Gravity scoliosis correction device

Gravity correction scoliosis device comprises a rotary table (2), whereby the frame (1) has a shape of a steel frame with a wide support and is connected with the rotary system (3) which comprises an axle (4) fixed securely and transversally to the central part of the table (2) and which has ring grips (5) at both ends. The rotary system (3) allows to obtain and secure the desired position of the patient on the device. In the lower part of the frame (1) a fastening element (6) for attaching patient’s lower limbs is fixed. The table (2) is fitted with two longitudinal, parallel rails (7) attached to the longer sides of the table (2) or possibly at least one rail (7) attached to the bottom of the table (2) on which there are releasable and slidable booms (8) fixed to them with replaceable correction pads (9) - elements which affect the patient’s body directly up and down as well as closer and further from the side of the patient’s body with the possibility of interaction in peroneal, frontal or transverse plane.
The subject of this invention is a gravity scoliosis correction device for treatment of bad posture effects, especially abnormal curvature of the spine to the side (scoliosis) of children and youths.

So far, a lot of devices supporting the treatment of spine diseases, including scoliosis have been known. For example, in a Polish description of a utility model no. Ru 60060 (publ. BUP 7/1999), a "Derotational-correctional-redresing device for scoliosis treatment" has been known. This device used for active exercises comprises a structure of two frames, front and back one, connected by a guide in the upper part on which slides are mounted. In the lower part of the front frame there is a hand support fixed and connected with a head traction, and higher on the back frame there is a knee support connected with a hip traction. Two connectors stabilize the whole device. Exercises involve a patient in a supported kneeling position being stabilized by a shoulder and hip block. The patient doing "a cat stretch" exercises has a blocked rib hump and lumbar region in the apex of the curve by protrusions of the supports which during exercises press on the spine following a partial curve of the circle causing derotation, correction and redressing of the bent curves of the spine.

Another solution has been described in a Polish invention no. PL 176238 - "Scoliosis correcting adjuster" (publ. BUP 25/1996). Scoliosis correcting is characterized in that the adjuster comprises a rectangle base with vertical protrusions on one side of the longer sides, in which there is a retractable bar fixed of a sheer adjustable along the perpendicular line to the basis and along the line at an acute angle to the base, and on the other side of the base there is a releasable and slidable blocking plate fixed to its longer side. An elastic string is fixed to the shorter side of the base on the opposite side of the vertical protrusions. It goes through the openings of the longer sides of the base and vertical protrusions to which the grip handles are fixed. Moreover, the base is fitted with a movable strap placed in the openings made in the longer sides of the base.

"Scoliosis treatment device" has been well-known from a Polish patent application no. P391612 (publ. BUP 01/2012). This device has a main frame in the shape of a cuboid with stands. The upper arms of the frame are connected with each other by an upper bar. An upper rod is fixed to the ball joint of the upper bar. The lower arms of the main frame are connected with each other by a lower bar. A lower rod is fixed to the ball joint of the lower bar. The upper rod has grip handles and the lower rod has feet supports for the exercising person. Upper stress elements are fixed to the ends of the upper rod and lower stress elements are fixed to the ends of the lower rod.

There are also different type of tractions known in the treatment of spine diseases, distortion or bad posture including spine curvature disorders. Glisson's loop i.e. a gravity neck traction which comprises a T-bar, loop, and block and weights system used in the reduction of the pain in the neck, has been described in the book "Introduction to orthopaedics and traumatology" by T. Zuk, A. Dziak, A. Gusta (Warszawa, PZWL, 1980) and "Introduction to Physiotherapy" by J. Nowotny (publishing house KASPER, 2007). Also well known is Saunders cervical traction used for headaches caused by artery obstruction and for spinal disc herniation. Moreover, in the above mentioned publications there is described Cotrel traction used in cervical pain, neuralgia, scoliosis, disc prolapse and mainly before surgeries. Also well known are tractions for lumbar spine, knee-joint, tractions relieving hip joints. These tractions refer selectively or partially to spine diseases, however their main aim is not the treatment of scoliosis. Furthermore, Majoch traction is well known - a gravity traction used in the treatment of scoliosis as a preparation for surgery. It causes stretching of shrunk peritubular elements of the concave side of curvature. It involves hanging upside down and therefore can be used only by some patients who have no problems with blood circulation and are able to hang with their head downwards.

