

## Use of Hypnosis in the Treatment of Pain

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Hypnosis is an altered state of consciousness that comprises of heightened absorption in focal attention, dissociation of peripheral awareness, and enhanced responsiveness to social cues. Hypnosis has a long tradition of effectiveness in controlling somatic symptoms, such as pain. Pain, the most common symptom in clinical practice, is a multi-dimensional experience, which includes sensory-discriminative, affective-emotional, cognitive and behavioral components. There is a growing recognition for hypnosis and related techniques in pain management. Psychological approaches to pain control, such as hypnosis, can be highly effective analgesics, but are underused in Korea. In this article, we would like to review the basic concepts of hypnosis, the mechanism, and the outcome data of the analgesic effects of hypnosis, and also, its limitations. (Korean J Pain 2012; 25: 75-80)

### Key Words:

antinociception, hypnosis, hypnotherapy, pain.

### INTRODUCTION

Using hypnosis for pain treatment can be found in records as old as literature from the 1840s [1]. It is difficult to define hypnosis, but it can be seen as an altered state of consciousness that comprises heightened absorption in focal attention, dissociation of peripheral awareness, and an enhanced responsiveness to social cues [2]. In other words, after induction by the therapist, it is a process of changing the perception, sensation, thought, and behavior of the patient or subject through suggestions [3]. Hypnosis is one of the oldest methods used for pain treatment, but had not received much interest or wide use. Especially in our country, South Korea, there are only a few therapists

who use hypnosis in the treatment of pain. However, recently, there has been an increase in interest regarding hypnosis abroad. This is due to a growing reports in the importance of brain function during the progress and treatment of chronic pain, evidence of the influence that hypnosis has on the neurophysiology of pain, and continuous reports of hypnosis treatment effects on chronic pain [1].

In this review, we would like to introduce hypnosis to a pain specialist who had not encountered hypnotherapy before, while also examining the recent research findings regarding the treatment mechanism of hypnosis on pain and its outcome.

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## BODY

### 1. Concept of hypnosis

There are three elements in hypnosis: absorption, dissociation, and suggestibility [4]. Absorption is immersing deeply into perception, imagination, or an abstract experience. Those who have a tendency to easily experience absorption are more hypnotizable than people with no experience [5]. Dissociation is the separating of the elements of the mind and behavior, for example when recalling an autobiographical memory, it is similar to the state of dreaming where the subject is both the observer, as well as the main character, simultaneously. There could be a behavior in the state of unconsciousness, or an experience of sensation of the other body parts separated to other parts of the body. Suggestibility is that the subject easily conforms to the therapist's directions during hypnosis. However, this does not mean that the subject has completely lost his or her volition. Rather, as the subject is immersed in a state of hypnosis, the subject's judgment is reserved for a short time. Hypnosis only makes it easier for the subject to accept suggestions and approach a memory, which is not achieved by force. Unless there was a concrete suggestion in which what happened during the hypnosis was not remembered and the subject accepts this suggestion, the treatment process can be remembered.

Hypnosis is not induced or effective in all people. The subject's response to hypnosis and suggestions after hypnosis are different for each individual, and there are temperamental characteristics to a certain degree, which can be termed hypnotic susceptibility or hypnotizability [6]. According to the literature, terms such as hypnotic responsiveness and hypnotic suggestibility are also used. When measuring hypnotic susceptibility, a standardized tool such as the hypnotic induction profile (HIP) is used [7]. An interesting aspect is that hypnotic susceptibility can be related to the effects of not only hypnotic treatment, but in other treatment as well. In patients with chronic pain, those with higher hypnotic susceptibility had a larger reduction in pain after acupuncture [8]. In a research that compared the efficacy of acupuncture with placebo for chronic shoulder pain, there were no significant differences in the treatment outcomes between the two groups, but in both groups, patients with high hypnotic susceptibility showed a significant improvement in pain [9]. Faymonville

et al. [10] reported experiences of performing local anesthesia or conscious sedation, accompanied with hypnosis instead of general anesthesia, in more than 4,800 patients in their department of anesthesiology. When a stress reduction method and hypnosis were randomly allocated to patients receiving plastic surgery, the patient group, who underwent hypnosis, had lower pain and anxiety, as well as a lower use of analgesics and higher patient satisfaction.

