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Original Research

EFFECTIVENESS OF CONTINUOUS EPIDURAL ANALGESIA BY BUPIVACAINE 0.1% COMBINED WITH FENTANYL FOR PAIN ATTENUATION DURING LABOR AT HUE CENTRAL HOSPITAL

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ABSTRACT

Introduction: *Epidural analgesia was an extremely effective and popular treatment for labor pain. This study aimed to assess the effectiveness and safety of combinational use of bupivacaine 0.1% and fentanyl in epidural anesthesia for pain relief during labor.*

Methods: *A cross-sectional descriptive study was conducted on 270 parturients who required epidural anesthesia for pain relief during labor. All parturients received 06ml epidural solution of bupivacaine 0.1% with fentanyl (30µg). After 10 minutes, continuous epidural infusion (CEI) at 6 ml/h with bupivacaine 0.1% + fentanyl (2µg/ml). Extra boluses of 6ml solution of (bupivacaine + 0.1% fentanyl (2µg/ml) when VAS (Visual Analog Scale) score >6 points. Measured variables included total bolus requests, pain Visual Analog Scale (VAS), modified Bromage scores, labor duration, delivery outcome, and maternal satisfaction after delivery.*

Results: *The average analgesia induction was 4.32 ± 0.58 minutes. VAS score ≤ 3 points: 88.52% of parturients, VAS score = 3-6 points: 8.52% of parturients (1 rescued bolus) and VAS score> 6 points 2.96% of parturients (2 rescued bolus). There were (208/270) 77.04% with normal labor. The average labor pain relief time was 161.98 ± 46.58 minutes. Side effects were as follows: Feeling numb in the leg (but still able to move): 8.15%; transient chills: 3.33%; nausea: 2.96%, itching: 1.85%. There were no cases of headache, hypotension, arrhythmia, respiratory failure and dural puncture. The average Apgar score at the 1st minute was 8.35 ± 0.24 and at the 5th minute was 8.79 ± 0.07, without cases of asphyxia. Regarding maternal satisfaction, very satisfied and satisfied levelsoccupied 74.04% and 25.96%, respectively.*

Conclusion: *In our study, continuous epidural analgesia by combinational use of bupivacaine 0.1% and fentanyl(2µg/ml) provided effective labor pain relief, hemodynamic stability, and normal neonatal outcomes.*

Keywords: *Labor pain relief,epidural anesthesia, continuous epidural infusion -CEI.*

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I. INTRODUCTION

Labor was a physiological process that occurred naturally. A woman‘s vocation was to give birth. However, research revealed that two-thirds of pregnant women‘s pain during childbirth was extremely painful, involuntary agony that the mother must bear. Labor pain was now acknowledged to influence the mother‘s body, anxiety, tiredness, and the fetus. Pain can also make labor more difficult and complicated, especially if the mother is psychologically ill and has a low tolerance for pain. When the pain is under control, women may find it easier to give

birth naturally [1]. Therefore, pain relief during labor was critical. There are currently several methods for relieving labor pain; each method has advantages and disadvantages;among them, the continuous epidural infusion was the most effective form of pain relief in labor [2]. Because of the benefits of delivering continuous analgesia and the mother to be awake, alertand comfortable in labor and childbirth (mobility and pushing during labor), continuous infusion of local anesthetic into the epidural space for labor pain relief has become popular [3]. The postpartum period was less stressful, and the mother healed rapidly, resulting in a shorter hospital stay. Thus, labor pain relief with continuous epidural anesthetic was critical for addressing three medical, economic, and psychological issues. We conducted this study to determine the level of labor pain alleviation by infusion of a bupivacaine 0.1% and fentanyl (2 g/ml) mixture in the epidural space, and determine the side - effects of the procedure.

II. MATERIALS AND METHODS

2.1. Subjects

Inclusion criteria: Pregnant women aged 18-40, full-term fetuses with normal development; there were indications for epidural anesthesia, with a written consent form for epidural analgesia for labor pain relief; obstetrically, there were indications for natural birth.

