Use of Mirror Therapy for Phantom Limb sensation: A case study from Nepal

Aswin Kumar Dawadi[1], Shailendra Raj Adhikary[2]

1 Lecturer, B.P. Koirala Institute of Health Sciences, Dharan, Nepal

2 Professor, Chitwan Medical College, Bharatpur, Nepal

Abstract

Introduction

Phantom Limb Sensation (PLS) and Phantom Limb Pain (PLP) are frequently reported after amputation, with prevalence as high as 76–87%[1]. Mirror therapy (MT) is an affordable intervention used globally to reduce PLP and PLS[2], but published evidence from Nepal is limited.

Case Description

A 17-year-old female underwent below-elbow amputation following a road traffic accident and subsequently developed PLP with a clenching–type phantom hand posture. A two mirror setup placed at a right angle was used to create a clear visual illusion of the missing limb. Mirror therapy was conducted for 15 minutes, three times daily.

Discussion

The patient showed rapid improvement in her symptoms in eight days. There was partial relief by Day 6 and complete resolution of pain by Day 8. Lack of long-term follow-up is a limitation.

Conclusion

Our case highlights that mirror therapy is a simple, cost-effective technique with meaningful benefit for PLP for short-term, especially in young patients with early initiation of therapy. This case supports its feasibility and encourages its use in resource-limited Nepalese clinical settings.

Keywords

phantom limb pain, phantom limb sensation, mirror therapy, amputation

***Corresponding Author**

Aswin Kumar Dawadi

Lecturer, B.P. Koirala Institute of Health Sciences, Dharan, Nepal

Email: aswindawadi150@gmail.com

INTRODUCTION

Phantom Limb Pain (PLP) is a distressing complication experienced after limb amputation. Studies estimate that 76–87% of amputees will experience PLP at some point in their lives[1]. PLP manifests as burning, stabbing, cramping, or electric shock–like sensations and may significantly affect psychological wellbeing, sleep, and rehabilitation outcomes.

The predominant theory behind PLP relates to maladaptive cortical reorganization, where the somatosensory cortex undergoes changes due to loss of sensory input[2]. The visual–motor mismatch that follows amputation contributes to persistent erroneous signals, which the brain interprets as pain. Mirror therapy (MT), first described by Ramachandran[2], and provides a corrected visual input by reflecting the intact limb to simulate the presence of the amputated limb. This visual feedback has shown promise in "retraining the brain", reducing pain, and restoring voluntary control of phantom limb movements.

While mirror therapy has been widely described internationally, there is limited published evidence from Nepal. Considering resource-constrained healthcare settings in Nepal, mirror therapy represents a valuable intervention due to its low cost, portability, and simplicity. This case illustrates successful early use of mirror therapy in a young Nepalese amputee and emphasizes its feasibility in similar clinical environments.

CASE DESCRIPTION

A 17-year-old right-handed female presented to a tertiary care hospital in Nepal following a high-impact road traffic accident. She sustained an open fracture of the radius and ulna with extensive soft-tissue damage, necessitating a right below-elbow amputation with vessel ligation and stump closure. Postoperative recovery was medically

uncomplicated. However, two weeks later, she reported distressing symptoms consistent with phantom limb sensation and pain. She described a vivid and uncomfortable perception of her missing hand being tightly clenched, accompanied by intermittent paroxysmal pain rated 7/10 on the Visual Analogue Scale (VAS).

A psychiatric evaluation revealed sadness related to sudden disability, anxiety concerning future functioning and concerns about social stigma. She met criteria for adjustment disorder with mixed anxiety and depressed mood. She was prescribed tablets Escitalopram, Pregabalin, and Naproxen for 2 weeks. But the phantom limb clenching sensation and pain persisted (VAS 7/10).

Given the persistent PLP, mirror therapy was initiated following standard protocols[2]. A two-mirror setup positioned at a 90° angle, as seen in the provided image was used (figure 1). This method allowed a wider and more realistic illusion of bilateral upper limb movement. The patient positioned her intact left hand between the mirrors, with the amputated right limb completely out of view. She was instructed to perform slow, deliberate movements such as opening and closing her fist, finger extension, wrist flexion and extension while focusing on the mirror image.

She completed 15 minutes per session and covered three sessions per day. By Day 6, the patient reported partial release of the phantom clenching sensation and a reduction in pain to VAS 5/10. By Day 8, she reported complete pain relief, with the ability to visualize full finger extension in the mirrored image corresponding to the phantom limb. She was discharged at her guardian's request shortly thereafter. No long-term follow-up could be conducted due to difficulty contacting the patient.

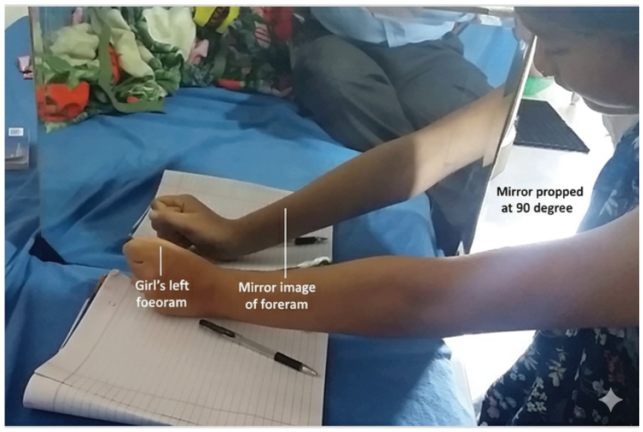

Figure 1: The patient performing mirror therapy (Two-mirror setup)

DISCUSSION

This case demonstrates the successful application of mirror therapy for PLP in a young amputee in Nepal. We utilized a two-mirror setup, enhancing sensory illusion compared to a standard single mirror.

The marked reduction in pain observed by Day 8 in our patient aligns closely with the finding of MacLachlan et al., who documented substantial PLP reduction within the first week and no pain in three weeks.[3] Similarly, Kim et al. reported partial reduction by one week and more than 50% reduction by one month.[4] Our patient was a female of 17 years of age, which is in contrast to the patients of the latter two case reports, where in both reports, the patients were male in their 30's.

Young patients may respond more rapidly due to heightened neuroplasticity. Our patient's ability to sustain visual attention and perform repeated motor tasks likely contributed to the positive outcome. It is important to explore the variation in the outcomes of mirror therapy inn PLS across different age group and gender in future studies.

The effectiveness of mirror therapy is attributed to correction of the visual–motor mismatch, activation of mirror neurons[2], reduction of maladaptive cortical reorganization [8], and restoration of voluntary motor imagery pathways.[9] Chong et al.[5] described mirror therapy as an effective method even in routine clinical settings, supporting its application beyond specialized neurological centers. Similarly, our case demonstrates that mirror therapy can be implemented with minimal equipment, making it particularly suitable for Nepal's resource-limited healthcare environment.

While early randomized controlled trials showed mixed results[6,7] methodological issues such as short duration, inconsistent protocols, or inclusion of chronic PLP patients limit generalizability. More recent reviews highlight stronger outcomes when mirror therapy is initiated early and practiced consistently[5] , just as the conditions met in this case. Further studies with larger sample sizes and long-term follow-up are recommended to strengthen evidence for its broader implementation.

CONCLUSION

Our case highlights that mirror therapy is a simple, cost-effective technique with meaningful benefit for PLP for short

term, especially in young patients with early initiation of therapy. This case supports its feasibility and encourages its use in resource-limited Nepalese clinical settings for postoperative rehabilitation for amputees.

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