The Effect of Acupressure at the Extra 1 Point on Subjective and Autonomic Responses to Needle Insertion

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BACKGROUND: Premedication with sedatives can decrease the discomfort associated with invasive anesthetic procedures. Some researchers have shown that acupressure on the acupuncture extra 1 point is effective for sedation. We investigated whether acupressure on the extra 1 point could alleviate the pain of needle insertion.

METHODS: We investigated the effect of acupressure at the extra 1 point or a sham point on needle insertion using verbal rating scale (VRS) pain scores and heart rate variability (HRV). Twenty-two healthy female volunteers were randomly allocated to two groups: the extra 1 group received acupressure at the extra 1 point, and the sham group received acupressure at a sham point. After starting the electrocardiogram record, a 27-gauge needle was inserted into the skin of a forearm. Thereafter, another needle was inserted into the skin of the other forearm during acupressure.

RESULTS: Acupressure at the extra 1 point significantly reduced the VRS, but acupressure at the sham increased the VRS. Acupressure at the extra 1 significantly reduced the low frequency/high frequency ratio of HRV responding to needle insertion.

CONCLUSIONS: Acupressure at the extra 1 point significantly reduced needle insertion pain compared with acupressure at the sham point. Also, acupressure at the extra 1 point significantly reduced the low frequency/high frequency ratio of HRV responding to needle insertion, which implies a reduction in sympathetic nervous system activity.

(Anesth Analg 2008;107:661–4)
METHODS

After receiving ethics committee approval from Aichi Medical University and written informed consent, 22 healthy female volunteers were recruited in this prospective, blinded, randomized, controlled trial. Individuals were not familiar with acupuncture or related techniques. Exclusion criteria were concomitant sedative or analgesic medication, chronic pain syndrome, neurological disease, or a skin lesion at the site of a needle puncture.

The volunteers were randomly allocated to two groups: the extra 1 group received acupressure at the extra 1 point; and the sham group received acupressure at a sham point. All measurements were performed during afternoon hours. Each volunteer was lying comfortably in a bed in a quiet environment. The extra 1 acupressure point, Yintang point, is located midway between the medial ends of the eyebrows at the root of the nose and the sham point is located 2 cm lateral and horizontal from the lateral end of the left eyebrow7–9 (Fig. 1). After arrival in the quiet environment, the volunteers were allowed to relax for 10 min. During the period, 27-gauge needles were marked to a length of 3 mm under sterile condition.3 Thereafter, the record of the electrocardiogram (ECG) signals started. Five minutes later, one of the needles was inserted vertically into the skin of a forearm 3 mm and was kept there for 30 s. For the verbal rating scale (VRS), the volunteer was asked to verbally rate her level of perceived needle pain intensity on a numerical scale from 0 to 10 (0 = no pain, 10 = worst pain imaginable). Acupressure was then started by the pulp of the right thumb in a rotary fashion at 20–25 cycles per minute.7–9 Three minutes later, one of the needles was inserted vertically into the skin of the other forearm 3 mm and kept for 30 s, and acupressure was discontinued. The pain was rated using the VRS.

During these measurements, ECG electrodes were attached for HRV analysis for an assessment of the autonomic responses, and the ECG signals were obtained from a conventional anesthesia monitor (Hewlett Packard, Model 66s). The data were transferred to an online computer loaded with HRV analysis software (TARAWA/WIN; Suwa Trust, Tokyo, Japan). For real-time analysis, the RR intervals were obtained with the accuracy of 1 ms and analyzed with the “MemCalc” computer program.14 The two series of power of the RR intervals (ms2), LF (0.04–0.15 Hz), and HF (0.15–0.5 Hz), were calculated. HR and the LF and HF values and LF/HF ratios of HRV were recorded.

A pilot study using 10 volunteers showed the mean (sd) of VRS to needle insertion before and during acupressure to be 2.8 (1.3) and 2.1 (0.8) in the extra 1 group, and 3.1 (0.9) and 4.5 (1.4) in the sham group, respectively. Thus, the sample size of 10 was needed for each group to show a difference of 1.0 (1.0) within the group (before and after acupressure) and 2.0 (1.0) between the groups, respectively, with a significance level of 0.05 (α = 0.05) and a power of 80% (β = 0.20). Data are presented as median (range or interquartile range). Data were analyzed using Wilcoxon’s signed-ranks test, Mann–Whitney test, or Friedman test where appropriate. After Friedman test for repeated-measure analysis, post hoc multiple comparison tests were performed with Student–Newman–Keuls method. A P value <0.05 was considered statistically significant.

RESULTS

There were no significant differences in the median (range) of age, height, and weight between the two groups (Table 1). Acupressure at the extra 1 point significantly reduced the VRS for needle insertion pain, whereas acupressure at the sham point significantly increased the VRS (Fig. 2). Needle insertion significantly increased the LF/HF ratio of HRV in the extra 1 group (Fig. 3). Acupressure at the extra 1 point significantly decreased the LF/HF ratio, and acupressure at the extra 1 point significantly reduced the LF/HF ratio of HRV responding to needle insertion in line with the decrease of the VRS (Fig. 3). In contrast, acupressure at the sham point induced no change in the LF/HF ratio of HRV responding to needle puncture (Fig. 3).

DISCUSSION

This study showed that acupressure at the extra 1 point significantly reduced the VRS to needle insertion, whereas acupressure at the sham point significantly increased the VRS. Acupressure at the extra 1 point significantly reduced the VRS for needle insertion pain, whereas acupressure at the sham point significantly increased the VRS. Acupressure at the extra 1 point significantly reduced the VRS for needle insertion pain, whereas acupressure at the sham point significantly increased the VRS.
point significantly reduced the LF/HF ratio of HRV responding to needle insertion.

Acupuncture and related techniques have been used for treatment of acute and chronic pain and the control of postoperative nausea and vomiting.9,15–18 Several researchers investigated the effect of acupressure at the extra 1 point on sedation and/or electroencephalogram and some of them showed that acupressure at the point is effective for sedation.7–9 In the present study, acupressure at the extra 1 point reduced pain to needle puncture compared with acupressure at a sham point. Also, acupressure at the extra 1 point significantly reduced the LF/HF ratio of HRV responding to needle insertion. Thus, we believe that the sedating effect of acupressure at the extra 1 point alleviates pain to needle insertion and suppresses the sympathetic nervous system.

As there are several acupuncture points near the area we chose to be the sham point, acupressure at the sham point might have induced an unidentified effect in the present study. However, several researchers compared the effect of acupressure at the extra 1 point with that at the sham point7–9 similar to our study. Thus, we used the point in the present study. Since electroacupuncture at acupuncture points influences the autonomic nervous system,19,20 acupressure at the sham point might have influenced HRV in the present study. Therefore, further study is required using different acupuncture points.

In conclusion, although acupressure at the extra 1 point significantly reduced the VRS for needle puncture, acupressure at the sham point significantly increased the VRS. Acupressure at the extra 1 point significantly reduced the LF/HF ratio of HRV responding to needle puncture in line with the decrease of the VRS.

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