European Review for Medical and Pharmacological Sciences 2013; 17: 2690-2692

A new Walker with upper trunk suspension system for severely disabled patients

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Abstract. – We have recently designed a new type of walker for those severely disabled patients who cannot walk with commonly used medical walkers. A drawing and the description of this new walker is reported in order to permit the worldwide companies as well as artisans to develop and produce it for the people affected from severe motor problems.

This walker supposes the patient wearing either a modified climbing harness or equipped clothes and being suspended to the walking frame. It consists in two series of bands suspending the patient from the frame; the upper one suspends him for the upper part of his trunk, the lower one by his pelvis.

This walker is suggested for patients belonging to three principal groups: (1) Persons who have no trunk control (e.g.: patients affected by severe stroke or ataxias). (2) Persons whose walk is allowed only if they achieve a significant reduction (up to 30-40%) of the their body weight charging on trunk, spine, and lower limbs. (3) Persons who need a differentiated reduction of the body weight either among anterior and posterior side or among their right and left part of the body (hemiparesis, Parkinson disease, scoliosis, kyphosis).

Creating this walker is easy; producing costs are low; there are no maintenance costs.

Key Words:
Walker, Rollator, Suspending Walker, Suspending walking frame, Suspending rollator, Device for severely disabled patients.

Introduction

Commonly used medical walkers consist in devices the patient uses leaning on them with his hands, arms or armpits and, therefore, achieving a small reduction of the body weight charging on his legs. These walkers lack in permitting walk in disabled patients with severe lower limb weakness or without trunk control.

We have recently planned a new type of walker for severely disabled patients and applied for brevetting it in Italy (Demand for brevetting RM2012A000338). However, we have now decided to publish the drawing and the description of our walker with the aim of facilitating its production and permitting every worldwide company and artisan to be allowed to produce it for the people affected from severe motor problems.

Objectives

The objective of this new walker is permitting walking to a population of patients who don't use medical walkers until now on sale:

1. Persons who have no trunk control.
2. Persons whose walk is allowed only if they achieve a significant reduction (up to 30-40 %) of the body weight charging on trunk, spine, and lower limbs.
3. Persons who need a differentiated reduction of the body weight either among anterior and posterior side or among their right and left part of the body (hemiparesis, Parkinson disease, scoliosis, kyphosis).

Presentation of the Walker

The first aim of this walker is obtaining a marked reduction of the weight, charging the latter not only on the lower limbs but on the upper part of the trunk of the patient as well.

Such a reduction is achieved by means of the patient wearing an harness and being held and suspended from the top.

Therefore, as the Figure 1 shows, the device consists in three components:

1. A metallic frame higher than the patient;
2. A suspending system consisting in two series of bands hooked into the frame on the top and into the patient on the bottom;
3. A body harness such as a modified climbing harness. An alternative system could be an equipped clothing (as in the figure) consist-

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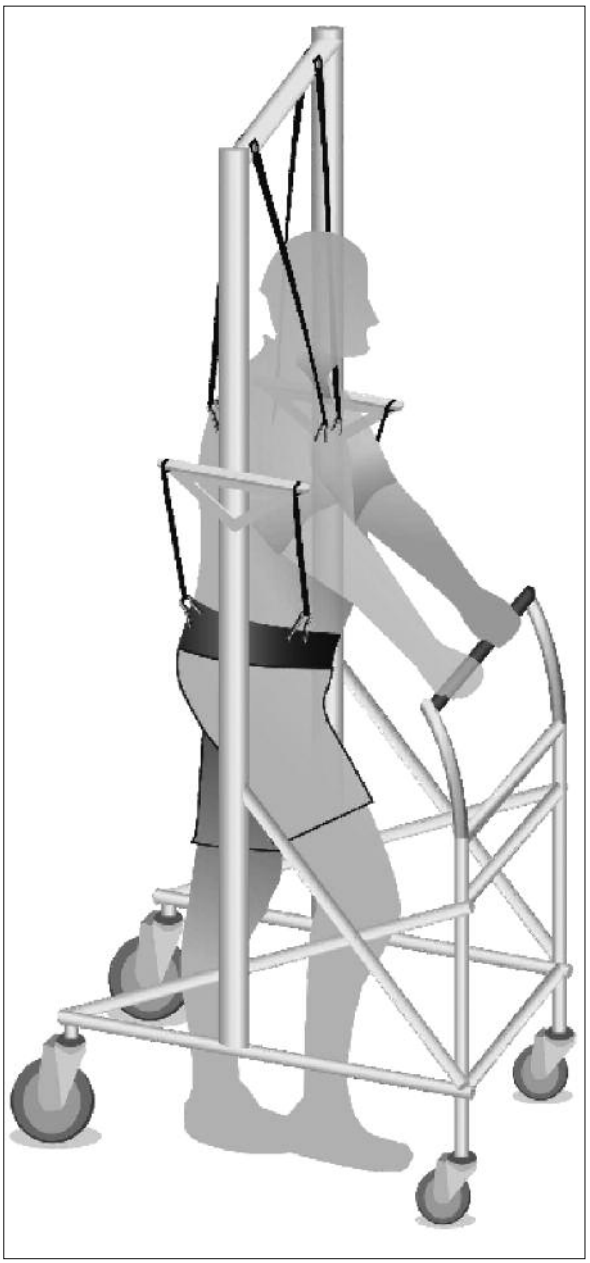

