



International Bobath Instructors Training Association

An international association for adult neurological rehabilitation

IBITA

FROM THE EDUCATION COMMITTEE – December 2007

RECENT ARTICLES OF INTEREST

1. McDonnell MN, Hillier SL, Miles TS, Thompson PD, Ridding MC. (2007)
Influence of combined afferent stimulation and task-specific training following stroke: a pilot randomized controlled trial.
Neurorehabil Neural Repair. Sep-Oct;21(5):435-43. Epub 2007 Apr

ABSTRACT

BACKGROUND: Reorganization of the human motor cortex can be induced by specific patterns of peripheral afferent stimulation. The potential for afferent stimulation to facilitate the functional recovery associated with conventional rehabilitative techniques has not previously been investigated. **OBJECTIVE:** The authors sought to determine whether combining appropriate afferent stimulation with task-specific training resulted in greater improvements than training alone in patients with impaired upper limb function in the subacute phase following stroke. **METHOD:** Twenty patients with hemiparesis due to stroke were allocated randomly to either a stimulation or control group. All received 9 sessions of task-specific physiotherapy training over 3 weeks. Prior to each training session, associative electrical stimulation of the motor point of 2 hand muscles was given in the stimulation group, whereas the control group received sham stimulation. Changes in dexterity were assessed using a grip-lift task, and standard measures of upper-limb function were made before and following the intervention. Corticospinal excitability was examined using transcranial magnetic stimulation. **RESULTS:** Both groups showed comparable improvements in functional measures of upper-limb function. Of the 20 patients, only 14 could perform the grip-lift task, which is an objective measure of dexterity. Patients in the stimulation group exhibited significantly greater improvements in this task than the control group. There was no significant change in corticospinal excitability in either group. **CONCLUSION:** This pilot study provides preliminary data suggesting that targeted afferent stimulation may facilitate the response to conventional rehabilitation in patients with hemiparesis due to stroke, but these results need to be confirmed in a larger scale study.

Comment

This is the first study to investigate whether combining afferent stimulation aimed to increase the excitability of the motor cortex projecting to the hand muscles with task specific training leads to improved upper limb function in a group of patients with hemiparesis due to stroke than training alone. This pilot study is interesting for a number of reasons.

It is well designed. The interventions (both electrical nerve stimulation and training protocol) are particularly well described and could be easily reproduced in the clinical setting should the results be confirmed in a larger study.

That one of the inclusion criteria is 10 degrees of active wrist extension on the affected side indicates the extent to which this has become accepted as a marker for potential improvement.

The patients selected were between 1 and 8 months post stroke and had been discharged from upper limb rehabilitation. All subjects showed improvements in scores of upper limb function with the standardized individualized interventions over time. The training protocol was task specific training involving repetitive practice of everyday tasks. Tasks included reaching, wrist extension against resistance; the practice of skills tasks like writing, manipulating putty and placing items in a box. They were standardized and repeatable, relevant to individualized impairments and progressed appropriately. Treatment intensity was 2 hours (1 hour afferent/sham stimulation, 1 hour task specific training) three times a week for three weeks plus approximately 20 minutes home exercises daily. Improvements made on all measures were maintained to a similar extent for both groups at three months.

The study also illustrates how important it is to select sufficiently sensitive measuring instruments i.e. the purpose built manipulandum for the grip-lift task versus the ARAT and the FMA. The stimulation group but not the control group improved significantly on two key features of the dextrous grip lift task. Previous research has shown that a number of grip-lift parameters correlate well with the ARAT (1). However there was no significant difference between groups for the other functional outcome measures including the ARAT in this study.

The authors acknowledged that limitations of this study included the small sample size and possibly the limited number of treatment sessions. It would be valuable to see if a larger study confirms these results and whether improvements in the key features of the grip lift task correlate with improvements in the ARAT or FMA.

