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Acupoint injection of ropivacaine for epidural blockade: Clinical observation of the use of labour analgesia

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Research Article

Keywords: labour analgesia, acupoint injection, ropivacaine, epidural

Posted Date: April 29th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9429350/v1

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Additional Declarations: No competing interests reported.

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Funding:

1、Zhejiang Province Medical and Health Science and Technology Programme Project (2024KY1745)

2、The Construction Fundof Key Medical Disciplines of Hangzhou (Anesthesia and Pain MedicineOOO20200484)

Conllicts of Interest:

The authors declare no conflicts of interest [ce state spocific conflicta).

Abstract:

Purpose:To observe the clinical effect of the acupoint injection (Hegu, Sanyinjiao) of ropivacaine for epidural blockade for labour analgesia.

Methods: A total of 100 women who received labour analgesia at Shangyu Maternal and Child Health Hospital, Shaoxing City, from January 2024 to June 2024, who met the inclusion and exclusion criteria and who signed informed consent forms were included. The patients were randomly divided into two groups: the epidural analgesia group (Group C) and the acupoint injection combined with epidural analgesia group (Group O). Following application of additional exclusion criteria, 80 patients were ultimately included in this clinical observation, with 40 patients assigned to each group. The following observation indices were used: the pain visual analogue scale (VAS) score [before labour analgesia (T0), 15 min after analgesia (T1), when the uterine opening reached 6 cm (T2), and when the perineal suture was closed in the third stage of labour (T3)], modified Bromage score, use of oxytocin, mode of delivery, amount of postpartum haemorrhage (ml), Apgar score [at 1 min and 5 min], additional amount of self-controlled analgesia administered, epidural ropivacaine dosage, total ropivacaine dosage, maternal adverse reactions [postpartum headache, urinary retention, and epidural-related maternal fever (ERMF)],and conduct a survey on maternal satisfaction and postpartum depression scale one day after delivery.

DISCUSSIONS: **The acupoint (Hegu, Sanyinjiao) injection of ropivacaine increased the effectiveness of epidural labour analgesia, reduced the required dosage of epidural ropivacaine without significant adverse effects, and significantly improved maternal satisfaction. This method of analgesia is therefore worthy of clinical promotion and use. (Retrospectively Registered No. ChiCTR2400092969,Registration date 2024-11-26)**

Keywords: labour analgesia; acupoint injection; ropivacaine; epidural

INTRODUCTION:

Pain during childbirth is an inevitability that has accompanied mothers since the emergence of humanity, and for thousands of years, people have been searching for and exploring ways to reduce or eliminate labour pain. "Analgesia in labour" is the application of various medications and/or techniques to reduce or eliminate pain during labour while safeguarding the safety of the mother and foetus. Acupuncture has been used in China and Japan for more than 2,000 years to relieve labour pain and promote cervical ripening, with Sanyinjiao (Point SP6, Sanyinjiao) and Hegu (Point LI4, Hegu) being the most widely chosen acupoints[1].

Continuous epidural block is the most commonly used technique for mitigating labour pain, the main drug of choice being a combination of local anaesthetics and low-dose opioids, administered via a low-concentration, high-volume epidural drug delivery mode, and patient-controlled epidural analgesia (PCEA) for the maintenance analgesia phase. This method reduces the occurrence of breakthrough pain and improves other obstetric outcomes with a low incidence of side effects and adverse reactions. However, many problems remain, such as hypotension, motor blockade, and prolongation of the first and second stages of labour, and women on opioids are more likely to have increased oxytocin use and postpartum haemorrhage[2]. In addition, the incidence of epidural-related maternal fever (ERMF) during epidural labour analgesia is approximately 26%, and ERMF may be associated with the impaired release of antipyrogenic IL-1ra due to the use of local anaesthetics[3-4].

Acupoint injection therapy is an innovative integrative therapy that combines drugs, acupuncture and meridian action and is widely used for managing a variety of conditions,

including labour pain[5], given its immunomodulatory and other adjuvant therapeutic functions[6-7]. In this study, we proposed the acupoint injection of ropivacaine combined with epidural low-concentration ropivacaine and low-dose opioids for labour analgesia to increase the efficacy of the drugs via acupoint injection and to further regulate the neural-immune-endocrine system by stimulating the reflexes of the acupoints to enhance analgesia and comprehensively manage the labour process. The ultimate aim of this study is to provide a simple, safe and effective combination of Chinese and Western medicines that is easy to administer, safe, effective, and easily acceptable to mothers and their families and to provide new ideas for and clinical experience in administering individualised analgesia for childbirth.

Methodology

Subjects of the study:

This study was approved by the Ethics Committee of the hospital (Ethical Approval No. LL-2023-10-07). Primigravid women who requested labour analgesia in the Department of Obstetrics of Shangyu Maternity and Child Healthcare Hospital, Shaoxing City, from January 2024 to March 2024 were initially selected. After a comprehensive examination and application of the inclusion and exclusion criteria, a total of 100 people voluntarily participated in this clinical observation and signed informed consent forms. This clinical trial has been registered with the China Clinical Trial Registry (registration number: ChiCTR2400092969).

Inclusion and exclusion criteria

The inclusion criteria were as follows: (1) American Society of Anesthesiologists (ASA) anaesthesia classification of I or II, (2) cephalic singleton labour, (3) primiparity (37 to 42 weeks), (4) cephalopelvic symmetry, (5) expected foetal weight of 2 kg to 4 kg, (6) no history of acupuncture

treatment, and (7) suitability for vaginal delivery. The following exclusion criteria were used: (1) contraindications to vaginal delivery; (2) contraindications to labour analgesia; and (3) treatment with acupoint analgesia or sedative drugs before delivery.