Exclusion criteria: abnormal fetal position: transverse, breech or facial; oligohydramnios or polyhydramnios; placenta previa, placental abruption; fetal heart failure, preterm or overdue fetus; abnormal uterine contractions or abnormal progress of labor. Pregnant women were suffering from mental illnesses and lack of collaboration. Have had a pre - history of cesarean section or uterine fibroids excision.

The research was conducted at the Department of Anesthesia and Resuscitation A, Hue Central Hospital, from June 2021 to April 17, 2022.

2.2. Methods

A cross-sectional descriptive study was conducted on 270parturients who required epidural anesthesia for pain relief during labor

Equipment serving for study:

- Monitoring: Keep track of your pulse, blood pressure, and SpO2
- Monitoring fetal heart rate and uterine contractions (Figure 1)
- Electric syringe, 50ml, 10ml, 5ml, 1ml syringe.
- Continuous epidural anesthesia kit (Figure 2)
- Local anesthetic: Bupivacaine 0.5% 100 mg in 20ml

Figure 1: Fetal Heart Monitoring

Figure 2: Epidural continuous infusion kit

Epidural anesthesia procedure:

- Preparing the pregnant woman before the epidural anesthesia procedure: The obstetrician and anesthesiologist examined the pregnant woman to determine if she was eligible for labor analgesia and explained to her the benefits and adverse effects of this method understand and cooperate. Insert an intravenous line.
- Implementing the continuous epidural infusion technique: Anesthesia moment: 3 cm dilated cervix. Performing epidural anesthesia [4].

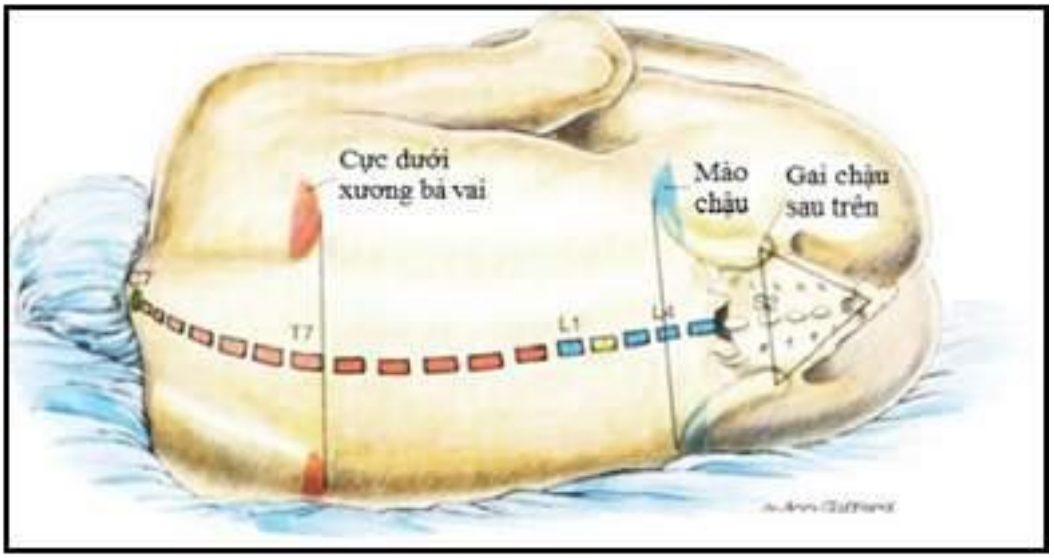

Figure 3: Lying on the side with the back arched. Needle insertion site: L3-4; if difficult, look for L2-3. The "loss of resistance" technique, air/saline test to identify the epidural space, is used to determine the epidural space. Insert the catheter 3 - 5 cm toward the mother's head into the epidural space.

