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Hypnosis in the Control of Pain During Hyperthermia Treatment of Cancer

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Controlled investigations studying the effectiveness of hypnosis in reducing cancer pain and clinical pain in general are conspicuously lacking. In addition, the importance of hypnotic susceptibility (as measured by standardized scales) in determining the efficacy of hypnosis in clinical pain reduction has not been studied experimentally. Clinicians advocating the use of "indirect" techniques suggest that hypnotic susceptibility is not an important factor, although they have not presented controlled clinical data to support this contention (2).

One reason for the lack of controlled investigations into the efficacy of hypnosis and hypnotic susceptibility in clinical pain is the difficulty in precisely producing and quantifying clinical pain. Radiofrequency-produced hyperthermia is an experimental treatment for cancer and affords a unique opportunity to study clinical pain in cancer patients in a rigorous experimentally controlled manner. A magnetrode produces a 13.5-MHz radiofrequency stimulus to destroy tumors by heating them in excess of 42°C (6). The stimulus has a continuously adjustable power output ranging from 0 to 1,000 watts.

Although most of the patients in the present study experienced chronic pain secondary to their cancer, acute additional pain resulting from hyperthermia has been shown to be proportional to the wattage received. When the hyperthermia stimulus is terminated, the pain caused by the hyperthermia subsides. Thus, hyperthermia provides a clinical pain stimulus with properties paralleling laboratory pain stimuli in that it is discrete and can be precisely regulated, quantified, and replicated across individuals and experimental trials. Pain resulting from hyperthermia is described as either a superficial burning sensation (very rarely) or, more frequently, a deep ache in the sternum or within the tumor. In approximately one-third of the patients, the pain can be so marked that watt dosage must be reduced or treatment terminated even though temperature measurements indicate that no tissue damage is occurring. Chemical analgesics have not appreciably affected hyperthermia pain. The

ability to alter pain during hyperthermia in a significant number of patients has yet to be systematically investigated.

The present study used high and low hypnotically susceptible subjects to compare the effectiveness of a hypnosis experimental group to a no-hypnosis control group in reducing pain during hyperthermia treatment for cancer. An indirect hypnotic technique was used.

METHOD

Twenty-eight patients (16 male and 12 female) ranging in age from 30 to 73 years (median, 50) undergoing their first course of hyperthermia at the University of California at Los Angeles were subjects in the present experiment. All subjects had far advanced cancer that had failed standard methods of treatment.

Procedure

Hyperthermia treatments were conducted once a month on five consecutive days (Monday through Friday). Monday served as a preexperimental session designed to study hyperthermia tumor dynamics and involved placing temperature needle probes into the tumor and collecting parametric data with the magnetrode. Systematic psychological data was not collected on Monday. If a patient reported acute pain during his preliminary hyperthermia session, a research assistant contacted the patient and discussed the randomized study.

All patients interested in participating became subjects and signed a consent form; the Stanford Hypnosis Clinical Scale (SHCS) was then administered (3). The SHCS score was not disclosed to the subject, clinical nurses, or the experimenter conducting the subsequent hypnosis training. Subjects were stratified into low (SHCS score 0–1) and high (SHCS score 4–5) hypnotic susceptibles. Subjects then were randomly assigned to the hypnosis group or the no-hypnosis control group with the constraint that an equal number of high and low susceptibles were placed in the hypnosis and no-hypnosis control group. This resulted in four experimental conditions: hypnosis–high SHCS (H–H); hypnosis–low SHCS (H–L); no-hypnosis control–high SHCS (C–H); no-hypnosis control–low SHCS (C–L).

All experimental groups received the standard sequence of hyperthermia on Tuesday and Wednesday with no other intervention. The hypnosis group received a 45-min hypnosis training session using an indirect induction (1) with posthypnotic suggestions for analgesia Wednesday evening and again on Thursday morning. Although patients were instructed and given posthypnotic suggestions to practice the hypnosis prior to and during the final two hyperthermia sessions on Thursday and Friday, no objective observations were taken to ensure that patients complied with the instructions. The clinical nurses indicated that not all patients in the hypnosis groups overtly practiced hypnosis during the final two hyperthermia sessions, and signs of posthypnotic suggestion were not evaluated. Thus, Tuesday and Wednesday served

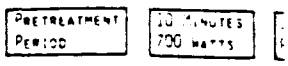

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FIG. 1. Scheme of a typical hyperthermia treatment session. Wattage will vary from patient to patient depending on tumor location.

as a base-line recording period, and Thursday and Friday the intervention period for the hypnosis groups. The no-hypnosis groups received the standard hyperthermia without hypnosis on all four days.

Psychological data were collected only during the Tuesday through Friday hyperthermia sessions. Each session began by having the patient rate his pretreatment level of pain on a visual analog scale (VAS) (5). The VAS is a 10-cm horizontal straight line, the ends of which are anchored by "no pain" and "pain as bad as it could be." The subject was instructed to place a mark somewhere along the VAS indicating his level of pain. The position of the mark on the VAS is measured in centimeters in order to quantify the pain rating. The subject was then given hyperthermia over the tumor site at a preset wattage for 1 to 15 min depending on his ability to tolerate the pain. A 1-min "rest" period followed, and the subject rated his maximum level of pain on the VAS. Another hyperthermia period followed at an increased wattage level for 1 to 15 min. This period was again followed by a rest period and VAS pain rating. If the subject could tolerate the pain, the sequence of alternating hyperthermia periods and 1-min rest periods with pain ratings was repeated at increasing wattage until the subject received a total of 60 min of hyperthermia (Fig. 1).

