

# The Use of Auricular Acupuncture to Reduce Preoperative Anxiety

Shu-Ming Wang, MD\*, Carol Peloquin, MD\*, and Zeev N. Kain, MD\*†‡

Departments of \*Anesthesiology, †Pediatrics, and ‡Child Psychiatry, Yale University School of Medicine and Yale-New Haven Hospital, New Haven, Connecticut

**B**oth pharmacologic interventions and psychological preparation programs are often used to treat preoperative anxiety (1,2). These interventions, however, can be time consuming, cause undesirable side effects, and increase health care costs, or a combination of these. Thus, the search for the low-cost intervention continues. Ear acupuncture, a microacupuncture technique similar to reflexology, was first described in French and Chinese medicine in 1950 (3,4). It was speculated that the technique worked because groups of pluripotent cells contain information from the whole organism and create regional organization centers representing different parts of the body (4). Thus, one can stimulate a reflex point and relieve symptoms of distant pathology.

Previously, we demonstrated that ear acupuncture at the relaxation point significantly decreased daily situational anxiety, i.e., transitory feelings of apprehension, tension, and worry related to work and daily living in a group of healthy volunteers (5). Because daily situational anxiety probably differs from preoperative anxiety, we designed this follow-up study to determine the effects of ear acupuncture on preoperative anxiety.

## Methods

Participants in this randomized, blinded, controlled trial were 91 elective ambulatory surgery patients (ages 19–66 yr) with ASA I and II physical status, no history of psychiatric illness, and no prior acupuncture experience. Participants were scheduled for both

anticipated benign diseases as well as potential malignant diseases. Patients taking anxiolytic herbs (e.g., kava kava) or psychotropic medications were excluded. Sedative premedication was not offered to participants of this study. The Yale University IRB approved the protocol.

Participants were randomized to three intervention groups.

1. Traditional Chinese Medicine group (TCM): this group received ear acupuncture based on the traditional Chinese theory that the kidney is related to fear, the heart is related to anxiety, and the shenmen point will tranquilize the mind (4,6). The kidney point is located at the superior concha, the heart point is at the most central area of the inferior concha, and the shenmen point is at the inferior lateral wall of the triangular fossa (Fig. 1).
2. Relaxation group: this group received ear acupuncture by using the relaxation (4,5), tranquilizer, and master cerebral points, which are documented to produce relaxation, general sedation, and anxiety diminishment, respectively (4,6). The relaxation point is located at the superior lateral wall of the triangular fossa, the tranquilizer point is at the inferior tragus, and the master cerebral point is at the joint of ear lobe and face (Fig. 1).
3. Control group: this group received ear acupuncture needles at three points that have no documented effect on anxiety (Fig. 1).

Upon recruitment, participants completed a demographic questionnaire and a baseline State-Trait Anxiety Inventory (STAI) (7). The STAI is a self-report instrument that contains two 20-item subscales measuring trait anxiety, which is described as relatively stable individual differences in the tendency to experience anxiety, and state anxiety (STAI-S), which is described as situational or transitory feelings of apprehension, tension, and worry. The higher the score, the more anxious the subject is. Ear acupuncture was performed by the first author (S-MW), who is a trained,

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Address correspondence and reprint requests to Shu-Ming Wang, MD, Department of Anesthesiology, Yale University School of Medicine, PO Box 208051, 333 Cedar St., New Haven, CT 06521. Address e-mail to shu-ming.wang@yale.edu. **IMPLICATIONS:** Ear acupuncture can decrease preoperative anxiety in adults undergoing outpatient surgery.