Table 1: How to mix and adjust anestheticsfor labor pain relief [4]

Volume of anesthetic required	Mixing anesthetic and solution concentration
Test dose: Required, 02 ml	2.1ml: 2ml Lidocaine 2%; 10µg Adrenaline (adrenaline 1mg mix 10ml) 0.1ml= 10µg
Bolus dose: 5 minutes after test dose. 06 ml (bupivacain 0,1% + fentanyl 30µg)	10 ml: 2ml Bupivacain 0,5%; 1ml Fentanyl (50µg); 7ml NaCl 0,9% (bupivacain 0,1% and fentanyl 5µg/ ml)
Maintenance dose: 10 minutes after bolus dose Infusion through an epidural catheter 06ml/h Bupivacain 0,1% + fentanyl (2µg/ml)	50 ml: 10ml Bupivacain 0,5%; 2ml Fentanyl (100µg); 38ml NaCl 0,9% Solution (*): (bupivacain 0,1% + fentanyl 2µg/ml)
Rescue dose: Bolus 06 ml Solution (*) when VAS score > 6 points	
Dose of abortion and perineal suture: 08ml solution (*)	

Data collection and follow-up after epidural anesthesia.

- Indicating the assessment time: Before anesthesia starts. Every 5 minutes after anesthesia inductionfor 30 minutes. During labor: Stage II. When the cervix was completely open. During the episiotomy procedure.
- Monitoring: Heart rate, blood pressure and SpO2.
- Monitoring analgesia quality: Determine the time of anesthesia induction (minutes). Analgesic effectiveness evaluation: VAS scale:

+ No leg numbness when VAS ≥ 5 or face ≥ 2 was used. 2ml/h increase in maintenance dose.

+ No leg numbness when VAS ≥ 7 or face ≥ 4 was used. 5ml rescue dose bolus; repeated after 5 minutes of assessment. When the VAS is ≤ 2 or the face was ≤ 1; reducing the daily maintenance dose to 2ml/h. If both legs were numb, temporarily stopped the maintenance dose until the numbness in both legs went away. If the woman was still in pain, or because of an incorrectly placed epidural catheter, or inconvenient obstetric evolutions.

Figure 4: VAS ruler measuring pain intensity

- According to Bromage scale, monitor motor blockage:

M0: no paralysis (0%); M1: Straightening the legs without lifting them off the tabletop (25% inhibition); M2: The knee unable to bend, but the foot can move (50%); M3: Completely failed to flex foot and thumb (100%)

There is a loss of movement if the lower extremities are numb. M ≥ 1. Reduce the maintenance infusion dose or temporarily suspend the maintenance of local anesthetic until the woman can move again.

M=3 if all movements are lost. Stop local anesthetic injection and consider inserting a catheter into the subarachnoid space.

- Labor monitoring: Check the fetal heart rate and uterine contractions. Infusion of oxytocin: As directed by the obstetrician. When labor is "adverse," an emergency cesarean section is performed.

- Determine the infant's condition using the Apgar score at 1 and 5 minutes [5]: 3 points for severe asphyxia and active resuscitation. Asphyxia of 4-6 points: Mild to moderate. 7 points: Excellent condition, no asphyxia.

- Examination of unfavorable effects: Pruritus is classified into three levels: pruritus, rash, and papules. Nausea and vomiting, dural puncture causes headaches. An arrhythmia occurs when systolic blood pressure falls by more than 20% from baseline.

- Assessing pregnant women's satisfaction through interviews: Very satisfied, satisfied, and dissatisfied

2.3. Data analysis

SPSS 20.0 software was used for data processing. Using the student's t-test to compare two means (quantitative with normal distribution). Using Mann-Whitney, compare two means (quantitative, not normally distributed).Use the $\chi 2$ test to compare the proportions of qualitative variables. The difference is statistically significant at p=0.05.

III. RESULTS

3.1. Research subject characteristics

Table 1: Maternal age, height, and weight

N=270	Min - Max	$\overline{X}$ ± SD
Age (year)	21 – 38	26,94 ± 4,28
Height (cm)	149 – 170	156,26 ± 4,71
Weight (kg)	48 – 78	59,36 ± 6,86

The average age was 26.94 years old, which fell within the reproductive age range. The dose of local anesthetic was related to a mean height of 156.26cm and a mean weight of 59.36kg.