Sample size calculation

According to the literature[8-9], trans-acupoint injections generally produce an analgesic effect in approximately 25 percent of patients.Therefore,combined with the preclinical pretrial sample size, the clinical sample size was calculated as 80 cases using G*Power software. Taking into account the loss of cases to caesarean section and other reasons during the course of the experiment(20%), a total of 100 cases were included.

Randomisation

A computer-generated random number table was used to generate 100 random numbers, which were arranged according to the law of natural numbers. The first 50 were specified as the epidural labour analgesia group (Group C), and the last 50 were assigned to the acupoint injection combined with epidural analgesia group (Group O). The envelopes were pre-packed according to the random number and grouping information and numbered consecutively (i.e., from 1 to 100), and the subjects' random numbers and grouping information were managed by a dedicated person in the project research team, who randomly distributed the envelopes to the subjects during project implementation; then,the operators opened the sealed envelopes immediately before labour analgesia, and carried out the labour analgesia for the corresponding group according to the random numbers and grouping information in the envelopes. The operation was managed according to the random number and group information inside the envelope.The operators opened the sealed envelopes immediately before administering analgesia in labour to the corresponding

group according to the random number and grouping information in the envelopes. The trial was designed in a blinded manner, that is to say, the clinical operators, the record keepers of indicators and the data statisticians were separated. All the research materials such as the clinical research observation forms were given to the hospital's scientific research management department for preservation and archiving. The clinical observation form and all other research data were submitted to the research management department of the hospital for retention and archiving.

Interventions

Mothers in the acupoint injection combined with epidural labour analgesia group (observation group, Group O) received PCEA followed by acupoint injection at the place of delivery, whereas mothers in the epidural labour analgesia group (control group, Group C) received PCEA only when the cervix was dilated to 2–3 cm.

(1) In the epidural labour analgesia group (control group, Group C), epidural analgesia was administered after the woman's labour entered the active phase, i.e., when the mouth of the uterus opened to 2–3 cm. The puncture point was chosen as the L_{2-3} vertebral space, and the epidural cavity was punctured. After successful puncture, an epidural catheter was gently placed 3–5 cm cephalad, and after retraction without blood or cerebrospinal fluid, 3 ml of 1.5% lidocaine was injected after ensuring that the catheter was in the epidural space, followed by the injection of the epidural labour analgesia drugs. The PCEA pump was then connected to the epidural catheter. The PCEA infusion was prepared by dissolution (0.1% ropivacaine + 2 mg/ml fentanyl), and the PCEA parameters were set as follows: background infusion volume of 8 mL/h, single dose of 6 mL, and locking time of 20 min. After the uterine mouth was fully opened, the PCEA pump was turned off, an additional dose of PCEA was administered before the perineal wound was sutured, and

postnatal observations were performed for 2 hours. (2) In the acupuncture point injection combined with epidural labour analgesia group (observation group, Group O), after completing the epidural block operation in the same manner as for Group C, the maternal bilateral upper limb Hegu acupoints and lower limb Sanyinjiao acupoints were selected and were positioned according to the national standard of the People's Republic of China (GB12346-90). The bilateral Hegu points (LI 4) were punctured perpendicular to the skin to 0.5 to 0.8 inches (the same as the body inches) using acupuncture needles (0.32 × 25 mm). Then, a needle prick (0.32 × 40 mm) was used to puncture the bilateral Sanyinjiao points (SP 6) perpendicular to the skin to 0.8–1.2 inches (the same as the body inches). After obtaining qi (i.e., the patient experienced a sensation of acidity, numbness, distension, and heaviness), the surface of the skin was scrubbed clean with an alcohol-saturated cotton ball. Then,after receiving gas (i.e., there is a sensation of soreness, numbness, distension, and heaviness),bilateral Sanyinjiao points (SP 6)were punctured with a needle (0.32×40mm) 0.8-1.2 inches perpendicular to the skin and then scrubbed clean with an alcohol-soaked cotton ball.The catheter was pumped back until no blood was visible. Then, 1 ml of each of the 0.2% lidocaine solutions was injected slowly and pressed gently for 10-20 seconds to spread the medication uniformly.

Figure 1:



Location of Sanyinjiao Point

Figure 2:



Injection at the Sanyinjiao Acupoint

Primary Outcome Measurement

Observation of analgesic effects

(1) Visual analogue scale (VAS) scores of pain were recorded at four time points: before (T_0) and 15 min after (T_1) epidural labour analgesia, when the uterine opening was 6 cm (T_2), and at the time of perineal suturing in the third stage of labour ($T_{(3)}$). The number of times that the self-controlled analgesic pump was used was also recorded.

(2) Indicators of motor block judgement

Fifteen minutes after the completion of the epidural block operation and the administration of the initial dose, the modified Bromage score[10] was determined to judge the degree of maternal lower limb motor nerve block, with 0 indicating normal; 1 indicating numbness in the lower limbs and a slight sense of inconvenience when moving; 2 indicating an inability to lift and straighten the lower limbs but the ability to move the knee and the foot; 3 indicating an inability to lift and straighten the lower limbs and to flex and extend the knee and the foot; 4 indicating an inability to move and a lack of sensation; and 5 indicating an inability to move the lower limbs and a lack of sensations.

(3) Observation of the course of labour and the outcome of delivery

The duration of labour, use of oxytocin, mode of delivery, 24-hour postpartum haemorrhage, neonatal weight, 1-min and 5-min Apgar scores after delivery, and epidural-related maternal fever (ERMF), defined as a temperature ≥ 38°C, were recorded.

