AOTA Critically Appraised Papers Series

Evidence Exchange

* A product of the American Occupational Therapy Association’s Evidence-Based Literature Review Project

CRITICALLY APPRAISED PAPER (CAP)

FOCUSED QUESTION

Is mirror therapy more effective in a group, or individually, on sensorimotor function, activities of daily living, quality of life, and visuospatial neglect in patients with severe arm paresis after stroke?


CLINICAL BOTTOM LINE:

Mirror therapy was specific toward those who have had a stroke and currently were in a rehabilitation facility. The results of this study showed that mirror therapy did not have an effect on motor function; however, there was a significant effect on visual–spatial neglect for those who received this treatment. Therapists working with clients who have had a stroke and have visual as well as motor impairments should use mirror therapy as an intervention technique. The improvements in visual neglect are significant for clients with stroke and are difficult to treat. Therefore, occupational therapists can use this relatively new technique in treatment.

RESEARCH OBJECTIVE(S)

List study objectives.

1. To evaluate if mirror therapy is more effective during group or individual therapy in improving upper-limb sensorimotor function, activities of daily living (ADLs), quality of life, and visuospatial neglect in patients with severe arm paresis due to stroke.
2. Evaluating the overall effect of group therapy compared to those in an individual treatment.

DESIGN TYPE AND LEVEL OF EVIDENCE:

- Randomized controlled trial (RCT). This study had 3 groups; 2 received the clinical intervention (group and individual mirror therapy), and 1 group was the control group.
- Level I.
Limitations (appropriateness of study design):
Was the study design type appropriate for the knowledge level about this topic?  
Circle yes or no, and if no, explain.

YES/NO  Yes

SAMPLE SELECTION
How were subjects selected to participate? Please describe.

Participants were patients with stroke who were referred to the study by their physicians or physical therapists. A total of 205 patients were screened for eligibility; of those, 60 met the inclusion criteria and gave their informed consent.

Inclusion Criteria
1. Participants had to have had a first supratentorial stroke within the previous 3 months, which was ensured by a diagnosis of their primary care hospital.
2. Participants had to be between ages 18 and 80 years.
3. Participants had to be clinically diagnosed with a severe distal hemiparesis of the arm.

Exclusion Criteria
1. Participants were excluded if they had visual impairments that would limit them from participation in the mirror therapy.
2. Participants were excluded if they had severe cognitive and/or language deficits that could prevent them from following instructions.
3. Participants were excluded if they had other neurological or musculoskeletal impairments of the upper extremity unrelated to stroke.
4. Participants were excluded if they had a severe visuospatial neglect (made through a clinical evaluation by therapists asking patients to turn their head toward the examiner on their contralesional side).

SAMPLE CHARACTERISTICS

<table>
<thead>
<tr>
<th></th>
<th>N = 60.</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Dropouts</td>
<td>18.3%</td>
</tr>
<tr>
<td>No./(%) Male</td>
<td>35/58.3%</td>
</tr>
<tr>
<td>No./(%) Female</td>
<td>25/41.7%</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>N/A</td>
</tr>
</tbody>
</table>
| Disease/disability diagnosis | Stroke (ischemic/hemorrhagic) 
|                      | Lesion side, left/right 
|                      | Time post stroke, days 
|                      | MRC, wrist extension 
|                      | MRC, finger extension |


Check appropriate group:

| <20/study group | ✓ | 20–50/study group | 51–100/study group | 101–149/study group | 150–200/study group |

**INTERVENTION(S) AND CONTROL GROUPS**
*Add groups if necessary.*

**Group 1**

**Brief Description**
Individual Mirror Therapy—Mirror therapy for the upper limb consisted of 1 therapist treating 1 patient with a mirror (50×m × 50 cm) positioned between both arms. The mirror was reflecting the non-affected arm. Patient was instructed to move both arms, but the affected arm should be moved as well as possible. Therapists were instructed to include object-related movements, such as putting a ball or bigger squares in different directions, moving sticks, or wipe-like movements with a cloth. Type of movements, repetitions, and series were adapted by therapists according to patients’ abilities.

**Setting**
Rehabilitation facility.

**Who Delivered?**
1 therapist treated 1 patient.

**Frequency?**
Varied between 3 and 5 sessions per week.

**Duration?**
30 minutes.

**Group 2**

**Brief Description**
Mirror Therapy Group—This group followed the same protocol as the individual mirror therapy but contained 2 to 6 patients. Mirror therapy for the upper limb consisted of 1 therapist treating 2–6 patients with a mirror (50×m × 50 cm) positioned between both arms of each patient. The mirror was reflecting the non-affected arm. Each patient was instructed to move both arms, but the affected arm should be moved as well as possible. Therapists were instructed to include object-related movements, such as putting a ball or bigger squares in different directions, moving sticks, or wipe-like movements with a cloth. Type of movements, repetitions, and series were adapted by therapists according to patients’ abilities.

**Setting**
Rehabilitation facility.

**Who Delivered?**
1 therapist treated 2–6 patients at the same time.

**Frequency?**
Varied between 3 and 5 sessions per week.

**Duration?**
30 minutes.
### Group 3

| Brief Description | Control Therapy—Patients underwent a control therapy using a group intervention protocol. In this group, the mirror was turned so a wooden board restricted the view on the impaired arm. Patients in this group were instructed to move both arms while looking at the non-affected arm and imaging the analogous movements of the affected arm but then followed the same protocol as in the mirror therapy groups. |
| Setting | Rehabilitation facility. |
| Who Delivered? | 1 therapist. |
| Frequency? | Varied between 3 and 5 sessions per week. |
| Duration? | 30 minutes. |

**Intervention Biases:** *Circle yes or no and explain, if needed.*

- **Contamination**
  - YES/NO: No

- **Co-intervention**
  - YES/NO: Yes. 3 different interventions were used, but participants were randomly selected to each. Other interventions the patients could also receive at the same time would be physical therapy and speech therapy, because the setting they were in was rehabilitation.

