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ORIGINAL ARTICLE OBSTETRIC ANESTHESIA

Epidural versus low-dose spinal for analgesia of late first stage of labor: a randomized clinical trial

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ABSTRACT

Background & Objectives: Epidural analgesia is the most effective method of reducing pain during normal delivery. However, it may not be a suitable choice in parturients presented in the late first stage of labor due to lack of time and lack of cooperation by the parturients. Spinal analgesia could be a suitable alternative. We compared epidural with spinal anesthesia for pain relief during late first stage of labor.

Methodology: 100 parturient, who presented in the late first stage of labor and requested neuraxial analgesia, were randomized to receive either epidural analgesia or single-shot spinal analgesia. The time needed to perform the block, onset and duration of analgesia, sensory level, hemodynamic effects, maternal side effects, and neonatal outcomes were recorded in both groups.

Results: The time needed to perform the block was significantly shorter in the spinal group (5.2 ± 0.9 min) than in the epidural group (17.3 ± 1.5 min) ($P < 0.001$). The onset of analgesia and time to reach adequate analgesia were significantly faster in the spinal group ($P < 0.001$). Pain scores decreased significantly in the spinal group until 15 min after the block. After that point, there were no significant differences in both groups. Regarding MAP, there was no significant difference except at 5 min after the block in the spinal group, with a significant reduction in MAP ($P < 0.001$). There were no significant changes between the two groups as regards maternal side effects and neonatal outcomes.

Conclusion: Although epidural analgesia is the most reliable method for pain control in normal labor. however, spinal analgesia may be a good alternative, especially in parturients presenting in late first stage of labor.

Abbreviations: GA- General Anesthesia; MAP - Mean Arterial Pressure; HR- Heart Rate

Key words: Neuraxial analgesia; Spinal; Epidural Analgesia; Normal labor

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1. INTRODUCTION

Epidural analgesia is a popular method for pain reduction during labor.[1-3] Effective epidural analgesia can decrease maternal plasma concentrations of catecholamines, increasing uteroplacental blood flow, better cooperation by the parturients and more effective uterine activity.[4] In addition, epidural analgesia can facilitate the rapid induction of anesthesia for emergency cesarean delivery if required.[5]

However, epidural analgesia may be challenging and time-consuming in a parturient who requires analgesia or anesthesia shortly before anticipated vaginal delivery; and it may not be an available option in low-resource

settings.[6] Low-dose single shot spinal analgesia may be good alternative.[7] Intrathecal morphine in combination with bupivacaine and fentanyl or sufentanil have been examined to increase the duration of the analgesia. A recent meta-analysis suggests that more adequately powered trials are necessary to determine the benefits and risks of the technique.[8]

Neuraxial fentanyl is commonly added to enhance the neuraxial analgesic effect of local anesthetics and reduce their requirements. Epidural administration of fentanyl alone provides moderate analgesia, compared to the potent effect of local anesthetics. Intrathecal fentanyl may be more effective than epidural or systemic administration, but unfortunately it has a short duration of less than 2 h, and it is less potent than intrathecal local anesthetics.[9,10] Moreover, administration of neuraxial fentanyl may produce dose-related maternal adverse effects such as pruritus, nausea, vomiting, and sedation. Furthermore, the use of intrathecal fentanyl can produce unexplained fetal bradycardia independent of hypotension.[11]

This study aimed to compare the effects of epidural analgesia versus low-dose spinal analgesia in parturients in the late first stage of labor regarding the time needed to perform the block, duration of the intra-and postoperative analgesia, and the incidence of procedure-related adverse events.

2. METHODOLOGY

After approval of the research by the ethics committee of the Faculty of Medicine, Ain Shams University (FMASU R155/2021) and clinical trial registration at ClinicalTrials.gov (registration number NCT05056142), this prospective, randomized, study was conducted on 100 parturients admitted for normal vaginal delivery in the late first stage of labor (cervical dilatation ≥ 8 cm by examination), aged 18–40 y old, singleton term pregnant with normal fetal heart rate and requesting neuraxial analgesia. An informed signed written consent was obtained from all parturients.

