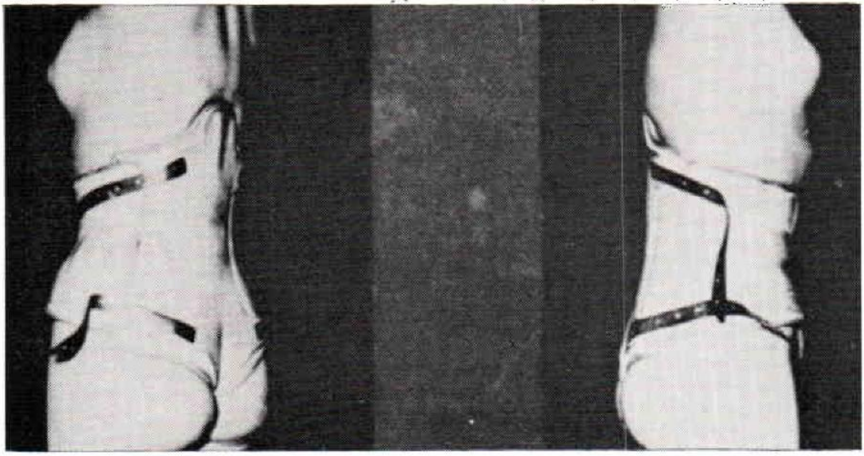


Fig. 41. The orthopedic corset which is still applied for some time in order to ensure successful treatment.

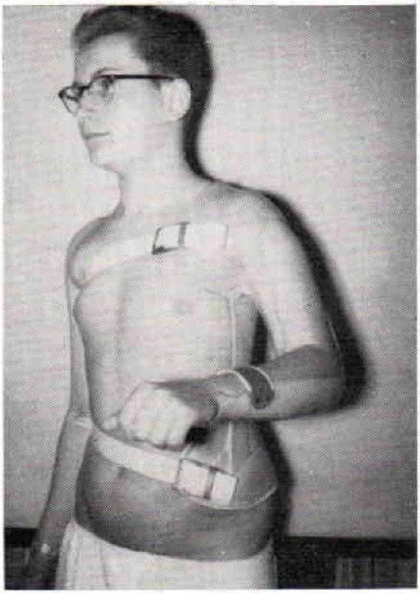


Fig. 42

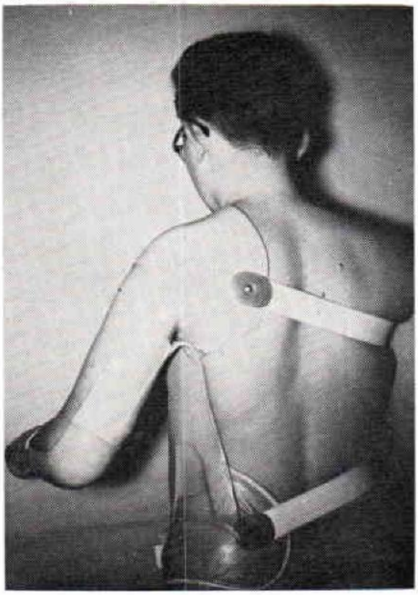


Fig. 43. The specific gravity of the arm causes good support at the iliac crest.

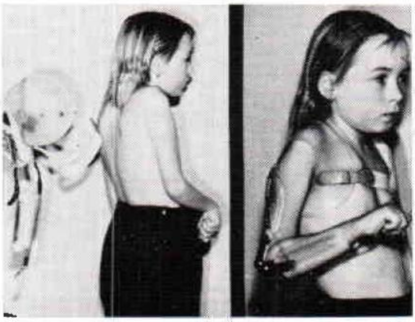


Fig. 44. In the arm splint the elbow-joint can be moved by shoulder traction.

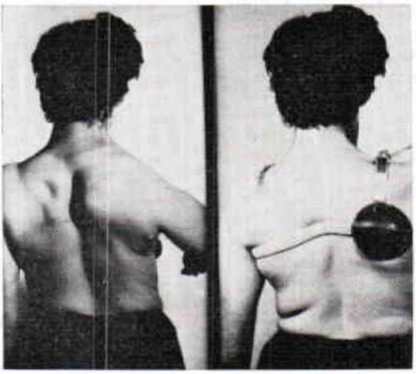


Fig. 46. Serratus bandage. By means of this bandage the shoulder-blade is kept to the rib-cage. The arm can now be raised above the horizontal line.

