Mirror therapy improves hand function in subacute stroke: a randomized controlled trial


Aim: To evaluate the efficacy of mirror therapy in the upper limb rehabilitation of people with subacute stroke.

Methods: Randomised controlled trial of four weeks duration. Forty inpatients with severe hemiparesis within one year of having suffered their first stroke, and without neglect, apraxia or severe cognitive deficits, were recruited. Participants were randomly allocated into either the mirror group or the control group. Those in the mirror group received 30 minutes of mirror therapy in addition to their conventional therapy (physiotherapy, occupational therapy, and if necessary speech therapy, for two to five hours per day), five days per week. During the mirror therapy sessions participants were asked to perform wrist and finger flexion and extension exercises and could only see the reflection of their non-paretic hand. At the same time as performing these exercises, they were also asked to try and do the same movements with their obscured paretic hand. In addition to the conventional therapy, the control group received a sham treatment (using the non-reflecting side of the same mirror) of identical exercises, performed for the same duration as the mirror group. The same therapist delivered both the mirror and sham interventions. Motor recovery was measured using the Brunnstrom stages, spasticity by the Modified Ashworth Scale (MAS), and activity by the self care items of the Functional Independence Measure (FIM). Measures were taken at baseline, four weeks (post treatment) and six months (follow-up). Assessor blinding was achieved however participant and therapist blinding was not possible.

Results: The mirror therapy group showed a statistically significant improvement in motor recovery as measured by the Brunnstrom stages, spasticity by the Modified Ashworth Scale (MAS), and activity by the FIM self-care subscale. These improvements directly relate to improved independence and the potential to reduce carer burden, and therefore long term Ministry of Health costs. The lack of change to the MAS score from this intervention is unsurprising given that the MAS measures resistance to stretch, and the exercises performed were not designed to increase flexibility but rather to improve active movement. It is heartening to note that the authors report there were no adverse effects associated with mirror therapy.

Conclusion: Mirror therapy, in addition to conventional therapy, improved hand function in patients with severe hemiparesis both post-treatment and at six month follow-up.

Commentary
Each year in New Zealand approximately 5640 people suffer their first ever stroke and at one year following a stroke 50% of those that survive will still have a motor deficit (Life After Stroke, New Zealand Guideline for Management of Stroke, 2003). Recovery of hand function is essential for participation in activities of daily living and is often necessary to achieve patient goals. Mirror therapy is an emerging area of research which shows potential for application in neurorehabilitation (Rizzolatti et al, 2009). It offers an inexpensive and simple intervention that is able to be applied independently of the degree of motor return, yet it requires active patient involvement (Sharma et al, 2006; Yavuzer et al, 2008). The results of the above clinical trial show promise for applying this intervention to patients in rehabilitation settings. The participants in this trial had no greater motor return than Brunnstrom stage four (lateral prehension, release by thumb movement, semi voluntary finger extension with small range) which is a patient group that physiotherapists frequently treat in an inpatient setting. However, these types of patients are often excluded from upper limb rehabilitation interventions due to insufficient voluntary motor control. Not only did this study have the advantage of obtaining clinically relevant results that were retained at follow-up, it achieved these by implementing a clinically feasible intervention. Thirty minutes per day of additional intervention, which requires only a 35cm x 35cm mirror, would be well justified considering the long term improvements that were made in the FIM self-care subscale. These improvements directly relate to improved independence and the potential to reduce carer burden, and therefore long term Ministry of Health costs. The lack of change to the MAS score from this intervention is unsurprising given that the MAS measures resistance to stretch, and the exercises performed were not designed to increase flexibility but rather to improve active movement. It is heartening to note that the authors report there were no adverse effects associated with mirror therapy.

Further trials are necessary to determine whether this intervention can be applied to broader populations or as a home-based exercise intervention. However, clinicians can be encouraged that their patients with severe hemiparesis within one year of having suffered their first stroke, who do not have neglect, apraxia or severe cognitive deficits, may show increased upper limb motor and functional return with the addition of mirror therapy such as that described in this trial.

REFERENCES
After partial knee replacement, patients can kneel, but they need to be taught to do so: a single-blind randomized controlled trial

**Jenkins C, Barker KL, Pandit H, Dodd CAF and Murray DW (2008):** After partial knee replacement, patients can kneel, but they need to be taught to do so: a single-blind randomized controlled trial. Physical Therapy 88: 1012-1021. (Abstract prepared by Sarah Johnston)

**Purpose:** To determine whether a single intervention would improve patient reported kneeling ability following a partial knee replacement.

**Methods:** This was a prospective, randomised controlled trial with single blinding. Sixty participants with medial compartment knee joint osteoarthritis were randomly assigned to either the kneeling intervention group or the routine intervention (control) group. Patients were eligible for inclusion if they were due to have a partial knee joint replacement; they were excluded if they lived more than 45 minutes from the hospital, may have required a total knee replacement, experienced other lower limb problems, or were unable to kneel for other reasons. The participants were assessed pre-operation, and at six weeks and one year post-operation. The physiotherapist conducting the trial collected all of the initial data and administered the kneeling intervention. At the one-year review an independent physiotherapist masked to the treatment allocation collected all the data. At this point the routine intervention group was offered the kneeling intervention. The primary outcome measure used was patient-reported kneeling ability, assessed in particular by question 7 of the Oxford Knee Score (Dawson et al 1998; Murray et al 2007). In addition, scar position, numbness, range of motion, involvement of other joints and pain were recorded as outcome measures to investigate their relationship and influence on kneeling. Pre-operative and one year post-operative outcomes between groups were assessed using independent Mann-Whitney U tests.