Table 2: The study's proportions of first, second, and third children

Number of births	Amount	%	p
First child	194	71,85	< 0,01
Second child	64	23,70	
Third child	12	4,45	

The rate of the first-born childin the study was 71.85%, while the rate of the second child was 28.15%;there was a statisticallysignificant difference. The high first–born child rate was related to a longer mean labor time.

Table 3: Birth weight and gestational age

	Min - Max	$\overline{X}$ ± SD
Gestational age (weeks)	38 – 41	38,64 ± 0,71
Birth weight (grs)	2700 – 3800	3124,02 ± 325,86

Normal labor was associated with a mean gestational age of 38.64 weeks and a mean gestational weight of 3124.02g. The greater the weight, the more difficult it was to give birth.

3.2. Result of labor pain relief

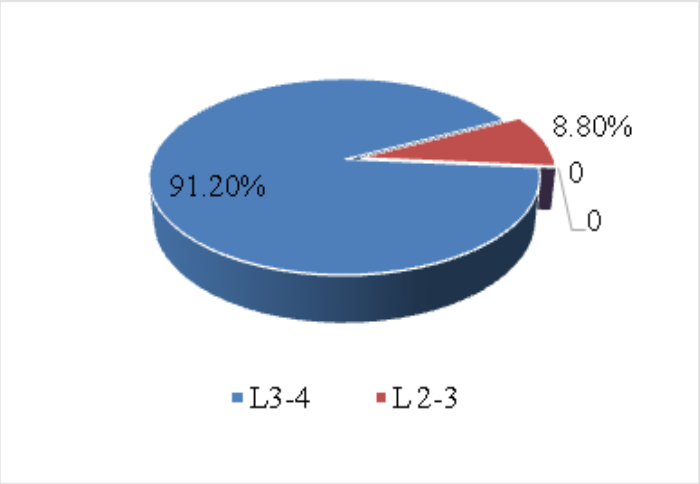

Chart 1: Epidural anesthesia location

The needle insertion site at L3-4 for epidural analgesia accounted for 91% of all cases and was the best site for labor epidural analgesia.

Table 4: The distance between the skin and the epidural space, as well as the length of the catheter insertion into the epidural space

Distance (cm)	Min - Max	$\overline{X}$ ± SD
From the skin to the epidural space	3,2 – 4,8	4,17 ± 0,32
Catheter length inserted into the epidural space	3,0 – 5,0	4,37 ± 0,53

The average distance between the skin and the epidural space was 4.17±0.32cm. The catheter's average length inserted into the epidural space was 4.37±0.53cm, making it suitable for the needle puncture site at the L3-4.

Table 5: Cervical dilation during epidural anesthesia

Tổng	First child	The following child	P
	Min – Max **$\overline{X}$ ± SD**	**Min – Max** **$\overline{X}$ ± SD**	
Cervical dilation during epidural anesthesia (cm)	3 – 5 3,25 ± 0,42	3- 6 4,88 ± 0,86	< 0,05

The mean cervical dilation of women giving birth to their first child wassignificantly less than that of their following child, p < 0.05.

Table 6: Mean time of anesthesia induction in the study

	Min – Max	$\overline{X}$ ± SD
Time of anesthesia induction (minutes)	4 – 7	4,32 ± 0,58

The average anesthesia induction time was 4.32 ± 0.58 minutes, with the longest time till 7 minutes.

Table 7: Change in VAS score in labor

	Min – Max	$\overline{X}$ ± SD	P
Before epidural anesthesia	5 – 9	7,12 ± 1,08	< 0,01
After 5 minutes	2 – 7	3,34 ± 0,98	
After 10 minutes	1 – 5	2,18 ± 0,72	
After 15 minutes	0 – 4	1,82 ± 0,75	
After 20 minutes	1 – 5	1,34 ± 0,75	
After 25 minutes	0 – 4	1,14 ± 0,73	
After 30 minutes	0 – 5	1,20 ± 0,76	
When the cervix completely open	1 – 6	3,42 ± 1,16	
Phase II	1 – 5	3,26 ± 0,90	
Performing procedure	1 – 5	3,07 ± 1,22	
Uterin check and uture perineal	1 – 4	2,04 ± 0,84	

The difference was statistically significant when comparing the average VAS score before and after epidural anesthesia (p<0.01). At all stages of labor, the mean VAS score after epidural anesthesia was <4 (no pain or little pain).

