

# Effect of induced relaxation on pain and anxiety in thoracotomized patients

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## Summary

Pain is practically unavoidable during the postoperative period. The control of pain by pharmacological means is not always easy to achieve because of the patient's physical conditions or the anxiety responses (muscular tension, irrational thoughts, fantasies, etc.) related to pain.

Besides reducing emotional stress, muscular relaxation is an aid to the pharmacological control of pain. The aims of this study were to explore whether learned muscular relaxation is helpful in the pharmacological treatment for diminishing the severity of postoperative pain, and to observe whether this pain is related to the anxiety and depressive symptoms present in patients.

Before the selected patients underwent surgery, the Hospital Anxiety and Depression Scale (HADS) was applied to them. After the surgery, pain was evaluated by means of an Analog Visual Scale (AVS), and the patients were assigned to one of two groups. The first group received muscular relaxation training (Shultz's technique), whereas the second received only the usual medical treatment. The evaluation of patients' lasted until they were discharged from the hospital. From 20 patients who entered the study ten of them received the experimental maneuver. There were no significant changes regarding either anxiety or depression. Initial scores on AVS were similar in the two groups, and they decreased in both groups over time. The experimental group showed that pain decreased after relaxation instruction, there was no correlation of pain with either anxiety or depression.

**Key words:** Pain, relaxation, thoracotomized patients.

## Resumen

El dolor es una experiencia prácticamente inevitable en el periodo postoperatorio. El control del dolor mediante medios farmacológicos no es tan fácil de alcanzar como se piensa,

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ya sea por las condiciones fisiológicas o psicológicas del paciente (tensión muscular, pensamientos irracionales, fantasías, etc.) relacionadas con el dolor.

Además de que la relajación muscular reduce el estrés emocional, es un coadyuvante en el manejo del control del dolor. Los objetivos de este estudio fueron explorar la relajación muscular aprendida es de ayuda en el tratamiento farmacológico del dolor y en la disminución de la severidad del dolor postoperatorio, así como observar si este dolor está relacionado con los síntomas de ansiedad y depresivos que presentan los pacientes.

Antes de que los pacientes fueran sometidos a cirugía se les aplicó la escala HAD. Después de la cirugía el dolor se evaluó mediante una escala análoga visual y se asignó a los pacientes a uno de dos grupos. El primer grupo recibió la relajación muscular en tanto que el segundo recibió el tratamiento médico habitual. La última evaluación se realizó antes de que el paciente fuera egresado del hospital. Menos de diez pacientes recibieron la maniobra experimental. No se presentaron diferencias significativas ni en las escalas de ansiedad ni en las de depresión. Las evaluaciones iniciales en la escala análoga visual fueron similares en ambos grupos y disminuyeron en los dos a lo largo del tiempo. El grupo experimental mostró que la severidad del dolor disminuyó después del entrenamiento en relajación pero no se observó ninguna correlación con significancia clínica entre el dolor, la ansiedad y la depresión.

**Palabras clave:** Dolor, relajación, pacientes toracotomizados.

## Introduction

Any surgery intervention, from a minor one as a tonsillectomy, to a major one as a thoracotomy, might provoke anxiety and, eventually, depression (from mild to severe) in any patient facing it. Patients might reflect this anxiety by means of constant complaints, but they might also present a rebellious behavior towards the therapeutic maneuvers performed by the medical staff.

Although it is evident that anxiety, or stress, constitutes an ordinary and almost unavoidable fact in life, every change requiring adaptation provokes stress. When it becomes rather severe or long lasting it elicits alarm signals that might reveal themselves through serious events, e.g. an important modification in physiological responses -immune response (20,22,23), endocrinology activation (2), cardiovascular functioning (11), phobias, obsessions, addictive behaviors, emergence

or exacerbation of psychosomatic diseases (1,23,28), and so on.

In this regard, psychology evaluates the development of the reactions elicited by alarm signals and identifies the different mechanism that might aid to reduce and control the physiological consequences of stress. In this context, relaxation constitutes a practical and rapid method in the handling of the stress phenomenon.

Since stress, or anxiety, is conserved in terms of the perception of threats, and expresses itself biologically by means of a general state of activation, the counterpart of this biological activation is relaxation (1,2,3,5,9,11,14,20,22,23,25,26).

In the practice of medicine, it has been observed that patients who must undergo a surgery intervention reflect their anxiety through foreshadowing fantasies about the outcome of the operation in terms of physical pain. Some studies (1,3,4,6,12,14,21-27) point at anesthesia as one of the main factors involved in the emergence of anxiety during the preoperative period, and at pain as the most frequently identified stressing factor throughout the preoperative phase.

Fear of pain is an expected response in most human beings, that is, it constitutes a universal experience. In 1990, Miller and Perry (21) reported that from 60 % to 80 % of the patients are given an insufficient treatment for the control of severe postoperative pain, and very few patients are really satisfied with the way in which their pain is handled.

Pain is a particular experience. Its severity and duration vary according to each individual's perception. It is necessary to take into account and to treat the anxiety response in benefit of both, patients and physicians. Since patients accept more easily all the therapeutic maneuvers and the efforts of the medical staff, are more likely to be effective (1,3,5,7,11,12,18,27,28,29,30).