Secondary outcome measures

(1) Maternal Satisfaction Survey and Postpartum Depression Scale Survey

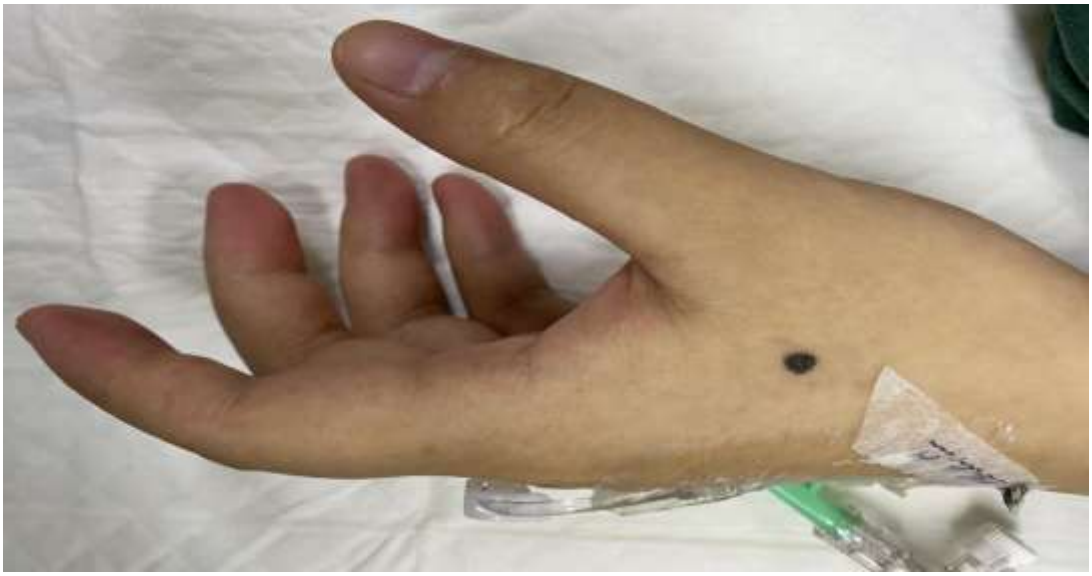
The Satisfaction Survey and Self-rating Depression Scale (SDS) survey were completed within 1 day after delivery.

The SDS indicator is the total score. The individual scores of the 20 items were added together to obtain the raw score. The standardised score is equal to the integer part of the raw score

multiplied by 1.25. The upper limit of normal for the total raw score is 41 and that of the standardised total score is 53. Depression severity=Cumulative score/80. Results for each item: a score of 0.5 or less indicates no depression; 0.5–0.59 indicates mild to moderate depression; 0.6–0.69 indicates moderate to severe depression; and 0.7 or more indicates severe depression [11].

The survey of maternal satisfaction with labour analgesia was scored on a 5-point scale as follows: very dissatisfied, 1 point; dissatisfied, 2 points; fair, 3 points; satisfied, 4 points; and very satisfied, 5 points.

Figure 3:



Location of Hegu Point

Figure 4:



Injection at Hegu Point

Statistical analysis

The data obtained from the study were statistically analysed with SPSS version 25.0, and GraphPad Prism version 8 was used to create graphs. The measurement data are reported as the means and standard deviations ($\bar{x}\pm$ s). One-way ANOVA was used for comparisons between groups of measurements that conformed to a normal distribution, and the SNK method was used for two-by-two comparisons. The χ^2 test was used to compare count data between groups. P<0.05 was considered to indicate a trend towards significance, and P<0.01 was considered to indicate a statistically significant difference.

Results

A total of 187 subjects with primigravida were included in this study; 81 subjects were excluded because they did not meet the inclusion criteria, and 6 subjects were excluded because they refused to provide informed consent for participation in this clinical trial. The 100 remaining subjects were randomly and evenly divided into the epidural group (control group, Group C) and

the acupoint injection combined with epidural analgesia group (observation group, Group O) according to the random number table method. Eight patients were excluded because they underwent caesarean section, three patients were excluded because of emergency delivery, three patients were excluded because of forceps delivery, five patients were excluded because of macrosomia, and one patient was excluded because she switched to intravenous analgesia due to ineffective epidural analgesia, other patients have good compliance. A total of 80 patients were ultimately eligible for labour analgesia: 40 patients in Group C and 40 patients in Group O. For details, see the flow chart of the study (Figure 3.1).

