

# Transcutaneous electrical nerve stimulation

## Analgesia in labour: a review of the TENS method

Transcutaneous electrical nerve stimulation (TENS) is a form of analgesia available to women in labour. The first reference to the use of electricity for pain relief dates back to about 2500 BC when Egyptians were believed to have stood on an "electric" fish in order to numb a painful leg. More recently, in the 19th century, a Frenchman reported using static electricity for pain relief, while at about the same time, in America, an electric current was applied as analgesia to the site of a surgical procedure.

Such experiments were then abandoned until the development of the gate-control theory of pain by Melzack and Wall<sup>1</sup> in 1965. Electricity, harnessed into pulsed, controlled electrical waves, now known as TENS equipment, was first found to be effective for chronic pain. Only in the past two decades has it been used for labour pain.

Since February 1991, midwives have been able to encourage, advise and use TENS equipment as an analgesic for labour pain, provided that they have received adequate instruction in the method<sup>2</sup>. This is in line with Clause 4 of the UKCC Code of Professional Conduct<sup>3</sup> and Section 3.3.3 of the Midwife's Code of Practice<sup>4</sup>. Even before that date there was an increasing use of TENS, led by consumer demand and stimulated by media reports such as "Turn off the agony, switch on the ecstasy" in the Daily Express<sup>5</sup> and "Plug into pain relief" in *Mother and Baby* magazine (1986)<sup>6</sup>. Support groups such as the National Childbirth Trust also encouraged the use of TENS as part of a trend towards less medicalised childbirth. But does research support the claims made for this method of pain relief?

### How does TENS work?

The effectiveness of TENS is attributed to its twofold action. Firstly, it blocks incoming painful stimuli, the gate-control theory of pain highlighted by Melzack and Wall<sup>1</sup> (see Table), and secondly it stimulates the production of natural endorphins and enkephalins<sup>7</sup>. Yet this may not be the whole answer if pain is, as Melzack and Wall have said: "A complex perceptual experience profoundly influenced by psychological variables as well as physical damage"<sup>8</sup>.

Elizabeth Cluett reviews the research into this popular form of pain relief



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Table: Theories of pain and a rationale for TENS

### PAIN AND TENS

Melzack and Wall's explanation of pain is that pain impulses are mediated in the gelatinous substance in the spinal cord. The dorsal horns of the spinal cord act as "gates", controlling the entry of pain signals into the central pain pathways. This is known as the gate-control theory.

Melzack and Wall's initial theory (1965)<sup>1</sup> spurred considerable further research into the physiology and psychology of pain. New approaches to treatment emerged, based on the prediction that pain might be lessened by applying electrical stimulation to nerve fibres in the skin. When electrical waves are applied it seems to impair the transmission of painful stimuli from the periphery to the central nervous system. Melzack and Wall (1983)<sup>8</sup> believe that these procedures produce sensory inputs that inhibit pain signals by closing the "gate" in the spinal cord.

This research was paralleled by the discovery of endorphins (morphine-like substances occurring naturally in the body) and enkephalins (opioid substances found in the brain), both of which have an analgesic effect. TENS is thought to activate the release of endorphins.

### Research studies

Research into the use of TENS as an analgesic in childbirth over the past 20 years has tried to establish to what degree TENS is effective against labour pain. Augustinsson et al's study<sup>9</sup> involved 147 women who all used TENS; 44% reported good pain relief and a further 44% moderate pain relief. There was no control group and the women were all volunteers, which may have biased the results.

Bundsen *et al*<sup>10</sup> undertook a larger study involving 283 women, again not randomly selected and with no control group. This study concluded that TENS was safe in terms of >

neonatal outcome. It also concluded that TENS was acceptable to the women as it was user-friendly and was an effective form of pain relief. Both these results could have been due to the psychological impact of the equipment and the support of those encouraging its use, rather than the physical properties of TENS itself (Figs 1,2).

