

Hypnosis-induced analgesia as treatment for patients with chronic phantom pain

Abstract (word count: 160, max 200 words)

Objective: Treatment-requiring chronic phantom pain occurs in 5-10% of patients after amputation. The aim of this article is to describe the effect of hypnosis-induced analgesia as a treatment for patients with chronic phantom pain.

Design: Descriptive study reporting impact from hypnosis in five patients suffering from chronic phantom pain.

Result: Three out of five patients experienced a markedly and stable reduction in pain intensity during the study period. Two other patients achieved only a short-term effect of hypnosis.

Conclusion: Our non-randomized hypnosis treatment for chronic phantom pain shows efficacy in the majority of the patients. No patients reported undesirable adverse effects from the treatment. Evidence of efficacy from hypnotically induced analgesia in patients with chronic phantom pain is not clear. Non-pharmacological treatment including hypnosis should be considered in line with pharmacological treatments.

Necessary selection of patients, including screening for anxiety and depression, as well as adequate professional qualifications in therapists prior to performing clinical hypnosis must be considered as mandatory.

Keywords: hypnosis; chronic pain, adult patients, phantom limb pain; hypnosis-induced analgesia.

Introduction

Phantom sensations after limb amputation occur in virtually all newly amputated patients and can be uncomfortable, but not necessarily painful for the patient. The patients most often experience the phenomenon as itching, pressure, cold or heat from the missing limb, without the patient being able to remedy this, (Nikolajsen 2013). Almost all patients with phantom pain also feel phantom sensations. The pain is typically located to the distal part of the missing extremity. The descriptions of the pain can vary from patient to patient, often with terms such as "pinching / squeezing", "stinging / ants crawling" or "burning / stinging".

Recent studies estimate that up to 60-80% of all newly admitted patients experience phantom pain. Jensen et al (1983) examined the incidence of phantom pain among amputees and found that 72% of all newly-amputees reported pain eight days after surgery. Six months after surgery, the incident of patients with phantom pain was reduced to 65%. Recent studies estimates that approximately 5-10% of amputated patients have treatment-requiring chronic phantom pain (Nikolajsen 2013).

Etiology and pathophysiology

Recent pathophysiological theories describe phantom pain as an interplay of elements of peripheral neuropathy, central sensitization at the spinal level, and cerebral reorganization (Nikolajsen 2013). In other words: Phantom pain is explained as a result from a peripheral trauma followed by a cascade of spinal and supraspinal processes leading to changes in the cortical processing of somatosensory signals.

These explanations for the development of phantom pain after amputation are primary based on data from clinical studies and do not contain a coherent explanation of the phantom complex where phantom sensations and phantom pains usually occur simultaneously . Melzack emerged in 1990 based on the pioneering gate-control theory

of pain with the hypothesis that we are genetically equipped with a neuromatrix; a system that regulates the body's proprioceptive impulses in an interaction between the thalamus, the limbic and somatosensory system and posterior parietal cortex. The neuromatrix also maintains a representation of a "body self" independent of external sensory impulses. The theory gain support from the fact that children born with one or more missing extremities often feel the missing body part.

The modern development of Mirror Therapy for the treatment of phantom pain is attributed to Ramachandran (Ramachandran et al 2000). Results from working med Mirror Therapy have created a theoretical explanation model for both phantom sensations and phantom pain attributed to the maladaptive (adaptation that is more harmful than helpful) neurocognitive processes that are activated by loss of visual and proprioceptive feedback from the amputated limb. Motor commands originate from the motor cortex and send information to the muscles instructing them to perform a task. This information returns in a feedback loop that informs the brain that the task is completed. If a limb is absent and the task cannot be completed, the feedback process does not take place. The brain learns that the limb is motionless and then adopts a "learned paralysis". Through Mirror Therapy, a "visual feedback" is introduced which has shown effect on painful phantom spasms. Mirror therapy is used in ergo- and physiotherapy for patients in which anxiety/movement neglect of an extremity, phantom pain, central and peripheral paresis plays a role.

Richardson et al (2017) concludes in a review of 38 treatments that there is currently no first-line treatment available for phantom pain patients. The conclusion is

weakened by the fact that the quality of several of the reported trials is low, which the researchers themselves address as a bias.