Pain medications were given in a standard fashion for each patient less than 1 hr prior to treatment and were not altered during the course of the experiment.

RESULTS

A total pain score was derived for each hyperthermia treatment. The total pain score reflected the wattage, time of exposure, and VAS for each hyperthermia period within each treatment session. The pain score also accounted for the total duration of hyperthermia during each daily session. The total pain score (P_T) formula is

$$P_T = \frac{\sum_{i=1}^{n} \left(\frac{1}{W_i} \times \frac{1}{T_i} \times \mathrm{VAS}_{\log} \right)}{\Sigma T_T}$$

in which W_i is the wattage per period, T_i the time (in minutes) per period, $\mathrm{VAS}_{\log}$ the logarithm of the VAS score, and T_T the total time (in minutes) per treatment.

A split-plot factorial ANOVA with two levels of group (hypnosis; no hypnosis) and two levels of susceptibility (high SHCS; low SHCS) as between

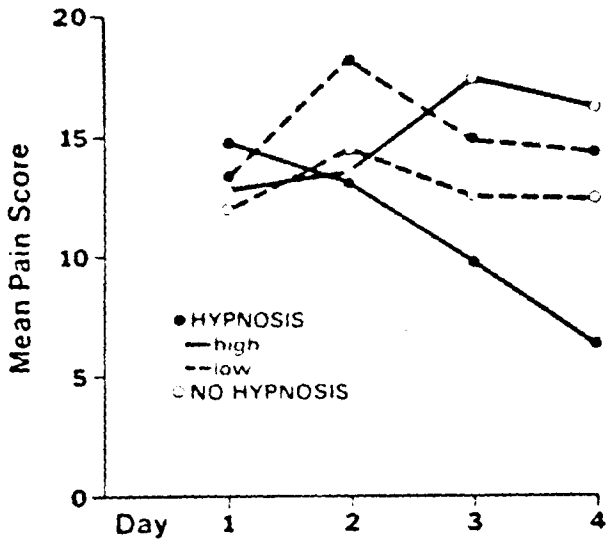

FIG. 2. Mean treatment pain score for days 1, 2, 3, 4 (Tuesday, Wednesday, Thursday, and Friday, respectively). Days 1 and 2 served as a no treatment control condition for all 4 experimental groups. Hypnosis was employed during days 3 and 4 with the hypnosis groups.

factors and four levels of day (1, 2, 3, and 4) as a repeated measure was used to analyze the total pain score (4). The ANOVA revealed highly reliable group × day [$F(3,72) = 3.61, p = 0.0174$] and group × susceptibility × day [$F(3,72) = 423, p = 0.008$] interactions. A trend analysis to decompose the group × susceptibility × day interaction resulted in a reliable linear trend over time, interacting with the experimental condition [$F(1,24) = 9.09, p = 0.006$]. Figure 2 illustrates these findings. Only the H–H group showed a reliable linear decrease in pain across treatment days. The other experimental conditions showed a generally stable trend in pain over treatment days.

Pearson correlations were computed between SHCS scores and pain change scores. Pain change scores were computed by averaging together each subject's total pain score from Thursday and the pain score from Friday as an average. A reliable correlation was found for the hypnosis group (group H–H and H–L combined) between pain change and SHCS for Friday r ($df = 12$) $= 0.757, p < 0.05$ and a marginally reliable correlation on Thursday r ($df = 12$) $= 0.527, p < 0.06$. No reliable correlations were found for the no-hypnosis control group (groups C–H and C–L combined).

DISCUSSION

Although clinical reports abound (3), there have been no systematic investigations of the role of hypnotic susceptibility in the reduction of pain in cancer. In addition, clinicians utilizing indirect hypnotic approaches have questioned

the clinical utility of hypnotic outcome (2). Hyperthermia p tification of clinically significa liminary observations on the r effectiveness of an indirect hyp resulting from hyperthermia t

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The authors wish to grateft for their critical role in condi for Cancer Research seed m which this study would have i (awarded to Dr. Storm) supp

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the clinical utility of hypnotic susceptibility scales in predicting treatment outcome (2). Hyperthermia provides an opportunity for the precise quantification of clinically significant pain. The present experiment provides preliminary observations on the role of hypnotic susceptibility in predicting the effectiveness of an indirect hypnotic approach in the reduction of clinical pain resulting from hyperthermia treatment of cancer.

The results of the present experiment do not support the contention of proponents of indirect hypnotic techniques. Within the context of hyperthermia treatments, hypnotic susceptibility as measured by the SHCS is an important factor in the reduction of pain using hypnosis, even when an indirect technique is used. The data indicate a highly reliable linear decrease in pain for the high-susceptibility group (H–H). The low-susceptibility group that received hypnosis (H–L) and the no-hypnosis control groups showed no change across the treatment sessions.

These data have potential relevance in individualizing psychological interventions for cancer patients undergoing treatments that produce side effects such as pain. However, the data should be interpreted cautiously, since only two brief hypnosis training sessions were conducted. It is possible that extended training may have benefited the low-hypnotizability patients. In addition, an attention/placebo control condition is needed to equate for therapist contact. Further controlled studies are warranted to test the interaction between patient characteristics and psychological treatment modality in the reduction of clinical pain.

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