

CT POSITIONING DEVICE FOR LOWER LIMB SCANNING OF RADIOTHERAPY PATIENT

Field of the Invention

5 The present invention relates to the field of radiotherapy CT positioning technology,
particularly to a CT positioning device for lower limb scanning of radiotherapy patient.

Background to the Invention

10 Radiation therapy is currently one of the main methods for treating tumors. Nowadays,
radiation therapy has entered the era of "precise positioning, precise planning, and precise
treatment", which requires high requirements for the fixation of radiation therapy positions.
Some auxiliary radiation therapy CT positioning devices currently used still have significant
shortcomings, such as the unsatisfactory positioning effect of the auxiliary radiation
therapy CT, which is not conducive to effective fixation of the patient's lower limbs. Patients
15 are prone to lower limb displacement due to muscle relaxation or unconscious movement
during the scanning process, and the lack of effective restraint on the trunk may cause
deviations in the connected lower limbs (up, down, left, right, front, back, and rotation),
resulting in deviations in CT positioning positions and subsequent treatment positions.
Therefore, an improvement is needed. Therefore, a CT positioning device for lower limb
20 scanning of radiotherapy patient is now proposed.

Statement of Invention

In order to solve the problem of unsatisfactory lower limb fixation effect in radiotherapy
patients, the present invention provides a CT positioning device for lower limb scanning of
25 radiotherapy patient.

The present invention provides a CT positioning device for lower limb scanning of

radiotherapy patient, which adopts the following technical solution:

A CT positioning device for lower limb scanning of radiotherapy patient comprises a base and a CT machine, the inner cavity of the base is provided with a moving mechanism, the top of the moving mechanism is fixedly connected to a lying plate, the right side of the top of the lying plate is fixedly installed with a foot wrist fixing mechanism, and the top of the lying plate is provided with a trunk fixing mechanism;

The ankle fixing mechanism comprises two L-shaped support plates, which are fixedly installed at the front and rear positions on the right side of the top of the lying plate, the top of the L-shaped support plate is threaded with a screw rod, and the top of the screw rod is fixedly connected with a handle, the bottom of the screw rod is rotatably connected with an ankle positioning plate through a bearing, and the front and rear positions on the right side of the ankle positioning plate are fixedly connected with a foot positioning plate, one side of the foot positioning plate is fixedly connected with an elastic protective pad.

By adopting the above technical solution, the patient's feet can be limited and fixed, and the patient's feet can also be limited to avoid positional deviation caused by the patient's lower limbs moving up, down, left, right, front, back, or inside and outside rotation, which affects subsequent treatment. This method has a good effect on the patient's lower limb fixation, and the patient's lower limbs will not move or rotate during CT positioning, with high positioning accuracy.

Optionally, the trunk fixing mechanism comprises a positioning box, which is fixedly installed on the front position of the top of the lying plate, and a first motor is fixedly installed on the right side of the inner cavity of the positioning box, the output end of the first motor is fixedly connected to a rotating shaft, and the outer surface of the rotating shaft is uniformly fixedly connected to a winding roller, the outer surface of the winding roller is wrapped with a fixing strap, and one end of the fixing strap is fixedly connected with a snap

ring, and a buckle used in conjunction with the snap ring is uniformly fixedly connected at the rear position of the top of the lying plate.

By adopting the above technical solution, it is possible to fix and limit the patient's trunk.

Optionally, the moving mechanism comprises a second motor fixedly installed on the right side of the inner cavity of the base, the output end of the second motor is fixedly connected to a threaded rod, and the left side of the threaded rod is rotatably connected to the left side of the inner cavity of the base through a bearing, the outer surface of the threaded rod is threaded with a threaded sleeve, and the top of the threaded sleeve is fixedly connected to a push plate, the top of the push plate is fixedly connected to the bottom of the lying plate.

By adopting the above technical solution, it is possible to drive the lying plate and the patient to move left and right, which facilitates CT positioning scanning of the patient.

Optionally, the bottom of the threaded sleeve is fixedly connected to a sliding block, and the bottom of the inner cavity of the base is provided with a sliding groove for cooperating with the sliding block, the outer surface of the sliding block is slidably connected to the inner surface of the sliding groove.

By adopting the above technical solution, it is possible to guide and limit the movement of the threaded sleeve.

Optionally, the top of the base is provided with a first through groove, and the outer surface of the push plate is slidably connected to the inner surface of the first through groove.

By adopting the above technical solution, it is convenient to move the push plate.

Optionally, the back of the positioning box is provided with a second through groove, and the outer surface of the fixing strap is slidably connected to the inner surface of the second through groove.

