ORIGINAL ARTICLE

Effects of Tactile Desensitization on Postoperative Pain After Amputation Surgery

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Purpose: *Pain in the acute setting after amputation is complex with multiple types of pain experienced, including somatic and neuropathic. No studies have measured multiple pain control modalities while using self-management techniques for acute amputation pain. Desensitization could provide a means of pain control for somatic and neuropathic pain. The purpose of this study was to test the efficacious use and effects of tactile desensitization in managing acute postoperative pain after lower limb amputation.*
Design: *This was a pre-experimental repeated measure study.*
Methods: *Pain description, intensity, anxiety, depression, and medication usage were measured during repeated time periods. Pain intensity was measured before and after each intervention along with efficacy.*
Findings: *Of the times the intervention was self-administered (n = 50) there was a statistically significant reduction in the pain level (P < .001) with large effect sizes for all paired comparisons. Participants found the intervention efficacious and feasible to use.*
Conclusions: *The findings support a reduction in pain intensity scores using pain medication coupled with tactile desensitization.*

Keywords: *amputation, acute pain, neuropathic pain, desensitization, postoperative.*

PAIN IN THE ACUTE CARE SETTING after amputation is difficult to manage because of multiple types of pain experienced, including somatic and neuropathic.[1-4] The pain is intensified by psychological responses of the person before and after amputation.[2,5-7] Acute pain resulting from amputation surgery can lead to a chronic and persistent pain lasting years beyond the initial insult.[1,2,7,8] Wooden[2] defines chronic persistent postsurgical pain (CPPSP) as a persistent pain that lasts more than 2 months after surgery and is not attributed to a reoccurring medical condition or complication. This type of pain is inclusive of sensory and psychological aspects of pain.[2,9] The primary cause for CPPSP is mainly contributed to nerve injury.[2,9] Amputation is one of the primary surgeries that can lead to CPPSP.[9]

Chronic pain after lower extremity amputation surgery has been reported in 72% to 80% of patients.[10-13] This pain is associated with suffering, inability to perform activities of daily living, inability to participate in rehabilitation, psychological strain, and at times, a dysfunctional home environment because of role strain from the pain.[2,9,13] Evidence indicates that severe

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acute pain in the postoperative period leads to the development of chronic pain.[7,8,11,14] Therefore, researching strategies to mitigate both acute surgical and neuropathic pain during and immediately after amputation are imperative to alter chronic pain.

Acute Pain After Amputation Surgery

The management of acute pain has primarily focused on the use of opioids to control incisional, inflammatory, and musculoskeletal surgical pain.[1,2,9] Yet, opioid monotherapy for pain may not be sufficient for the multidimensional postamputation pain resulting from surgical removal and severing of nerve fibers, tissues, and bone coupled with the emotional responses of limb loss.[2,7,8] Research indicates that using only pharmacologic management to treat pain was inefficient in controlling neuropathic pain postamputation.[8,10,15,16] Because persistent postamputation pain is neuropathic in nature, adjuncts to opioid pain management are important for controlling amputation pain.[1,2,7,8]

To adequately control acute postamputation pain, supportive complementary treatments coupled with pharmacologic management should be considered. It is unknown if the use of complementary therapies in the acute setting after amputation alters sensory, neuropathic, and affective components of pain. Unfortunately, complementary interventions have not been well developed or tested in the acute setting immediately after amputation surgery. The purpose of this study was to test the efficacy and feasibility of a complementary therapy and its outcome on acute postamputation pain in the immediate postoperative setting.

Desensitization as a Complementary Therapy

Melzack's[17] Neuromatrix theory provided the framework for the development of the complementary therapy used in this study. The theory is based on the premise of a genetically engineered neurosignature of the body affecting the somatosensory map of the body because of constant firing of neurons. The neurosignature is specific to each person resulting in an individualized pain experience. To re-establish homeostasis of the somatosensory area in the brain after surgical removal of the limb, restructuring of the internal neurosignature has to occur. Melzack believes that an instinctive way to restructure is to establish a new pathway through stimuli at the site.[18] Yoo[19] discussed that the Neuromatrix theory could be the proposed change that occurs centrally after amputation and suggests that this may be the need for nonpharmacologic approaches for the experience of neuropathic pain. A means of establishing a new pathway at the site for amputees could be the use of tactile stimulation through desensitization therapy.

Desensitization was first described by Fisher and Boswick[20] as a technique using percussion and massage after neuroma formation in digital amputations. The initial narrative did not provide a procedure on how to perform the technique, but did describe using it in reshaping the sensory nerves. Desensitization, a noninvasive complementary therapy, is a touch healing technique that is purported to decrease pain.[20,21]

Kerr et al[22] define touch healing as a medical treatment in which the primary mode of administration is through tactile contact. Kaptchuk and Eisenberg's[23] classification of tactile therapies range from Class 1 to Class 3. Desensitization is categorized as a Class 1 or light touch therapy. The goal with Class I therapy is to induce a somatosensory response. After amputation surgery, changes in the somatosensory map of the brain occur in relation to central sensitization changes.[1,2,14,22] Central sensitization occurs in the central nervous system at both the spinal and supraspinal level causing a more sensitive state of pain. The hyperexcitability of the central neurons because of the constant firing of peripheral nociceptors along with downregulation of opioid receptors leads to this heightened pain state (allodynia).[1,9,14,22,24] Consequently, the dorsal horn of the spinal cord has to be desensitized to increase the pain threshold and inhibit transmission.[9,22,25]

Dermatomes adjacent to the amputated limb have shown spinal changes consistent with surgical removal of the unviable tissue.[25] Pain radiates along a dermatome or sensory pathway after the severing of nerves with amputation surgery.[2] Exploration of methods to desensitize these pathways is needed.[14,26] Although, desensitization is included in guidelines of care after amputation, there is no