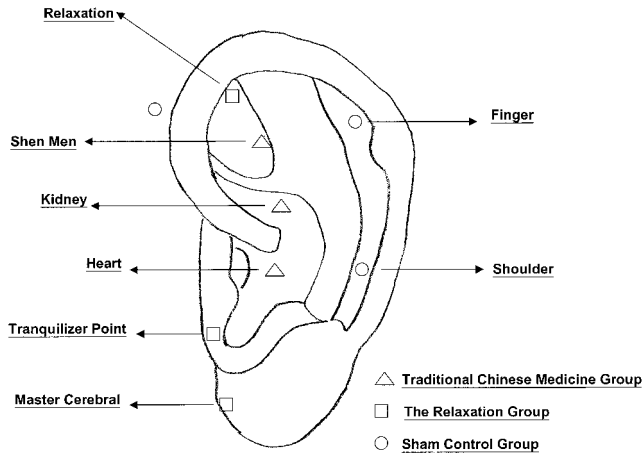


Figure 1. The anatomic locations of the various intervention points.

licensed acupuncturist, with occlusive press needles (Pyonex-small; Seirin, Japan). All participants received three ear acupuncture press needles at the nondominant side (the opposite side of the patient's dominant hand) of their external ear for 30 min without any stimulation. The participants stayed in the holding area during this time, and their activities were not restricted. Regular preoperative procedures were not altered, nor was sedative medication administered to any of the subjects. STAI (state) was reassessed 30 min after the intervention. The press needles were then removed.

Sample size was calculated *a priori* on the basis of our previous study (5). Considering a repeated measures design, a 20% effect of intervention, an  $\alpha$  of 0.05, and power of 85%, 27 patients were needed in each of the three study groups. Data were analyzed by using SPSS version 10 (SPSS Inc., Chicago, IL). Normally distributed data are presented as mean  $\pm$  SD. A two-way analysis of variance (ANOVA) with repeated measures was used to analyze the changes in anxiety (STAI). A one-way ANOVA with the Scheffé test for multiple comparisons was used to localize differences between intervention groups. Comparisons were considered significant if  $P < 0.05$ .

## Results

Ninety-one patients scheduled for elective ambulatory surgical procedures were recruited for this study. Groups were demographically similar and showed no significant differences in type of surgical procedure or baseline trait anxiety (Table 1).

A two-way repeated-measures ANOVA demonstrated a significant group difference ( $F_{2,88} = 4.5$ ,  $P = 0.014$ ), a group  $\times$  time interaction ( $F_{2,88} = 3.5$ ,  $P = 0.02$ ), and a time difference ( $F_{1,88} = 8.2$ ,  $P = 0.001$ ) in anxiety

Table 1. Baseline Characteristics and Demographic Data

Variable	Group 1 (n = 31)	Group 2 (n = 32)	Group 3 (n = 27)
Age (yr)			
Mean $\pm$ SD	38 $\pm$ 12	41 $\pm$ 12	39 $\pm$ 14
Range	(20-66)	(19-65)	(19-62)
Sex			
M/F (%)	29/71	16/84	36/64
Education (yr)			
Mean $\pm$ SD	15 $\pm$ 3	16 $\pm$ 3	15 $\pm$ 3
Smoking (%)			
Yes	9	6	17
Caffeine (%)			
Yes	77	93	82
Alcohol (%)			
Yes	59	63	57
ASA status (%)			
I	50	40	52
II	50	60	48
Attitude (%) <sup>a</sup>			
Yes	72	70	67
No	9	12	10
Undecided	19	18	23
Trait anxiety			
Mean $\pm$ SD	41 $\pm$ 9	38 $\pm$ 8	40 $\pm$ 8
State anxiety (baseline)			
Mean $\pm$ SD	47 $\pm$ 11	46 $\pm$ 12	45 $\pm$ 13
Type of surgery (%)			
Ortho <sup>b</sup>	20	38	44
GYN/GU <sup>c</sup>	33	22	30
ENT <sup>d</sup>	23	25	15
Other <sup>e</sup>	24	15	11

<sup>a</sup> P was not significant for any variable.

<sup>b</sup> Believers in alternative medicine.

<sup>c</sup> Orthopedic procedures.

<sup>d</sup> Gynecologic and genitourinary procedures.