2. Schmid A, Duncan PW, Studenski S, Lai SM, Richards L, Perera S, Wu SS 2007
Improvements in speed-based gait classifications are meaningful.
Stroke. Jul;38(7):2096-100. Epub 2007 May 17

ABSTRACT

BACKGROUND AND PURPOSE: Gait velocity is a powerful indicator of function and prognosis after stroke. Gait velocity can be stratified into clinically meaningful functional ambulation classes, such as household ambulation (<0.4 m/s), limited community ambulation (0.4 to 0.8 m/s), and full community ambulation (>0.8 m/s). The purpose of the current study was to determine whether changes in velocity-based community ambulation classification were related to clinically meaningful changes in stroke-related function and quality of life. **METHODS:** In subacute stroke survivors with mild to moderate deficits who participated in a randomized clinical trial of stroke rehabilitation and had a baseline gait velocity of 0.8 m/s or less, we assessed the effect of success versus failure to achieve a transition to the next class on function and quality of life according to domains of the Stroke Impact Scale (SIS). **RESULTS:** Of 64 eligible participants, 19 were initially household ambulators, and 12 of them (68%) transitioned to limited community ambulation, whereas of 45 initially limited community ambulators, 17 (38%) became full community ambulators. Function and quality-of-life SIS scores after treatment were significantly higher among survivors who achieved a favorable transition compared with those who did not. Among household ambulators, those who transitioned to limited or full community ambulation had significantly better SIS scores in mobility ($P=0.0299$) and participation ($P=0.0277$). Among limited community ambulators, those who achieved the transition to full community ambulatory status had significantly better scores in SIS participation ($P=0.0085$). **CONCLUSIONS:** A gait velocity gain that results in a transition to a higher class of ambulation results in better function and quality of life, especially for household ambulators. Household ambulators possibly had more severe stroke deficits, reducing the risk of "ceiling" effects in SIS-measured activities of daily living and instrumental activities of daily living. Outcome assessment based on transitions within a mobility classification scheme that is rooted in gait velocity yields potentially meaningful indicators of clinical benefit. Outcomes should be selected that are clinically meaningful for all levels of severity.

Comment

This article is a valuable addition to the debate regarding the use of gait velocity (measured using the 10 metre walk test) as a proxy measure for community ambulation (1, 2). Gait velocity is a simple, "clinician friendly", valid and reliable measure of walking recovery after stroke. However Lord and Rochester concluded recently that "there is no guarantee that increases in gait velocity will denote a meaningful improvement in performance"(3). A recent systematic review of outcome measures to assess walking ability following stroke concluded that " the most frequently used outcome measures reflect only one aspect of walking ability : walking short distances. Mobility tasks related to function in the community, like walking long distances, around obstacles and over uneven ground, and moving around outside or in buildings other than the home are not well represented by outcome measures used in most studies" (4)

The study is a secondary analysis of data from a previously reported prospective, randomized, controlled, single blind clinical intervention trial (3). The objective was to determine whether a positive

move up the functional mobility classes was associated with a change in self reported SIS scores of ADL, IADLs, mobility and social participation after stroke.

At present there are no universally agreed cutoff classifications of gait velocity for functional ambulation. For this study gait velocity was stratified into 3 clinically meaningful functional ambulation classes based on the work by Perry et al (1); household ambulation (<0.4m/s), limited community ambulation (0.4 - 0.8 m/s), full community ambulation (>0.8 m/s). Successful walking recovery was defined when subjects moved from <0.4m/s to 0.4 to 0.8m/s (household to limited community ambulation) or from 0.4m/s to 0.8m/s to >0.8m/s (limited to full community ambulation).

The results of this study indicate that when 10m gait velocity measures are stratified into clinically meaningful functional ambulation classes then gait velocity can be a clinically meaningful outcome measure. This study also illustrates the value of ensuring that chosen outcomes are clinically meaningful for all levels of severity. They achieved this by using a sliding dichotomy to define recovery. A limitation of the study is the small sample size.