### 2. Pain control mechanism of hypnosis

For a long time, after "the specific theory" of Descartes, pain was thought to start from the pain receptors at the ends of the body, traveling to the pain nucleus in the brain to be sensed [11]. However, with this point of view, there were many limitations in understanding and treating chronic pain. Gate control theory, presented in 1965, emphasized the importance of the psychological function in pain control, as in the process of conveying peripheral pain stimulation to the center, the pain is controlled by ascending and descending inhibitory control circuit in the spinal cord [12]. Afterwards, as neuroimaging techniques developed, it was revealed that various parts of the brain were important for the experience and control of pain. The brain areas that are activated when pain is experienced are the thalamus, primary somatosensory cortex (SI), secondary somatosensory cortex (SII), insula, forebrain (eg. prefrontal cortex), amygdale, and anterior cingulate cortex (ACC). These brain areas are called the neuromatrix [12]. Each brain area has different functions, the thalamus, SI, SII, and the posterior parts of the insula are responsible for the sensory-discriminatory experience, the amygdale, ACC, and anterior parts of the insula are responsible for the affective-motivational components of pain, and the PFC is responsible for the cognitive-evaluative aspects of pain [13]. These brain areas are also closely related to the functions of emotional processing and thinking in humans, so the multi-dimensional characteristics, where pain experience is decided by several factors, can be explained.

In the functional brain image research using  $H_2^{15}O$ -PET (positron emission tomography), when subjects in hypnotic state were directed to recall happy memories, several areas such as occipital, parietal, precentral, prefrontal, and cingulate cortex were activated [14]. On the other hand, when subjects were directed to recall happy memories in the awakened non-hypnotic state, both the temporal lobes and basal forebrain were activated. This

suggests that the state of the brain, when recalling during hypnosis, is different to the brain performing episodic memory in the general awakened state.

When normal people are hypnotized and suggested to feel pain, not only do they experience pain, but the activity of the thalamus, ACC, insula, prefrontal, and parietal cortices are increased. The degree of pain and the increase in brain activity were larger than when directed to imagine without inducing hypnosis [15]. These brain areas are also activated when actual pain is experienced. When pain was suggested, after inducing hypnosis to patients of chronic pain who were already suffering pain, the pain became more severe than usual [16]. When the patients of chronic pain were hypnotized and suggested for the pain to be weak, moderate, or severe, the degree of pain and brain activity changed according to the direction of the suggestion, and the degree of change was larger than just imagining without the hypnotic induction [16].

Hypnosis not only affects pain intensity, but it also affects the emotional responses to pain. In the brain, ACC is responsible for processing emotion. During hypnosis, when an unpleasantness due to pain is suggested to increase or decrease, the unpleasantness changed in accordance to the suggestions, and the ACC activity also changed accordingly. However, there were no changes in pain intensity and brain activity including SI and SII [17]. In contrast, when the pain intensity was suggested to increase or decrease after hypnosis, SI and SII activity changed in accordance, but there were no changes in ACC activity at that point. When hypnosis was induced in fibromyalgia patients and relaxation was ordered, the degree of pain was reduced compared to the awakened state, and the cerebral blood flow of the bilateral orbitofrontal, right thalamus, and left inferior parietal cortex increased, while the cerebral blood flow of the bilateral cingulate cortex decreased [18].

These findings imply that the cortical modulation is involved in the pain control effect of hypnosis. Kosslyn et al. [19] reported the effects of hypnosis on color perception using PET. After inducing hypnosis, when color cards were suggested to be perceived as grey cards, and grey cards to be perceived as color cards, the activity of the lingual gyrus, which is the brain area that processes color, increased or decreased according to the suggestions. This implies that, not only with the pain experience, but other sensations as well, can be controlled, and that the activity

of the relevant brain area changes according to the suggestions during hypnosis.