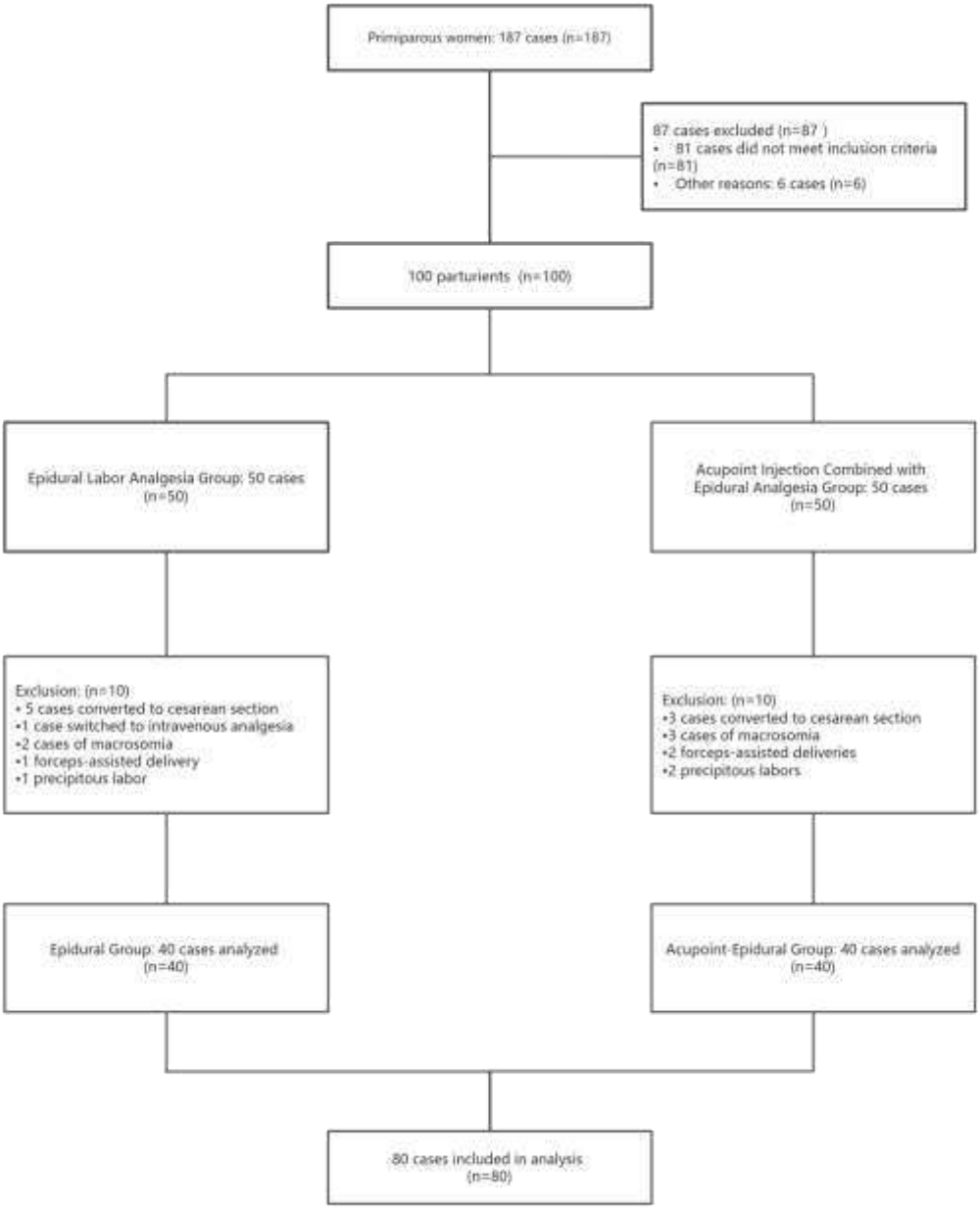


Figure 3.1 Flowchart of the study process for the subjects

Analysis of the general maternal situation in the two groups

In this study, according to the inclusion and exclusion criteria, maternal baseline data including age, body mass index, maternal gestational weeks and other general conditions were compared, and the differences between the two groups was not statistically significant (P>0.05). The groups were thus considered comparable, as shown in Table 3.1.

Table 3.1 Comparison of general maternal data between the two groups (n=40, $\bar{x}\pm$ s)

groups	Age (years)	body mass index (BMI)	Maternal week of pregnancy (weeks)
Group O	29.33±3.79	26.30±3.55	38.67±1.36
Group C	29.05±3.73	26.44±3.26	38.84±1.28
P	P=0.744	P=0.606	P=0.622

Note: Group O: acupoint injection combined with epidural analgesia group; Group C: epidural analgesia group.

Maternal VAS scores at different time points in both groups

A comparison of the VAS scores of each group of women before epidural analgesia (T_0) and 15 min after analgesia (T_1), when the uterine opening was 6 cm (T_2), and when the perineal suture was closed in the third stage of labour (T_3) revealed no statistically significant differences between the groups at T_0 and T_1 (P>0.05). The VAS scores of Group O were significantly lower than those of Group C at T_2 and T_3, indicating that the analgesic effects of acupoint injection manifested gradually (P<0.05); see Table 3.2.

Table 3.2 Comparison of VAS scores at different time points during labour analgesia in the two groups (n=40, $\bar{x}$± s) (score)

groups	T_0	T_1	T_2	T_3
Group O	8.55±1.08	2.35±0.76	2.47±0.67*	2.57±0.74*
Group C	8.45±1.01	2.32±0.86	2.8±0.60	2.9±0.44
P	0.670	0.891	0.026	0.034

Note: *P<0.05 for comparisons between groups.

Group O: acupoint injection combined with epidural analgesia group; Group C: epidural analgesia group.

Figure 3.2 Comparison of VAS scores at different time points during labour analgesia between the two groups

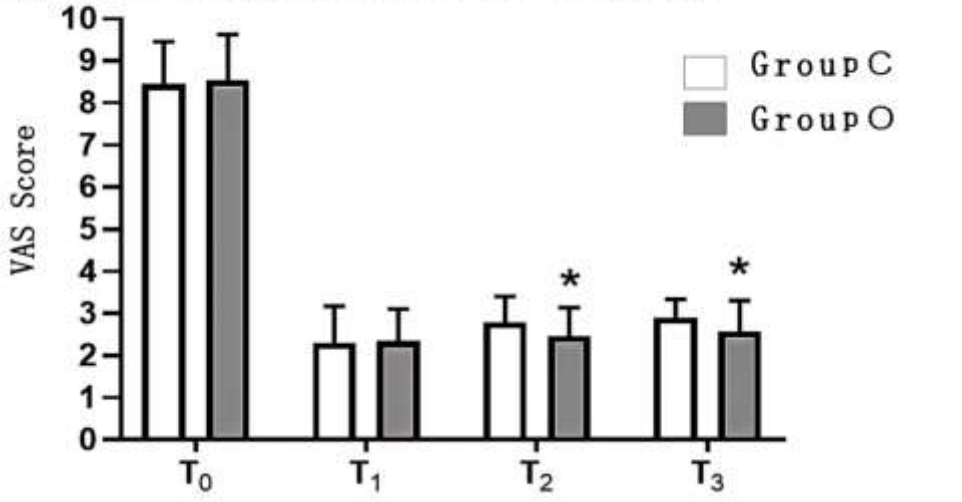


Figure 3.2 Comparison of VAS scores at different time points during labour analgesia between the two groups

Note: *P<0.05 for comparisons between groups.