- **Timing**
  - YES/NO: Yes. Throughout the entire study, the patients in the mirror therapy (both group and individual) performed an additional 15 hours of mirror therapy.

- **Site**
  - YES/NO: No

- **Use of different therapists to provide intervention**
  - YES/NO: N/R—Only stated how many participants were assigned to therapist. Did not state whether a different therapist was used for each group.

### MEASURES AND OUTCOMES

Complete for each relevant measure when answering the evidence-based question:

Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article—yes/no/NR [not reported]), and how frequently the measure was used.
Fugl–Meyer Test—Motor function on impairment; arm section ranged from 0 to 66 points, with more points indicating better motor function. Reliability and validity were not reported. This test was taken at baseline and after the intervention.

Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article--yes/no/NR [not reported]), and how frequently the measure was used.

<table>
<thead>
<tr>
<th>Name of measure</th>
<th>What outcome was measured</th>
<th>Whether the measure is reliable and valid</th>
<th>How frequently the measure was used</th>
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</thead>
<tbody>
<tr>
<td>Action Research Arm Test</td>
<td>Activity level; this test contained 4 subscales: Grasp, Grip, Pinch, and Gross Movement.</td>
<td>Sum score ranges from 0 to 57 points, with higher scores indicating better functioning. Reliability and validity were not reported. This test was taken at baseline and after the intervention.</td>
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<tr>
<td>Barthel Index</td>
<td>Independence in ADLs. Reliability and validity were not reported. This test was taken at baseline and after the intervention.</td>
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<tr>
<td>Modified Ashworth Scale</td>
<td>Detected changes in resistance to passive movement of finger and wrist flexors. Reliability and validity were not reported. This test was taken at baseline and after the intervention.</td>
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<tr>
<td>Star Cancellation Test</td>
<td>Visuospatial neglect; patients below a baseline cut-off point of 43 were integrated in the analysis on visuospatial neglect. Reliability and validity were not reported. This test was taken at baseline and after the intervention.</td>
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</table>

Measurement Biases

Were the evaluators blind to treatment status? Circle yes or no, and if no, explain.

YES/NO: No. The secondary outcome parameters of ADLs, quality of life, sensory function, range of motion (ROM), pain, and visuospatial neglect were not blindly assessed.

Recall or memory bias. Circle yes or no, and if yes, explain.

YES/NO: No

Others (list and explain):
RESULTS

List results of outcomes relevant to answering the focused question.

Include statistical significance, where appropriate (\( p < 0.05 \)).
Include effect size, if reported.

When comparing mirror therapy—carried out as an individual or group intervention—with a control intervention, no different effects on sensorimotor function, ADLs, quality of life, ROM, and pain in this study were found. A positive effect of individual mirror therapy on visuospatial neglect compared to control therapy was detected. The 3 participants receiving individual mirror therapy had an increased score on the Star Cancellation Test (14.5–20.0). The 5 participants receiving group mirror therapy had an increase from 4.4 to 6.7. In contrast, the 6 participants in the control group had a decrease (−2.3 from 5.2). A post-hoc analysis revealed a significant difference between the individual mirror therapy from the control group (\( p < 0.01 \)). These results for visuospatial testing should be carefully interpreted due to the small sample size. It was also found that patients receiving individual mirror therapy developed more resistance to passive motion than patients in the mirror therapy group intervention. It was found that it was possible to structure mirror therapy as a group intervention even for stroke patients with severe motor impairment with no relevant differences in dropout rate and compliance to the other groups.

After 5 weeks, no significant group differences for motor function were found (\( p > 0.05 \)). The Action Research Arm Test score of all participants increased significantly over time (\( p = 0.002 \)). There were no significant group differences. No significant interactions between groups were detected for the Fugl–Meyer Test; however, motor scores for the upper limb in all participants increased over time (\( p < 0.001 \)). The Barthel Index increased in all patients over time (\( p < 0.001 \)); however, no significant group differences were found. There was a significant effect on visuospatial neglect for patients in the individual mirror therapy compared to the control group (\( p > 0.01 \)).

Was this study adequately powered (large enough to show a difference)? Circle yes or no, and if no, explain.

YES/NO No. The researchers calculated a sample size of 66 participants to detect a medium effect size. It is possible that this was an overestimated effect for severely affected patients, and therefore, the study may be underpowered.

Were appropriate analytic methods used? Circle yes or no, and if no, explain.

YES/NO Yes

Were statistics appropriately reported (in written or table format)? Circle yes or no, and if no, explain.

YES/NO Yes
CONCLUSIONS
State the authors’ conclusions that are applicable to answering the evidence-based question.

This study showed no effect on sensorimotor function of the arm, ADLs, and quality of life of mirror therapy compared to a control intervention after stroke. However, there was a positive effect of individual mirror therapy on visuospatial neglect compared to the control therapy. The researchers also found that patients receiving individual mirror therapy developed more resistance to passive motion than patients in the mirror therapy group intervention. The outcomes reported of the study were not appropriate due to the study design being am RCT. Also, the outcomes of the study did not coincide with the focused question. Most of the outcomes were found to be insignificant, except the visuospatial. The main results of the study focused more on whether individual or group therapy worked better overall rather than focusing on the specific areas stated in the question.

This work is based on the evidence-based literature review completed by Gia Mancini, OTS, and Rochelle Mendonca, PhD, OTR/L, Faculty Advisor, University of the Sciences.


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