Mirror Therapy as an Alternative Treatment for Phantom Limb Pain: A Short Literature Review

Farshad Hasanzadeh Kiabi, MD, Mohammad Reza Habibi, MD*, Aria Soleimani, MD, and Amir Emami Zeydi, MSc†

Mirror Therapy, a non-pharmacological and alternative treatment strategy that has been proven successful in managing phantom pain, is a neurorehabilitation technique designed to remodulate cortical mechanisms of pain. With this technique, patients perform movements using the unaffected limb while watching its mirror reflection superimposed over the (unseen) affected limb, thus creating a visual illusion (and therefore positive feedback to the motor cortex) of movement of the affected limb. The visual illusion of movement of the affected limb generates positive feedback to the motor cortex, which might in turn interrupt the pain cycle [9].

A few studies on the effectiveness of mirror therapy as a pain management intervention for patients with PLP exist. In a case study by MacLachlan et al., mirror therapy was used to treat PLP in a patient with a lower limb ampu—
tation (amputation through the hip due to necrotizing fasciitis) who presented PLP at the time of treatment. The authors showed that during the intervention, there was a significant reduction in the patient’s PLP, an increase in the sense of motor control over the phantom limb and a change in the aspects of the phantom limb that was experienced [3]. In addition, Darnall reported a case in which a 35-year-old man with an acquired above-knee amputation of the left lower limb had success with home-based patient-delivered mirror therapy after failing to respond to conventional treatment for PLP: with mirror therapy, his phantom pain resolved, and his nerve pain was well managed [10]. In another pilot study by Darnall et al., 40 patients with unilateral amputations and PLP were studied to evaluate the feasibility and preliminary efficacy of self-delivered home-based mirror therapy for PLP. Patients received an explanation of mirror therapy and were asked to self-treat for 25 minutes daily. Patients completed the home therapy and posted answers to sets of outcomes questionnaires at months 1 and 2 post-treatment. The results of the study showed a significant reduction in average phantom pain intensity at month 1 (n = 31, P = 0.0002) and month 2 (n = 26, P = 0.002). However, patients with higher education levels experienced a greater reduction in pain intensity compared to patients with lower education levels [6].

Hanling et al. described the cases of 4 patients who performed daily mirror therapy for 2 weeks before undergoing elective limb amputation and its effect in preventing PLP. It was shown that one of the patients experienced no PLP. Rare episodes of mild PLP were experienced by two of the patients, without affecting their quality of life or their participation in physical therapy: one patient reported daily, brief episodes of moderate PLP without any effect on his participation in physical therapy or his stated quality of life [8]. In addition, Kim et al. reported the successful reduction of PLP in a 30-year-old male patient with an above-elbow amputation using mirror therapy. In this patient, mirror therapy resulted in dramatic pain relief for chronic phantom limb pain when other treatments such as medications, physical therapies, nerve blocks and nerve transformations did not work [11]. In addition, in a study of patients with PLP who had undergone lower limb amputations, Chan et al. found that all patients in the mirror therapy group (15 minutes daily for 4 weeks) reported a significant decrease in pain intensity [12]. However, in a randomized controlled trial by Brodie et al., on 80 lower limb amputees, mirror therapy only produced a significantly greater number of phantom limb movements compared to the control condition but did not reduce phantom limb pain and sensations any more than that of the control condition [13].

In summary, considering the importance of PLP and its management, as well as the potential effectiveness of mirror therapy as an easy-to-use and low-cost adjuvant therapeutic technique, it seems that this modality can be widely used to treat PLP, although future research including randomized controlled trials to evaluate the efficacy of mirror therapy in PLP is warranted.

REFERENCES

1. Flor H. Phantom-limb pain: characteristics, causes, and treatment. Lancet Neurol 2002; 1: 182–9.
2. Knotkova H, Cruciani RA, Tronnier VM, Rasche D. Current and future options for the management of phantom-limb pain. J Pain Res 2012; 5: 39–49.
3. MacLachlan M, McDonald D, Waloch J. Mirror treatment of lower limb phantom pain: a case study. Disabil Rehabil 2004; 26: 901–4.
4. Bosmans JC, Hubink M, van der Schans CP, Geertzen JH, Dijkstra PU. Amputation, phantom pain and subjective well-being: a qualitative study. Int J Rehabil Res 2007; 30: 1–8.
5. Ziegler–Graham K, MacKenzie EJ, Ephraim PL, Traverson TG, Brookmeyer R. Estimating the prevalence of limb loss in the United States: 2005 to 2050. Arch Phys Med Rehabil 2008; 89: 422–9.
6. Darnall BD, Li H. Home-based self-delivered mirror therapy for phantom pain: a pilot study. J Rehabil Med 2012; 44: 254–60.
7. Wilcher DG, Chernev I, Yan K. Combined mirror visual and auditory feedback therapy for upper limb phantom pain: a case report. J Med Case Rep 2011: 5: 41.
8. Hanling SR, Wallace SC, Holtenbeck KJ, Belnap BD, Tuls MR. Preampulation mirror therapy may prevent development of phantom limb pain: a case series. Anesth Analg 2010: 110: 611–4.
9. Cacchio A, De Blasis E, De Blasis V, Santilli V, Spacca G. Mirror therapy in complex regional pain syndrome type 1 of the upper limb in stroke patients. Neurorehabil Neural Repair 2009; 23: 792–9.
10. Darnall BD. Self-delivered home-based mirror therapy for lower limb phantom pain. Am J Phys Med Rehabil 2009; 88: 78–81.
11. Kim SY, Kim YY. Mirror therapy for phantom limb pain. Korean
12. Chan BL, Witt R, Charrow AP, Magee A, Howard R, Pasquina PF, et al. Mirror therapy for phantom limb pain. N Engl J Med 2007; 357: 2206–7.

13. Brodie EE, Whyte A, Niven CA. Analgesia through the looking-glass? A randomized controlled trial investigating the effect of viewing a ‘virtual’ limb upon phantom limb pain, sensation and movement. Eur J Pain 2007; 11: 428–36.