

A Pilot Study on the Use of Transcutaneous Electrical Nerve Stimulation Machine for First-stage Analgesia in a Teaching Hospital

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Objectives:

To report our preliminary experience in the use of transcutaneous electrical nerve stimulation (TENS) machine for first-stage analgesia.

Methods:

The number (%) of pethidine injections used before and after the introduction of TENS machine in April 2007 were reviewed. The women who had vaginal deliveries or underwent emergency caesarean sections for analysis were included.

Results:

After the introduction of the TENS machine in April 2007, the proportion of pethidine injections decreased significantly from 11.5% (October 2006 to March 2007) to 7.8% (April to September 2007) [$p < 0.001$]. The difference was 3.7% (95% confidence interval, 1.7-5.7%).

Conclusions:

Our preliminary data suggested that the use of TENS could decrease the use of pethidine for first-stage analgesia.

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Introduction

Childbirth is one of the most painful experiences the human body can ever have. Some women are lucky when they have a relatively short, easy, and uncomplicated labour process, while others may experience long and agonising ordeals. The control of labour pain is the major concern in maternity care. Melzack¹ found that many nulliparous women go into labour without having considered that they might need some form of pain relief. He reported that 75% of nulliparous women requested analgesia during labour because of the pain. Only 1 to 2% of women reported that they had no pain in labour^{2,3}. It is hard to describe the type of pain in childbirth because pain tolerance is so variable among individuals.

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Pain during the first stage of labour is due to the pressure on nerve endings between the muscle fibres of the body and fundus of the uterus, contraction of the ischaemic myometrium and cervix, and the inflammatory changes of uterine muscle. Cervical dilatation is suggested to be an important source of pain at first stage of labour⁴. However, it is believed that strong uterine contractions

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generated in the presence of abnormal lie or strongly dilating cervix is very painful⁵. The severity of pain increases progressively with increased duration and intensity of contractions⁶.

Previously, we have widely used pethidine for analgesia in the first stage of labour, and it is the popular choice for pain relief among the women in labour. Unfortunately, the analgesic effect of pethidine is variable and the overall effect reflects the general systemic effect of the drug. The side-effects of pethidine are well known—restriction of mobilisation of the woman; affecting breastfeeding after delivery; as well as neonatal respiratory depression. Nevertheless, it has become a common practice to prescribe pethidine for all labouring women as the initial measure for pain relief in the early stage of labour.

Use of Transcutaneous Electrical Nerve Stimulation Machine in Obstetric Patients

Transcutaneous electrical nerve stimulation (TENS) is widely used as a pain-relief method especially in patients with chronic pain. It is claimed to be useful because it can block the pain messages at the spinal cord by passing mild electrical impulses through the skin via electrode pads into the nerve fibres which lie below, and block the impulses to the brain (the gate theory of Melzack and Wall⁷). It also helps stimulate the production of pain-killing chemical such as endorphins⁸. Endorphin is an endogenous opioid biochemical compound. It resembles the opiates to produce analgesia and a sense of wellbeing, since it will attach to the same neuron receptors as opiates like morphine and heroin, and interfere with the transmission of pain impulses to the brain.

The TENS machine has been advocated to be an effective and non-invasive method of pain relief during early first stage of labour, since it stimulates the body to produce endorphins and block the pain messages at the spinal cord as the same way as in non-pregnant patients. It enables the woman to be in control of her pain and there are no known side-effects on the mother and baby. The objective of the present study was to report our experience in the use of TENS machine for first-stage analgesia.

Methods

In April 2007, we introduced non-pharmacological

methods in pain relief, including the use of the TENS machine. During the antenatal talk, explanations on the options of different pain relief methods, such as the use of the TENS machine, birth ball, pethidine injection, and epidural analgesia were given; and the women could choose among these options as their preferred pain relief methods during labour.

The number of pethidine injections used, the total number of vaginal deliveries and emergency caesarean sections (elective caesarean section was excluded) in 2006 and 2007 were reviewed. The percentage was calculated by the number of pethidine injections used in the latent phase of labour over the total number of vaginal deliveries and emergency caesarean sections (excluding the elective caesarean section).

Results

The Figure shows that the highest incidence of pethidine use each year were 16.0% and 11.2% in September 2006 and January 2007 respectively. After the introduction of the TENS machine in April 2007, the proportion of pethidine injections versus application of the TENS machine were 5.2% vs 17.5% in November 2007, and 5.6% vs 11.5% in December 2007 for the first-stage analgesia. After the introduction of the TENS machine in April 2007, the proportion of pethidine injections decreased significantly from 11.5% (October 2006 to March 2007) to 7.8% (April to September 2007) [$p < 0.001$]. The difference was 3.7% (95% confidence interval, 1.7-5.7%).

There was a dramatic drop in the use of pethidine after the number of available TENS machine was increased from one to three in November 2007.

Discussion

Several studies reported that 60% of women had reduction of pain by using TENS during the first stage of labour⁹⁻¹¹. More recent studies with a placebo control group did not show any difference between TENS and placebo during labour^{12,13}. In a randomised clinical trial study, van der Ploeg et al¹⁴ reported that TENS was not more effective than a placebo apparatus in relieving pain during the first stage of labour.