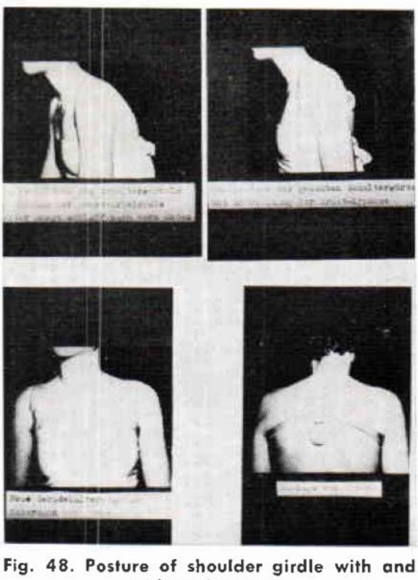


Fig. 48. Posture of shoulder girdle with and without bandage.

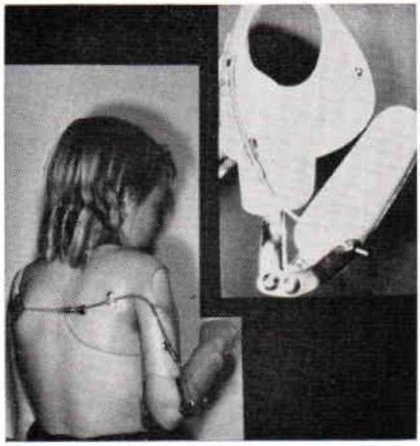


Fig. 45. As a result of the extended lever arm at the elbow-joint the force of the shoulder traction is very great.

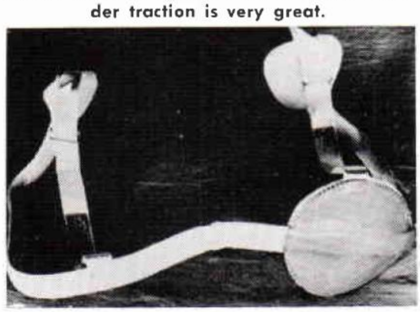


Fig. 47. The bandage alone. It is best to manufacture it from a plaster model.

Fig. 49

For positioning braces of the upper extremities the plastic-laminate method is suitable. Splints for resting the arm, e.g. made of plastic; are very light and cosmetically favourable, since they can be worn under the clothing. They are supported by attaching them to the iliac crest. Two to three straps are then sufficient for fastening them to the body. (Fig. 42, 43)

With the aid of an arm harnessing, similar to those used in arm prostheses it is possible, for instance, to reduce the extent of an arm-paralysis. (Fig. 44, 45)

In the case of paralysis of the serratus muscle the arm cannot be raised above the horizontal line and the scapula (shoulder blade), in the attempt of lifting the arm, deviates, especially with its medial portion, from the trunk. With the aid of a simple bandage the deviation of the scapula from the trunk when the arm is lifted can be avoided and allows at the same time raising the arm above the horizontal line. Apart from the advantage of improved function the damaged muscle is thereby protected from hyperextension which is important for the recovery from the muscle damage. (Fig. 46, 47)

Fig. 50. The construction is very simple. But here, too, it is advisable to produce it from a plaster model.

The habitual weakness of posture in juveniles exhibits the picture of the shoulder-girdle hanging downwards anteriorly. The commonly used bandage-supports with shoulder and axila loops respectively are to restricting, especially in the region of the m. pectoralis which is particularly strained in this anomaly of posture by atrophy or shortening.

A new very simple bandage permits satisfactory reclination of the shoulder-girdle by means of a system of pads which especially does not restrict the axillary region including the m. pectoralis. (Fig. 48, 49, 50)

I would also like to demonstrate another bandage. There are many systems of radialis splints in which the hand is held in slight dorsal flexion. The American constructions especially have the advantage of being very effective despite simple finish.

Since often parts of splints are an impediment in the region of the volar palm in grasping with a radialis splint, a splint was constructed which is fixed dorsally, leaving the volar side completely free for grasping. (Fig. 51, 52)

There is one more very effective repositioning splint for the night, for talipes cavus, designed by Prof. Hepp.

The upright calcaneous and the highly bent internal and external longitudinal arch cannot be provided with orthopaedic supports. This defective shape of the foot, however, causes considerable discomfort and impairs ambulation. The talipes cavus lacks the elastic movements of the normal longitudinal arch. The gait resembles walking on stilts.