Table 8: VAS-based efficacy rate of continuous epidural analgesia

N = 270	Amounts	Percentage
VAS ≤ 3 incontractions	239	88,52
3 < VAS ≤ 6	23	8,52
VAS score> 6 points dose adjusted	08	2,96

The rate of epidural anesthesia with good pain relief VAS≤3 points is 88.52%. Women with at least 01 VAS>3-6 required 1 rescue bolus, while VAS>6 required 2 rescue bolus. There were two cases (0.74%) in which an epidural catheter could not be placed (not included in the study).

Table 9: Time of labor with epidural analgesia

Tổng	First child	The following child	P
	Min – Max X ± SD	Min – Max X ± SD	
Labor time (minutes)	60 – 540 185,26 ± 89,37	30 - 350 136,94 ± 56,52	< 0,05

The average labor time for the first child was longer than for the second child with p<0.05

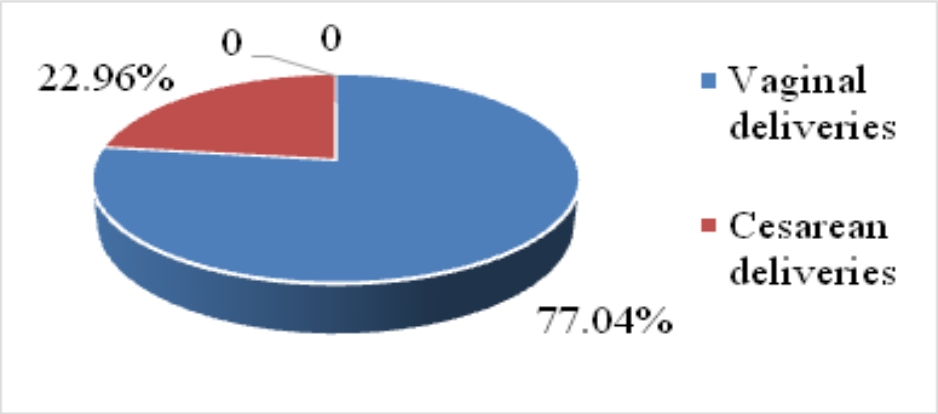

Chart 2: Pain relief percentage in vaginal and cesarean deliveries

The normal birth rate is 208/270, which accounts for 77.04% of all births. Because of the study's high birth rate.

Table 10: According to Bromage in the study, the degree of motor paralysis

N = 270	N	%
M0: no paralysis	248	91,85
M1: Inability to raise the extended leg	22	8,15
M2: Inability to flex the knees, able to move the feet only	0	0
M3: Inability to flex the ankle and digits	0	0

The pregnant women were completely normal, with no lower extremity weakness accounting for 91.85% and a sensation of heaviness and numbness in the legs accounting for 8.15%.

Table 11: The ability of the mother to push to give birth

N= 208	Amounts	%
Very good	163	78,37
Good	41	19,71
Weak	04	1,92

The ability to push birth is very good at 78.37% due to no or little inhibition of movement.

3.3. Adverse: Drug Reactions

Table 12: Epidural anesthesia's effect on contractions and contraction pressure

Tổng	Frequency	Pressure	P
	$\overline{X}$ ± SD Times/10 minutes	$\overline{X}$ ± SD mmHg	
Before anesthesia	2,64 ± 0,56	61,24 ± 15,56	> 0,05 < 0,05
After 5 minutes	2,68 ± 0,71	62,28 ± 17,60	
After 15 minutes	2,84 ± 0,62	63,04 ± 14,74	
After 30 minutes	3,04 ± 0,75	62,88 ± 13,63	
The cervix is completely open	4,02 ± 0,84	80,40 ± 8,86	
Phase II	4,02 ± 0,84	83,34 ± 9,26	

The difference in uterine contraction pressure and contractions before and after anesthesia (before the cervix is fully dilated) is not statistically significant (p>0.05). The frequency and pressure of uterine contractions increased with cervix opening and the second stage of labor, p<0.05.

