

## Ear acupuncture in unilateral migraine pain

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**Abstract** The needle contact test (NCT) is a diagnostic technique useful to identify, through the contact of the needle on the skin of the ear, the most efficacious points for reducing pain during a migraine attack. The aim of this study was to identify the most important auricular zones for pain control by applying the NCT in a group of 15 women during a unilateral attack of migraine without aura. We also assessed how effective the insertion of a semi-permanent needle in these zones was in reducing the migraine pain during the next 24 h. The most effective tender points in pain control were located on the antero-internal part of the antitragus, the anterior part of the lobe and the upper auricular concha ipsilateral to the side of pain. The insertion of a semi-permanent needle in these zones allowed stable control of the migraine pain, which occurred within 30 min and persisted at the same levels 24 h later (ANOVA for repeated measures:  $p < 0.01$ ). Pain was tested by using a visual analogue scale; the values recorded were the following:  $7.6 \pm 1.6$  at baseline and  $4.3 \pm 1.7$ ;  $4.1 \pm 1.9$ ;  $3.9 \pm 1.8$ ;  $3.4 \pm 1.8$ ;  $2.3 \pm 1.6$  after, respectively, 15, 30, 60, 120 min and 24 h.

**Keywords** Ear acupuncture · Migraine ·  
Needle contact test

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### Introduction

Ear acupuncture is often used in pain control [1]. It was recently demonstrated that a new diagnostic technique called the needle contact test (NCT) could be useful to identify, through the simple contact of the needle on the skin of the ear, the most efficacious points for reducing pain during a migraine attack [2].

In a group of patients with migraine attack in progress, Romoli [1] demonstrated that when the NCT is performed on specific auricular points for 10 s, it can significantly reduce the intensity of the migraine pain at 1 and 5 min after being performed, and that the result remains stable even 15 and 30 min after NCT.

The aim of this work was to identify the most important auricular zones for pain control by applying the NCT in a group of patients with migraine attack in progress; and following the insertion of a semi-permanent needle (ASP SEDATELEC, France) in these zones, to assess any changes in the migraine pain during the next 24 h.

### Materials and methods

Fifteen women (mean age 41.8, range 25–56,  $DS \pm 7.74$ ) suffering from migraine without aura, diagnosed according to the International Headache Society criteria [3], admitted for observation at the Women's Headache Center of Turin University, were tested during a migraine attack. The patients selected for the study must not have taken any analgesics to control the migraine pain, the attack had to have started no more than 4 h before the treatment, and it had to be exclusively unilateral.

Migraine intensity was measured by means of a visual analogue scale (VAS) before applying NCT ( $T_0$ ). A specific

algometer exerting a maximum pressure of 250 g (SEDATELEC, France) was chosen for identifying the tender points of the ear with the pain–pressure test (PPT): this procedure has been previously described [2]. The points identified by the algometer as being tender were marked on the ear with a felt-tip pen and simultaneously recorded on a paper map of the ear. Subsequently, every tender point was tested with NCT (an acupuncture needle having a diameter of 0.30 mm, placed in contact with the skin without penetrating it) for 10 s on the auricle which was ipsilateral to the side of pain. After 1 min, if the test was positive and the reduction was at least 25% in respect to the initial pain, a semi-permanent needle (ASP SEDATELEC, France) was inserted. In contrary, if, after 1 min pain did not reduce, a further tender point was challenged in the same area and so on. When a number of needles sufficient to constrain the attack had been inserted, the patient was invited to score the intensity of pain with a Visual Analogue Scale (VAS) at the following intervals: after 15 min ( $T_1$ ); after 30 ( $T_2$ ); after 60 ( $T_3$ ); after 120 min ( $T_4$ ); after 24 h ( $T_5$ ).

The average values of VAS were calculated at different times of the study and differences between the values obtained were compared by using an ANOVA for repeated measures.