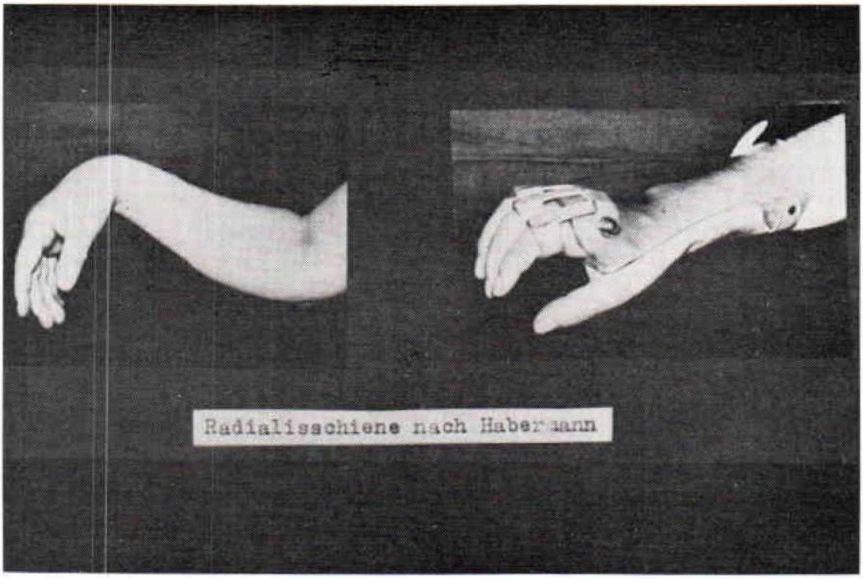


Fig. 51. The dorsal splint is made of Plexiglas (safety-glass), consequently hardly visible.

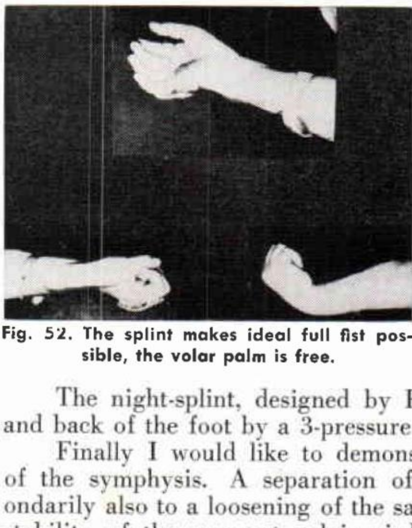


Fig. 52. The splint makes ideal full fist possible, the volar palm is free.

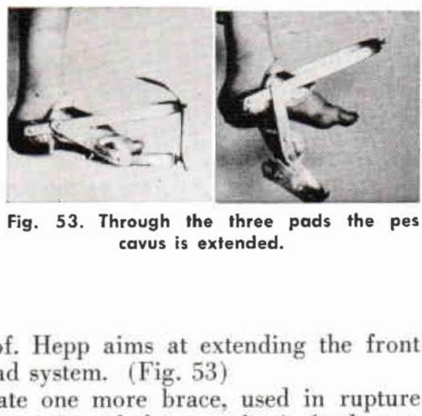


Fig. 53. Through the three pads the pes cavus is extended.

The night-splint, designed by Prof. Hepp aims at extending the front and back of the foot by a 3-pressure pad system. (Fig. 53)

Finally I would like to demonstrate one more brace, used in rupture of the symphysis. A separation of the joint of the symphysis leads secondarily also to a loosening of the sacro-iliacal joints, thereby destroying the stability of the compact pelvis girdle and inducing pain especially in the region of the transition between sacrum and lumbar region. The patient with a rupture of the symphysis has an uncertain, waddling gait. The X-ray picture reveals frequently besides the slit in the symphyseal joint also a shift in the vertical plane. (Fig. 54)

This condition can only be improved by strong pressure from the lateral side to the center. The previously used circular bandages were not ideal, since by the firm circular restriction the soft parts and the hip muscles respectively were compressed and, in addition, the bandages used to slip upwards in the sitting position. The bilateral compression of the trochanter major is very effective, since this is the only way of obtaining direct pressure on the widened symphyseal joint.

