SIENCE AND TECHNICAL DEVELOPMENTS:

»REDUCTION OF SPASM BY USING MOVEMENT TRAINERS?«

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1. INTRODUCTION

To treat spasm that occurs with all different neurologic diseases (such as hemispasm after stroke, brain-trauma, para-spasm with patients suffering from traumatic spinal cord injuries and multiple sclerosis), we are facing a problem that occurs on a daily basis. Though it has been tried especially and mainly in the rehabilitation to face the problem with intense physiotherapy (as baclofen, ticanidin) or more invasive techniques such as botulinum toxin-injections, even selective denerving techniques are being considered.

A further therapeutic starting point would be the movement therapy of the patient by using a movement trainer, though statements being grounded by studies regarding the effectiveness of those trainers do not exist so far. Therefore the attempt was being started to give proof of the effectiveness of a movement trainer, in cooperation with a company connected with medical treatment (in this case THERA-vital of medica enterprises, to be specific).

movement trainer (foot-trainer)

movement trainer (upper-body-trainer)

2. STRUCTURE OF STUDIES

225 patients (165 patients recovering from stroke, 36 Parkinson-patients and 25 patients suffering from multiple sclerosis) showing tonus-increase at the lower extremities were being put on the THERA-vital in the special clinic Ichenhausen.
They were given a therapy unit of 20 minutes each. All the patients were examined by an experienced physiotherapist and the muscle tonus was determined according to the Ashworth scale for the following muscles: hipflexor and extensor, abductions and adductions, inner and outer rotators, knee-flexor and extensors, plantarflexors, dorsalextensors. The different muscle groups were being compared regarding the muscle tonus before and after the therapy, taking into account the Ashworth items on the scale. For the significancy test the pre-writing according to Dixon and Mood were used (diversity tests for 2 distributions with dependent spot checks). en).

3. RESULTS

3.1 PATIENTS RECOVERING FROM STROKE

First the patients recovering from stroke the seperate muscles showing a muscle tonus increase of at least one item on the Ashworth scale, were compared in their state before and after the therapy.
The study groups suffered from an increase muscle tonus in the adductors, the plantaflexors, the knee flexors, and extensors as well as the abductors. By doing the therapy a significant reduction of the muscle tonus regarding all the muscles was caused. Moreover, another outstanding aspect was observed: the muscle groups in the hip section and the thighs profited distinctively more than the muscle groups in the thigh section.

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Muscle	Number for T1 > 0	Mean T1	Mean Diff. T2-T1	Median Diff. T2-T1	Improvement	Sig.
Hip-flex	11	1,36	-1,18	-1,0	91%	0,0020
Hip-ext.	8	1,13	-1,13	-1,0	100%	0,0078
Adductors	72	1,25	-0,65	-1,0	57%	0,0000
Abductors	23	1,04	-0,74	-1,0	74%	0,0000
Inner-rot.	10	1,10	-0,80	-1,0	70%	0,0156
Outer-rot.	32	1,13	-0,59	-1,0	59%	0,0000
Knee-flex.	54	1,35	-0,44	0,0	46%	0,0000
Knee-ext.	32	1,34	-0,56	0,0	47%	0,0005
Plant.-flex.	64	1,30	-0,45	0,0	45%	0,0000
Dors.-ext.	18	1,33	-0,50	-0,5	50%	0,0039

Chart 1:
Results for seperate muscles

Furthermore, patients recovering from stroke were observed, with whom the sum-score gotten by the Ashworth-readings for adductors, abductors, knee flexors, knee extensors, plantaflexors and dorsalextensors for each concerning side (=6 readings, theoretical clamping range 0-30) was at least >2. The average result readings were 5.2 before the therapy and 3.2 after the therapy. (p<0,001), 40 out of 49 test persons showed improvements (82%), 3 fell off quality. If establishing a standard form of the prae-post-difference on the standard deviation of the T1-readings (which is a popular but rather problematic method), you get an effective power of 0,74, what can be interpreted as 'medium efficiency', according to the classification by Cohen.

	Mean	Median	SD
T1	5,2	4,0	2,8
T2	3,2	3,0	2,6
Diff. T2-T1	-2,0	-2,0	2,2

Chart 2:
Direct Changes in tonus regarding apoplex-patients (N=49)

Note: The last line shows the medium values of the individually created differences, they therefore do not necessarrily correspond with the difference of the aggregatdates (line T2-T1). (This is the case with the following charts also).

3.2 MS-PATIENTS

In regards to the MS-patients the sum-score was created by Ashworth-readings for adductors, abductors, knee flexion, knee extension, plantar flexion, and dorsal extensors of both sides (=12 readings, theoretical clamping range 0-60). The medium value of the sum-scores of the 19 MS-patients was at 10.3 items before the therapy and at 8.3 items after the therapy. 14 out of 19 test persons were showing improvement (74%), 4 fell off in quality (p= 0,0309).

	Mean	Median	SD
T1	10,3	7	9,0
T2	8,3	5	8,9
Diff. T2-T1	-2,1	-2,0	4,4

Chart 3:
Direct changes in tonus regarding MS-patients (N=19)

3.3 PARKINSON-PATIENTS

In regards to the Parkinson-patients, the sum-score was also created from Ashworth-readings for adductors, abductors, knee flexion, knee extension, plantar flexion, and dorsal extensors of both sides. Here 27 out of 34 test persons (79%) were showing improvement, 2 fell off in quality (p<0,0001).

	Mean	Median	SD
T1	9,2	6,0	9,5
T2	6,6	5,0	8,2
Diff. T2-T1	-2,6	-2,0	3,3

Chart 4:
Direct changes in tonus regarding Parkinson-patients (N=34)

4. CONCLUSIONS

Passive movement training of spastic extremities being done by using a movement trainer clearly lowers the muscle tonus directely after the therapy. Almost all the patients that were being examined by us profited from this. Only a few number of patients were showing a worsening of their symptoms by using the movement trainer. One of the main goals in further studies must be to determine if to lower the muscle tonus stays with the patient as a long term effect, and how often patients have to do such a training in order to create a long term reduction of the muscle tonus.

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