The participants in the kneeling intervention group received one 30-minute session (at the six-week visit), in which they were told that “even though kneeling might be uncomfortable or painful, kneeling on their partial knee would not damage the new joint”. A demonstration of safe kneeling was given whereby participants were instructed to kneel on both knees on a soft exercise mat (using a plinth for support), keeping their knees, hips and shoulders aligned. They were advised to try kneeling at home on a soft surface when undertaking normal activities of daily living, but were not to attempt to sit back on their heels initially, as they did not have enough flexion to do this. The control group received the standard hospital protocol which did not include kneeling tasks.

**Results:** There was no significant difference in patient-reported kneeling ability between the groups pre-operatively. At one year post-operatively, after the kneeling intervention, there was a significant improvement in patient reported kneeling ability compared to the control group (P=0.013). Also, a significant difference was found between the groups in the change in scores at the one-year assessment. Even taking into consideration the other variables, the group to which a participant was assigned was the only significant factor in determining improvements in patient-reported kneeling ability.

**Conclusion:** A single physical therapy intervention at six weeks postoperatively will significantly improve patient-reported kneeling ability after a partial knee replacement. Therefore, because it is an important function, kneeling should be included in a patient’s rehabilitation plan.

**Commentary**

The results of this study suggest that a single intervention at six weeks post-operatively will significantly improve a patient’s ability to kneel, which is not only desirable but necessary for many activities of daily living.Whilst the authors have described the kneeling intervention in some detail, it would be useful when applying this in practice to have a more detailed outline of what was said to the patients and the specific technique employed when demonstrating kneeling. With more detail the application of this intervention would be simple as it does not require extensive training or equipment; therefore it is also cost effective. It must be remembered that the patients included in this study all received partial knee joint replacements and had an average age of 66-67 years; therefore the outcomes of this intervention may not be directly transferable to patients with total knee joint replacements or those who are much older or younger than the population investigated. However, this study highlights the importance of educating patients about their operation and replacement, an area of practice which physiotherapists are intimately involved with. Providing clear explanations, guidelines and demonstrations will aid in making patients feel safe and confident with the use of their new joint.

This study is relevant to clinical practice because orthopaedic patients often have difficulty kneeling due to discomfort. They may also be told that it will not be possible to kneel again, but this is an essential function for quality of life, affecting activities such as gardening or playing with grandchildren. It is also an important skill from a safety perspective, for example being required to get back up following a fall. The relevance of the study is reinforced by patient’s feedback, in that they could not kneel but had a desire to do so, a factor that was revealed from a hospital audit prior to the study’s conception. It is also reflected in the high retention rates of the study, whereby only one person did not attend the final one-year review. It would be interesting to apply this intervention to a population of patients with a total knee joint replacement or to a younger population with anterior cruciate ligament reconstruction, to examine the effect of the kneeling intervention on different patient groups.

Sarah Johnston, BAppSc, Dip Mas Ther, BHSc (physio), Musculoskeletal Physiotherapist, Focus Health Ltd, Havelock North, Hastings

**REFERENCES**


Trigger Point Dry Needling Courses 2009

Applications for Pain Management and Sports Injuries

Detailed course information and on-line registration at: gemtinfo.com.au

Dry Needling: Experience what everyone is talking about, learn new techniques to save your hands and enhance your clinical outcomes.

3 DAY WORKSHOP - APA & NZPA Accredited Courses

Trigger point dry needling uses a fine filament needle to release tight muscles with the goal of permanently reducing muscle pain and dysfunction. Clinicians around the world are flocking to this new technique as they find it improves patient outcomes AND saves their thumbs! Applicable for patients in chronic pain and the athletic population.

Schedule: Level One Courses

Hobart: April 3 - April 5 (The Old Woolstore)
Christchurch: April 24 - April 26 (Canterbury University)
Melbourne: May 8 - May 10 (Milano’s Brighton)

These courses include: Fully illustrated course manual (over 100 pages), a needle starter pack, initial free membership to our website, on-going clinical support, full catering and CPD points apply.

Early Bird Rates Apply

Register online to receive detailed course information, rates & enrolment forms.

To secure your place register online or contact: Deb Hampton on: courses@gemtinfo.com.au or +613 9583 5248
gemtinfo.com.au
Why publish in the New Zealand Journal of Physiotherapy?

- Indexed in CINAHL and other highly-searched databases
- Free international access to your articles via the Journal website
- Unrestricted dissemination of electronic PDF versions of your article
- Availability of colour illustrations
- Reaches over 70% of New Zealand physiotherapists, and an international audience
- Contributes to the vitality and development of the physiotherapy profession in New Zealand
- National-level publication and peer esteem is valuable for PBRF and academic promotions
- The Journal has a policy of nurturing new talented researchers and authors
- The Journal is an internationally-recognised, fully peer-reviewed publication

“The mission of the New Zealand Journal of Physiotherapy is to serve the members of the New Zealand Society of Physiotherapists by publishing content that reflects excellence in research and professional issues relevant to the New Zealand and international physiotherapy communities.”