Surgery is considered an important source of psychological stress (1,3,6,12,15,19,20), and it is a well known fact that individual responses to stress are mediated by psychological processes such as cognition, behavior and feelings. The psychological factors intensifying pain complaints include anxiety, conceived as the fear of having a sensation of loss of control and the subsequent subjective distress.

Daczman et al (8) carried out a study in which they evaluated the prevalence and functional significance of long-term postthoracotomy pain. They analyzed the data of 56 patients two months after the surgery and then three years later. They reported that the most frequent postthoracotomy pain is felt at the thoracic walls; usually, this pain is not severe but a few patients experience persistently a mildly incapacitating pain.

Several studies (1,3,5,11,13,16) evaluate the usefulness of relaxation techniques in decreasing postoperative anxiety and pain. Researchers agree in pointing out the benefits obtained for patients when anxiety is reduced by means of relaxation.

It has been generally observed that patients who are trained in reducing anxiety, and orientated in regard to confrontation tasks, during the preoperative period, express less pain, complain about fewer and less severe bodily discomforts, and experience less anxiety than patients who are not given this treatment. Apart from

these subjective reports, the trained patients require fewer analgesics during the immediate postoperative phase. Other authors have studied anxiety conditions as well as beliefs on severe and chronic pain (5,6,7,12,14,19,20,27).

Besides analgesics, the methods for relieving pain are: cutaneous stimulation, relaxation, cognitive distraction, imagery and hypnosis (3,5,6,13,15,18). Of all these methods, relaxation is the simplest, most rapid and easiest to adopt therapeutically by patients (1,3,14,15,18).

Relaxation is defined as a total response of the hypothalamus resulting in a generalized decrease in the activity of the sympathetic nervous system (11,12,14,25). The physiological changes associated to the relaxation response are: a decrease in blood pressure, as well as an increase in the elimination of carbon dioxide, along with a decrease in the respiration rate (14).

Relaxation might reduce pain severity because of the decrease in muscular tension and anxiety resulting from the physiological changes mentioned above. The various combinations of pain, muscular tension and emotional tension are known as the "pain-tension-anxiety" circle (5,6,15). Stress, pain, or both, provoke an activation of the autonomous nervous system that reflects itself by an increase in pulse frequency, respiration rate, muscular tension and other physiological changes. If the event producing pain is repeated, physically as well as through a reiterative mental process, the autonomous nervous system continues responding to the threat. Relaxation reduces pain because it reduces wariness. Relaxation aids suggestion and imagery, which are used for diminishing pain (3,5,6).

Thus, the relaxation techniques that relieve muscular and emotional tension might also reduce autonomous responses to pain, tension and anxiety. The studies in which anxiety, muscular tension and associated physiological responses are reduced, conclude that there is not a specific method to control pain and suggest further investigation on this respect. The objective of the present study was to evaluate the effect of relaxation (Shultz's technique, 14) and deep respiration on the anxiety and pain of surgery patients.

## Material and methods

First, patients were evaluated for operation by the Surgery Board at the National Institute of Respiratory Diseases (Instituto Nacional de Enfermedades Respiratorias), at Mexico City. Once accepted and programmed for an "open" lung biopsy or thoracotomy (in which the length of the surgery wound might go from 4 to 12 inches and the use of a water seal probe is required), they were randomly assigned to one of two groups. The experimental group received the usual medical treatment plus a training in autogenous relaxation (Schultz's Technique, 14), whereas the control group was only given the medical maneuver,

All the subjects met the criteria for inclusion: they were capable of reading and writing, they could follow direc-

tions and understand adequately the tools applied in the study. Patients ranged in age from 18 to 65 years old. Sex was not a criterion for inclusion,

Both Eysenck's Personality Questionnaire (EPQ, 10) and the Hospital Anxiety and Depression Scale (HADS, 28) were applied to all patients. Pain severity was evaluated by means of an Analog Visual Scale (AVS) before each dressing of the surgery wound and then ten minutes after the healing was performed.

Patients in the experimental group were trained in autogenous relaxation by a qualified female psychologist, who recommended them to practice it thrice a day throughout the preoperative period. Patients in the control group had only a few minutes of informal talk with the psychologist.

After the surgery had taken place, the psychologist attended the daily wound dressing and probe moving. During these maneuvers, patients usually reflect pain, anxiety and foreshadowing fear. The follow-up of patients lasted until they left the hospital (approximately 10 days after the surgery). At their last day at the hospital the patients were applied the HADS once more, in order to evaluate their mood and anxiety conditions.

As for the statistical analysis, the nature of each variable determined the use of the appropriate statistics: proportions, percentages, means and standard deviations. Signal or "t" tests were used for the multiple comparisons of ANOVA measures, according to needs.

## Results

Ten patients were included in each group: the mean age in the control group was  $36.8 \pm 9.2$  years, and  $44.4 \pm 12.9$  in the experimental one. Forty percent of the patients in both groups were females and 80 % were married. The kind of operation practiced in the largest number of patients in this study was lung biopsy: Forty percent of the patients in each group underwent it; 20 % underwent "E. Bless", and on the remaining patients other surgeries were practiced.