Research by Robson<sup>11</sup> and Stewart<sup>12</sup> used women in labour as controls by asking them to turn off the TENS equipment and then report on the pain in comparison to when they were using it. The women overwhelmingly wanted the TENS to be turned on again and reported that it was effective. The validity of this experiment is debatable, since the removal of any support tends to increase anxiety and reduce the body's natural abilities to control pain.

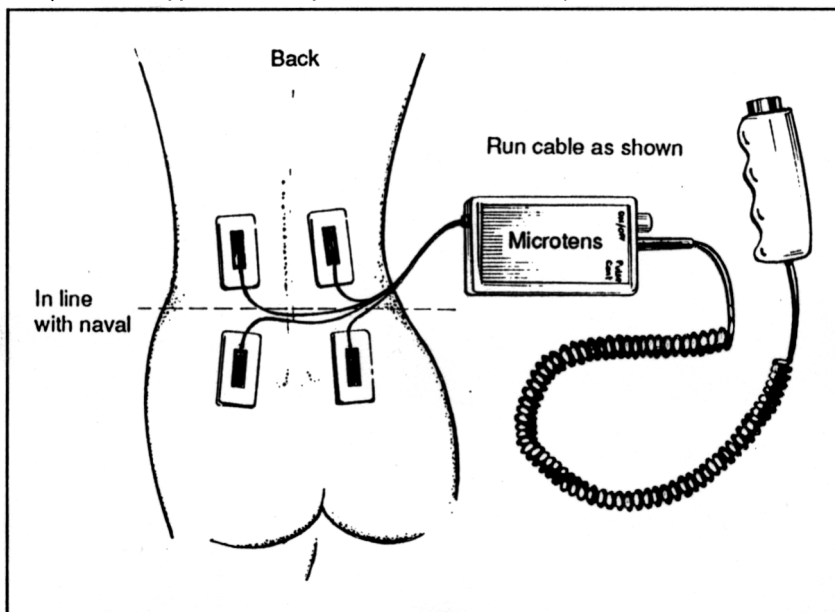
In Murrey's double-blind study<sup>13</sup>, approximately half the mothers in both groups required similar amounts of additional analgesia. Murrey concluded from this that there was apparently little or no worthwhile analgesic effect from the use of TENS. However, the study only had eight clients in each group, so is too small to give results in which we can have complete confidence.

In a double-blind study of 150 women, randomly selected, who were given either TENS or a placebo, Harrison *et al*<sup>14</sup> concluded that there was evidence of consumer satisfaction, despite no significant difference in terms of analgesia. A further study by Harrison *et al*<sup>15</sup> compared TENS with Entonox, pethidine and epidural anaesthesia. This study concluded that while epidural was the

Figure 1: The TENS control unit fits easily in the hand



Figure 2: For use in labour, the electrode pads of the TENS apparatus are positioned 40mm to 50mm above and below an imaginary line drawn level with the naval, and positioned approx. 75mm apart on either side of the spine, as shown



most effective method of pain relief, and pethidine the most disliked, TENS and Entonox were both effective and liked by women who had short labours and needed no other form of analgesia.

The most recent research by Hardy<sup>16</sup> compared pain relief in two groups of women. One group used TENS as their first form of analgesia and the second group did not use TENS at all. The results took into account the percentage of women in each group requiring additional analgesia and at what stage in the labour it was required. From this study there was no evidence that TENS was an effective analgesic, although there was considerable consumer preference for this method.

The majority of the research seems to indicate that the effectiveness of TENS as an analgesic in labour is limited, but perhaps that merely reflects the strong and unique nature of labour pain as identified by Melzack and Wall<sup>7</sup>.

### Why do women like TENS?

There is repeated evidence that women like TENS. There could be many explanations for this. Most women are concerned about the well-being of their unborn child, and the fact that TENS appears to have no adverse effects on the fetus may be an important consideration for them. This could outweigh its limitation as an analgesic.

Another important factor ➤

### REFERENCES

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