Sample size was calculated using STATA program, setting the type-1 error (α) at 5% and the power (1-β) at 0.8. Results from pilot study showed that the mean duration to performance among epidural group cases was 18.97 ± 6.3 min compared to 6.78 ± 1.7 min among spinal group. Based on these values, a sample size of 50 cases per group (100 total) achieves 100% power to detect the observed difference.

Parturients who refused to participate, ASA > II, BMI > 30 kg/m^2, had severe pre-eclampsia or eclampsia, preexisting neurologic deficits, or any contra-indication to epidural/spinal anesthesia, including spinal deformity or previous spine surgery, any hypersensitivity to the study drugs, and parturients who were scheduled for emergency cesarean section due to any reason were excluded from the study.

In the operating room, an 18G intravenous cannula was inserted then an infusion of lactated Ringer's solution at 5–7 ml/kg was started. Inj. ondansetron 0.1 mg/kg IV was given prior to the neuraxial block. Standard patient monitoring including electrocardiogram (ECG), noninvasive blood pressure (NIBP) and pulse oximetry (SpO_2), the fetal heart rate (FHR) were applied before induction of neuraxial analgesia.

All parturients were randomly allocated into one of the two groups using computer generated random numbers list and use of opaque sealed envelopes. Neuraxial blocks were done by an experienced anesthesiologist independent of the study.

Group 1 (Group EA) (n = 50): parturients received epidural analgesia with 15 ml isobaric bupivacaine 0.125% plus fentanyl 2 μg/mL.

Group 2 (Group SA) (n = 50): parturients received spinal analgesia with 5 mg hyperbaric bupivacaine and 25 μg of fentanyl in a 2 ml volume.

2.1. Epidural analgesia technique

Epidural analgesia was performed while patient in the sitting position with 18G Touhy needle (Braun, Germany), via midline approach at the L2–L3 or L3–L4 intervertebral space under complete aseptic condition. Epidural space was identified by loss of resistance to air, a 20G catheter was passed with the tip of the epidural needle in a cephalic direction.

A 3 ml test dose of 2% lidocaine was given to the patient to rule out subarachnoid catheter placement after a trial of aspiration of blood or cerebrospinal fluid (CSF). If blood was aspirated, the catheter was withdrawn, and another attempt was made at a different site. The patient was excluded from the study if CSF was aspirated. Over the next 2–3 min, parturients were asked if they had any signs of intravascular injection, such as a metallic taste, tinnitus, or dizziness, or if they had any signs of a subarachnoid injection, which were determined by their ability to move their legs and the absence of low blood pressure. The catheter was fixed and the parturients were put in the supine position with 15° head up position and the table tilted 15° left lateral to alleviate aortocaval compression. Subsequently, epidural injection of 15 ml isobaric bupivacaine 0.125% plus fentanyl 2 μg/mL was done.

2.2. Spinal analgesia technique

Spinal analgesia was performed with parturients in the sitting position in the paramedian approach at the L2–3 or L3–4 level, with a 27G Quincke needle under

complete aseptic conditions. After obtaining free flow of cerebrospinal fluid, intrathecal hyperbaric bupivacaine 5 mg plus 25 µg fentanyl in a total volume of 2 ml was injected. All parturients were then placed supine 15° head up position, and the table was tilted 15° left lateral.

One of the study members evaluated both sensory and motor block. A blunt pinprick was used to test sensory blockage while the modified Bromage score was used to measure motor block.[12] However, they were not blind to the assigned group. Cervical dilatation progress was assessed at intervals of 15 min.

