Original Article

Efficacy and Safety of Epidural Analgesia versus Traditional Analgesia for Relief of Labour Pain

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Abstract

Background: *Labour pain, a form of acute pain, intensity of the pain is perceived by many women as very severe or intolerable especially in nulliparous. Providing effective and safe analgesia during labour has remained an ongoing challenge. Multiple pharmacologic and non-pharmacologic options are available to manage labour pain. Epidural analgesia have reported nearly complete pain relief with effective labour conduction.* ***Objective:*** *Purpose of this study was to evaluate the effectiveness of epidural analgesia and pethidine during labour and delivery.* ***Materials & Methods:*** *This cross sectional comparative study was conducted to compare the efficacy and safety between epidural and traditional analgesia on nulliparous women in labour. Subjects were grouped into two, group A received epidural & group B received traditional analgesia, each group comprising with 40 patients. Then the subjects were followed up and outcomes were recorded in a preformed data collection sheet.* ***Results:*** *The two groups were almost identical. Maternal age, gestational age and preinduction pain score ($p = 0.127$, $p = 0.454$ and $p = 0.186$ respectively). Study demonstrated earlier onset, pain score at different time intervals and the time of delivery were lower in epidural group than traditional ($p < 0.001$). No significant difference of complications ($p = 0.431$). Two(5%) patients in the epidural and five(12.5%) in the traditional group required caesarean delivery ($p=0.455$). No significance on neonatal outcome.*

Conclusion: *Epidural analgesia induces a much earlier onset, intensity of pain reduced to a tolerable level and maintained up to delivery which not attained in the traditional method of analgesia.*

Key words: *: Labour Pain, Inj. Pethidine, Epidural Analgesia.*

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Introduction

Pain is a reflection of the individual's emotional, motivational, cognitive, social, and cultural circumstances. Labour pain, a form of acute pain, is perceived by many women as very severe or intolerable. Pain relief is an integral part of labour management. Obstetric analgesia is essential not only for patient's comfort but also for feto-maternal safety. Pain associated physiological responses are potentially harmful for the foetus.[1] Numerous methods are used to relieve labour pain. These include pharmacological and non-pharmacological methods of pain management. Of the pharmacological agents, epidural analgesia and opioids are commonly used. However, controversy surrounds about these two methods regarding the maternal and perinatal outcome following analgesia.[2]

Early labour pain is primarily visceral and occurs during uterine contraction. Epidural analgesia is a central nerve block technique achieved by injection of a local anaesthetic close to

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the nerves that transmit pain and is widely used as a form of pain relief in labour. Pain relief in labour has always been surrounded with myths and controversies. Hence, providing effective and safe analgesia during labour has remained an ongoing challenge.

Analgesia refers to the relief of pain without the loss of consciousness. An epidural analgesia is a procedure used to make a woman more comfortable during labour. The use of this technique allows the patient to be fully awake and participating in all aspects of the birthing process.[3] Epidural analgesia done by a team of an experienced anaesthesiologist, a dedicated obstetrician and a trained mid-wife can convert the painful labour into a less stressful event.[4] if attention is paid to correct inefficient uterine action early in labour with oxytocin infusion.[5]

Epidural analgesia is the most effective method for the control of pain during labour, but toxicity of local anaesthetics is the major limitation. It allows emergency caesarean section to be performed without recourse to general anesthesia.[6] Epidural dose is often reduced in the second stage of labour with the intention of improving maternal expulsive efforts and decreasing the need for instrumental vaginal delivery (IVD).[7]

The somatic component of labour pain is caused by distension, inflammation, and tissue injury of the pelvic joints, vagina, pelvic floor, and perineum. This pain occurs as the fetus descends in the birth canal during the late first stage and second stage of labour. The visceral and somatic components of labour pain can be blocked at various levels by one or more nerve blocks. Epidural analgesia can block the visceral, somatic, both components of labour pain, depending on the spinal nerve root block. Some authors reported that epidural analgesia impedes the progress of labour by causing dystocia and increasing operative delivery rates.[8-10] Evidence is unclear as previous reviews have included disparate regimens for epidural analgesia and women of mixed parity.[11-13] Sharma and associates (2002), however reported that epidural analgesia compared with intravenous meperidine analgesia during labour does not increase cesarean deliveries in nulliparous women.[14]

Parenteral pethidine is a traditional method for pain relief during labour. Studies suggested that intramuscular pethidine provides little pain relief in labour and has a number of side effects affecting mother and fetus. It can cause nausea, vomiting in mothers and reduced fetal heart rate variability and accelerations. Neonatal effects include respiratory depression. Still pethidine is routinely used throughout world for labour analgesia.[15] But there are few studies comparing the relative side effects and efficacy of epidural analgesia and conventional labour pain management with pethidine and as such a study comparing the outcome of these two methods deemed essential.