Hypnosis as pain treatment

The Society of Psychological Hypnosis, Division 30 of the American Psychological Association defines hypnosis as:

“A state of consciousness involving focused attention and reduced peripheral awareness characterized by an enhanced capacity for response to suggestion.” (2010)

Hypnosis is a dissociative state in which peripheral awareness and critical analytical cognition are suspended, which promotes seemingly involuntary changes in perception, memory, and mood, with behavioral and biological consequences. The patient's expectations and motivation for the effect of hypnosis are crucial for the outcome (Brown & Fromm 2013). At the same time, susceptibility to hypnosis seems to vary from person to person. Characteristics of people with high susceptibility are, among other things, that they have a high degree of trust in others, have cooperative ability and a well-functioning imagination. Conversely, people with a complex psychiatric history and / or drug or alcohol abuse are much less susceptible to hypnosis.

Hypnosis has been demonstrated to reduce analogue pain, and studies on the mechanisms of laboratory pain reduction have provided useful applications to clinical populations (Patterson & Jensen 2003). The mechanism behind the effect from hypnotically analgesia is still not described systematically (Patterson & Jensen 2003). According to the authors, results from laboratory studies indicate a possible inhibition at the spinal cord level. In studies from the seventies, naloxone failed to reverse the analgesic effects suggesting that endogenous opioids may not be responsible for hypnotically induced analgesia. To our knowledge, no reviews published later than 2003

contain systematic descriptions that supplement the mentioned mechanisms behind the pain-relieving effect related to hypnosis.

Hypnosis-induced analgesia for phantom pain has been implied both as a single intervention and in combination therapy. However, a review of studies identified in the Cochrane Database found limited evidence for the treatment approach, primarily due to a lack of well-conducted controlled clinical studies (Batsford et al 2017).

Methods and procedure

Population

Five patients with chronic phantom pain were referred for hypnosis treatment. All patients were screened for anxiety and depression prior to hypnosis sessions, with moderate to severe anxiety and depression being contraindicated for hypnosis sessions. All patients were subjected to relevant pharmacological treatment prior to referral (TCA, SNRI, gabapentinoids and opioids).

Procedure

The patients were informed by the attending physician and after a brief introduction, received hypnosis at the first meeting with the therapist. 14 days after first hypnosis, efficacy was assessed at attendance by use of NRS (Numeric Rating Scale) using the numbers 0 to 10 (0 = no pain and 10 = worst imaginable pain) and the hypnosis session repeated if needed. The overall effect was assessed one month after first hypnosis. Two of the patients attended treatment with Mirror Therapy during the same period as when they participated in the hypnotic sessions.

The hypnotic session lasted about 30 minutes. Each patient was brought into a trance with counting technique. The pain problem was then intervened by instructing

the patient to detach the amputated leg, followed by induction of pain reduction. The Patients were then returned from trance with reverse counting technique.

Results

At one-month follow-up, three out of five patients reported a markedly stable reduction in pain intensity. Two patients achieved only a short-term effect (less than two weeks) of hypnosis. One of these patients received consequently treatment with cannabis-based medicine (dronabinol) without any sufficient effect. The following two case histories are selected hypnosis reports for five lower extremity amputated patients with phantom pain (Table 1). The reason for choosing these two is the consideration of the desire to represent a spread in age and gender.

Neither of the two selected patients received mirror therapy as combination therapy, which two other patients did, which they considered a valuable supplement.

Case 1.

49-year-old female patient with chronic phantom pain after amputation of both legs 10 cm below knee joint and partial amputation of three fingers of the left hand after sepsis with multi-organ failure. The patient was in a comatose state for a period during hospitalization. Released from hospital to own home March 2018. At discharge, the patient was not mobilized and dependent on help from the spouse and the municipal system. The patient completed opioid tapering followed by phantom pain in the amputated limbs in which the patient described: "As if the legs were in a blender all the time". The intensity was increasing during the day, and thus especially noticeable from the afternoon until bedtime. The patient rated the phantom pain intensity with NRS to "6/10". The treatment with hypnosis given at the first attendance focusing on "detachment of the amputated limb" and "pain reduction". The patient experienced pain relief after the first session, but reported management problems with the amputated leg