Table 13: Adverse Drug Reaction on Pregnant woman

Research targets	Amount	%
Normal	248	91,86
Chills	9	3,33
Nausea	8	2,96
Itching	5	1,85
Headache	0	0,0
Perforation of the dura mater	0	0,0
Hypotension	0	0,0
Heart arrhythmia	0	0,0
SpO2 < 95%	0	0,0

Side effects are minimal due to the low concentration of local anesthetic (diluted 5 times). There were no cases of hypotension, arrhythmia, or headache.

Table 14: Change in fetal heart rate during labor (beats/minute)

	Min – Max	$\overline{X}$ ± SD	P
Before anesthesia	137 – 154	139,14 ± 6,28	> 0,05
After 10 minutes	131 – 159	141,84 ± 8,61	
After 20 minutes	132 – 162	142,52 ± 8,20	
After 30 minutes	129 – 163	142,92 ± 6,35	
The cervix is completely open	125 – 156	141,48 ± 6,60	
First minute after birth	132 – 155	141,58 ± 6,07	

The change in fetal heart rate before and after anesthesia was not statistically significant, p>0.05.

Table 15: Apgar Scores of Infants First Minute and 5 Minute

	Min	Max	$\overline{X}$ ± SD
First Minute	7	9	8,35 ± 0,24
After 5 minutes	8	10	8,79 ± 0,07

Average Apgar > 8, none < 7 (Asphyxia, respiratory failure).

Table 16: Determine pregnant women's level of satisfaction.

Satisfaction level	208 Natural childbirth		62 Caesarean	
	SL	%	SL	%
Very satisfied	154	74,04	28	45,16
Satisfied	54	25,96	34	54,84
Unsatisfied	0	0,0	0	0,0

The rate of very satisfied and satisfied is high, and there have been no cases of dissatisfaction, including women who had a difficult labor and were delivered by cesarean section.

IV. DISCUSSION

4.1. Subjective characteristics of research subjects

The study's pregnant women had an average age of 26.94 4.28 years. That is the woman's childbearing age, according to Do Van Loi's research (26.6±4.2; 28.1±4.2; 27.2±4.7; 26.7±4). Chora, Hussain is 26.2 24.9 years old [6] and some other authors Chora, Hussain is 26.2±4.9 years old [7].

The average height of the participants in the study was 156.26 4.71cm. Similar to Do Van Loi's findings (157.97 ± 4.25; 157.43 ± 4.33; 158.11 ± 5.01; 157.51 ± 4.48 cm) [6]. Because the height of the mother is related to the dose of local anesthetic used during epidural anesthesia, the dose of anesthetic used in our study is equivalent to the above authors.

In the study, the average weight was 59.36 6.86kg. Author Tran Thi Kiem's similar research results are 60.90 ± 4.77 kg [8].

Gambling et al's study on European pregnant women with average height (160 ± 1.6 cm) and weight (71 ± 3.2 kg) [9] was larger than our study, so the dose numbness in the author's study was greater than in our study.

The study found that 71.85% of women gave birth to their first child and 28.15% gave birth after (the second child was 23.7% and the third child was 4.46%). The rate of first-born birth was 79.3% [11], similar to Nguyen The Loc's research results and higher than Do Van Loi's research results, who gave birth to the first child of four groups at 58.9%, 55.6%, 55.6%, and 68.9%. In our study, the rate of the first child is 3.5 times higher than that of the second child.

Our study's average gestational age was 38.64 ± 0.71 weeks. Fetal weight is one of the factors associated with the possibility of pregnancy and the mother's level of pain. The study's mean fetal weight was 3124.02 ± 325.86 grams, with the smallest being 2700g and the largest being 3800g. This result is equivalent to Do Van Loi's research result (3200 ± 330; 3190 ± 2300g) [6].

