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CASE REPORT

A Case Report on the Effect of Sham Acupuncture

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Abstract
When nausea, an extremely unpleasant symptom, is experienced during dental treatment, it generates disorders and obstacles for both the patient and the professional, compromising the good quality of dental care. Clinical studies have confirmed the antiemetic action of acupuncture and shown its use for the treatment of nausea and vomiting. In the scientific literature there are several recent studies that address the placebo effect of acupuncture. The aim of this manuscript is to present a case report of a 46-year-old Caucasian male patient, who had severe symptoms of nausea while undergoing dental care. Treatment with sham acupuncture (acupuncture simulation) obtained a positive result of nausea prevention. We will discuss three possible hypotheses concerning this result: (1) there was action of Deqi; (2) high expectations of the patient; and (3) association with specific learned response. The patient in this case report received nonpenetrating sham acupuncture at acupoint Neiguan (PC6), which resulted in the complete remission of nausea during an intra-oral impression-taking procedure, but it is unclear whether the placebo effect was triggered by the action of Deqi, the high expectations of the patient, an association with a learned response, or by the interaction of all these factors.

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1. Introduction

When nausea, an extremely unpleasant symptom, is experienced during dental treatment, it can hinder or even prevent the necessary dental procedures from being performed. This especially applies when intra-oral impressions are being taken, as this is capable of inducing vomiting. This clinical situation generates disorders and obstacles for both the patient and the professional, jeopardizing the quality of dental care.

The trigger factors for nausea may be of local, systemic, anatomical, psychological, and iatrogenic origin [1]. Thus, the etiology of nausea is considered to be multifactorial.

According to Western medicine, nausea is the conscious recognition of excitation of a brain area that is associated with the vomiting (emesis) center [2]. Nausea is defined as a "stimulated, protective, reflex response to prevent material from entering the mouth or oropharynx. Gagging stimuli can be physical, auditory, visual, olfactory, or psychologically mediated and the muscular contractions caused may result in vomiting" [3]. According to traditional Chinese medicine, nausea and vomiting are explained as an upward Qi (energy) of the stomach in rebellion and the PC6 acupuncture point has the effect of redirecting the Qi counterflow [4].

The antiemetic action of acupuncture has been confirmed in clinical studies that have shown its use in the treatment of nausea and vomiting in postoperative chemotherapy and pregnancy [5–7].

Acupuncture is defined as the insertion of needles into specific body parts (acupoints) for prevention, therapy, or maintenance of health [8]. The acupuncture theory is based on the existence of patterns of energy flow (Qi) through the body that are essential for health; and imbalances in the flow of this energy are responsible for diseases [5].

A clinical study has shown that acupuncture with actual penetration into the skin was more effective in treating pain than a similar treatment using a placebo needle at the same point [9]. This suggests that the actual penetration of the needle is an important component of acupuncture treatment [10].

In the scientific literature there are several recent studies that address the placebo effect in acupuncture [11–13]. Placebo effects are the responses obtained in clinical trials, when some substances or procedures that are designed to serve only as control conditions in the study, produce some effect on the results. These indirect effects produced by biologically inert substances or by inactive procedures are considered within the term "placebo effect" [14].

The aim of this manuscript is to present a case report of a patient with the symptom of nausea during dental care, who was treated with sham acupuncture (acupuncture simulation) and obtained a positive result.

2. Case Report

This article describes the case of a patient, a 46-year-old Caucasian man, who had a severe symptom of nausea while undergoing dental care. This patient participated in a larger, double blind clinical study with 33 volunteers, divided into two groups (test and control), to evaluate the control of nausea by acupuncture. The study was conducted at the Piracicaba Dental School, State University of Campinas (Unicamp), in Piracicaba, São Paulo, Brazil.

