TRANS-CUTANEOUS ELECTRIC NERVE STIMULATION (TENS) FOR LABOUR ANALGESIA

By

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ABSTRACT

An entirely new concept of analgesia, viz., trans-cutaneous electric nerve stimulation (TENS) during delivery has been evaluated. The stimulation was delivered by the battery operated generator producing biphasic pulses varying in frequency and amplitude. A low intensity stimulation was given continuously while high intensity stimulation was given during uterine contractions. The electrode were taped at T 10-L 1 and S2-S3 during first and second stages of labour respectively.

Fifty women were studied, 24 (48%) of whom considered pain relief by TENS as very good, 13 (26%) as good, 12 (24%) as moderate, while only 1 (2%) considered TENS was without any effect. There were no maternal or foetal complications.

Introduction

The pain associated with labour and delivery has been a challenge to modern medicine because little medication can be administered to the pregnant woman without affecting the unborn child. The conventional measures of pain relief during labour include analgesics, sedatives, epidural injection of local anaesthetics, local blocks, etc. All these possess varying degrees of potential risk both to mother and foetus.

During the last 10 years, an increasing number of reports concerning the pain reducing effect of trans-cutaneous electric nerve stimulation TENS have been published. The results are fairly uniform and no significant complications have been reported. Favourable experience with TENS prompted us to use the method during delivery to evaluate its pain reducing effect in labour.

Material and Methods

The study includes 50 patients, primis and multis. The method of TENS was explained to each patient without suggesting that pain relief would necessarily accompany the feeling of stimulation.

It was also made clear that whenever needed, conventional pain relief would be supplemented. The participation in the study was voluntary. Special efforts were made to exclude complicated cases such as those with toxaemias, heart disease, anaemias, previous caesarean sections, twins;

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C.P.D., mal-presentation grand multis, elderly primis, etc. Otherwise no specific criteria for patient selection were used.

A few hours after delivery, all the patients answered a detailed questionaire regarding the effect of TENS on pain relief.

Technical Details and Technique of Stimulation

The stimulation system consists of a stimulator and a pair of electrodes (See Fig. 1 on page V). The stimulator contains a pulse generator and two controls for amplitude and frequency. The pulse generator delivers biphasic pulses with a pulse length of 0.25 msec. The amplitude and the frequency can be varied. The amplitude range is 0-220 volts and the frequency range is 10-150 Hertz. The electrodes are made of metal and have an active area of 30 mm x 80 mm.

Technique of Stimulation

The electrodes are taped to the patient's back symmetrically with respect to spinal process. The electrodes were taped at T10-L1 during the first stage of labour and at S2-S3 during the second stage of labour because the levels correspond to the influx of pain into the spinal cord during the first and second stages of labour respectively.

To obtain optimal analgesic effect, the stimulation amplitude was increased to a level where muscular fasciculation appeared in the vicinity of electrodes. This high intensity stimulation was used during uterine contraction at the height of pain for about 1 minute. Otherwise, low intensity stimulation was used continuously during first stage. Both the stimulation levels are experienced as tingling sensations of different intensity over the involved dermatomes of the back.

Results

Table I shows age and parity distribution of the selected cases. There were 17 primigravidas and 33 multigravidas Majority i.e., 43 (86%), were in the age group of 20-30 years. Elderly primies and grand multis were not included in the study group as far as possible.

Table II and III show the results of the questionaire answered by the patients after delivery regarding subjective effect of TENS on pain relief during first and second stages of labour respectively. Twenty four (48%) rated pain relief as very good in the first stage of labour, while only 1 (2%) did not have any pain relief. As regards second stage of labour, 16 (32%) had very good pain relief and only 4 (8%) did not have any pain relief. This indicated that the pain relief by TENS is more effective in the first stage of labour as compared to that in

TABLE I
Age and Parity Distribution

Age (Years)	Parity				
	I	II	III	IV	Total
Less than 20	2	1	—	—	3 (6%)
20-25	10	7	8	—	25 (50%)
26-30	4	9	3	2	18 (36%)
31-35	1	2	1	—	4 (8%)
	17 (34%)	19 (38%)	12 (24%)	2 (4%)	50 (100%)

the second stage. Most of the patients who had very good pain relief by TENS were introduced and acquainted to TENS use during ante-natal clinic.

