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Transcutaneous Electrical Nerve Stimulation as a method to relieve pain during childbirth

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Abstract

Transcutaneous Electrical Nerve Stimulation (TENS) is one of the most commonly used non-pharmacological methods of alleviating pain in women during physiological labor after the 37th week of pregnancy. Contraindications to stimulation are: the pacemaker's heartbeat, serious cardiological diseases, epilepsy and mental illness. TENS consists in irritating nerve endings using a flowing current in the vicinity of four electrodes stuck to the patient's body. The place of electrode sticking and parameters are selected individually. The TENS analgesic effect is explained by two mechanisms: the goal control theory and the effect on hormone secretion.

Abstrakt

Przezskórna elektrostymulacja nerwowo - mięśniowa (TENS) stanowi jedną z najczęściej stosowanych niefarmakologicznych metod łagodzenia dolegliwości bólowych u kobiet w trakcie porodu fizjologicznego po 37 tygodniu ciąży. Przeciwwskazaniami do wykonania stymulacji są: rozrusznik serca u rodzącej, poważne choroby kardiologiczne, padaczka oraz choroby psychiczne. TENS polega na drażnieniu zakończeń nerwowych za

pomocą płynącego prądu w okolicy czterech elektrod przyklejonych do ciała pacjentki. Miejsce przyklejenia elektrod oraz parametry dobierane są indywidualnie. Efekt analgetyczny TENS tłumaczą dwa mechanizmy: teoria bramki kontrolnej oraz wpływ na wydzielanie hormonów.

Key words: TENS, delivery a child, pain relief

Introduction

TENS (Transcutaneous Electrical Nerve Stimulation) involves the use of pulse currents with low frequency (1-150 Hz) in physiotherapy.

In obstetrics, Transcutaneous Electrical Nerve Stimulation was used for the first time in the 1970s in Scandinavia[1], then in the United Kingdom and the USA. Delivery pains are felt in a conscious way. Maternity women describe them as very strong, radiating to the sacral area of the spine. TENS, thanks to its specific mechanism of action, is a particularly effective and safe method of relieving pain during childbirth in women after 37 weeks of pregnancy[2].

Mechanisms of action of TENS

The effect of Transcutaneous Electrical Nerve Stimulation is explained by two mechanisms. The control gate theory is based on stimulation of Aβ nerve fibers, which inhibits the nociceptive impulses from the posterior horns of the spinal cord and activates antinociceptive descending systems[3]. During therapy, the number of Aβ-induced pain impulses is increased without changing the amount of Aδ and C conductors. Because the nerve fibers transmit the signal from the stimulator faster than the nerve fibers carry the pain signal from the muscle of the uterus, the first information reaches the hypothalamus from the stimulator, which makes it difficult to activate the transmission of pain with thin fibers[4]. There is a blocking of the nerve impulse carrying information about pain, so the body has no data about its location and severity. The brain, by receiving sensory stimuli, is limiting the processing of pain stimuli

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from a sick place. We can achieve a similar effect while using cold, warmth or lower back massage. The TENS impulses with high amplitude are responsible for this action.
The second mechanism of action explains the analgesic effect of TENS on the secretion of hormones. Current stimulation causes the release of endogenous opioids through the brain with low-frequency pulses. The secretion of beta-endorphin also has an analgesic effect on alleviating pain associated with childbirth[5]. It is also believed that TENS, indirectly increasing sense of control, reduces anxiety levels in the emerging, leading to a slower release of catecholamines. This action is associated with better well-being and reduction of pain in the labor[6].

In the case of acute pain, it is better to use a high frequency (of 80-120 Hz) and low intensity current. The effect of this therapy appears after a few seconds, but it is only temporary. Such parameters are used in the case of sudden pain in order to obtain quick relief[7].