The time needed to perform the block which was defined as the time from the preparation until the full injection of analgesic drug mixture was recorded. Also, the time from the block to adequate analgesia was recorded. Adequate analgesia was defined as a VAS score ≤ 10 in the presence of contractions or a VAS score ≤ 10 in the absence of contractions, as long as the VAS score remained 10 throughout the subsequent contraction. Upon request for neuraxial labor analgesia, parturients marked their "pain level" on a 100-mm VAS scale. Parturients were then told to record their 'degree of pain' every 2 min for up to 20 min in order to ensure whether appropriate pain management (VAS ≤ 10) was attained. Each time they recorded the VAS score, they were asked whether they were experiencing contractions or not. The cardiotocography (CTG) trace indicated the presence of contractions. If adequate analgesia was not achieved within 20 min, the need for further analgesia was assessed by a member of the anesthesia caring team and the additional analgesic modality to be used was determined on case bases.

MAP and HR were measured at baseline; 5 min before the neuraxial block; then at 5 min, 10 min, 15 min, and 20 min after the injection of the local anesthetic; then every 15 min until the completion of the third stage of labor. Hypotension (MAP ≤ 20% of the baseline or < 65 mmHg) was recorded. It was treated with intravenous boluses of 250 ml of lactated Ringer's solution or, if necessary, 3 to 6 mg of ephedrine. Intravenous atropine sulphate 0.5 mg was given if bradycardia developed (HR < 50 b/min). FHR was also recorded. If FHR < 110 b/min, it was considered fetal bradycardia.

During the first 24 h after surgery, the degree of postoperative nausea and vomiting (PONV) was recorded and classified as 'no PONV, mild, moderate, or severe PONV'.[13] Parturients diagnosed with moderate or severe PONV were given 4 mg of ondansetron IV. The incidence of pruritus and respiratory depression (defined as SpO_2 < 92% or respiratory rate < 10 breaths/min) was also evaluated. In addition, Ramsay sedation scale (RSS) was used to assess sedation.[14]

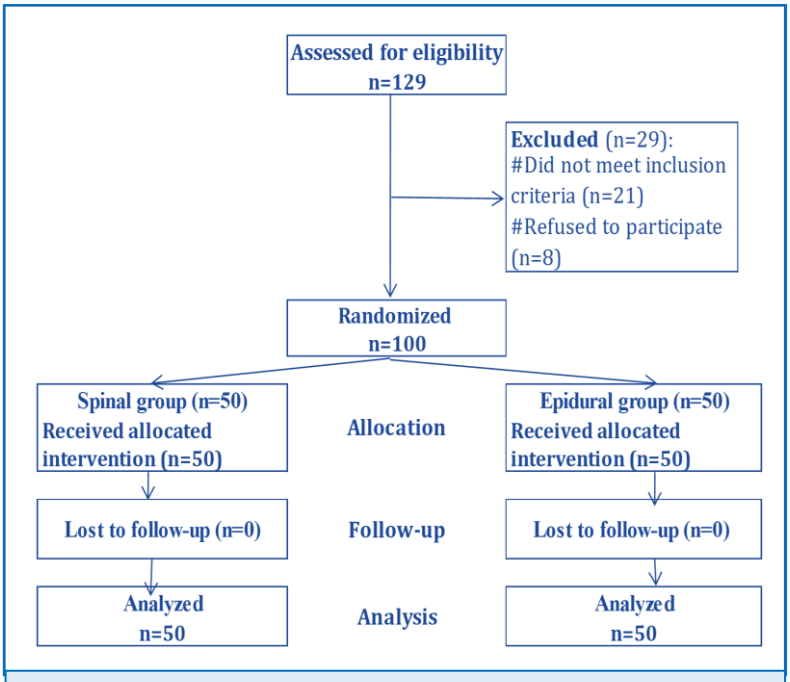

Figure 1: Flow chart of the study

Neonatal outcome parameters (the attending neonatologists assessed the Apgar scores at 1 min and 5 min, and reported the incidence of meconium aspiration. The umbilical artery blood gas analysis was done.

The primary outcome was the time needed to perform the block. The secondary outcomes were the interval needed for the block to provide adequate analgesia and the incidence of the adverse events.