Group O: acupoint injection combined with epidural analgesia group; Group C: epidural analgesia group.

Impacts of different methods of labour analgesia on women in labour

The main observation indices used for assessing labour analgesia were the modified Bromage score, total labour duration, postpartum haemorrhage, and the application of oxytocin during labour. When contraction weakness occurred during labour (duration of contraction <30s, intervals >3 minutes, increase in uterine contraction pressure <50mmHg), intravenously injected contractin (2.5U of contractin added to 5% glucose 500 ml fluid, starting at 3 drops/min) to maintain normal uterine contraction. There was no statistically significant difference between

group O and group C in terms of maternal Bromage score 15 min after the completion of epidural blockade and the number of cases of contraction use during labour, and the acupoint injection did not affect maternal lower limb muscle strength or contractions. The total duration of the labour process was shorter in Group O than in Group C, and the amount of haemorrhage at 24 hours postpartum in Group O was smaller than that in Group C; the differences between the two groups were statistically significant (P<0.05), suggesting that acupoint injections improved the process of labour and the patients' contractions. The labour process and obstetric outcomes of the women are shown in Table 3.3.

Table 3.3 Effects of different analgesic methods on labour in the two groups (n=40)

groups	Bromage score (points)	Number of patients needing oxytocin (percent)	Total labour time (points)	Haemorrhage (ml)
Group O	1.60±0.67	27 (67.5 percent)	455.05±168.78*	333.75±72.27*
Group C	1.63±0.62	25 (62.5 percent)	527.75±146.01	370.07±79.05
P	0.863	0.812	0.048	0.035

Note: *P<0.05 for the intergroup comparisons.

Group O: acupoint injection combined with epidural analgesia group; Group C: epidural analgesia group.

Effects of different methods of labour analgesia on neonates in the two groups

No statistically significant difference in the weight of the newborns was observed between the two groups (F=0.407, P=0.676). The difference in the Apgar scores of the newborns between the two groups at 1 min and 5 min was not statistically significant (P>0.05). Additionally, no other neonatal abnormalities were detected. See Table 3.4.

Table 3.4 Effects of different methods of labour analgesia on neonatal Apgar scores in the two groups (n=40) (Points)

groups	1-minute Apgar score	5-minute Apgar score
Group O	9.70±0.79	9.72±0.71
Group C	9.77±0.65	9.92±0.22
P	0.882	0.649

Group O: acupoint injection combined with epidural analgesia group; C: epidural analgesia group

Comparison of the adverse effects between different labour analgesia methods

Adverse reactions, including the number of cases of headache, the number of cases of urinary retention, and the number of cases of epidural-related labour fever (ERMF), are shown in Figure 3.4. The incidence of the above adverse reactions in Group O were not significantly different from that in Group C according to the x^2 test (P>0.05) (Table 3.5).

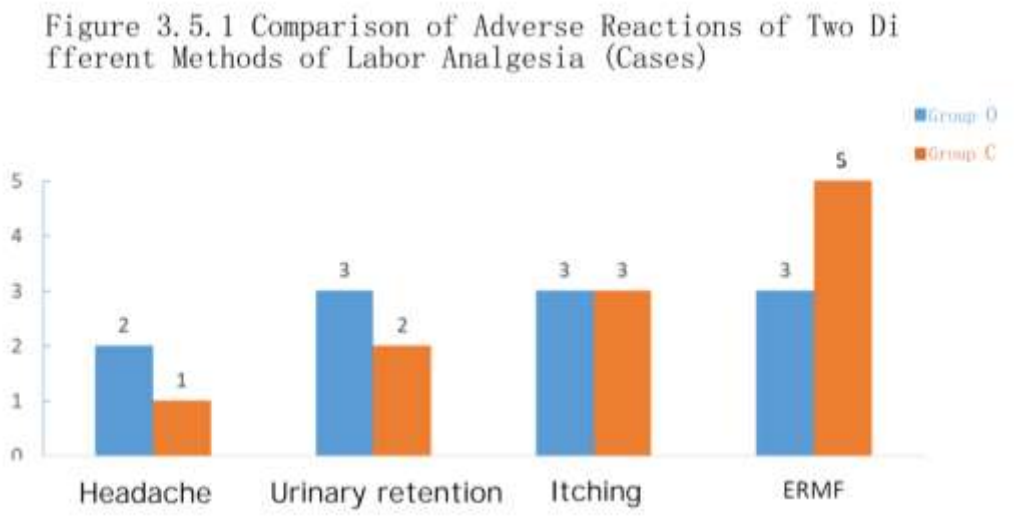


Figure 3.4 Comparison of the adverse effects of different methods of labour analgesia in the two groups (patients)

Table 3.5 Comparison of the adverse effects of two different labour analgesia methods (n=40 patients)

groups	headache	urine retention	pruritus	ERMF
Group O	2	3	3	3
Group C	1	2	3	5
P	0.556	0.664	1	0.456

Group O: acupoint injection combined with epidural analgesia group; Group C: epidural analgesia group.