4.2. Evaluation of the pain relief results of pregnant women in labor

In our study, the anesthetic site was mostly at the intervertebral fissures L3-4 (91%) and L2-3 (9%). Similar to Do Van Loi (L3-4 is 94.4%) [6,] and higher than Tran Thi Kiem (L3-4 is 86.7%) [8]. Anatomically, the L2-3 and L3-4 intervertebral slits are the largest, making it simple to perform, avoiding technical complications, and ensuring pain relief from T10 to S4.

Needle Tuohy has a line (9cm) that makes it easy to determine the depth of the needle during epidural anesthesia, through which we can determine how many centimeters the catheter has been inserted. Our study's distance from the skin to the epidural space was 4.17 ± 0.32cm (3.2 - 4.83cm). The catheter's length in the epidural space is 4.37 ± 0.53 cm. This result is comparable to Doan Trung Quyen's research (3.92 ± 0.53cm) [12].

Cervical dilation during epidural anesthesia: According to our findings, epidural anesthesia with

the cervix dilated 3 cm corresponds to a lot of pain and a lot of pain. With $p < 0.05$, the mean cervical dilation of pregnant women (3.25 ± 0.42 cm) was less than that of women giving birth (4.88 0.86 cm). Do Van Loi's cervical dilation (3.26 ± 0.55; 3.21 ± 0.49 cm) [6].

Effective labor pain relief: According to our study findings, the average induction time was 4.32 ± 0.58 minutes, with the fastest being 04 minutes and the slowest being 07 minutes. Doan Trung Quyen's study with ropivacaine lasted 4 to 8 minutes [12]. The time to begin analgesia was 9.40 ± 2.37 minutes [7] for Chora I. and Hussain A.

Before anesthesia, the average VAS score of pregnant women in the study was 7.12 ± 1.08. (the lowest was 5, the highest was 9 points: severe and very painful). After 5 minutes of epidural anesthesia, the mean VAS score dropped to 3.34 ± 0.98 points (no pain or mild pain). The remaining stages of labor all had an average VAS score of 4. The mean pain score after epidural anesthesia with bupivacaine 0.1% was statistically significantly lower than the pain score before epidural anesthesia, with $p<0.01$. According to Tran Van Quang's research, 100% of pregnant women with moderate to severe pain before anesthesia had moderate to severe pain, and the average VAS score ranged from 6.10 to 6.27. After anesthesia, the range is 0.57 to 1.73 in stage I, 1.63 to 2.57 in stage II, and 1.03 to 2.70 in stage III [13]. Similar to the findings of Doan Trung Quyen [12].

Effectiveness of continuous epidural analgesia in labor: According to Table 9, there are 239 women with pain score VAS≤3 accounting for 88.52%, VAS from 3-6 with 23 women (8.52%), we used a rescue dose of 5ml bolus of bupivacaine 0.1% solution + fentanyl (1g/ml), after 3-5 minutes, the VAS score decreased to ≤3 (mild pain), and VAS > 6 had 08 women (2, 96 Furthermore, in the study, 2cas (0.74%) were unable to have an epidural catheter (not included in the study). According to Do Van Loi, 44.7% of pregnant women have at least one VAS > 4 while in labor. As a result, some women experience significant pain during labor, but this is only temporary because the pain in labor gradually increases until the cervix is fully dilated. As a result, the dose of continuous infusion via electric syringe varies with each woman, and at each stage of labor, rescue doses must wait a while to have an analgesic effect.

Pain relief time in labor from epidural to umbilical cord clamping: The first child's labor time (185.26 ± 89.37 minutes) was longer than the second child's (136.94 ± 56.52 minutes) with $p<0,05$. In which the first child's time is 30 minutes and the second child's time is 540 minutes (9 hours). Chora I. et al. found that the average duration of analgesia in labor was 258.00 ± 137.56 minutes [7].

Analgesia rate in normal labor: There were 208/270 (77.04%) normal labor and 62/279 (22.96%) adverse labor by cesarean section in the study. In the Do Van Loi study, the cesarean section rate ranged from 2.2% to 6.7% [6], while in Doan Trung Quyen, the cesarean section rate varied between 8% and 10% [12]. The rate of cesarean section in our study was higher than in Do Van Loi's study, possibly because our study had a higher birth rate (71.87% versus 58.9%). Because the study subjects were pregnant women who gave birth, Tran Van Quang's study found that 100% of pregnant women gave birth normally [13].