2.3. Statistical analysis

The collected data were coded, tabulated, and statistically analyzed using IBM SPSS (Statistical Package for Social Sciences) software version 28.0, IBM Corp., Chicago, USA, 2021. Quantitative data was tested for normality using Shapiro-Wilk test, then described as mean ± SD (standard deviation), and then compared using independent t-test. Qualitative data described as numbers and percentages and compared using Chi square test as well as Fisher's Exact test for variables with small, expected numbers. The level of significance was taken as P < 0.050.

3. RESULTS

In the present study, 129 pregnant women in the late 1st stage of labor who requested neuraxial analgesia were

Table 1: Demographic data and baseline characteristics

Variables		Spinal (N = 50)	Epidural (N = 50)	P-value
Age (y)		29.9 ± 5.8	28.6 ± 5.9	^0.260
Gestational age (weeks)		38.4 ± 1.0	38.3 ± 0.8	^0.741
Weight (kg)		77.3 ± 5.8	77.1 ± 7.2	^0.872
Height (m)		1.70 ± 0.05	1.71 ± 0.05	^0.341
BMI (kg/m^2)		26.6 ± 1.4	26.2 ± 1.7	^0.210
Gravidity	Primigravida	15 (30.0)	13 (26.0)	#0.656
	Multigravida	35 (60.0)	37 (74.0)	
Presentation	Occiput anterior	45 (90.0)	43 (86.0)	§0.803
	Occiput posterior	4 (8.0)	5 (10.0)	
	Breech	1 (2.0)	2 (4.0)	
Cervical dilatation before block (cm)		6.0 ± 1.0	5.8 ± 0.8	^0.256
Time from block until end point¤		106.3 ± 7.9	105.6 ± 8.3	^0.649

Data presented as Mean ± SD or n (%). ¤End point is delivery in vaginal and shift to cesarean in cesarean. NA: Not applicable. ^Independent t-test. #Chi square test. §Fisher's Exact test.

Table 2: Analgesic effects and pain perception

Variables		Spinal (N=50)	Epidural (N=50)	P-value	Relative effect	
					Mean ± SE	95% CI
Time needed to perform block		5.2 ± 0.9	17.3 ± 1.5	^< 0.001*	-12.1 ± 0.3	-12.6–-11.6
Onset of analgesia effect		2.4 ± 0.5	11.6 ± 0.9	^< 0.001*	-9.1 ± 0.1	-9.4–-8.9
Time to reach adequate analgesia		4.9 ± 0.6	18.5 ± 2.0	^< 0.001*	-13.6 ± 0.3	-14.2–-13.0
Duration of analgesia		155.6 ± 15.6	153.3 ± 13.7	^0.432	2.3 ± 2.9	-3.5–8.1
Maximum sensory level	T12	5 (10.0)	0 (0.0)	§< 0.001*	Not applicable	
	T11	6 (12.0)	0 (0.0)			
	T10	39 (78.0)	24 (48.0)			
	T9	0 (0.0)	17 (34.0)			
	T8	0 (0.0)	9 (18.0)			
Pain perception (VAS-100)						
Min-2		24.6 ± 3.6	71.0 ± 5.9	**^< 0.001***	-46.4 ± 1.0	-48.3–-44.5
Min-4		15.0 ± 3.2	41.2 ± 5.5	**^< 0.001***	-26.2 ± 0.9	-28.0–-24.4
Min-6		8.7 ± 2.2	34.4 ± 3.3	**^< 0.001***	-25.7 ± 0.6	-26.8–-24.6
Min-8		8.0 ± 2.5	19.9 ± 3.4	**^< 0.001***	-11.9 ± 0.6	-13.1–-10.7
Min-10		7.6 ± 2.5	12.4 ± 2.5	**^< 0.001***	-4.8 ± 0.5	-5.8–-3.8
Min-12		5.3 ± 1.4	11.0 ± 2.6	**^< 0.001***	-5.7 ± 0.4	-6.6–-4.9
Min-15		4.9 ± 1.4	8.8 ± 0.6	**^< 0.001***	-3.9 ± 0.2	-4.4–-3.5
Min-30		5.0 ± 0.7	5.3 ± 0.8	^0.084	-0.3 ± 0.1	-0.6–0.1
Min-45		5.4 ± 1.0	5.6 ± 0.8	^0.367	-0.2 ± 0.2	-0.5–0.2
H-1		5.5 ± 1.0	5.7 ± 0.8	^0.424	-0.2 ± 0.2	-0.6–0.2
End point¤		7.3 ± 0.9	7.6 ± 1.3	^0.143	-0.3 ± 0.2	-0.8–0.1

