The Clinical Journal of Pain
19:187–191 © 2003 Lippincott Williams & Wilkins, Inc., Philadelphia

Acupuncture During Labor Can Reduce the Use of Meperidine: A Controlled Clinical Study

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Abstract:

Objective: To evaluate the effectiveness of acupuncture as an analgesic during labor.

Design: A randomized, unblinded, controlled study.

Setting: A labor ward in a University Hospital.

Patients: Parturients at term.

Interventions: One group received acupuncture (N = 106); another did not (N = 92). A second control group (N = 92), drawn from the labor ward protocol, consisted of patients who met the eligibility criteria for the study and were matched to the "no acupuncture" group by parity, but who had not been offered the opportunity to take part. Outcome measure "effectiveness of acupuncture" was measured by the requirement for use of meperidine.

Results: Meperidine was given to 11% of the acupuncture group, 37% of the no acupuncture group ($P < 0.0001$), and 29% of the control group. The use of other analgesics was also lower in the acupuncture group. Patient satisfaction was high: 89 of 103 patients asked said they would want acupuncture during another labor.

Conclusions: Acupuncture during labor reduced the requirement for other painkillers and has high patient satisfaction in this randomized, unblinded, controlled study.

Key Words: acupuncture, labor analgesia

Acupuncture is widely used in the treatment of pain. There is growing interest in acupuncture as an alternative to other analgesics for labor pain. Acupuncture has been found to have some effect in three small, uncontrolled studies,[1–3] in a controlled study (which was, however, not randomized and where the controls were chosen from the labor ward protocol),[4] and in a study which was not randomized and where there is no description of how the patients or the untreated controls were chosen.[5] A Medline database search from 1965 did not retrieve any randomized controlled trials of acupuncture for labor pain.

Received March 3, 2001; revised November 21, 2001; second revision June 19, 2002; accepted July 5, 2002.

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Meperidine has for some time been one of the most widely used drugs for pain relief during labor, but there is some evidence that opioids are not very effective for pain control during labor.[6,7]

MATERIALS AND METHODS

The aim of the study was to find out whether acupuncture could reduce the use of meperidine during labor. The reason for choosing meperidine as a test variable was that this has traditionally been the drug of first choice as an analgesic during labor and can be administered by the midwife without the need to ask the doctor's consent in each case. The null hypothesis was that acupuncture during labor does not reduce the use of meperidine. In a pilot study in our unit not involving acupuncture, 50% of the parturient women received meperidine. We wished to be

able to detect a reduction in the frequency of meperidine use to 30% of the parturient women or fewer, with power of the test 0.9 and at a significance level of 0.5. Using a table based on the Fisher-Irwin test, we calculated that 102 patients would need to be included in each group to achieve this.

The study was performed as a prospective, randomized controlled study, without blinding. The inclusion criteria were regular contractions at term (37–42 weeks) and ability to speak Norwegian. Exclusion criteria were induced labor, planned cesarean section, the patient's wish for an epidural block, medical reasons for an epidural block, and parenterally infectious diseases.

Treatment assignment was randomized by a computer program. The words "acupuncture" and "no acupuncture" were written in random order on a piece of paper contained in sealed opaque envelopes that were numbered consecutively. A person not involved in conducting the study performed these procedures. When a patient was entered into the study, the midwife was instructed to use the envelope with the lowest number available.

Eight midwives in our department had been educated in acupuncture techniques. Three of these eight midwives had taken a course for midwives at The Norwegian School of Acupuncture, with 108 hours of training. Five midwives had taken a course with 22 hours of training.

Patients were enrolled in the study when one of these midwives was on duty. A patient was included in the study if the midwife decided that she satisfied the inclusion criteria and after the patient had received verbal and written information about the study and had given her written consent. In this case, the envelope containing the patient's group assignment was opened.

The midwife giving the acupuncture was also in charge of the patient. In addition to the acupuncture, the patient received other analgesics on demand if thought appropriate by the midwife (see next paragraph).

The midwife selected the acupuncture points on the basis of her assessment of the patient's needs (eg, degree of pain, localization of pain, stage of labor, and restlessness and anxiety). The midwives used sterile needles of traditional Chinese type. Table 1 shows the acupuncture points used. A 1.5-inch (gauge 30) needle was used for back pain (BL32). For some points, like GV20 + Sishencong, BL60, BL62, and BL67, a 0.5-inch (gauge 32) needle was used. A 1.0-inch (gauge 30) needle was used for the other points. The *de-qi* (literally "arrival of energy"—the patient's feeling of pressure, heaviness, tenderness, or variation in temperature) location was searched for in the insertion of the needles. The depth of needling to reach de-qi varied among the different women, depending, among other factors, on the amount of subcutaneous adipose tissue. Often, the needles were manually rotated to achieve de-qi. For the most part, the needles were left in place for 10 to 20 minutes, but in some instances they were removed a few minutes after de-qi, and in some instances they were taped and left in place for the entire duration of labor. The duration of needling would vary with the different acupuncture points and with the patient's response to the acupuncture. The needles were removed immediately if a patient indicated that she felt uncomfortable with them in any way. The patients in the no acupuncture group received conventional care during labor, with analgesics as thought appropriate.