Effects of different methods of labour analgesia on maternal satisfaction and maternal SDS

The data obtained from the surveys of maternal satisfaction and maternal SDS were converted to count data; according to ANOVA, maternal satisfaction was better in group O than in Group C, and the differences between the groups were statistically significant (P<0.05). The

postnatal depression scale survey score indicated a very significant improvement in outcome for group O compared with that in group C ($p<0.01$)

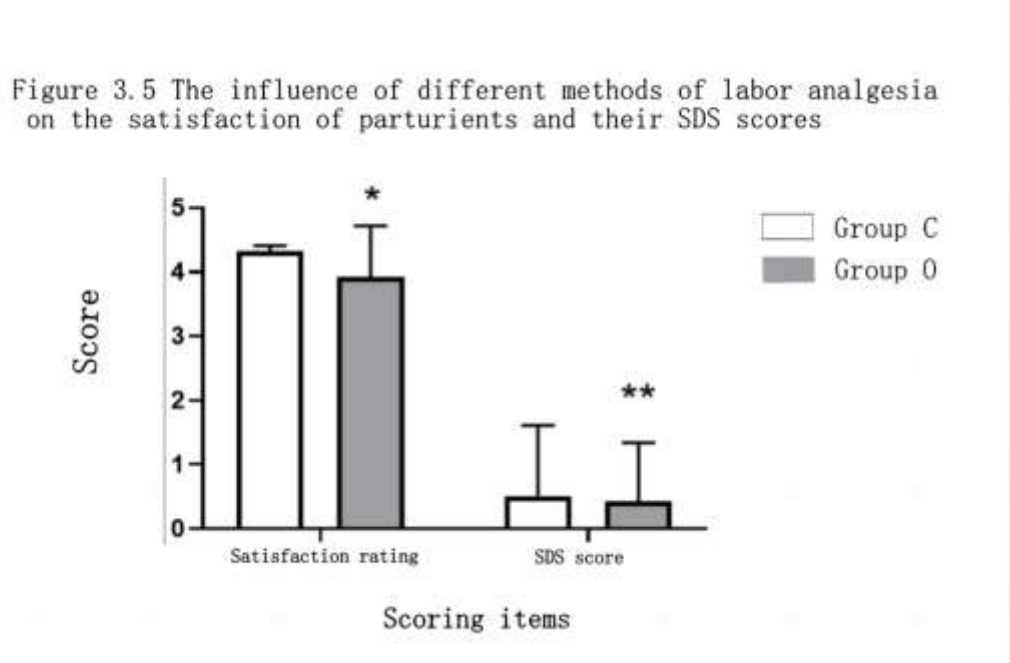


Figure 3.5 Effects of the different methods of labour analgesia on maternal satisfaction and maternal SDS

Note: **P<0.01 and *P<0.05 for comparisons between groups.

Group O: acupoint injection combined with epidural analgesia group; Group C: epidural analgesia group.

Discussion

Labour pain is a type of acute physiological pain. The increasing pain and tension during labour can lead to not only maternal and infant complications, such as elevated maternal plasma catecholamine levels, prolonged labour, foetal distress, and increased caesarean section rates, but also excessive psychological stress, resulting in a significant increase in the incidence of adverse events, such as postpartum depression[12-13]. Perinatal humanistic care centred on labour analgesia embodies reproductive civilisation and respect for individual life. Although epidural labour

analgesia is currently the gold standard for clinical pharmacological labour analgesia, it still has shortcomings. According to the tenets of traditional Chinese medicine, appropriate stimulation of the corresponding acupoints on the human body can play a role in promoting qi and blood circulation, dredging the meridians and changing the state of qi and blood circulation in the diseased area to relieve or prevent pain. The Sanyinjiao point, used in this study, is a commonly used acupoint for assisting labour and analgesia in traditional Chinese medicine; it is an acupoint of the foot-taiyin and spleen meridians and is a point of convergence of the foot-three-nyin meridians. Hegu is the original point of the handyangming meridian, which has the effects of regulating qi, moving blood, regulating qi and catalysing labour. The applied acupoint injection therapy is an innovation and development of traditional Chinese medicine therapy, and some studies [14-15] have shown that Hegu and Sanyinjiao acupoint injection of ropivacaine can improve the shortcomings of the previous acupoint injection of 0.9% sodium chloride solution, which had a briefer analgesic effect, by significantly relieving the pain stimulated through the maternal labour process.In this study, 100 qualified primigravid women were randomly divided into two groups, Group O and Group C, after the inclusion and exclusion criteria were met; ultimately, 40 patients in each group were subjected to clinical observation. When maternal baseline data, including age, body mass index, maternal gestational week, neonatal birth weight and other general conditions, were compared between the two groups, the differences were not statistically significant, indicating that these observation data were comparable. The factors affecting labour pain are complex and may include both physiological and psychological factors. Therefore, the variables used to set the baseline comparison between the groups need to be further refined to exclude any subjective and objective factors affecting labour pain as much as possible and to make the results more reliable.