*Data presented as Mean ± SD. ^Independent t-test. §Fisher's Exact test. *Significant. RR: Relative risk. SE: Standard error. CI: Confidence interval. Relative effect: Effect in spinal group relative to effect in epidural groups*

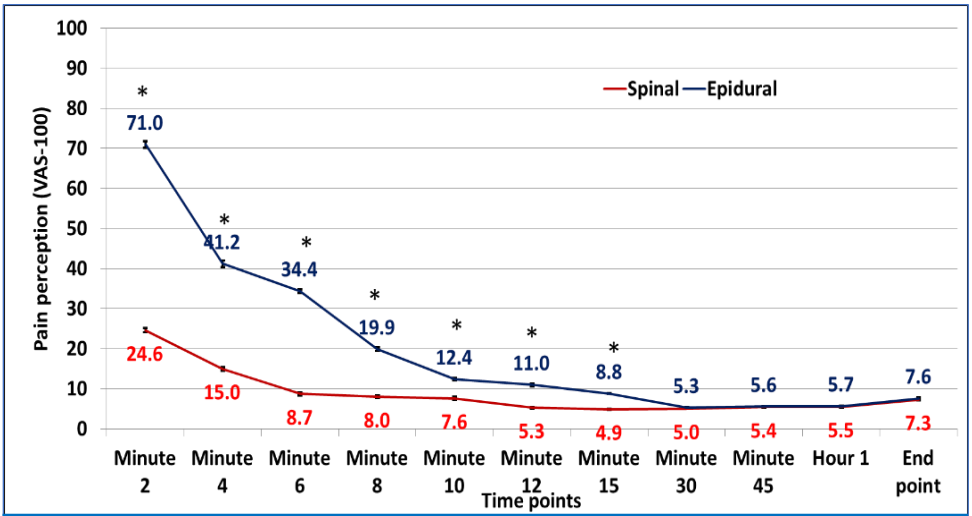

Figure 2: Comparative pain perception; VAS presented as percentage from 0–100 at different time points (*significant)

recruited, 21 parturients did not meet inclusion criteria, and eight parturients refused to share in the study, so 29 parturients were excluded before randomization. Finally, the study included 100 parturients after providing written consent and being randomly divided into the study groups; 50 pregnant women in each group (Figure 1). There were no significant differences regarding demographic data and parturients' baseline characteristics (age, weight, gestational age, height, BMI, gravidity, degree of cervical dilatation, and fetal presentation) between the two groups (P > 0.05).

There was no significant difference between the two groups regarding time from block until the end point, i.e., vaginal delivery or shift to cesarean delivery (Table 1). The time needed to perform the block was significantly shorter in the spinal group than in the epidural group (P < 0.001). Also, time to reach adequate analgesia was significantly shorter in the spinal group than in the epidural group (P < 0.001). On the other hand, the top sensory levels were more significant in the epidural group than in the spinal group (P < 0.001). There was no significant difference between the two groups regarding the duration of analgesia (P = 0.432) (Table 2). Regarding VAS scores, significantly lower values were recorded in the spinal group when compared to the epidural group until 15 min after block (P < 0.001). However, mean VAS scores were comparable in both groups until delivery (P > 0.05) (Table 2) (Figure 2).

In this study, there was not any significant difference between the two study groups as regards to HR (P > 0.05). MAP was significantly lower in spinal group at min 5 (Figure 3).