While the effectiveness of the TENS used in first stage of stage may still be controversial; differences in

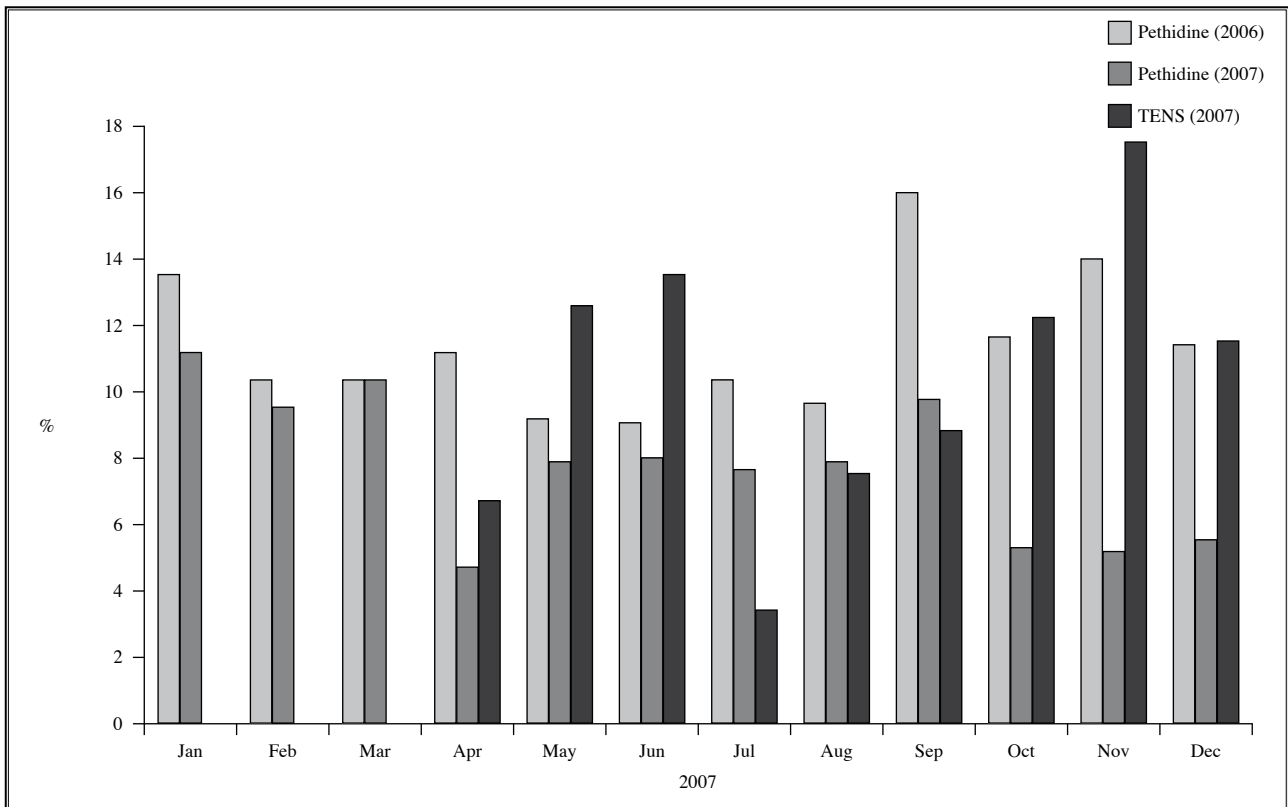


Figure. Uses of pethidine and the transcutaneous electrical nerve stimulation (TENS) machine

the models of the TENS machine used in different studies could have been the underlying explanation, since the models used were not clearly described. We could not determine whether there is different effectiveness among the different models, since we have only used one model, the “Elle TENS machine” (Babycare TENS Ltd, South Woodford, London) which is designed to have “BOOST” and “BURST” modes. The “BURST” mode is used in between the contractions, and it will continue to supply the electric current via the electrodes to the woman’s back. The labouring woman simply presses on the “BOOST” button when the contraction starts, and she can also increase the intensity to counter the pain during contractions. Once the contraction has passed, she can release the “BOOST” button, and it will return to the “BURST” mode. The crucial point is the sense of self-control, which is essential for labouring women to overcome the pain during labour. It has been pointed out that maternal feelings of control or personal control during labour could be the most vital predictor of an enjoyable birth^{15,16}.

Nowadays, we advocate natural birth and non-pharmacological pain-relief methods. We have shown that when an alternative method of pain relief is available

for women to choose during labour, the usage of pethidine injection has dramatically dropped resulting in reduction in the incidence of side-effects caused by the pethidine. We can encourage the labouring women to mobilise even they are using the TENS machine, which will help in shortening the latent or first stage of labour. Moreover, it also reduces the incidence of neonatal respiratory suppression caused by pethidine; and this will result in reducing the number of babies being admitted to the special care baby unit for close observation. In addition, the rooming-in policy will promote maternal and baby bonding; and increase the rate of successful breastfeeding.

Labour may ‘hurt’ so that the expectant mothers have sufficient warning to get to a safe place for giving birth. As midwives, we cannot kill the pain for the mother, but our role is to help the mother to cope with the labour pain through various methods. We advocate the personal control of pain and satisfaction in childbirth. With the introduction of TENS machine, although each woman may experience significant pain during labour, she will also feel to be in control during the process of labour.

Conclusion

As there is no previous experience in using

TENS machine in obstetric clients in the Hospital Authority hospitals, the effectiveness of this machine remains largely unknown to us. We have implemented the pain assessment forms and satisfactory survey for

all the women when using the TENS machine. After collecting all the data and performing the data analysis, a more detailed report can be provided in the near future.

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