Mirror Therapy Induces Mirror Movements In Stroke: Effect on Lower Limb Recovery

Introduction

- **Mirror Therapy** (MT) is an upcoming method in Stroke Rehabilitation
- A visual impression is created by observing the image of the less-affected extremity
- It gives an illusion that both the limbs are moving
- **Mirror movements** are involuntary motor response that occur on the affected side during MT
- Such movements are also observed in early infancy till the complete development of Corpus Callosum
- **Mirror neurons** play important role for movement execution
- MT activates the brain areas of inferior parietal lobe and frontal gyrus
- **Activity-based MT** induces greater motor recovery

**Methods**

- Setting: O.T. of a rehabilitation institute
- Design: Case Series
- Participants: 06 chronic hemiparetic subjects across all stages of Brunnstrom recovery stages (BRS)
- Outcome Measure: Fugl-Meyer assessment (FMA) – lower extremity (LE)
- Intervention: Activity-based movements on the less-affected side in front of the mirror while hiding the affected limb
- Subjects observed the less-affected side image in mirror
- Posture: sitting / long-sitting
- Activities:
  - Rocker board
  - Ball rolling
  - Ball kicking
  - Wiping
  - Pedaling dustbin
  - Shifting pillow
  - Curling bed-sheet
- No. of sessions: 30

### Table: MT Induces Mirror Movements

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Sex</th>
<th>Side</th>
<th>Stroke Onset (months)</th>
<th>Pre FMA-LE (max. 34)</th>
<th>Post FMA-LE (max. 34)</th>
<th>Mirror Movements (+ / X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>I/L</td>
<td>11</td>
<td>25</td>
<td>30</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>I/L</td>
<td>06</td>
<td>26</td>
<td>32</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>H/R</td>
<td>20</td>
<td>20</td>
<td>26</td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>I/R</td>
<td>12</td>
<td>28</td>
<td>30</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>H/L</td>
<td>10</td>
<td>18</td>
<td>25</td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>H/R</td>
<td>09</td>
<td>23</td>
<td>28</td>
<td>✓</td>
</tr>
</tbody>
</table>

*M- Male; F-Female; I-Ichtemic; H-Hemorrhagic; R-Right; L-Left

**Clinical Observations**

Similar movements were observed on the affected side when performed on the less-affected side

None of the subject was aware about the mirrored movement on the affected side

Mirror movements were more obvious for ankle dorsiflexion, knee extension, hip internal rotation & adduction

Amount of movements varied from complete to a small range

Five subjects could perceive mirror illusion but mirror movements were observed in 4 patients

**Non-reflected surface / without object:**
Disappearance of mirror movement in 3 subjects & very minimal in 1 participant

**Discussion**

- MT is a promising therapeutic tools for stroke rehabilitation
- Activity based MT is one of the new form
- FMA-LE score established positive change in knee flexion-extension, ankle dorsiflexion-planterflexion, hip abduction-adduction & rotations made good changes
- Hip flexion-extension could not show any change because of the limitation of position
- Hip was only maintained in flexion during therapy session
- Mirror neurons are more responsible for distal movements than proximal; may be one of the neuro-anatomical fact for better recovery of knee and foot than hip
- Object related MT induces greater mirror neuron activation
- Lack of advance tool to measure mirror movements is one of the limitations
- Further studies in form of trials are needed to investigate the effect of activity based MT

**Conclusion**

- The findings exhibited that activity-based MT is feasible
- MT enhance mirrored movement of the affected lower extremity in stroke subjects
- Such movements may be utilized in motor therapy of the post stroke subjects

**References**


**Amount of Mirror Movement**

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild spasticity &gt; Severe spasticity</td>
<td>Spasticity &gt; Flaccidity</td>
</tr>
<tr>
<td>Fair motor recovery &gt; poor recovery</td>
<td>Right hemiparetic &gt; left hemiparetic</td>
</tr>
<tr>
<td>BRS stage 3 &amp; above &gt; below stage 3</td>
<td></td>
</tr>
</tbody>
</table>