Adverse Drug Reaction: The concentration of local anesthetic may affect the effect of analgesia on labor. A large total dose of local anesthetic can inhibit maternal motility, resulting in abdominal muscle relaxation that can effectively reduce maternal pushing if the concentration of local anesthetic is high [3]. In our study, there were 22/270 (8.15%) pregnant women who felt heavy numbness in their legs but could still move (M1), 248/270 (91.85%) of the women were completely normal, and there were no cases of loss of lower extremity movement. As a result, women's ability to push birth was quite good in the study, with 163/208 (78.36%) pushing very well, 41/208 (19.71%) pushing well, and 4/208 (1.92%) weak delivery. The study by Tran Van Quang compared labor analgesia with three different concentrations of levobupivacaine (0.0625%, 0.1%, and 0.125%) but the same volume. The results showed that levobupivacaine 0.125% caused little or no desire to push (43.4%) when compared to levobupivacaine 0.1% (20%) and levobupivacaine 0.0625% (6.7%). [13].

For spontaneous labor, the average frequency of contractions was 2.64 0.56 times/10 minutes prior to induction of general anesthesia. The labor force is pushed after analgesia for about 5 minutes, 15 minutes, and 30 minutes until the cervix is fully opened, and the frequency of uterine contractions

increases to ensure physiological for normal labor. This result is comparable to Tran Van Quang's [13].

Before epidural anesthesia, the mean uterine contraction pressure was 61.24 15.56 mmHg; after epidural anesthesia, uterine contraction pressure tends to increase gradually during the stages of labor and is within the normal range. Almost all pregnant women had adequate uterine contractions and pressure strong enough to warrant a normal delivery by the stage of cervical dilation. If the frequency or pressure of uterine contractions decreases after anesthesia during labor, it is easily corrected with oxytocin infusion (Obstetrician). Our findings are consistent with those of Do Van Loi [6], Tran Van Quang [13].

For pregnant women: In the study, there were 09 pregnant women (3.33%) with transient chills, 08 (2.96%) with nausea, and 05 (1.85%) with itching sensations; there were no cases of headache, hypotension, arrhythmia, respiratory failure, or dural puncture.

For infants: In the study, the average Apgar score was 8.35 0.24 at the first minute and 8.79 0.07 at the fifth minute; there were no cases of infant suffocation. Our findings are consistent with those of other researchers [6,13].

Maternal satisfaction: Our study evaluated pain relief, technique, and communication of medical staff with pregnant women through interviews. For 208 women who had pain relief during normal labor, the rate of very satisfied and satisfied was 74.04% and 25.96%, respectively; and for 62 women who had pain relief during labor and cesarean section, the rates of very satisfied and satisfied were 45.16% and 54.84%, respectively, with no women dissatisfied. Pain relief in labor provides 100% satisfaction to pregnant women, similar to Bremerich et al. [14], and Chethanananda's study [15] had similar results.

V. CONCLUSION

Continuous infusion of bupivacaine 0.1% and fentanyl (2 g/ml) in the epidural space provided good analgesia in labor. The average induction time was 4.32 0.58 minutes. The mean VAS pain score after anaesthesia was lower than the pre-anaesthesia pain score (VAS>7). In the study, 208/270 (77.04%) women experienced normal labor. The percentages of pregnant women who are very satisfied and satisfied are 74.04% and 25.96%, respectively. Adverse drug reaction of epidural analgesia in low-rate labor includes severe numbness but ability to move, transient chills, nausea, and itching sensation. The frequency and intensity of contractions are unaffected. There were no reports of headaches, hypotension, arrhythmias, respiratory failure, or dural puncture. There were no asphyxiated babies.

VI. RECOMMENDATIONS

In order to improve maternal satisfaction and the effectiveness of pain relief in labor, we propose to implement two techniques of pain relief in labor with continuous infusion epidural analgesia (CIEA) in the near future as well as patient-controlled epidural analgesia (PCEA).

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