

Continuous passive motion of the foot in combination with vibration in severely affected patients in the early phase of rehabilitation

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Introduction

Long-term bed immobilization results in a limited range of lower limb joint mobilization due to muscle stiffness and contracture. Particularly the ankle joint is prone to a fixed plantarflexion rendering later verticalisation and gait rehabilitation extremely difficult.

Methods

Our group therefore designed a powered device to passively move the paretic ankle joint in combination with a vibration of the footsole. The maximum speed was 15°/s. The vibration ranged from 20 – 50 Hz. The passive motion intended to prevent ankle contracture and the vibration to lessen muscle tone, to strengthen muscle power and to prevent thrombosis. Eight tetraparetic patients of the intensive care unit were treated in such a way that one side was conventionally treated (manual mobilisation and preventive positioning) while the other side received the device-assisted treatment (2 x 30 min and preventive positioning), each intervention for three weeks. The passive range of ankle motion and the muscle tone were the relevant parameters.

Results

Both methods decreased to muscle tone to a clinically relevant extent (a median of -1 in the Ashworth scale). The effect lasted up to 1h but so far both ankles did not differ significantly.

Conclusion

Continuous passive motion in combination with vibration reduced the muscle tone in the shank muscles and seem to be a safe and feasible method to support ankle mobilisation. A larger study is warranted.