TABLE 1. *Acupunture points*

Indiction	Acupunture points
Tension, nervousness, tiredness	GV-20, HT-7, LR-3
Cervix rigidity	LR-3, GB-34
Symphysis pain in early labor	CV-4
Pain during first stage of labor	LI-10, LI-11
Back pain in early labor	BL-23, BL-60
Back pain later in labor	BL-27, BL-28, BL-32
Strong pain during contractions	LI-4, SP-6
Nausea	PC-6, PC-7
Any pain	ST-36

In both groups, the analgesic methods conventionally used in the department (sterile water papules in the lower back during the first stages of labor, mainly for back pain; nitrous oxide self-administered intermittently for painful contractions; meperidine for painful contractions combined with unrest or anxiety; and epidural analgesia for painful contractions during a longer-lasting labor) were administered as clinically indicated. In advance, 204 numbered envelopes were prepared, each containing the group assignment of one patient.

Because the study was not blind, there was a possibility of bias in the types and amounts of analgesics given to the no acupuncture group. A control for each patient in the no acupuncture group was chosen from the labor ward protocol. Inclusion criteria were the same parity as the index patient, spontaneous labor at term, and no planned cesarean section. The patient chosen was the first to give birth after the index patient who had not been included in the randomized study and who satisfied the inclusion criteria. These patients were called the control group.

Meperidine use was recorded in milligrams. The use of other analgesics (nitrous oxide, epidural block with Marcaine [Astra Zeneca, Oslo, Norway], epidural analgesia with Sufenta [Janssen-Cilag, Oslo, Norway], sterile water papules) was recorded as yes or no. The other variables recorded were age, parity, duration of labor, mode of delivery, weight of infant, and Apgar score.

TABLE 2. *Patient characteristics*

	Acuputure (N = 106)	No acupuncture (N = 92)	Control group (N = 92)
Age in years			
Median (range) parity, N (%)	30 (18–41)	30 (21–42)	30 (20–41)
0	54 (51)	51 (55)	51 (55)
≥1	52 (49)	41 (45)	41 (45)
Duration of labor (h), Median (range)			
Para 0	10.0 (4–30)	9.5 (4–36)	7.0 (1–21)
Para ≥1	6.0 (2–21)	5.5 (2–24)	6.0 (1–15)
Weight of infant (g), median (range)	3685 (2,750–5,300)	3,600 (2,560–4,800)	3,580 (2,550–4,910)
Operative delivery (forceps/vacuum/cesarean), N (%)	11 (10)	11 (12)	10 (11)
Apgar score, N (%)			
1 min <6	2 (2)	0 (0)	3 (3.3)
5 min <8	1 (1)	0 (0)	2 (2.2)

Shortly after labor and before leaving the labor ward, the patients in the acupuncture group were asked by the midwife to indicate pain relief on a 10-cm visual analog scale, ranging from "no effect" to "no pain." They were also asked to indicate whether they would want acupuncture if they were to give birth again.

Possible side effects of the acupuncture were assessed and recorded by the acupuncturist/midwife. Special attention was given to vasovagal reactions, psychic reactions, hematomas, and infections. Drowsiness is a sought-after effect of acupuncture during labor and was not regarded as a side effect. The Regional Committee for Research Ethics approved the study.

RESULTS

When the study was finished, there were records from 106 patients who had received acupuncture and 92 patients in the no acupuncture group. There were 6 missing records. There was one dropout in the acupuncture group, which was analyzed according to the intention-to-treat principle.

The three treatment groups were comparable based on demographic variables (Table 2), apart from somewhat longer labors in the primiparae included in the randomized study than in those in the control group.

Table 3 shows the percentage of patients in the different treatment groups who received meperidine. In the no acupuncture group, 37% received meperidine, compared with 11% in the acupuncture group. The difference was statistically significant (Fisher-Irwin test, $P < 0.0001$).

Because six records were missing, we repeated the statistical analysis twice, assuming either that these records belonged to patients in the acupuncture group who had received meperidine, or that they belonged to patients in the no acupuncture group, none of whom had received meperidine. In both cases the difference between the two groups was still significant ($P = 0.0006$, and $P = 0.0001$, respectively). For those patients who did receive meperidine, there was no difference between the groups with regard to the amount given (median 75 mg, range 25–100 mg in all groups).

Because the various analgesic methods as a standard are used either alone or in combination, a detailed description of each analgesic or analgesic combination is complicated. Table 4 shows the number of patients who received any analgesic method, contrasted with those who received none (apart from acupuncture). Thirty-four percent of patients in the acupuncture group received no analgesic (apart from acupuncture), whereas this was the case for 18% in the no acupuncture group and 21% in the control group. The reduction in use was apparent for all analgesics (individual results not shown in the table).

The proportion of patients receiving meperidine differed somewhat between the no acupuncture group and the control group (37% and 29%, $P = 0.17$; Table 3), but there was only a minor difference in the proportion of patients receiving any type of analgesia (82% and 79%; Table 4).