TABLE II
Subjective Effect of Tens
(First stage of Labour)

Rating	Primies %	Multis %	%
Very Good	7 (41.2)	17 (51.5)	24 (48)*
Good	4 (23.5)	9 (27.2)	13 (26)
Moderate	5 (29.5)	7 (21.2)	12 (24)
Nil	1 (5.8)	—	1 (2)
Total (50)	17	33	

*—TENS was introduced in A.N.C.

TABLE III
Subjective Effect of Tens
(Second stage of Labour)

Rating	Primies	Multis	%
Very Good	3	13	16(32)
Good	4	6	10(20)
Moderate	6	14	20(40)
Nil	4	—	4(8)
Total (50)	17	33	

The Apgar scores of the newborns and its relation to the duration of TENS is shown in Table IV. There was no significant correlation between Apgar scores and duration of TENS use. Only one had Apgar score below 5, where TENS was used for less than 2 hours. The new born was resuscitated and had an uneventful post-natal period.

TABLE IV
Apgar Scores and Duration of Tens
(in Hours)

Apgar Score	Duration of TENS (in hours			Total
	less than 2	2-5	6-10	
below 5	1	—	—	1
5- 7	1	3	2	6
8-10	12	21	10	43
Total (50)	14	24	12	50

As regards outcome of labour, all had normal vaginal delivery. Only one had prolonged labour due to incoordinate uterine action. Uterine action curves and foetal heart rate tracing were within normal limits. TENS did not affect the uterine action. Foetal monitoring was done after switching off the TENS unit as TENS may interfere with the foetal monitoring.

Discussion

Pain is a complex phenomenon with various factors contributing to the degree of pain perceived. Separation of neuro-physiological mechanisms through which pain relief is achieved from psychological mechanisms or placebo effect is difficult. From practical standpoint, such a separation of neuro-physiological from neuro-psychological mechanism is of little consequence or importance. One cannot have a control study of another person due to difference in the psychological make-up Hence, we decided to do a self-control study in which each participant judges the effectiveness of the unit, by switching it off for some time and thus experiencing the contractions with and without the unit. Although the sample of the study is small, 74% of the mothers considered pain relief by TENS to be good or very good, 24% got moderate relief, while 2% had no effect at all. Most of the patients expressed a desire to use TENS in subsequent deliveries. These results approximate those of the previous studies by other European authors, viz., Augustinsson *et al* (1977)—88% pain relief, Robson (1979)—82% pain relief and Anderson *et al* (1976)—85% pain relief. Only one American study was available for

comparison viz., Grim and Morey, (1985). Which reported excellent relief in 20% and some form of relief in 87%. We could not find similar study in Indian Literature.

As shown in the results, one patient had prolonged labour and foetal distress due to incoordinate uterine action. At birth baby had Apgar score of 6 and 10, at 1 and 5 minutes respectively. The possibility of TENS induced irregularities in the foetal heart rate cannot be excluded, which would influence the total score. A thorough neurobehavioural evaluation of infants by Bundson *et al*, (1982) failed to show any significant differences between the study and the control groups.

TENS may interfere with foetal monitoring especially recording because TENS interferes with signals to fetal monitor. The TENS unit should be shut off while monitoring periodically. However, continuous fetal monitoring may be difficult.

TENS has some advantages over other conventional methods of labour analgesia. It is safe to both mother and child. It is non-invasive, easily administered, rapidly reversible. This is of particular significance to those with previous caesarean and desiring subsequent vaginal delivery. The use of TENS allows pain to be used as a diagnostic symptom because it can be turned off at will with immediate effect on pain relief.

It is clear from the results (Table III) that the pain relief during second stage of labour was much less as compared to that during first stage and may require supplementation by conventional analgesics. This might support the assumption that C-fibre mediated pain is more amenable to pain relief by TENS than A-fibre mediated pain.

TENS treatment does not influence the consciousness of the woman which implies that she can actively take part in the course of delivery and experience the joys of childbirth.

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References

1. Anderson S. A., Block E., Holmgren E. and Lakartidningen: 73: 2421, 1976. (In Swedish and English Summary).
2. Augustinsson L. E., Bohin P. and Bunsden P.: Pain, 4: 59, 1977.
3. Bunsden P., Ericson K. and Patterson: Acta Obstet. Gynaecol. Scand., 61: 129, 1982.
4. Grim L. C. and Morey S. H.: Physical Therapy, 65: 357, 1985.
5. Robson J. F.: Anaesthesia, 34: 357, 1979.