By adopting the above technical solution, it is convenient for the movement of the fixing

straps.

Optionally, the bottom four corners of the base are fixedly connected with cushion blocks, and the bottom of the cushion blocks is fixedly connected with rubber pads.

By adopting the above technical solution, the base can be supported.

5 Optionally, the front of the base is fixedly installed with a control panel, and the front of the control panel is equipped with a control switch.

By adopting the above technical solution, the device can be controlled.

In summary, the present invention has the following beneficial effects:

1. The present invention facilitates CT positioning scanning of patients by setting the base,
10 lying plate, and CT machine. By setting the foot wrist fixing mechanism, the patient's feet can be limited and fixed, and the patient's feet can also be limited to avoid positional deviation caused by the patient's lower limbs moving up, down, left, right, back, or inside and outside rotation, which affects subsequent treatment. By setting the trunk fixing mechanism, the patient's trunk can be fixed and limited to avoid lower limb movement
15 caused by trunk movement. This method has a good effect on the patient's lower limb fixation, and the patient's lower limbs will not move or rotate during CT positioning, with high positioning accuracy.

2. The present invention can drive the lying plate and the patient to move left and right by
20 setting the second motor, threaded rod, threaded sleeve, and push plate, which facilitates CT positioning scanning of the patient.

Brief Description of the Drawings

FIG. 1 is a schematic diagram of the structure of the present invention;

FIG. 2 is a sectional view of the base structure of the present invention;

25 FIG. 3 is a top sectional view of the positioning box structure of the present invention;

FIG. 4 is a schematic diagram of the structure of the foot wrist fixing mechanism of the present invention.

In the figure: 1. Base; 2. CT machine; 3. Moving mechanism; 301. Second motor; 302. Threaded rod; 303. Threaded sleeve; 304. Push plate; 4. Lying plate; 5. Foot wrist fixing mechanism; 501. L-shaped support plate; 502. Screw rod; 503. Handle; 504. Ankle positioning plate; 505. Foot positioning plate; 506. Elastic protective pad; 6. Trunk fixing mechanism; 601. Positioning box; 602. First motor; 603. Rotating shaft; 604. Winding roller; 605. Fixing strap; 606. Snap ring; 607. Buckle; 7. Sliding block; 8. Sliding groove.

10 **Detailed Description**

Below, the technical solutions in the embodiments of the present invention will be clearly and completely described in conjunction with the accompanying drawings. Obviously, the described embodiments are only a part of the embodiments of the present invention, not all of them. Based on the embodiments of the present invention, all other embodiments
15 obtained by ordinary skilled persons in the art without creative labor are within the scope of protection of the present invention.

Embodiment:

Please refer to Figures 1-4, a CT positioning device for lower limb scanning of radiotherapy patient comprises a base 1 and a CT machine 2, the inner cavity of the base 1 is provided
20 with a moving mechanism 3, the top of the moving mechanism 3 is fixedly connected to a lying plate 4, the right side of the top of the lying plate 4 is fixedly installed with a foot wrist fixing mechanism 5, and the top of the lying plate 4 is provided with a trunk fixing mechanism 6;

The ankle fixing mechanism 5 comprises two L-shaped support plates 501, which are
25 fixedly installed at the front and rear positions on the right side of the top of the lying plate 4,

the top of the L-shaped support plate 501 is threaded with a screw rod 502, and the top of the screw rod 502 is fixedly connected with a handle 503, the bottom of the screw rod 502 is rotatably connected with an ankle positioning plate 504 through a bearing, and the front and rear positions on the right side of the ankle positioning plate 504 are fixedly connected with a foot positioning plate 505, one side of the foot positioning plate 505 is fixedly connected with an elastic protective pad 506.

As a technical optimization solution of the present invention, further, the trunk fixing mechanism 6 comprises a positioning box 601, which is fixedly installed on the front position of the top of the lying plate 4, and a first motor 602 is fixedly installed on the right side of the inner cavity of the positioning box 601, the output end of the first motor 602 is fixedly connected to a rotating shaft 603, and the outer surface of the rotating shaft 603 is uniformly fixedly connected to a winding roller 604, the outer surface of the winding roller 604 is wrapped with a fixing strap 605, and one end of the fixing strap 605 is fixedly connected with a snap ring 606, and a buckle 607 used in conjunction with the snap ring 606 is uniformly fixedly connected at the rear position of the top of the lying plate 4.