The inclusion criteria were as follows: volunteer patients, adults of both sexes, aged 18–85 years, who reported previous unpleasant nausea during dental procedures, hindering or preventing the dental treatment from being carried out properly. The exclusion criteria were: pregnant patients and patients who had been taking antiemetic drugs or medications that could produce nausea. The test group ($n = 17$) was treated with real acupuncture at acupoint Neiguan (PC6), using an acupuncture needle size 30 mm $\times$ 0.25 mm, (Qizhou Brand, Wujiang City Shenli Medical & Health Material Co. Ltd, Wujiang, Suzhou, Jiangsu, China). The control group ($n = 16$) were treated with sham nonpenetrating acupuncture (noninvasive) at the same acupoint, using the Streitberger sham needle (Asia-Med brand, asia-med GmbH & Co. KG, Pullach, Germany), measuring 0.30 mm $\times$ 30 mm. This needle is retractable and has a blunt tip, therefore, it does not penetrate the skin; however, when it touches the skin, the patient feels a stinging sensation [15]. A circular intermediate device (ring), 1 cm in diameter, made of resin, was used to fix the sham needle in the acupuncture point and this device was also used in the real acupuncture group. This device was attached to the skin by means of hypoallergenic microporous adhesive tape, 0.12 cm wide, (Nexcare; 3M, Sumaré, Sao Paulo, Brazil). When the sham needle is inserted through the micropore it touches the skin but does not penetrate. In both groups, the needles were inserted by the same experienced acupuncturist. To evaluate the degree of nausea, two maxillary impressions were taken (the first was taken before acupuncture and the second after acupuncture) and in both groups, nausea was assessed by the researcher. Neither the researcher nor the patient knew to which group the patient belonged. To ensure this, once the needles were inserted the patient was covered with a disposable blue sheet and remained covered until they were discharged. Nausea was evaluated by the researcher after the first impression was taken (without acupuncture) and after the second impression (with acupuncture). Nausea was evaluated using the gagging severity index (GSI) and gagging prevention index (GPI), indexes proposed in the study by Fiske and Dickinson [16]. The GSI was used in the first impression (without acupuncture) to assess the degree of nausea severity, which ranged from I (mild nausea and controlled by the patient) to V (very severe nausea, impossible to perform the treatment). The GPI was used in the second impression (after real or sham acupuncture) to evaluate the degree of nausea prevention, i.e., the effectiveness of the treatment. This scale ranged from I (reflex controlled, successful treatment) to V (severe nausea reflex, being unable to perform any treatment). The volunteers' expectation of nausea reduction through acupuncture was also evaluated using a 5-point Likert scale with the following options: no, I do not think so, maybe, I think so, yes. For more details, see the 2014 article by Zotelli et al [17].

In this study, acupuncture with real needle insertion was shown to be more effective than sham acupuncture in controlling nausea. However, one particular positive

outcome of a patient from the sham acupuncture group was highlighted. This patient reported symptoms of nausea in almost all the dental procedures to which he had previously been submitted in his life. He said he had felt nausea for over 35 years. He also stated that prior to this study he had been submitted to an acupuncture treatment during a dental cleaning procedure and had a very positive result. Due to this previous experience, he believed acupuncture would also effectively control his nausea problem when impressions were taken. Thus, the patient had highly positive expectations regarding the treatment.

When the first impression was taken (without acupuncture), the patient had a maximum degree of nausea severity (GSI = 5), which completely hindered the procedure. However, when the second impression was taken (after sham acupuncture), he had a maximum degree of nausea prevention (GPI = I), with full control of the nausea, which allowed the impression-taking procedure to be performed without any difficulty.

When he was asked whether he had felt any sensation at the site of needle insertion, the patient reported he felt "a small electric shock, a slight tingling sensation, and had no adverse effect."

When the data was collected and the results were being tabulated, to our surprise, we observed that in the random draw, this patient had been allocated to the control group, in which there was only a simulation of acupuncture without needle penetration, thus, this result was unexpected. Therefore, we consider that it was a placebo effect of acupuncture.

3. Discussion

According to scientific literature, there are some hypotheses to try to explain the placebo effect that occurred: that is to say, full control of nausea during intra-oral impression taking, despite the fact that the above-mentioned patient underwent a pseudo-needling. We will discuss the three possible hypotheses: (1) there was action of Deqi; (2) high expectations of the patient; and (3) association with specific learned response.