References

1. Perry J, Garrett M, Gronley JK, Mulroy SJ. (1995) Classification of walking handicap in the stroke population. *Stroke* 26: 982-989
2. Lord SE, McPherson K, McNaughton HK, Rochester L, Weatherall M. (2004) Community ambulation after stroke: how important and obtainable is it and what measures appear predictive? *Arch Phys Med Rehabil* 85:234-239.
3. Lord SE, Rochester L (2005) measurement of community ambulation after stroke :current status and future developments. *Stroke* 36:1457-1461
4. Mudge S, Stott NS (2007) Outcome measures to assess walking ability following stroke: a systematic review of the literature. *Physiotherapy* 93(3): 189-200.
3. Langhammer B, Lindmark B, Stanghelle JK
Stroke patients and long-term training: is it worthwhile: a randomized comparison of two different training strategies after rehabilitation.
Clinical Rehabilitation 2007 Jun;21(6):495-510

OBJECTIVE: To find out if there were any differences in improvement and maintenance of motor function, activity of daily living and grip strength between patients with first-ever stroke receiving two different strategies of physical exercise during the first year after stroke. **DESIGN:** A longitudinal randomized controlled stratified trial. **SETTING:** Rehabilitation institutions, community, patients' homes and nursing homes. **SUBJECTS:** Seventy-five male and female first-time-ever stroke patients: 35 in an intensive exercise group and 40 in a regular exercise group. **INTERVENTION:** The intensive exercise group received physiotherapy with focus on intensive exercises in four periods during the first year after stroke. The regular exercise group patients were followed up according to their subjective needs during the corresponding year. **MAIN OUTCOME MEASURES:** Motor Assessment Scale, Barthel Index of Activities of Daily Living, and grip strength. **RESULTS:** Both groups improved significantly up to six months when function stabilized. The groups did not differ significantly on any test occasions. The difference of improvement from admission to discharge was significant in favour of the intensive exercise group, in the Motor Assessment Scale total score (intensive exercise group 7.5; regular exercise group 1.7, $p = 0.01$), and in the Barthel Index of Activities of Daily Living total score (17.4 versus 8.9, $p = 0.04$). **CONCLUSION:** Motor function, activities of daily living functions and grip strength improved initially and were maintained during the first year after stroke in all patients irrespective of exercise regime. This indicates the importance of motivation for regular exercise in the first year following stroke, achieved by regular check-ups.

Comment

In 2004 the American Heart Association recommended that stroke survivors participate in regular physical exercise supporting the need for recommendations for effective and feasible programmes. This study is one of a growing number of recent articles responding to that need. (1,2,3)

This study was well designed. The initial hypothesis was that patients undergoing an intensive treatment programme would have better motor function, be more independent in ADL and have better grip strength at one year follow-up compared with those who received training when needed. Contrary to this hypothesis they found that the initial improvements made by both groups were maintained for a year regardless of their experimental or control group status.

The levels of exercise in both groups were unexpectedly high. They felt this was motivated by the test occasions (three, six and twelve months) and regular contact with a physiotherapist, particularly in the regular exercise group. They concluded that the exercise programme needs to be initiated and encouraged by medical staff with knowledge of and interest in functional exercise programmes individually tailored to stroke patients. This is something we should all be doing.

References

1. Olney SJ, Nymark J, Brouwer B, Culham E et al (2006) A randomised controlled trial of supervised versus unsupervised exercise programmes for ambulatory stroke survivors. *Stroke* 37:476-481
2. Thorsen AM, Holmquist LW, Pedro-Cuesta J, von Koch L (2005) A randomised controlled trial of early supported discharge and continued rehabilitation at home after stroke - a five year follow-up of patient outcome. *Stroke* 36:297-302
3. van de Port IG, Kwakkel G, van Wijk I, Lindeman E. 2006. Susceptibility to deterioration of mobility long-term after stroke: a prospective cohort study. *Stroke* 37(1):167-71.

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