Materials and Methods

This cross sectional comparative study was conducted among primigravida women with gestational age of greater than 37 weeks having no obstetric risk factors and established labour (cervical dilation >3 cm with regular uterine contraction). Total 80 patients were recruited and divided equally into two groups. To prepare for the administration of epidural analgesia the selected women were fully explained about procedure and signed consent was obtained from them.

An intravenous line was inserted and all necessary monitoring devices essential for mother & fetus was ensured. In sitting position with aseptic technique lumbar epidural puncture were performed using a midline approach with an 18-gauge Tuohy needle. Once the needle was appropriately placed in the epidural space, a 20-gauge multi-orifice epidural catheter was threaded into the space cranially. Having confirmed a negative aspiration test for blood or cerebrospinal fluid, 3 mL of 2% Lidocaine with epinephrine 5ug/mL was injected through the needle as a test dose.

Patient was observed for five minutes, if no complications were found, then 10mL of 0.125% bupivacaine was injected via the epidural catheter. The catheter was taped in place along the patient's back with the end over her shoulder for easy retrieval when further doses were required.

The effectiveness of epidural analgesia was assessed at half an hour interval till delivery additional doses of anesthetic were injected through the catheter when needed. Women who encountered cesarean deliveries, needed additional medication to control intra-operative pain. Side-effects that might appear were recorded. Using a pre-tested structured questionnaire, information was obtained directly from the study population and from their hospital records, ultrasonography reports and past medical records. Data were organized by the investigator to avoid the inter-observer variations. All collected questionnaire checked very carefully to identify the error in the data. Data processing work consist of registration schedules, editing computerization, preparation of dummy table, analyzing and matching of data. All data were analyzed by computer based software SPSS version 22. Quantitative data was analyzed by students' t- test. Categorical variables were analyzed by Chi square (X2) test. Statistical significance was set at P value less than <0.05 and confidence interval set at 95% level.

Results

Total of 80 patients fulfilling inclusion criteria were studied.

Table I shows the baseline characteristics between epidural and traditional analgesia groups. The two groups were almost identical with respect to maternal and gestational age (p = 0.127 and p = 0.454 respectively).

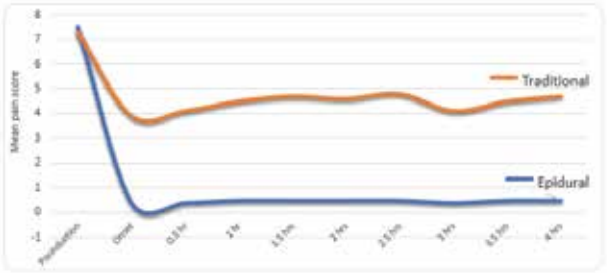
Table I. Baseline characteristics between the study groups

Baseline characteristics #	Group		p-value
	Epidural (n = 40)	Traditional (n =40)	
Maternal age (years)	24.1 ± 2.3	24.4 ± 1.6	0.127
Gestational age (weeks)	38.9 ± 4.9	39.5 ± 1.3	0.454

Pain was monitored at half hourly interval after onset of analgesia and it was recorded in the data-sheet. Pain score at onset of

analgesia was staggeringly lower in the epidural group than that in the traditional group ($p < 0.001$). Pain score at different time intervals from onset of analgesia up to delivery was observed to be appreciably lower in the former group than those in the latter group ($p < 0.001$ at all level of evaluation) (Figure-1).

Figure 1: Changes of mean pain score following epidural and traditional analgesia



Maternal outcome in terms of analgesia demonstrates that a significantly earlier onset of analgesia was observed in epidural group than that in the traditional group ($p < 0.001$). Majority (92.5%) of the epidural group exhibited effective analgesia throughout the period of labour as compared to only 10% of the traditional group ($p < 0.001$) (Table II).

Table II. Comparison of analgesia between the study groups

Analgesia	Group		p-value
	Epidural (n = 40)	Traditional (n =40)	
Time to onset of analgesia (min) #	12.3 ± 2.5	26.5 ± 4.0	< 0.001
Effective analgesia*	37(92.5)	4(10.0)	< 0.001

Complications like nausea and/or vomiting were completely absent in the epidural group as opposed to 7.5% in the traditional group ($p = 0.431$). Hypotension was absent in either group. Duration of 1ststage of labour was not affected in either group. Five (12.5%) patients in the epidural group and none in traditional group experienced prolonged 2nd stage of labour ($p = 0.027$) (Table III).