In terms of the VAS score of labour analgesia, the difference in the scores at T_0 and T_1 was not statistically significant, which further indicates that acupoint injection has a "triple effect": Acupuncture injection has three kinds of effects: ① immediate effect, which occurs within minutes or hours after the needle insertion, mostly due to the local stimulation caused by the needle insertion and the injection of drugs; ② delayed effect, which can appear within several hours to one day after the treatment, and is related to the biochemical reactions between the drugs and the local area of the acupoints; and③ after-effect, which is achieved by mobilizing and restoring the patient's own regulatory function on the basis of the above two effects. The mechanism is mostly due to the local stimulation caused by acupuncture and drug injection. A significant difference in the VAS score was not measured at T1, which may be related to the incomplete effect of acupoint injection, but further research is needed to determine the onset of the effect. The VAS scores at T2 and T3 of the observation group were significantly lower than those of the control group ($P<0.05$), demonstrating that acupoint injection of ropivacaine enhances epidural labour analgesia. Ropivacaine meridian points have a special synergistic effect, significantly enhancing the analgesic effect of ropivacaine, and the effect is long-lasting.The clinical effect of 0.2% ropivacaine injected into the upper limb Hegu acupoint and the lower limb Sanyinjiao acupoints derived from the dual effects of the acupuncture itself and the drugs, which stimulate the release of the endogenous morphine-like substances endorphin and dynorphin through acupuncture, exerting a specific analgesic effect[16]. The acupoint injections also have an amplifying effect, which further strengthens the analgesic effect of the acupoint injections of ropivacaine. In this study, a statistical comparison of the dosage of ropivacaine between the two groups revealed that the dosage of epidural ropivacaine and the amount of patient-controlled PCEA epidural drugs used in Group O

were significantly lower than those used in Group C. No difference in the total dosage of ropivacaine administered was observed between the two groups, indicating that the effect of acupoint injections was significantly greater than that of epidural application by changing the route of drug administration without any difference in the total amount. This result is consistent with the theory of acupoint injections: the drug's fast onset of effect and effect enhancement is equal to or even greater than the effect of an intravenous injection at the same dose and significantly stronger than the effect of subcutaneous or intramuscular injection[17]. This study revealed that acupoint injections can be a worthwhile therapeutic choice when the acupoints and the drugs are properly matched. With a fixed concentration of the epidural drugs ropivacaine and fentanyl, the amount of epidural fentanyl was reduced at the same time that the amount of epidural local anaesthetics was reduced, reducing the possibility of other adverse effects due to an increased fentanyl dosage.

The epidural block employed for Group O, combined with low-concentration ropivacaine acupoint injection, did not result in significant differences (P>0.05) between the two groups in terms of maternal Bromage scores, the number of patients using oxytocin during labour, and newborn's Apgar scores at 1 min and 5 min, suggesting that the composite acupoint injection had no significant effect on the epidural block during labour. Furthermore, neither analgesia method had a significant effect on either lower limb muscle strength or contractions in women, which is consistent with the findings that the application of ropivacaine during labour does not result in side effects reported in previous experiments obstetric anaesthesia or labour analgesia[18]. The present clinical observations revealed no difference in the Apgar score, a routine index for assessing neonates at birth, indicating that the ropivacaine acupoint injection applied in this study had no

significant effect on neonates, can be safely used for labour analgesia, and can be used as a beneficial supplement to epidural block for labour analgesia.

In this study, we found that the total duration of labour and postpartum haemorrhage were lower in Group O than in Group C. These findings further suggest that acupoint injections improved the course of labour in women undergoing labour analgesia with epidural block and contributed positively to the improvement in the maternal outcomes. The possible reason for these beneficial effects is that the acupoint injection of ropivacaine can significantly inhibit the increase in the cortisol concentration in maternal blood[19], as a high concentration of cortisol in the body can lead to a decrease in uterine blood flow and weak uterine contractions[20], which can lead to prolonged labour and increased uterine haemorrhage in the postpartum period. Other studies have shown that acupuncture at the Sanyinjiao point can significantly increase the number of uterine contractions, shorten the second stage of labour, and exert a specific analgesic effect[21]. Studies have shown[22] that, according to ancient Chinese acupuncture theory, female fertility and reproductive dynamic balance depend mainly on the abundance and coordination of qi and blood, which are closely related to organs such as "spleen", "liver" and "kidney". Multiple studies have confirmed that application of a specific pressure to any of the above points (including SP6 and LI4) has a definite effect during labour[23-29], and the results of the present study yielded similar results.

In this study, the number of cases of other adverse reactions during labour analgesia, such as headache, urinary retention, and epidural-related maternal fever (ERMF), were not significantly different between Group O and Group C (P>0.05). These results provide further evidence of the safety of acupoint injection for labour. The evidence indicates that effective stimulation of the foot-sanli (ST36) acupoint, whose stimulation can regulate the neural-immune-endocrine network, can

produce immunomodulatory and anti-inflammatory effects; however, in this study, no significant improvements in the common adverse effects of epidural labour analgesia (low-concentration loperamide combined with low-dose opioid), such as headache, itchiness, urinary retention, and epidural-associated maternal fever (ERMF), among others, were observed following acupoint injection. Although a growing number of animal model studies suggest that acupuncture stimulation may induce the generation of an organism-wide anti-inflammatory response [30-31], the present study did not confirm that acupoint injections had an ameliorating effect on ERMF, which may be related to the small sample size. Further studies are warranted to address this issue.

In this study, maternal satisfaction with epidural labour analgesia combined with ropivacaine acupoint injection was significantly optimised according to the postpartum depression scale results.We concluded that maternal satisfaction with the analgesic effect was associated with the analgesic effect itself, whereas the depression scale score within 1 day after delivery was correlated with the maternal satisfaction with labour analgesia score. Acupuncture point injections can regulate the body's endocrine and neuroimmune systems, block or attenuate the transitional stress response caused by labour pain stimuli, and maintain the stability of the maternal internal environment[32-36]. Current research suggests that many neuropathological mechanisms are related to inflammation, including postoperative cognitive dysfunction and Alzheimer's disease[37]; activation of microglia within the CNS may be one of the pathogenetic mechanisms underlying POCD and AD, whereas experimental studies have confirmed that acupoint stimulation can inhibit the activation of microglia[38] and improve inflammatory responses. Ropivacaine acupoint injection combined with epidural labour analgesia may be a way to reduce or delay the onset and development of these diseases through a neuro-psychosocial model, which provides new ideas for

the prevention and treatment of postpartum depression.