Total ephedrine used during the first 24 h was significantly higher in spinal group than in the epidural group (P < 0.001). In our study, 5 (10.0%) parturients in spinal group and 6 (12.0%) parturients in epidural group underwent caesarean delivery, either due to abnormal fetal heart rate or arrest of normal labor. Also, vacuum extraction was used in 13 (26.0%) parturients in spinal group and 18 (36.0%) parturients in epidural group to facilitate vaginal delivery.

Maternal side effects were equivalent in the two groups (P > 0.05). There was no significant difference between the studied groups in umbilical artery ABG findings and APGAR scores at 1 and 5 min (Table 3). RSS scores were also equivalent in both groups (P > 0.05).

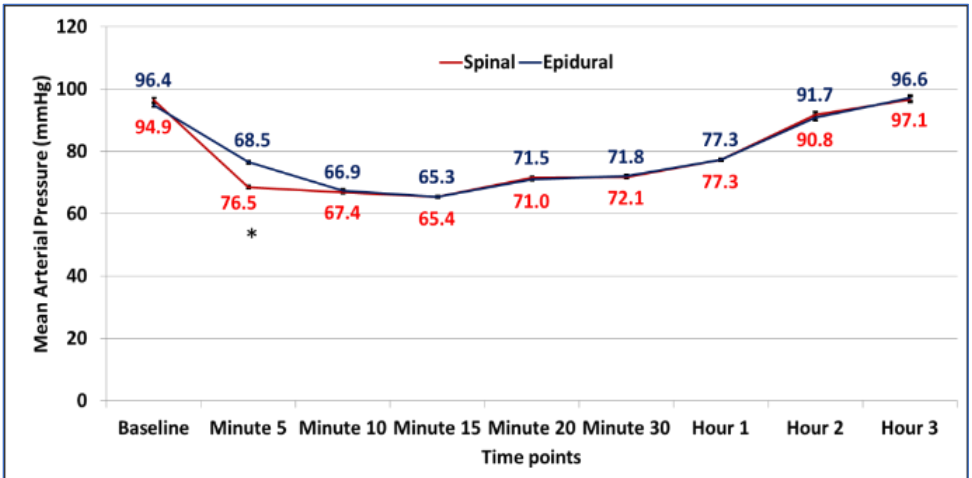

Figure 3: Comparative MAP at different time points (*significant)

Table 3: Mode of delivery, maternal side effects and neonatal outcomes

Variables		Spinal (N = 50)	Epidural (N = 50)	P-value	Relative effect	
					RR	95% CI
Mode of delivery						
Cesarean delivery		6 (12.0)	5 (10.0)	#0.749	1.20	0.39–3.68
Causes of cesarean	Abnormal CTG	4 (66.7)	4 (80.0)	§0.999	0.83	0.41–1.70
	Arrest of labor	2 (33.3)	1 (20.0)		Reference	
Need of ventouse delivery		13 (26.0)	18 (36.0)	#0.280	0.72	0.40–1.31
Maternal side effects						
Pruritus		9 (18.0)	6 (12.0)	#0.401	1.50	0.58–3.90
Nausea and vomiting		17 (34.0)	14 (28.0)	#0.517	1.21	0.67–2.19
Hypotension		14 (28.0)	18 (36.0)	#0.391	0.78	0.44–1.39
Neonatal outcomes						
Meconium-stained		6 (12.0)	7 (14.0)	#0.766	0.86	0.31–2.37
					Mean ± SE	95% CI
APGAR-1		7.7 ± 0.7	7.4 ± 0.9	^0.139	0.2 ± 0.2	-0.1–0.6
APGAR-5		9.1 ± 0.4	9.0 ± 0.6	^0.223	0.1 ± 0.1	-0.1–0.3
PH		7.32 ± 0.00	7.32 ± 0.01	^0.845	0.00 ± 0.00	0.00–0.00
Bicarbonate level		0.77 ± 0.07	0.78 ± 0.07	^0.764	0.00 ± 0.01	-0.03–0.02
Base deficit		22.9 ± 0.3	23.0 ± 0.5	^0.287	-0.1 ± 0.1	-0.2–0.1