The first hypothesis would be explained by Deqi which is described as a specific sensation that presents itself as soreness, numbness, warmth, heaviness, or distention around the area where a needle is inserted. It can be radiated along the path of the meridian to which the acupuncture point belongs [18]. Moreover, it may also present itself as the feeling of a mild electric shock [19]. Most acupuncturists consider the phenomenon of Deqi to be crucial to achieve the effectiveness of acupuncture [18]. From the perspective of neurophysiology, the complex pattern of Deqi sensations suggests involvement of a wide spectrum of myelinated and unmyelinated nerve fibers, particularly the slower conducting fibers in tendinomuscular layers [20]. Thus, because Deqi is generated by stimulation of the nervous system, it can be said that the noninvasive needles produce a minimum Deqi effect because they do not penetrate the skin and therefore cause minimal activation of neural receptors [21]. In our study, Deqi with the placebo needle may have been caused by the pressure of the circular resin device and fixing adhesive, psychological influences, or by pressure on the pain receptors in the skin [15]. Note that in the same control group, another patient also complained of a tingling sensation but showed no improvement in the symptom of nausea. Thus, in our view, it is not clear that the Deqi effect was responsible for the improvement in nausea of the highlighted patient.

The second hypothesis is explained by the influence of the patient's high expectations in relation to the action of acupuncture, which may have affected the outcome because although the patient believed he had received real acupuncture, he did not actually know which group he was in. Some research findings support the essential role of beliefs and expectations regarding the effectiveness of acupuncture. One study found that the effectiveness of acupuncture was significantly associated with the highest expectations [22]. However, in our main study [17], the Spearman correlation test was applied and there was no correlation between the expectations of patients and the control of nausea in either of the two groups. In addition, it is worth noting that in our main study, some patients who had also reported high expectations regarding treatment had no significant improvement in nausea. Therefore, from our point of view, it is unclear whether high expectations were or were not a decisive factor in the outcome.

The third hypothesis is based on the association with positive memories previously experienced by the patient. According to the literature, past negative experiences or beliefs learned by the patient himself, or heard about from a friend or relative are also factors that increase the possibility of occurrence of nausea [23]. Based on this concept, taking the opposite direction (i.e., the association with a previous positive experience), could elicit a placebo effect to control nausea. The central nervous system is the primary site and mediator of the physiological basis of placebo effects, through its role in learning and memory, its effects on sensory, motor, and autonomic pathways, and its effects on the immune and endocrine systems. There are individual characteristics that predispose people to be more or less receptive to certain stimuli; the interaction between the learned associations of a clinical situation and the particular biology of a person produces a response. The response may be a basic physiological process such as modulation of sensory processing, release of neurotransmitters, or alterations in the hypothalamic—pituitary—adrenal axis and the immune system activity. The placebo response can also be a complex process, including change in mood, motivation, or cognitive alterations [14]. We believe that this hypothesis of an association with the previous positive acupuncture experience is the most consistent with the placebo effect observed, however, this was also not clear in our study.

Greene et al [24] pointed out that clinicians need to be aware of the powerful impact of the placebo effects that are embedded in therapeutic interactions.

For the patient in this case report, nonpenetrating sham acupuncture at acupoint Neiguan (PC6) resulted in complete remission of the symptom of nausea during intra-oral impression taking.

This effect may not refer to a placebo effect, but instead to an effect comparable with that of acupressure, probably caused by the pressure of the micropore tape and

the resin ring that were used to support the sham needle, in addition to having the needle touch the skin. These may be sufficient stimuli to trigger a good effect on patients who are more receptive to acupuncture.

Nevertheless, it is unclear whether the placebo effect was triggered by the action of Deqi, the patient's high expectations, or because of an association with a learned response (memory), or by the interaction of all these factors. More specific studies to elucidate placebo effects are needed.

Disclosure statement

The authors declare that they have no conflicts of interest and no financial interests related to the material of this manuscript.

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