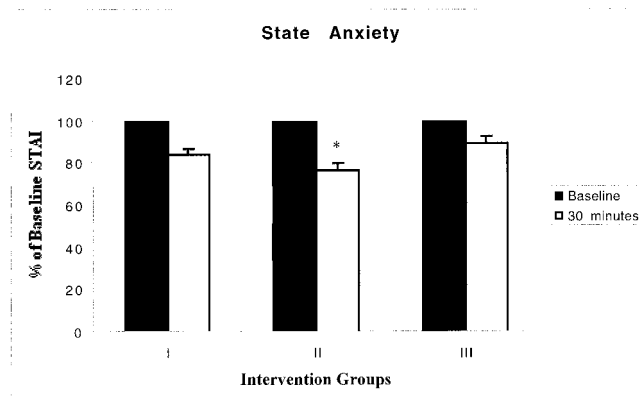
<sup>e</sup> Otolaryngologic procedures.

<sup>f</sup> Plastic, general, and ophthalmologic procedures.

levels among the three study groups. *Post hoc* analysis with one-way ANOVA demonstrated no difference in STAI scores among the groups before intervention (47  $\pm$  11 versus 46  $\pm$  12 versus 45  $\pm$  13,  $P =$  not significant). After the intervention, however, there were significant differences among the three groups (38  $\pm$  9 versus 35  $\pm$  8 versus 40  $\pm$  14,  $P = 0.014$ ). The Scheffé test for multiple comparisons has demonstrated that patients in the Relaxation group were significantly less anxious compared with patients in the Control group ( $P = 0.01$ ) (Fig. 2). The anxiety of patients in the TCM group, however, did not differ significantly from that of those in the Control group ( $P = 0.28$ ) or in the Relaxation group ( $P = 0.37$ ) (Fig. 2).

## Discussion

Patients who received ear acupuncture with relaxation points reported significantly lower levels of anxiety after the intervention as compared with the Control group. The anxiolytic effects of ear acupuncture for



**Figure 2.** Changes in anxiety level as assessed by the STAI (State Trait Anxiety Inventory). A significant group difference ( $F_{2,88}=4.5$ ,  $P=0.014$ ), a group  $\times$  time interaction ( $F_{2,88}=3.5$ ,  $P=0.02$ ), and a time difference ( $F_{1,88}=8.2$ ,  $P=0.001$ ) were observed among the three study groups. Please see text for details. I = Traditional Chinese Medicine group; II = Relaxation group; III = Control group.

patients receiving the TCM intervention were not as profound as those of the relaxation intervention. This may be because, according to traditional Chinese theory, the selection of acupuncture points is not fixed, as it was for the TCM group in this study, and should vary for each individual according to particular body constitution.

There are no data available regarding the exact mechanism of ear acupuncture. Several studies involving body acupuncture suggest, however, that the release of neurotransmitters such as serotonin may affect the emotional well-being of humans (8-11). It is speculated that ear acupuncture may have similar mechanisms.

Several methodologic issues involving this investigation have to be addressed. First, in this study we did not use objective physiologic outcome measures, such as arterial blood pressure and heart rate. These measures were not used because they were demonstrated in a previous investigation to be unaffected by acupuncture (5). Second, a large percentage (70%) of our subject population indicated that they believe in alternative medicine. As can be seen from Table 1, however, the three intervention groups did not differ in

this respect. Thus, this large percentage should not have any effect on the validity of the results of this study.

In conclusion, we demonstrated that ear acupuncture decreases preoperative anxiety in patients undergoing elective ambulatory procedures. Ear acupuncture is easy to administer (less than one minute), is relatively inexpensive, and has minimal adverse effects (5). In addition, all participants were able to perform their regular activities without restrictions in the preoperative holding area. Thus, this intervention may be used for patients who are anxious but reluctant to accept a pharmacologic intervention. Future studies are indicated to determine exact mechanisms of action and to expand the use of ear acupuncture in different perioperative settings.

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