*Data presented as Mean ± SD or n (%). ^Independent t-test. #Chi square test. §Fishers Exact test. *Significant. RR: Relative risk. CI: Confidence interval. Relative effect: Effect in spinal group relative to effect in epidural group.*

4. DISCUSSION

This study revealed that low-dose spinal anesthesia might serve as a suitable alternative to the epidural analgesia in the late first stage of labor. The time needed to perform the block in the spinal group is significantly shorter and the onset of analgesia and time to reach adequate analgesia are significantly faster among parturients received spinal compared to parturients received epidural with almost comparable maternal and neonatal adverse events.

Uterine contractions, cervical dilatation, and vaginal and perineal distention are the main causes of pain during normal vaginal delivery. In the first stage of labor, painful stimuli arise mainly from the lower uterine segment and cervix due to progressive cervical dilatation. Painful stimuli are transmitted through visceral afferent nerve fibers, which join sympathetic nerve fibers and enter the spinal cord at the 10th, 11th, and 12th thoracic and 1st lumbar spinal segments.[15]

In the second stage of labor (fetal descent), painful stimuli arise from the vagina and perineum, inducing sharp somatic pain. Somatic pain impulses travel through the pudendal nerve to the dorsal root ganglia of levels S2–S4.[16] There are multiple non-pharmacologic techniques for labor analgesia as acupuncture, transcutaneous electrical nerve stimulation (TENS), relaxation techniques, hypnosis, intradermal water injection and massage etc. Unfortunately, all these methods have minimal analgesic effects.[17] Pharmacologic methods for labor analgesia include systemic opioid use such as meperidine,[18] fentanyl[19] and remifentanil.[20] Meperidine is the most widely used drug. Inhalation of nitrous oxide (N_2O) has an analgesic effect in normal delivery, but its use is limited, perhaps due to lack of knowledge, expertise or the equipment.[21]

Neuraxial (epidural and spinal) analgesia is the most effective maneuver for pain control in normal vaginal delivery.[22] Lumbar epidural is the most widely used modality for normal labor analgesia. The insertion of an epidural catheter allows for the continuation of continuous analgesia until after delivery. It is time-consuming, needs special preparations, and has a delayed analgesic effect. Single-shot spinal analgesia may be an ideal alternative especially in parturients who need neuraxial analgesia shortly before anticipated vaginal delivery as in the late first stage of labor.[23]

Low dose spinal analgesia during normal delivery offers rapid onset, fewer hemodynamic effects, and no motor block. In the current study, intravenous hydration by lactated ringer solution was started at the time of performing neuraxial analgesia (co-load). Previous studies found no advantage to administering fluids as preload before the induction of neuraxial analgesia.[24]

Many neuraxial opioids such as fentanyl and sufentanil are commonly used as adjuncts to augment and prolong the sensory block of bupivacaine.[25,26] In our study, we added fentanyl to bupivacaine in both epidural and spinal groups. The combined use of bupivacaine with fentanyl permits the use of lower doses of each agent, thus reducing undesirable adverse effects. In a dose-dependent fashion, epidural fentanyl reduces epidural bupivacaine requirements during labor.[27]

In the current study, the time needed to perform the block was statistically shorter in the spinal group than in the epidural group. Spinal analgesia could provide a solution to the problems of lack of time and cooperation of the patient while giving analgesic blocks due to repetitive painful uterine contractions.

The onset time of sensory block and the time to reach adequate analgesia were significantly shorter in the spinal group compared to the epidural group. There was no significant difference in the duration of analgesia between the two groups. However, higher sensory levels were reported in the epidural group than in the spinal group. Abdel Barr et al. compared the same two groups and added fentanyl to bupivacaine and concluded that the onset of sensory block and time to reach maximum sensory block were shorter in the spinal than in the epidural group,[28] which is in line with our research. However, Abdel Barr et al. did not report any information about the time needed to perform the block. They also found that the duration of analgesia was significantly longer in the spinal group, which is the opposite of what we have observed.