### 3. Outcome data

Hypnosis is effective in various acute medical settings. In a randomized controlled trial, which observed the anesthetic effects of hypnosis during interventional radiology, the control group experienced intensifying pain as the procedural time became longer, but the hypnosis treatment group, who had learned self-hypnosis, had reduced pain and the amount of analgesia used through the patient-controlled analgesia pump, also decreased. Not only this, but the hypnosis treatment group had lower hemodynamic instability after the procedure, and the procedural time was also reduced 22% when compared to the control group [20,21]. As a result, \$338 in medical fees had been reduced per procedure, even when the costs for educating and instructing patients in self-hypnosis was taken into account [22]. Montgomery et al. were the first to conduct a meta-analysis of 18 research laboratory and clinical studies, and reported a effect size 0.71 of hypnosis in the analgesic effect [23]. Hypnosis not only has analgesic effects in acute pain, but it also serves to relieve chronic pain such as fibromyalgia, cancer pains, and headaches [24].

There are also randomized controlled trials reporting that the treatment effect is heightened when hypnosis is merged with other psychotherapy techniques. When hypnotherapy is merged into a group psychotherapy program for patients with metastatic breast cancer, not only does anxiety and depression decline, but better coping is enhanced, while the pain is relieved as well [25].

### 4. Techniques of hypnotherapy

The pain relief effect of hypnosis can be largely divided into two mechanisms; physical relaxation and perceptual alteration/cognitive distraction. Muscle tension often accompanies the occurrence of pain. When there is pain, the painful area is instinctively withdrawn, and as muscle tension increases, the pain intensifies. Therefore, when there is an absorption in images that arouse physical relaxation, such as 'floating' or 'lightness', the muscles become relaxed and the pain is reduced [26].

Different techniques should be used in perceptual alteration depending on the hypnotic susceptibility of the patient. People with low hypnotic susceptibility respond better to distraction techniques, which concentrate on

competing sensations in other body regions which do not feel pain. Imaginative suggestions can be used on those who are not induced into hypnosis due to low hypnotic susceptibility. This situation has the patient imagine, while suggestions are given without inducing hypnosis [27].

For patients with high hypnotic susceptibility, suggestions of numbness in the painful region can be used. For example, a feeling of receiving an analgesic injection or anesthesia at the dentist is recalled, and it is then suggested that this feeling spreads to the painful area. Also, suggesting that the pain is like a bad liquid that flows around the body and can flow out of the body, suggestions of separating the painful area from the body, and suggesting that the patient can separate from the body in order to be separated from the pain, can all be used during the hypnotherapy.

The temperature metaphor is a helpful and commonly used technique. It is effective when hypnotic susceptibility is more than moderate. Images of ice cold water, lumps of ice, and cold creek water coming down the mountain can be used to suggest that the painful area is becoming gradually colder, or in contrast, images of the sun, a warm bath, and an electric blanket can be used to suggest that the painful area is becoming warmer. Pain sensation and temperature sensation all pass through the lateral spinothalamic tract, which supports the usefulness of this technique. This technique helps the patient transform pain signals.

There are a few principles in the images and metaphors used in pain relief. First, pain may continue for the patient, but the patient should be able to feel the difference between the pain signal itself and the aroused discomfort, and then be able to filter the hurt out of the pain. Second, through hypnosis, the patient should have the experience where the pain signal is transformed into something less uncomfortable. Before hypnosis, it was either pain or no pain, but through hypnosis, the pain can be transformed into the different perception by competing sensations such as tingling, numbness, warmth, and coolness. Finally, the patient should not fight the pain. Fighting with the pain is actually concentrating more on the pain, so anxiety and depression intensifies, and physical tension is increased, which leads to more severe pain.