TABLE 3. *Use of meperidine*

Group	No meperidine N (%)	Meperidine N (%)	Total N (%)
Acupuncture*	94 (89)	12 (11)	106 (100)
No acupuncture†	58 (63)	34 (37)	92 (100)
Control group‡	65 (71)	27 (29)	92 (100)

*Acupuncture versus no acupuncture: Fisher-Irwin test, $P < 0.0001$; †acupunture versus control group: Fisher-Irwin test, $P = 0.001$; ‡no acupuncture versus control group: Fisher-Irwin test, $P = 0.17$.

TABLE 4. *Use of any analgesia (epidural, meperidine, nitrous oxide, sterile water papules)*

Group	No analgesia N (%)	Analgesia N (%)	Total N (%)
Acupuncture	36 (34)	70 (66)	106 (100)
No acupuncture	17 (18)	75 (82)	92 (100)
Control group‡	19 (21)	73 (79)	92 (100)

Use of meperidine (no/yes) was entered as the dependent variable in a stepwise logistic regression, with acupuncture group, age, weight of infant, duration of labor and parity as the independent variables. The control group was excluded from the regression analysis. Of these variables, only acupuncture group and duration of labor showed significant correlation with meperidine use (acupuncture group: odds ratio 0.18 [95% confidence limits 0.08–0.42]; duration of labor: regression coefficient = 0.09, $P = 0.003$).

The median pain relief as indicated on the visual analog scale was 5.0 (range 0.0–10.0). Of the 106 patients, 103 were asked whether they would want acupuncture in another labor. Of these, 89 patients answered yes, 6 answered no, and 8 did not give an answer. Acupuncture had no noticeable side effects.

DISCUSSION

At the end of the study there were 14 more patients in the acupuncture group than in the control group. Six records were missing. Because the treatment assignment was done completely at random, the number of patients assigned to the two groups might have been skewed, and it is not known how many of the 204 patients were originally assigned to which group. It is also not known whether the missing records belonged to patients in the acupuncture or the control group, and what the results were in these patients. Therefore, an analysis was done with the two worst-case scenarios in mind: namely, that all the missing records belonged to acupuncture patients who had all received meperidine, and that all missing records belonged to no acupuncture patients who had not received meperidine. The difference between the groups was still statistically significant in both cases.

The midwives taking part in this study had been taught obstetrical acupuncture by an experienced anesthesiologist/acupuncturist and used the methods as taught and described in a textbook of obstetrical acupuncture.[8]

We were able to show a substantial difference in the frequency of meperidine use, which was 37% in the no acupuncture group and 11% when acupuncture was used. The use of other analgesics was also reduced. There was a difference, however, between the group who did not receive acupuncture and the control group who did not take part in the study. The proportions receiving meperidine in these groups were 37% and 29% respectively, perhaps indicating that meperidine was used somewhat more liberally in the former. When all forms of analgesia were taken together, there were no differences between these two groups. It seems reasonable to conclude that acupuncture did have an analgesic effect in labor. It is not certain, however, whether this effect was a "real" analgesic effect, a placebo effect, or any other methodological artifact of our study.

The level of patient satisfaction was striking: 89 of 103 patients who received acupuncture wished to repeat their experience at another opportunity. Satisfaction with anesthesia was not assessed in the nonacupuncture group, so it is not possible to compare the satisfaction in the two groups.

Apart from acupuncture, duration of labor was the other main factor determining the use of meperidine. The duration of labor has previously been shown to be one of the main determinants of analgesic use.[9]

The recorded duration of labor was somewhat longer in the study population, irrespective of group assignment, than in the control group and in a larger population of Norwegian parturients.[10] The most likely reason for this is that the patients thought fit for inclusion in the study were those with a longer latent and early active phase than the average patient, providing the midwife with the opportunity to inform them of the study before the contractions were too painful.

The main weaknesses of the study are the lack of a placebo control and the lack of blinding. These points were given much consideration during the planning. It is difficult to envisage a perfect placebo for acupuncture. In other randomized controlled studies of acupuncture, sham treatment not thought to be effective,[11–13] needling at control points,[14–16] and no placebo[17,18] have been used. The main reason for the decision not to use placebo acupuncture in our study was that this would demand unreasonable acting skills of the midwives giving the acupuncture, so that there was a high risk that the patients would become aware of whether they were really receiving acupuncture. The possibility of having blinded third-party assessors was discarded for the same reason. Meperidine and other analgesics are administered by the midwife in charge of the patient, depending on the patient's perceived needs. Thus, even if the acupuncturist/midwife and the midwife in charge were two different persons, they would interact tightly in the same room for several hours, and we thought it little likely that the midwife would be deceived by the acupuncturist any more than the patient would. Because of the methodology of this study, it cannot be concluded whether the results show a genuine biologic effect of acupuncture on labor pain, or whether they are a result of a placebo effect. A definitive study would, however, be difficult in the setting of a labor room.

CONCLUSIONS

In this study, which was a prospective, randomized, open trial with a control group not receiving placebo, the

use of meperidine and other analgesics was lowered by the use of acupuncture during labor. Ideally, the results should be verified by a blinded placebo-controlled trial.

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