The bandage consists of 2 pads, 5 in. long and 2½ in. wide which narrow towards the front and are lined with foam-rubber. The pads enclosing the pelvis laterally are connected behind with a firm spring steel band. This forms a clamp which after applying is fastened in front with an eccentric lever clasp, thereby achieving an effective compression of the gaping symphysis. Immediately after application of the bandage the patient feels an

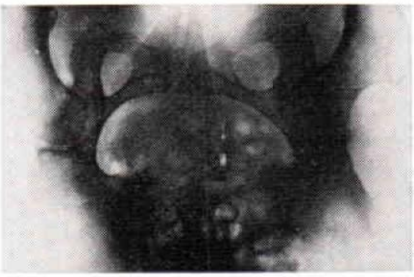
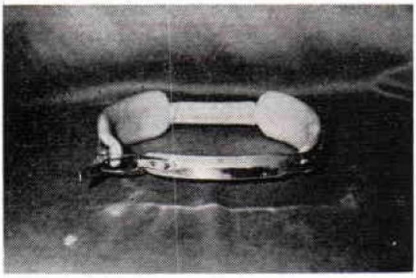


Fig. 54. X-ray picture of symphysis rupture.



Rig. 55. The bandage with open lever lock.

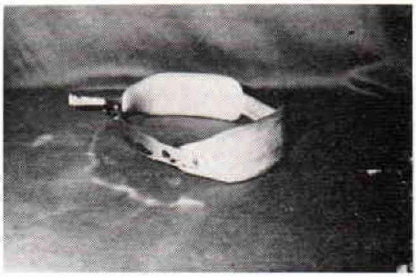


Fig. 56. The side view shows the shape of the pads.

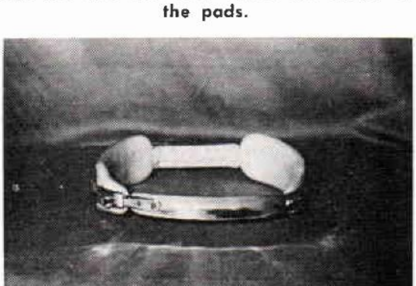


Fig. 57. The lock is closed.

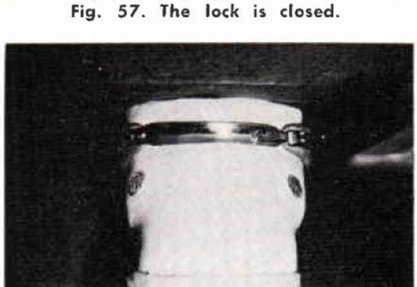


Fig. 58. The bandage is applied on a pelvis for demonstration purposes.

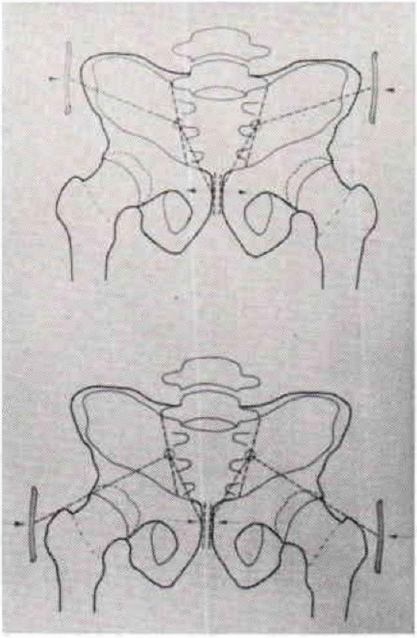


Fig. 59. The lateral pads must not be applied on the iliac crests, otherwise there will be increased gaping of the joint. If applied at a low point, the bandage has its greatest efficiency in terms of compression of the symphysis joint.

improvement in the stabilization of the pelvis and his gait becomes more secure. The symphyseal joint as well as the sacro-iliac joints become more firm. The bandage must not be applied too high at the pelvis since otherwise an opposite effect is induced, i.e. by lateral pressure on the iliac crests the gap in the symphysis is increased. (Fig. 55, 56, 57, 58, 59)

With this I should like to finish my report in the hope that I have succeeded in conveying to you a general survey of clinical-technical orthopaedics in Germany. I have demonstrated to you the most important constructions used in Germany of the individual sections of clinical-technical orthopaedics.

JERRY LEAVY AT TRADE FAIR IN POLAND—Polish Communist Chief, Wladyslaw Gomulka (center front), watches a demonstration of prosthetic devices performed by Jerry Leavy during the U. S. Exhibition at the 30th International Trade Fair, Poznan, Poland, June 11-25. The First Party Secretary was escorted through the American Pavilion by the Assistant U. S. Secretary of Commerce, Hickman Price (right, wearing lapel exhibition badge). Mr. Leavy, Vice President, A. J. Hosmer Corp., Santa Clara, Calif., showed orthopedic appliances and artificial units supplied by seven manufacturers of these products. He appeared at the U. S. Exhibition in Salonika, Greece, last year, and at the request of the U. S. Department of Commerce, he will repeat the demonstrations during the American Exhibition at Zagreb, Yugolsavia, in September.