stumps, which resulted in unstable walking the first 10 minutes after the session. Fourteen days after first hypnosis, the patient told that the pain-intensity was reduced from "6/10" to "2/10" as rated by use of NRS, and that she no longer recognized the experience of having the legs in a blender. The patient again received the same hypnosis. The patient walked from the session pain relieved and with significantly safer steps than at the previous hypnosis session. By appearing one month after initial hypnosis, the pain intensity was reduced and was rated to "2/10" by use of NRS. The patient reported that she had regained her life at the same time and that she has stopped all medical pain treatment with the exception of gabapentin. She claimed to be more satisfied with her life today. She often visits the public swimming pool together with her son for a swim and has resumed an education for social worker. All things considered, she seems to be living as before the phantom pain despite the presence of stump pain which is exacerbated by increased activity.

Case 2.

62-year-old man maintains early retirement. Is in a relationship but not cohabiting. They see each other on a regularly basis but they rarely go out together due to phantom pain related to right-sided leg amputation performed 10-12 cm below the right knee joint in 2015 after severe chronic ulcerations on the right foot. The patient was plagued with limb pain before the amputation. Specified NRS for "6/10" at rest and "9/10" at motion. The patient developed chronic phantom pain after crus amputation.

The phantom pain was located to the toes of the amputated leg. The patient did not notice any reduction in pain during pharmacological treatment. Prior to hypnosis, the patient experienced pain breakthroughs every other day and without prior notice. The phantom pain intensity was at "7/10" (NRS). The patient was treated with hypnosis at first attendance focusing on "detachment of the amputated limb" and "pain

reduction". The patient experienced pain relief after the first session. Fourteen days after initial hypnosis, the patient had the experiencing that the frequency of pain and intensity of pain was reduced significantly, thus he only had a single pain breakthrough in fourteen days. Furthermore, the pain intensity was reduced from "7/10" to "2/10". The patient did not receive any additional hypnosis during the conversation. When presenting a month after the first hypnotic session, the patient told that the pain was almost gone. The patient still rated NRS to "2/10".

The overall result indicated increased quality of life for the patient. Where the phantom pain previously made it difficult to participate in activities outside the house, he now feels more joy and indicates that he is also a bit proud that he can now accompany the girlfriend on city tours, shopping etc.

Discussion

The two cases described are subjective descriptions of a treatment field in which very few randomized trials are available. It is clear that the field calls for further randomized trials to document the effect of hypnosis-induced analgesia in phantom pain, thus moving forward that hypnosis may be a natural choice in therapy for phantom pain in the long term. However, the mechanism behind hypnosis is still unscripted insufficiently. Therefore, we have been inspired to use the work of [Ramachandran et al \(2000\)](#). [His](#) work is based on earlier works by Ronald Melzack (1990) but appears with more plasticity than the latter, who explains phantom limb pain as a result of an innate structure called a neuro matrix. Ramachandran's work a potentially useful model in understanding hypnotic therapy for the treatment of phantom pain.

In our treatment, we find that selection of patients is necessary. Likewise, the therapist who performs hypnosis must be professionally qualified.

The use of hypnosis and mirror therapy as combination therapy for patients with chronic phantom pain may appear contradictory from theoretical considerations. The fact that two of our patients reported mirror therapy as a valuable supplement just underlines the need for further research and controlled studies.

Conclusion:

Despite lack of evidence for efficacy in chronic phantom pain, data from this pilot study shows that hypnotic induced analgesia appears to be simple to perform, effective for pain relief in a majority of selected patients and without adverse effects. Randomized clinical trials including larger number of patients are needed to elucidate this topic.

Table 1. [TPE3]

	Gender	Age	Mirror Therapy	Effect of treatment	Depression prior	Anxiety prior	NRS Before Hypn	NRS after Hypnosis
Case 1	Female	49	Not treated	strong sustained effect	None	None	6/10	2/10
Case2	Male	62	Not treated	strong sustained effect	None	None	7/10	2/10
Case 3	Male	72	Not treated	Short-term effect	None	None	Not described	not described
Case 4	Male	74	Treated	Short-term effect	mild	None	8/10	4/10
Case 5	Male	72	Treated	strong sustained effect	Not informed	not informed	8/10	2/10

Conflict of interest statement

The authors have no conflicts of interest to declare.

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