## Results

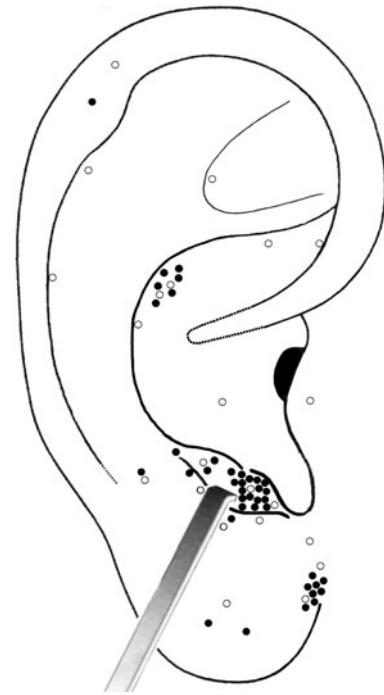
The PPT detected 62 sensitive auricular points in the 15 patients (4.1 points per patient on average). Of these, 64.5% (40 points, an average of 2.6 per patient) proved to be effective on the pain after NCT. The majority of these points (24/40, 60%) were effective very rapidly (within 1 min), while the remaining points produced a slower antalgic response, from between 2 and 5 min.

The values recorded with the VAS were the following:  $7.6 \pm 1.6$  ( $T_0$ ),  $4.3 \pm 1.7$  ( $T_1$ ),  $4.1 \pm 1.9$  ( $T_2$ ),  $3.9 \pm 1.8$  ( $T_3$ ),  $3.4 \pm 1.8$  ( $T_4$ ),  $2.3 \pm 1.6$  ( $T_5$ ); they decreased significantly ( $p < 0.01$ ) over time.

The sites most active in controlling the migraine pain were, in order of frequency of points detected, the antero-internal part of the antitragus, the anterior part of the lobe and the upper concha (Fig. 1). The insertion of a semi-permanent needle in these zones allowed stable control of the migraine pain, which occurred within 30 min and persisted at the same levels 24 h later.

## Discussion

If we admit the existence of a somatotopic representation of the human body on the auricle and the specificity of the location of the auricular points, as affirmed by the



**Fig. 1** Points effective on the pain after the NCT (black dots) and tender points not effective on the pain (circles) identified in the 15 patients with migraine attack

discoverer of auricular therapy, Nogier [4], we must hold that the areas we have identified are the representation of structures of the nervous system involved in the migraine attack.

Auricular therapy being a relatively recent discovery, we are not yet able to provide a better description of the significance of these zones in terms of neurophysiology. Nevertheless, some hypotheses are possible. The French school holds that the principal zone inside the antitragus relates to the thalamus, while for the Chinese school it is the “sub cortex” zone (AT4 *pizhixia*, according to the standardization of nomenclature and location of auricular zones of 1993) [5]. The Chinese authors maintain that one of the primary clinical uses of this zone regards the control of any kind of pain. The second zone, on the anterior part of the lobe, seems to have a psychic connotation since it has been correlated with depression by the Chinese school. However, it is also correlated with facial pain, in particular of dental origin. Romoli was also able to establish the therapeutic usefulness of this zone in chronic migraine, when the pain tends to shift from one side to the other [1]. Furthermore, Nogier had identified a “Master Point” for headaches in this zone [4]. As regards the upper concha, innervated by the parasympathetic system, Nogier identified in the representation of the liver a zone useful in the treatment of migraine. The Chinese authors, who instead have located the representation of the “pancreas-

gallbladder” (CO11 *yidan*) in this zone on their auricular maps, have also attributed to this area of the ear the specific indication for the treatment of migraine.

### Conclusion

This preliminary study highlights the usefulness of the NCT in identifying the most effective points during migraine attack. In fact, the points highlighted with the test proved rapidly effective in controlling the ipsilateral pain at the treated ear.

Although the neurophysiological significance of the identified zones has not yet been clarified, we can say that they probably have a somatotopic specificity that could be used advantageously in the treatment of acute migraine attack.

**Conflict of interest statement** The authors declare that they have no conflict of interest related to the publication of this article.

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