Figure 1. This Walker consists in three components: ***(1)*** A metallic frame higher than the patient. ***(2)*** Two series of bands suspending the patient by the upper part of his trunk and by his pelvis. ***(3)*** Either a body harness (such as a modified climbing harness) or equipped clothing (as in the figure) both supplied with rings for the snap hooks of the bands.

ing in a tight and resistant sleeved corset either in tight short pants with a strengthened belt. Both clothes and harness will be equipped in the same position with rings for the snap hooks of the bands.

Walking frame dimensions are arranged on patients' characteristics, including patients' corporal measures, his specific needs and architectonic requirements. The walker structure could consist on a resistant and light tubular material. Junctions and concentric tubes would permit (as a telescope) the walker to be folded, lengthened, shortened, enlarged and reduced. Wheels are equipped with brakes.

From the highest bar of the frame strong elastic or not elastic bands hang down and suspend the patient from the upper part of his trunk, being the trunk itself (other than lower limbs) less charged from the corporeal weight. We believe it to be the more innovative part of this new walker as it does not result us about the existence of any walker now in use capable of sustaining the higher part of the trunk.

From the lower bars are hung resistant bands which are hooked into the belt, thus sustaining the pelvis. This latter component is not actually an innovation of our walker, since it is already used and in commerce in some devices for disabled people (e.g.: the LiteGait model produced by Mobility Research Inc, from Tempe, AZ USA) and in many types of baby walkers. However, none of these walkers allow a differentiation of the weight charging on the anterior and posterior -either right and left- part of the body.

Each band is provided of a snap-hook which is hooked into a ring of the harness (either of the clothing). The snaps hooks of the upper series of bands suspend the patient at collarbones and upper scapulas levels. The snaps hooks of the lower series suspend him at his belt. A number of 8 bands can be sufficient: 4 bands for the superior part of the body and four bands for the inferior one. Each series has two bands forward, one on the right and one on the left, and two bands at the back, one on the right and one on the left.

Thus, each single band will be submitted to a little traction (e.g.: 3 kg) with a whole final reduction very consistent in terms of weight reduction: 3 x 8 = 24 kg, which is about 35% of the body weight in a person of 70 kg. Therefore, in a person of 70 kg using this new walker, 35% of the body weight is charged on the walker wheels and no more on patients' trunk and lower limbs.

Moreover, the possibility of differentiating the traction among right and left parts of the body permits the correction of alterations due to specific disorders (for example an hemiparesis following a stroke or a severe scoliosis) and facilitate the most possible balance in walking.

Similarly the possibility of differentiating the traction among the frontal and the posterior part of the body permits the correction of altered pos-

tures caused from other disorders (e.g.: the camptocormia of Parkinson disease or a severe kyphosis) and improves weight distribution for walking.

The subject is, therefore, suspended from two sets, made up of 4 bands each. A set permits the suspension from the trunk, the other one from the pelvis.

The suspending walker structure reduces the risk for the patient to fall down; compared to others walking frames it allows the patient to have at least one hand available and free.

Bands length and tension can be regulated in order to define the best reduction of the corporal charge. The more appropriate regulation of bands length and tension could be achieved by means of a platform with a balance the patients is placed on during the regulation process.

Conclusions

We believe this walker will have more than a benefit such as the advantage of consistently reducing the charge on both the trunk and lower limbs, of allowing the walking of patients without trunk control, and of differentiating the weight discharge according to the patients' needs (among right and left either front and posterior side of the body).

Moreover, in most subjects with spasticity, a consistent reduction of spasticity itself is associated with the reduction of the charging weight.

Potential users include patients with neurological disorders causing insufficient trunk control, lower limbs weakness, or ataxia (stroke, brain and spine traumas, multiple sclerosis, hereditary ataxias, amyotrophic lateral sclerosis, Parkinson disease, spinal cord diseases, spinal muscle atrophies, muscular dystrophies), and also patients whose orthopedic disabilities contraindicate charging an excessive weight on their bodies (severe scoliosis, fractures of vertebras and of the lower limbs bones).

This walker probably will permit some patients wheel-chaired since a few years to begin walking again. In other patients it could be useful both during rehabilitation treatment (e.g. either after a stroke or a spinal trauma) and during every day life, either domestic or on external not bumpy surfaces.

The walker realization is easy, production costs are low; there are no maintenance costs. It can be improved and produced from little and big companies as well as from skilled artisans according to the patients' needs.

Acknowledgements

The Authors thank Simoni Terrinoni for the drawings and his suggestions to improve the walker.

Conflict of Interest

The Authors declare that they have no conflict of interests.