

Postoperative Complication of Amputations- Phantom Limb Pain: Evidence for Efficacy of Mirror Therapy

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Abstract

Phantom limb pain is a painful sensation that is perceived in a body part that no longer exists, which was postulated to occur due to visuo-proprioceptive dissociation. One therapeutic approach that has the potential to temporarily resolve this visuo-proprioceptive dissociation is mirror therapy, during which amputees typically move their intact limb while observing its reflection in a mirror, which in turn evokes the illusory perception of movement of their phantom limb. The objective of this short communication was to update the evidence for efficacy of mirror therapy for phantom limb pain. There were two experimental studies (both were pilot studies) and seven case reports found in our PubMed search. Although most of the studies report positive benefits, the evidence is too low and insufficient to draw definitive conclusions or provide recommendations.

Keywords: Mirror therapy; Phantom limb pain; Postoperative complication; Post-amputation pain; Postsurgical rehabilitation.

Phantom limb pain is a painful sensation that is perceived in a body part that no longer exists, which was postulated to occur due to visuo-proprioceptive dissociation. One

therapeutic approach that has the potential to temporarily resolve this visuo-proprioceptive dissociation is mirror therapy, during which amputees typically move their intact limb while observing its reflection in a mirror, which in turn evokes the illusory perception of movement of their phantom limb. The objective of this short communication was to update the evidence for efficacy of mirror therapy for phantom limb pain.

Experimental studies

Darnall and Li[1] tested the efficacy and feasibility of self-delivered home-based mirror therapy for phantom pain among 40 community-dwelling adults with unilateral amputation and phantom pain that received an explanation of mirror therapy and were asked to self-treat for 25 min daily. Pain intensity was reduced at month 1 and at month 2 which was dependent upon subjects' level of education.

Schmalzl *et al*[2] implemented an alternative version of the mirror therapy involving a visuotactile illusion, by recruiting six upper limb amputees who had been previously exposed to the classical mirror therapy with no or limited success, and exposed them to two differential experimental conditions involving visualization paired with either illusory movement or illusory touch of the phantom

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hand. Five participants were found to have pain reduction during the stroking condition.

Case reports

MacLachlan *et al*[3] did a case study on use of 'mirror treatment' in a person with a lower limb amputation who was reporting PLP at the time of treatment. Reduction in PLP, increase in motor control and perceived changes in aspects of phantom limb were reported.

Darnall[4] regarded home-based patient-delivered mirror therapy as a promising approach in the treatment of phantom limb pain following reported success of a case which demonstrated that home-based patient-delivered mirror therapy may be an efficacious, low-cost treatment option that would eliminate many traditional barriers to care.

Ramachandran *et al*[5] reported the beneficial effects of mirror therapy given together with a shrinking lens which not only optically 'resurrected' the phantom but also made the phantom appear to shrink thereby causing the pain to 'shrink' as well.

Hanling *et al*[6] reported 4 patients who performed preoperative mirror therapy daily for 2 wk before undergoing elective limb amputation. "One patient experienced no phantom limb pain (PLP). Two patients experienced rare episodes of mild PLP without effect on their participation in physical therapy (PT) or their quality of life. One patient reported daily, brief episodes of moderate PLP without effect on his participation in PT or his stated quality of life."

Kim and Kim[7] reported another case that had a successful reduction of phantom limb pain using mirror therapy when other treatments initially failed to control the pain.

Clerici *et al*[8] described the use of mirror therapy to treat phantom limb syndrome in a 39-year-old patient whose right leg had been amputated at the age of 17 because of an osteosarcoma. The reported case highlighted the value of an integrated multidisciplinary approach including neurological/physiatric

assessment, clinical psychological support, physiotherapy and other, unconventional treatment modalities. The subjectively reported beneficial effects were present 6 months after treatment.

Wilcher *et al*[9] reported the case of a 24-year-old Caucasian man, a left upper limb amputee, treated with mirror visual feedback combined with auditory feedback with improved pain relief. The patient's improvement in symptoms highlighted the complex multi-sensory processing of body perception in patients who are amputees.

There were two experimental studies (both were pilot studies) and seven case reports found in our PubMed search. Although most of the studies report positive benefits, the evidence is too low and insufficient to draw definitive conclusions or provide recommendations.

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