Types of TENS for childbirth

During the delivery, conventional TENS and APL - TENS are used. Conventional TENS generates high frequency electric pulses (40-150 Hz) and short pulse duration (about 50 μs)[8]. The duration of the treatment can last from 30 to 60 minutes. The intensity set during the procedure is usually regulated by a midwife or physiotherapist with the active participation of a woman giving birth. Usually during a contraction, a higher intensity (amplitude of pulses) of the current is desired than in the interval between contractions. The woman should feel a pleasant tingling in the area of undergoing treatment. APL - TENS is a transcutaneous electrical nerve stimulation similar to acupuncture generating low frequency current (about 2 Hz) and a pulse duration of 0.2 ms[9]. The treatment time should take about 20 - 30 minutes, and the intensity should be the highest, tolerated by the patient.
In both cases, it is important that the skin where the stuck electrodes must be clean and free from lesions. Before the procedure, four electrodes are glued onto the skin of the back. The

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applied electric stimulus causes a feeling of tickling or tingling It is very important that the current does not cause pain to the patient[10].

The pain during the first stage of delivery is transmitted through the visceral nerves, which reach the spinal cord at the Th10-L1 level. The analgesic effect is due to the stimulation of the pelvic tracts and the hypogastrias. In the second stage of labor, muscle tension, traction of the fascia and strong pressure on the perineum are increased. In this phase, it is best to stimulate the parasympathetic nerves of the S2 - S4 segment.

The current parameters are selected individually for each patient. However, there are several contraindications that need special attention. These include: heart failure, a pacemaker in the patient, significant arrhythmia and epilepsy[11].

Electrostimulation with TENS currents is not recommended in women during preterm labor.[12] Transcutaneous electrical nerve stimulation is a safe method without affecting the mother and the fetus, but may produce distortion of cardiotocographic curve[13]. The TENS stimulation device is small and easy to use.

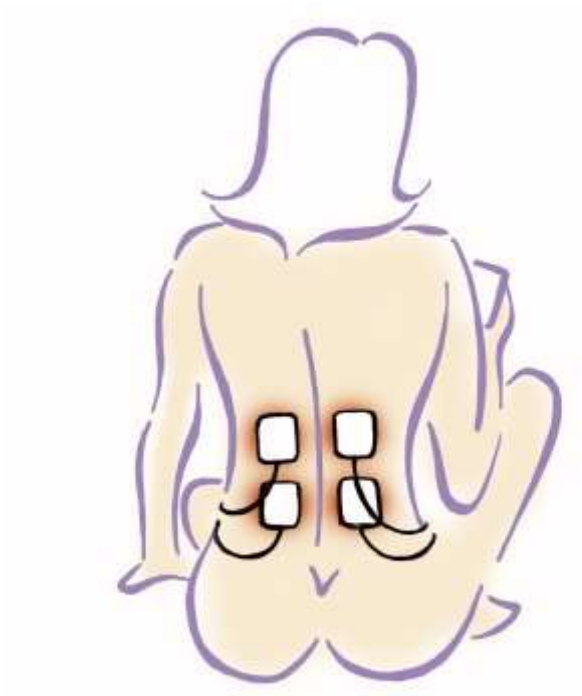

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Fig. 1 Method sticking electrodes in order to reduce pain during childbirth.
Source: www.szkolarodzenia.innomed.pl

The effectiveness of TENS during labor

There is no evidence in the available literature to indicate that TENS can be used as the only method to combat pain during delivery. It is emphasized that over 70% of patients require a line of anesthesia. Patients who used TENS currents during labor reported that they significantly reduced pain sensations. Transcutaneous Electrical Nerve Stimulation has a positive effect on the reduction of cross-over pain, but studies indicate that it did not affect lower abdominal pain[14],[15]. Although there is a high awareness of pregnant women about the existence of Transcutaneous Electrical Nerve Stimulation, the method itself is unfortunately not widely used. Śledzińska et al. In their research on the knowledge and use of Transcutaneous Electrical Nerve Stimulation to reduce pain showed that among 105 women who were giving birth, none of them used the TENS method during labor, even though they previously indicated that this method of pain relief exists[16]. This may be due to the fact that few delivery wards have the necessary equipment and the additional costs associated with purchasing their own equipment. TENS is widely used (with very good results) in Western Europe and North America[17].

Summary

TENS is a highly effective method of relieving pain. During labor, it effectively reduces the pain of the sacral area, assessed by the maternity as the strongest one. However, it is less effective in the case of pain in the lower abdomen, so its use may require other methods of alleviating pain.

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