As a technical optimization solution of the present invention, further, the moving mechanism 3 comprises a second motor 301 fixedly installed on the right side of the inner cavity of the base 1, the output end of the second motor 301 is fixedly connected to a threaded rod 302, and the left side of the threaded rod 302 is rotatably connected to the left side of the inner cavity of the base 1 through a bearing, the outer surface of the threaded rod 302 is threaded with a threaded sleeve 303, and the top of the threaded sleeve 303 is fixedly connected to a push plate 304, the top of the push plate 304 is fixedly connected to the bottom of the lying plate 4.

As a technical optimization solution of the present invention, further, the bottom of the threaded sleeve 303 is fixedly connected to a sliding block 7, and the bottom of the inner

cavity of the base 1 is provided with a sliding groove 8 for cooperating with the sliding block 7, the outer surface of the sliding block 7 is slidably connected to the inner surface of the sliding groove 8.

5 As a technical optimization solution of the present invention, further, the top of the base 1 is provided with a first through groove, and the outer surface of the push plate 304 is slidably connected to the inner surface of the first through groove.

As a technical optimization solution of the present invention, further, the back of the positioning box 601 is provided with a second through groove, and the outer surface of the fixing strap 605 is slidably connected to the inner surface of the second through groove.

10 As a technical optimization solution of the present invention, further, the bottom four corners of the base 1 are fixedly connected with cushion blocks, and the bottom of the cushion blocks is fixedly connected with rubber pads.

As a technical optimization solution of the present invention, further, the front of the base 1 is fixedly installed with a control panel, and the front of the control panel is equipped with a control switch.

15 In this embodiment, by setting the base 1, lying plate 4, and CT machine 2, it is convenient to perform CT scans on patients. By setting the L-shaped support plate 501, handle 503, screw rod 502, an ankle positioning plate 504, foot positioning plate 505, and elastic protective pad 506, the foot wrist fixing mechanism 5 is constructed, which can limit and fix
20 the patient's feet. At the same time, the patient's feet can also be limited to avoid positional deviations caused by the patient's lower limbs moving up and down, left and right, back and forth, or rotating inside and outside, which may affect subsequent treatment. By setting the positioning box 601, first motor 602, rotating shaft 603, winding roller 604, fixing strap 605, snap ring 606, and buckle 607, the trunk fixing mechanism 6 is constructed, which can
25 fix and limit the patient's trunk. This method has a good effect on fixing the patient's lower

limbs. During the CT positioning process, the patient's lower limbs will not move or rotate, and the positioning accuracy is high. By setting the second motor 301, threaded rod 302, threaded sleeve 303, and push plate 304, it can drive the lying plate 4 and the patient to move left and right, making it easy to perform CT positioning scanning on the patient. By setting sliding block 7 and sliding groove 8, it can guide and limit the movement of threaded sleeve 303. By setting the first through groove, it is easy to move the push plate 304. By setting the second through groove, it is easy to move the fixing strap 605. By setting the cushion block and rubber pad, it is easy to support the base 1. By setting the control panel and control switch, it is easy to control the device.

The implementation principle of the invention is as follows: when the CT positioning device is used, when a patient needs to be positioned by CT, the patient lies on the top of the lying plate 4, two ankles are placed in the L-shaped support plate 501, the handle 503 is rotated, the handle 503 drives the screw rod 502 to rotate, the screw rod 502 drives the ankle positioning plate 504 to move downwards to fix and limit the ankles of the patient, meanwhile, the ankle positioning plate 504 drives the foot positioning plate 505 and the elastic protection pad 506 to move downwards, the foot positioning plate 505 is positioned on two sides of the foot of the patient, the elastic protection pad 506 is used for limiting the foot of the patient, then the snap rings 606 are pulled in sequence to pull out the snap rings 606 from the surface of the winding roller 604 and then are clamped on the buckles 607, the control switch of the first motor 602 is started, the first motor 602 drives the rotating shaft 603 to rotate, the rotating shaft 603 drives the winding roller 604 to rotate, the fixing strap 605 is wound by the winding roller 604, the fixing strap 605 is tightened, and patient's thighs, abdomen, and chest are fixed and limited. The control switch of second motor 301 restarts, the second motor 301 drives the threaded rod 302 to rotate, and the threaded rod 302 drives the threaded sleeve 303 to move. The threaded sleeve 303 drives the push

plate 304 to move, and the push plate 304 drives the lying plate 4 and the patient to move left and right to perform CT positioning scanning on the patient. This method has a good effect on fixing the patient's lower limbs, and the patient's lower limbs will not move or rotate during the CT positioning process, with high positioning accuracy.

- 5 The above are the preferred embodiments of the present invention and do not limit the scope of protection of the present invention. Therefore, any equivalent changes made according to the structure, shape, and principle of the present invention should be included in the scope of protection of the present invention.