A well known method F.E.D. for scoliosis treatment uses a machine which patient enters. The patient is suspended under amplitus in a vertical position in a special jacket thanks to which about 80% of his weight is reduced and there is elongation of the spine but the pelvis and some elements of the spine i.e. compensation apex of the curve and curvature border vertebrae are immobilized. During the treatment, the pneumatic arm presses the apex of the spinal curve at a proper angle and force adjusted by the computer, however without the direct contact of the patient. Impact of this device on the patient's body is, however, not fully controlled and may cause too much pressure on the mobile segment of the spine. Patient's vertical position contributes to the destabilization of the spine in the segments above and below the deformation and may cause pain in the sacro-lumbar spine despite the stabilizing counter-pads.

The aim of the invention is to devise a gravity scoliosis correction device used for a three-plane mechanical correction of pathological spine distortions which will allow for the correction of the spine by traction which gives the correction of the spine axis and by derotation but keeping high safety standards thanks to the horizontal position of the patient while feeling comfortable and safe.

The key to the devised gravity scoliosis correction device which comprises the frame and a rotary table placed on it, is the fact that the table is fitted with two rails parallel to the longer sides of the table and slidable booms fixed to them with correction pads. Preferably, the rails are attached to the longer sides of the table or they are attached to the bottom part of the table. Preferably, the slidable booms are fixed to rails on which there are supporting counter-pads placed. Preferably, a
correction pad or a supporting counter-pad is placed on the boom and is connected with it in a separable manner and can be replaced. Preferably, the width of the table is smaller than the ¼ of the height of the table. Preferably, correction pads are shaped in such a way so that they affect the patient’s body up and down as well as closer and further from the side of the patient’s body with the possibility of interaction in peroneal, frontal or transverse plane.

[0010] The solution according to the invention is different from the so far known structures in that it is equipped with replaceable derotational pads (pushing) used during the gravity elongation. Pads play a significant role in the process of spine correction. Thanks to their precise operation, using appropriate force and due to their appropriate shape, a passive non-direct influence is exerted on the apex of the spinal curve and its correction. The possibility of choosing the pad of appropriate width and thickness by a therapist allows for a precise adjusting of the force and direction of the operation of the correction pad. The choice of the correction force is adjusted individually on the basis of a direct assessment of the part of the body while under pressure and during the personal contact with the patient. The level of the pads and the direction of their operation is adjusted on the basis of the clinical assessment of the rib hump and lumbar region as well as the X-ray analysis. The working range of the pad working angle is between 0 and 80 degrees which is sufficient for correction of every scoliosis. Due to a solid frame, the patient feels stable and safe despite the upside down position. The patient destination position is at an angle, however the patient is never in the position vertically upside down because it would change the pressure of the derotational pads and it is a poorly tolerable position by the patients and not always possible to use in every case. A lying, horizontal position of the patient’s body and using the supporting side hip and shoulder counter-pads in connection with the stabilization of the body by a strap on the level of the pelvis and chest guarantees a very good stabilization of the pelvis and its connection to the spine. The pressure of the pads destabilizes the spatial arrangement of the vertebra in the positive way, which allows to obtain a precise, three plane correction of the spine. Due to the horizontal position of the spine on the ground and a three-plane stabilization of the pelvis in the peroneal or transverse plane by a stabilizing strap on the pelvis and in the frontal plane by a lower limbs traction and supporting hip counter-pads - there is no decompensation of the spine in the segments above and below the distortion of the spine. The impact of the device on the patient lying in a horizontal position on the table with the head down at a 45 degrees angle and held by the lower limbs in the area of the shank above the ankles - is more comfortable for the patient. A lying position on the table during the operation of the gravity traction is also very safe. The device also allows for the correction when the spine distortion or blockage of the sacroiliac joint causes the functional shortening of one of the lower limbs or in extreme cases even by a few centimetres. Due to the one leg traction it causes stretching of the shrunken elements of the pelvic ligament apparatus. Thanks to its structure the device according to the invention allows for the spine correction in three planes and allows for the appropriate treatment of scolioses, thus avoiding a surgical treatment. Scolioses which are not treated appropriately may lead to reduction of the patient’s physical performance, severity of neurological disorders, permanent disability and in extreme cases to cardiopulmonary failure and early death.