Ngan Kee et al. observed that adding fentanyl to intrathecal bupivacaine in labor analgesia has a synergistic effect.[29] In our research, we found that the VAS scores for the spinal group were much lower than those for the epidural group. These results were in agreement with PACE et al., Abdel Barr et al., and Minty et al., who reported a significant reduction in the VAS scores in the spinal group when adding low-dose intrathecal fentanyl to bupivacaine in spinal analgesia for normal delivery.[28,30,31]

Regarding hemodynamics in our research (HR and MAP), there was no statistically significant difference between the spinal and epidural groups except at 5 min after spinal block, with a significant reduction in MAP. Also, the total dose of ephedrine was statistically higher in the spinal group than in the epidural group. In contrast to our results, Imani et al. found a significant reduction in blood pressure in the epidural group but not in the spinal group.[32]

In the current research, emergent cesarean section was decided for 6 parturients in the spinal group and 5 parturients in the epidural group due to abnormal fetal heart rate and/or arrest of labor. In the spinal group, for those parturients who were scheduled for CS, 3 parturients needed spinal anesthesia block and 3 parturients needed general anesthesia. In the epidural group, injection of 12 ml of bupivacaine 0.5% plus 60 µg of fentanyl was done. Regarding maternal side effects, the incidence of pruritus was not significantly higher in the spinal group than in the epidural group. This was in agreement with Simmons et al., who reported that the incidence of pruritus was higher with spinal opioid administration than with epidural opioid.[33]

There was no significant difference in the incidence of hypotension after the induction of neuraxial analgesia in both groups, except for 5 min after spinal analgesia. The neuraxial-induced hypotension was treated by an additional 250 ml of intravenous ringer lactate, placement of the parturient in the left lateral position, oxygen delivery, and administration of ephedrine 5–10 mg intravenously.[34]

Also, in this study, there was no significant difference in the frequency of nausea and vomiting in both groups. Contrary to what we found, Norris et al. reported that parturients who received spinal or epidural opioid analgesia during labor had an incidence of nausea and vomiting of 2.4% to 1.0%.[5]

In both groups, neonatal outcomes were measured using Apgar scores at 1 and 5 min, as well as umbilical artery sampling for PH, bicarbonate level, and base deficit or meconium-staining. We report no statistically significant difference in both groups. The strong point is that most neonates with meconium-staining were delivered by emergent CS after observation of fetal bradycardia.

In our study, we did not observe a higher incidence of fetal heart rate decelerations in both spinal and epidural labor analgesia. Pello et al.[36] observed a higher incidence of FHR decelerations after epidural administration of bupivacaine during labor. However, Nielsen et al.[37] noted that the administration of either epidural bupivacaine or spinal sufentanil was associated with a higher incidence of FHR decelerations (23% and 22%, respectively).

5. LIMITATIONS

Although spinal analgesia presented an excellent pain control modality in parturients, especially those in the late first stage, its short duration limits its use in the early

first stage of labor. Also, it provided insufficient anesthetic block in case of conversion to emergent cesarean delivery.

6. CONCLUSION

Although epidural analgesia is the most reliable method for pain control in normal labor, however, spinal analgesia may be a suitable alternative, especially in parturients presenting in late first stage of labor.

7. Data availability

The numerical data is available with the corresponding author and can be provided on request.

8. Conflict of Interests

Conflict of interest among authors was absent. No funding, either internal or external, was involved in this study.

9. Ethical Approval

This prospective, randomized, clinical study was approved by the University of Ain Shams Institutional ethics board review (FMASU R155/2021).

10. Authors' Contribution

AA: Data collection, Study writing

MM: Conduction of the study work

MAKB: Statistics, Concept, Designed the study protocol

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