1) **Self-hypnosis:** Self-hypnosis is performing the induction of hypnosis to own self. In the earlier 20<sup>th</sup> century, hypnosis induction was thought to be achieved by passing energy from the inducer to the subject. However, after the

mid 20<sup>th</sup> century, it was determined that hypnosis was due to the natural hypnotizability of the subject, and therefore, it was revealed that there was no need for another person to experience the hypnotic state.

To relieve habitual pain through suggestions and imagination in chronic pain, the hypnotic state must be frequently induced to extend the pain reduction during everyday life. However, it is practically impossible for a therapist to induce hypnosis several times a day, so applications of self-hypnosis are essential. Nevertheless, a problem present in pain treatment is that most Koreans do not practice self-hypnosis. If self-hypnosis is difficult, religious mediation, which is more familiar to Koreans, could be used as an alternative induction method with relaxation and concentration.

It is helpful to explain examples to the patient of the association between muscle tension and pain before actually inducing hypnosis, and also, the relationship between pain and concentrating on the pain.

## 5. Limitations of hypnotherapy in pain treatment

Hypnosis is an effective method for acute and chronic pain, but there are also a few limitations. First, it is only effective in patients with high hypnotic susceptibility. The anticipated analgesic effect is not achieved in low to moderately hypnotizable patients. Therefore, measuring the Eye-Roll Sign (ERS) [26], which is a scale of biological trance capacity, is helpful in identifying patients who can experience the analgesic effects through hypnosis. ERS has 5 grades, ranging from 0 to 4, and usually, patients who are 3-4 are highly hypnotizable. Most acute pain patients do not have any psychological disorders, so when ERS is high, it is most likely that the actual hypnotizability score is high. Second, there can be psychiatric complications in chronic pain patients. However, in chronic pain patients, their actual hypnotizability scores are not consistent with ERS. Instead, they are usually lower, since many of them are suffering from anxiety, depression, drug abuse, and personality changes, such as dependency and regression. Therefore, in chronic pain, the effect of hypnosis can be limited. Third, there are perceptions and expectations regarding hypnosis, and in many cases, patients expect that the pain will completely vanish during hypnosis. However, in chronic pain patients, even with high hypnotizability, the pain may decrease or disappear during hypnosis, but in most cases, the pain returns after a cer-

tain period after the hypnosis. Self-hypnosis should be practiced to supplement this aspect, but most Korean patients are not enthusiastic in the practice of self-hypnosis. Fourth, the cognitive-behavioral approach can be used in patients who do not practice self-hypnosis, but this is usually performed in a group therapy setting, for 12 to 15 sessions. However, forming groups is not easy in the case of Koreans. For this reason, the group therapy method can be applied to individual therapy, but realistic problems such as cost-effectiveness make it hard to utilize. Fifth, there are cases where patients with chronic pain have psychological problems at the same time. Feelings of anger and guilt are considered to be the psychological reasons. These patients require psychodynamic therapy, which is not in the range of pain medicine. Experienced psychodynamic hypnotherapist may be required, and in these cases, the high cost is a problem. Most chronic pain patients already have economic difficulties from the costs of their treatments for their original condition, even before reaching psychodynamic hypnotherapy.

However, despite such limitations, there are frequent clinical cases where hypnotic treatment has become a tool for the permanent cure of acute pain, as well as for patients with chronic pain.

## CONCLUSION

Hypnosis is a natural phenomenon which is genetically inherent in humans. Hypnotic treatments can be compared to a computer after clicking the icon of a program to activate it, where the installed program initially was not in use. This program then becomes hypnotizability or suggestibility, and the method to activate it is to induce hypnosis. Hypnosis induction is simple, and the basis is concentration and immersion of the mind. In a hypnotic state, various functional changes of the brain are achieved according to suggestions and the imagination, and through this, pain can be controlled. If pain medicine specialists, who have vast experiences in pain treatment, learn hypnosis and utilize it, it would be greatly helpful in the treatment of acute and chronic pain.

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