In conclusion, the intraacuppoint (Hegu and Sanyinjiao) injection of ropivacaine in the two groups selected in this trial increased the effect of epidural labour analgesia while reducing the dosage of epidural ropivacaine, and it had no significant effect on lower limb movement, contractions, or the overall outcomes of the mothers and neonates. In addition, the acupoint injection of ropivacaine can shorten the duration of the total delivery process and reduce the amount of maternal haemorrhage; it does not produce significant adverse reactions compared with epidural analgesia alone (the control treatment). Moreover, compared with the epidural analgesia group (control group), the combined treatment group did not experience additional significant adverse effects but had improved scores on the postpartum depression scale; thus, acupoint (Hegu and Sanyinjiao) injection could improve the effect of epidural labour analgesia, suggesting that it is an effective supplement that can significantly improve maternal satisfaction. The technique is easy to perform and inexpensive and is worthy of clinical promotion and use.

Declarations

Ethics approval and consent to participate：

This study was performed in line with the principles of the Declaration of Helsinki. This study was approved by the Ethics Committee of the hospital (Ethical Approval No. LL-2023-10-07).Informed consent was obtained from all individual participants included in the study.

Consent for publication：

Not applicable

Availability of data and materials：

The datasets generated and/or analyzed during the current study are not publicly available. Requests for access to the data should be made to the corresponding author based on reasonable grounds. The corresponding author will evaluate the validity of the request and provide the necessary data support in compliance with relevant regulations.

Competing interests：

The authors have no relevant financial or non-financial interests to disclose.

Funding：

This work was supported by Zhejiang Province Medical and Health Science and Technology Programme Project and The Construction Fundof Key Medical Disciplines of Hangzhou (Grant numbers [2024KY1745] and [Anesthesia and Pain MedicineOOO20200484]).

Authors' contributions：

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Hao Lv , Fangfang Luo , Chen Wang, Xinlei Lu , Weiping Lei , Yaqin Huang.The first draft of the manuscript was written by Jinjin Jiang and all authors commented on previous versions of the manuscript. Additionally, Shanfeng Ye, Yuan Cheng and Jianliang Sun ensure the accuracy and integrity of the work, verifies adherence to ethical guidelines (e.g., informed consent, institutional approvals), and confirms that all co-authors have

reviewed and approved the final manuscript. All authors read and approved the final manuscript.

Acknowledgements:

There are no conflicts of interest to declare regarding this work.

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Acknowledgments:

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Lv Hao, Luo Fangfang, Wang Chen, Lu Xinlei, Lei Weiping, Huang Yaqin.The first draft of the manuscript was written by Jiang Jinjin and all authors commented on previous versions of the manuscript. Additionally, Ye Shanfeng , Cheng Yuan and Sun Jianliang ensure the accuracy and integrity of the work, verifies adherence to ethical guidelines (e.g., informed consent, institutional approvals), and confirms that all co-authors have reviewed and approved the final manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The study was approved by the Ethics Committee of Shaoxing Shangyu Maternal and Child Health Care Hospital (Approval No.LL-2023-10-07). Written informed consent was obtained from all individual participants included in the study.

Supporting information:

Figure 1:



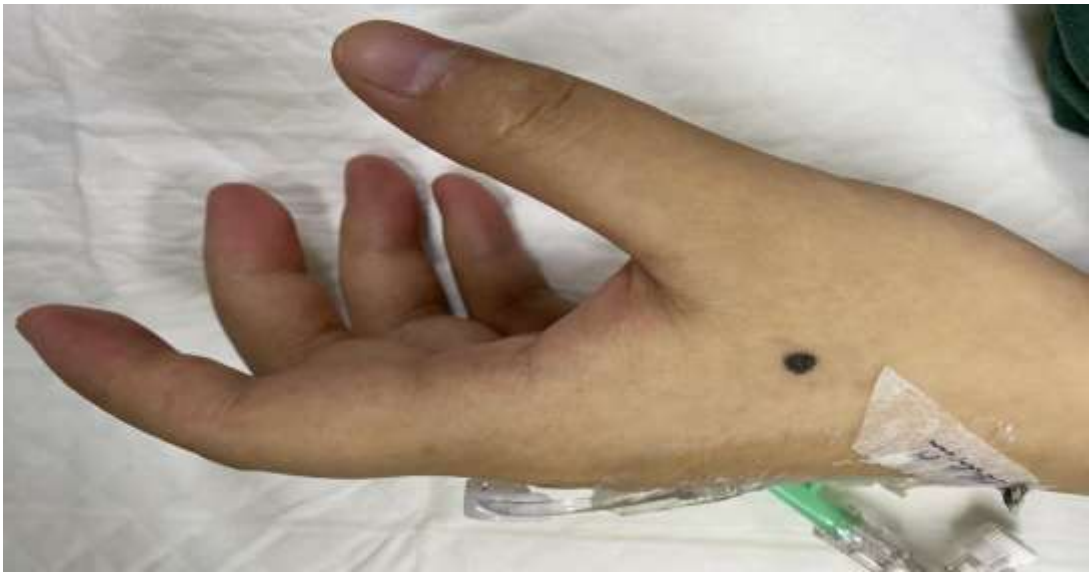
Location of Sanyinjiao Point

Figure 2:



Injection at the Sanyinjiao Acupoint

Figure 3:



Location of Hegu Point

Figure 4:



Injection at Hegu Point