[0011] The subject of the invention was shown on the picture - a gravity scoliosis correction device in a perspective section.

[0012] As shown on the picture, a rotary table 2 is placed in the frame 1 of the gravity scoliosis correction device whereby preferably the frame 1 has a shape of a steel frame with a wide support. The frame 1 is connected with the rotary system 3. The rotary system 3 comprises an axle 4 which is fixed securely and transversally to the central part of the table 2 and which has ring grips 5 at both ends. The rotary system 3 allows to obtain and secure the desired position of the patient on the device. In the lower part of the frame 1 a fastening element 6 for attaching patient’s lower limbs is fixed. The frame 1 allows a secure stabilization of the whole device and makes it easy for the patient to go onto the table 2, then lying down and turning him upside down. The table 2 is fitted with two longitudinal, parallel rails 7 attached to the longer sides of the table 2 on which there are releasable and slidable booms 8 fixed to them with correction pads 9. The rails 7 can also be attached to the bottom of the table 2. The table 2 can be narrow, its width usually smaller than ¼ of the table height 2 and corresponds to the width of an average patient. Such configuration of the table 2 allows appropriate arrangement of the correction pads 9 and their impact on the back of the patient’s body.

[0013] As described above, the correction pads 9 are pushed by the pivots in the form of the booms 8 and are fixed on the booms 8 in a releasable and replaceable manner. Correction pads 9 are shaped in such a way so that they affect the patient’s body directly up and down as well as closer and further from the side of the patient’s body with the possibility of interaction in peroneal, frontal or transverse plane. Thus, they affect the patient’s back and sides. The possibility of sliding the correction pads 9 along the rails 7 up and down as well as closer and further from the side of the patient’s body allows for their precise arrangement in reference to the patient’s body. In case of a C-scoliosis, the counter-pads 10 are placed on the other side of the patient’s body in reference to the correction pads 9, giving the triple fulcrum touching the shoulder and the hip and stabilization the hip and the body over the distortion and creating a type of a lever being a counter-force against the correction counter-pad 9 on the other side. In case of a S-scoliosis two correction counter-pads 9 are used for either side and the possibility of changing their height allows for a precise adjustment
of the level of the correction pad 9 on the apex of both curves e.g. in the chest part on the right and lumber part on the left. The force of the correction pads 9 goes over the spine in a three-plane manner i.e. from the back to the front, from the side to the center and moreover a gravity force affects the patient which stretches shrunken elements of the spine. Thus a hypercorrection of the spine is possible.

Device elements:

1 - frame
2 - table
3 - rotary system
4 - axle
5 - grip
6 - fastening element
7 - rail
8 - boom
9 - correction pad
10 - supporting counter-pad

Claims

1. Gravity correction scoliosis device comprises a frame with a wide support and a rotary table placed on it with a fastening element in the lower part for attaching patient’s lower limbs, equipped with a rotary set which comprises a stable axle fixed transversally to the central part of the table with ring grips at both ends, characterized in that the table (2) is fitted with two rails (7) parallel to the longer sides of the table (2) with slidable boom (8) fixed to them to which there are correction pads (9) attached.

2. Gravity correction scoliosis device according to claim 1 is characterized in that the rails (7) are attached to the longer sides of the table (2) or they are attached to the bottom part of the table (2).

3. Gravity correction scoliosis device according to claim 1 or 2 is characterized in that the slidable booms (8) on which supporting counter-pads (10) are placed are fixed to the rails (7).

4. Gravity correction scoliosis device according to claim 1 to 3 is characterized in that the correction pad (9) or/and supporting counter-pad (10) placed on the boom (8) is fixed to it in a releasable manner and can be replaced.

5. Gravity correction scoliosis device according to claim 1 to 5 is characterized in that the width of the table (2) is smaller than ¼ of the height of the table (2).

6. Gravity correction scoliosis device according to claim 1 to 5 is characterized in that the correction pads (9) are shaped in such a way so that they affect the patient’s body directly up and down as well as closer and further from the side of the patient’s body with the possibility of interaction in peroneal,
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