Personality traits, evaluated by the EPQ, were similar in both groups. Regarding the psychoticism scale, in which tendency values were judged and observed toward significance, as well as the tendency to disobey social rules, scores were:  $3.2 \pm 3.6$  the experimental group, and  $5.4 \pm 3.6$  in the control group. For the neurotics subscale, which reflects the tendency to feel anxiety, scores were:  $11.0 \pm 4.6$  for the experimental group and  $8.3 \pm 4.9$  for the control group.

Similarly, there were no differences in the extroversion subscale, which indicates the subject's tendency to require external stimulation for his well-being; here the scores were:  $20.2 \pm 7.0$  and  $23.6 \pm 6.9$ , indicating there were no differences in the tendency to behave according to social rules.

Contrary to expectations, the anxiety levels evaluated by HADS were similar before and after the surgery in both groups:  $9.3 \pm 2.3$  and  $7.2 \pm 2.5$  in the experimental group *versus*  $6.7 \pm 3.3$  and  $7.3 \pm 1.5$  in the control group. Similarly, the values for depressive symptoms were  $6.2 \pm 3.8$  at the beginning of the study and  $5.4 \pm 2.6$  at its end in the experimental group, whereas the values in

the control group were  $4.9 \pm 1.7$  and  $1.4 \pm 3.3$ , respectively.

Analyses of variance were performed for certain psychological variables: blood pressure, temperature, pulse and leukocyte total counts. These showed there were no important changes in patients before and after the surgery took place, and that both groups were similar ( $F < 1$ , for the treatment effect as well as for the repeated measures of all variables).

The effect of relaxation was observed in pain evaluations, specially in immediate postoperative pain. There was a significant decrease in pain scores in the experimental group:  $6.8 \pm 2.8$  *versus*  $3.7 \pm 2.0$  ( $p = 0.01$ ), whereas there was no reduction in the control group:  $6.7 \pm 3.3$  *versus*  $4.9 \pm 1.7$ . Nevertheless, this effect disappears over time. In the second evaluation of pain scores were:  $3.8 \pm 2.9$  *versus*  $1.7 \pm 1.7$  and  $4.0 \pm 3.3$  *versus*  $1.6 \pm 1.9$ .

## Discussion

The beneficial effect of autogenous relaxation training was observed in this study, which was carried out in a small number of patients. Usually, it is thought that studies with small groups provide little or no information at all. It is generally considered that their results could not be extrapolated to large populations of patients but, actually, it is in small groups where important differences can be found. Finding significant results in a small number of subjects brings forth stronger confidence in the clinical significance of the difference, than finding them in large groups, for in the latter, margin differences might be so high as to become significant.

One of the main difficulties for recruit a larger population was that most of the young physicians are scarcely willing to cooperate in the investigation by controlling the variables because, being at an intensive period in their training, they prefer to concentrate in the technical aspects of the procedures of healing. Another difficulty was the need to exclude from the protocol all those patients presenting added complications; for example, an infection resulting from a previously existing disease, as diabetes. Other patients had to be excluded from the protocol when the physicians identified in them severe anxiety and asked the psychologist for a more profound psychotherapeutic action.

Results indicate that relaxation is most effective in the severest conditions: it is during the immediate postoperative period when the effect of this maneuver is most clearly observed. That is, relaxation is useful when the patient requires it; afterwards, the body seems to learn by himself a mechanism for decreasing pain. This is suggested by the fact that when pain was evaluated for a second time it had decreased to such an extent that it was unachievable to find difference.

It is important to notice the little effect of relaxation on anxiety levels for, according to literature, this technique is useful in the handling of this syndrome. Perhaps the fact that patients remained at the hospital, waiting for a conclusive diagnosis, was an important factor. Nevertheless, it is also known that at a cognitive level, a change in the perception of anxiety requires psy-

chotherapeutic actions. For instance, a cognitive restructuring in which the patient is told, within realistic parameters, in a clear and simple way at the appropriate time, about all the aspects involved in a thoracotomy might be more effective than the sole use of relaxation of any kind. Some actions performed to make patients get well might reduce their sense of being defenseless by perceiving personal control as an important means to face stress.

Other studies suggest the existence of a close relation between anxiety levels and pain severity. It was not the case of this study since the correlation between HADS scores and the severity of pain was rather low ( $r = 0.23$ ,  $p = n.s.$ ). There was neither an important relation between depression and pain ( $r = 0.12$ ,  $p = n.s.$ ). Discrepancy with the results reported in other studies might be due to the particular characteristics of the

studied population: it was young, it experienced severe pain and the disease it presented had not evolved for a long time (as mentioned above, most patients underwent lung biopsy).

Difficulties in the understanding of Mc Gill's questionnaire for the measurement of pain qualities were also observed during this study. This confirmed that this tool is not adequate for the studied population, as Lara et al, had found when studying cancer patients (personal communication, 1992).

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