

The ORLAU VCG (variable centre of gravity) swivel walker for muscular dystrophy patients

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Abstract

Swivel walkers are being increasingly used for muscular dystrophy patients in order to prolong the period of their ambulation. Existing designs did not address the special problems of accommodating such patients comfortably and providing the easier and more assured ambulation which their weakened condition requires. The ORLAU VCG (variable centre of gravity) swivel walker has been developed so that the walking mechanics can be adjusted independently of patient posture. Additional patient support features permit the patient to be secured in their chosen position of comfort prior to setting the ambulation mechanics.

Patients using the device, which is now approved for supply by the Department of Health in England and Wales, have improved their walking performance and extended their period of walking.

Introduction

Swivel walkers have long been established as a means of ambulation for particular groups of paralysed patients (Motloch and Elliot, 1966; Edbrooke, 1970; Rose and Henshaw, 1972; Stallard *et al.*, 1978; Butler *et al.*, 1982; Farmer *et al.*, 1982). Their advantage is that they permit heavily handicapped individuals to walk with a high degree of stability, without the use of additional walking aids such as crutches.

More recently it has been recognised that

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swivel walkers have the potential to extend the period during which muscular dystrophy patients can continue to ambulate. They are used when the patient would otherwise be wheelchair bound. Initially standard designs of swivel walker were used, but it became apparent to those responsible for the ongoing care of these patients that they had unique problems which existing designs did not address. Assessment of these made it clear that a swivel walker with additional features was required in order to accommodate muscular dystrophy patients more comfortably and permit them more effective ambulation.

Orthotic problems of muscular dystrophy

Careful analysis of muscular dystrophy patients showed they had the following particular difficulties in comparison with other groups (primarily paraplegic) using swivel walkers:

1. sensitivity to posture greater than in other pathologies;
2. variability of hip and knee contractures;
3. sensation in the lower limbs which can result in discomfort at the patient/orthosis interface;
4. proprioception of hip position which can lead to a wish for greater abduction;
5. general weakness, which limits the input of propulsion forces;
6. apprehension of unsteady support and excessive step-length;
7. difficulty with the transfer of heavy, weak patients into the device for physiotherapists and parents.

Design features

Because of the problems experienced with existing swivel walkers, a new design called the ORLAU VCG (variable centre of gravity) swivel walker (Fig. 1) has been developed which has special features that fall into two main categories:

1. postural support;
2. ambulation mechanics.

Postural support in the VCG swivel walker is provided, as in conventional swivel walkers, by 4 point fixation (Stallard *et al.*, 1986) but incorporates additional adjustability for positioning of the feet through variable heel cups in order to permit careful alignment of posture.

The postural deformities which the VCG swivel walker is designed to accommodate are:

1. equinus;
2. knee flexion;
3. hip flexion;
4. hyperlordosis of the spine.

The contractures which cause these deformities tend to develop with the progress of the disease and can also be variable in nature over short time spans. To address these problems the VCG swivel walker has:

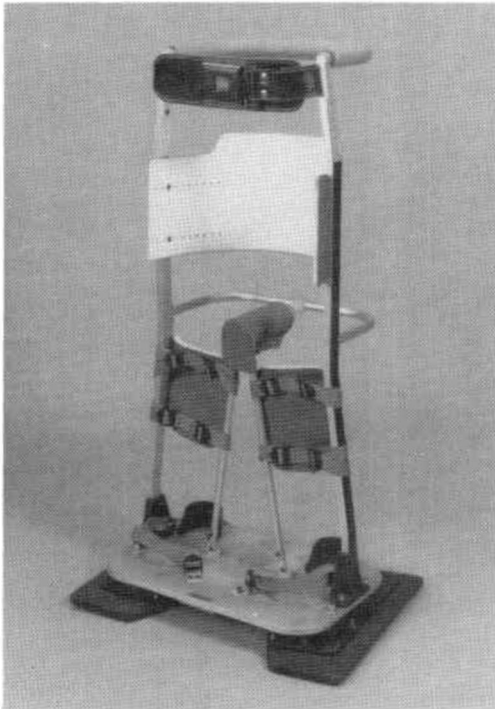


Fig. 1. The ORLAU VCG swivel walker.

1. the facility for insertion of compensatory wedges for equinus;
2. a range of easily adjusted knee pads with sheepskin interfaces;
3. an adjustable sacral band with an Evazote lining for patient comfort;
4. a range of thoracic bands which permits the attainment of the appropriate compromise between convenience and patient comfort.

The Swivel walker ambulatory mechanism (Stallard *et al.*, 1986; Rose and Henshaw, 1972) consists of two linked footplates, free to swivel about an essentially vertical axis, mounted beneath the baseplate, each one indexing forwards as the patient rocks from side to side.

Ambulation is more difficult for muscular dystrophy patients because of their general weakness. Consequently they require more careful adjustment of the swivel walker mechanism. This problem is aggravated by their postural sensitivity which prevents adjustment being achieved through changes in postural alignment, as is conventional in standard swivel walkers.

The two main factors affecting ease of ambulation in a swivel walker are:

1. position of centre of gravity relative to the footplate bearing centre in the sagittal plane. Ideally it should be 18–25 mm forward of this;
2. distance between footplate bearings in the coronal plane. The closer they are the easier it is to ambulate (although the step length and speed of walking are consequently reduced).

Both of these factors have been made more readily adjustable in the VCG swivel walker through a new design of baseplate. This consists of a double plate arrangement which allows the upper part of the swivel walker frame, including the patient support structure, to be moved forwards or backwards relative to the lower plate, to which are attached the footplates. This enables the orthotist to adjust the patient's centre of gravity relative to the footplate bearing centre to the optimum position without altering the patient's posture in the swivel walker frame. The footplate bearings are bolted to the lower plate and their relative spacing in the coronal plane is adjustable via a series of additional holes.

In order to cope with the apprehension which muscular dystrophy patients have of unsteady support, additional stability is provided by extended footplates.

Conclusion

Physiotherapists treating patients in a clinical trial of the new design reported that it had beneficial effects on patient confidence with commensurate improvements in ambulatory performance. The additional comfort and assurance which the patients attained further extended the periods of their walking.

It is very important that swivel walkers for patients with muscular dystrophy are used within a fully planned treatment regime for the individual. Appropriate control of clinical supply is vital if the best interests of patients are to be served. An important aspect of the orthotist training for the ORLAU VCG swivel walker is the philosophy of supply within a co-ordinated treatment regime. This is intended to eliminate inappropriate and harmful prescription and for this reason orthotist training is a mandatory condition for supply of the device to an orthotic contractor.

The ORLAU VCG swivel walker is now routinely available on Department of Health contract in England and Wales with the proviso that it **must** be fitted by an orthotist who has attended the Department of Health approved swivel walker course run by ORLAU.

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