Majority of the patients in either group have had normal delivery. Only 2(5.0%) patients in the epidural group and 5(12.5%) in the traditional groups required caesarean delivery. Four patients in the epidural group (10%) and one (2.5%) in the traditional group required instrumental delivery (forceps/Ventouse). The difference between the two groups in terms of their mode of delivery was insignificant.(P=0.455) (Table IV)

Table III. Evaluation of maternal complications between the study groups

Complications	Group		p-value
	Epidural (n = 40)	Traditional (n =40)	
Nausea/Vomiting *	0(0.0)	3(7.5)	0.431
Prolonged 2nd stage of labour*	5(12.5)	0(0.0)	0.027

Table IV. Comparison of mode of delivery between the study groups

Mode of delivery	Group		p-value
	Epidural (n = 40)	Traditional (n = 40)	
Normal	34(85.0)	34(85.0)	
Caesarean	2(5.0)	5(12.5)	0.455
Instrumental (forceps/Ventouse)	4(1o.o)	1(2.5)	

Neonatal outcome was evaluated in terms of APGAR score at 1 and 5 minutes of birth. There were no significant differences between the epidural and traditional analgesia groups in terms of APGAR scores at 1 and 5 minutes of birth ($p = 0.401$ and $p = 0.536$ respectively) (Table V).

Table V. Assessment of neonatal outcome

Fetal outcome	Group		p-value
	Epidural (n = 40)	Traditional (n =40)	
APGAR score at 1 minute	7.9 ± 0.7	7.8 ± 0.8	0.401
APGAR score at 5 minutes	8.5 ± 0.6	8.3 ± 0.6	0.536

Discussion

The present study intended to assess the efficacy and safety of epidural and traditional analgesia on nulliparous women with established labour demonstrated a significantly earlier onset of analgesia in epidural group than that in the traditional group. The pain score at onset and at different time intervals after induction and at the time of delivery were appreciably lower in women receiving epidural analgesia than those receiving traditional analgesia indicating that drastic reduction of pain

intensity and maintenance of the low intensity of pain up to delivery were successfully achieved in epidural group, where as traditional analgesia group failed to reduce the pain intensity to a tolerable level.

Thus, the primary objective of managing labour pain was achieved with epidural analgesia. Consistent with findings of our study, Sharma and colleagues reported that women who received epidural analgesia had lower pain scores during labour and delivery compared to women who received intravenous meperidine analgesia.[14] Another large trial reported that epidural analgesia had lower pain score than continuous midwifery support (supplemented by intramuscular meperidine, nitrous oxide inhalation, nonpharmacologic methods of pain relief).[16]

In terms of secondary objective like maternal and neonatal complications, the epidural analgesia was considered safe and favorable. None of the women receiving epidural analgesia experienced nausea and/or vomiting, whereas 3 (7.5%) of the traditional group have had the condition. Ullman and associates reported pethidine provides little pain relief in labour and had a number of side effects affecting mothers and neonates.[17] It can cause nausea, vomiting and dysphoria in mothers and reduce fetal heart rate variability and accelerations. Neonatal effects include respiratory depression and impaired feeding. In the traditional group respiratory depression (in terms of low APGAR score) was not observed in our study. However, a recent study conducted in the United Kingdom with Intramuscular Diamorphine demonstrates that diamorphine provides better analgesia with fewer side effects in mothers and neonates.[15]

In our study Prolonged 2nd stage of labour was observed in 5(12.5%) cases of epidural analgesia group compared to nil in the traditional group (P=0.027). Rate of caesarean section 2(5.0%) in epidural and 5(12.5%) in traditional group, instrumental delivery(Forceps/Ventouse) were 4 (10.0%) in epidural group to one (2.5%) in the traditional group. Epidural analgesia may increase the risk of instrumental delivery by several mechanisms. Previously, the association of neonatal morbidity and mortality with longer second stage labour had justified expediting delivery, leading to increased rates of instrumental delivery. Sharama also did not find any difference in the rate of cesarean deliveries between epidural and intravenous meperidine, analgesia (10.5% vs. 10.3%) with adjusted odds ratio being 1.04($p = 0.920$).[14] The cause of cesarean deliveries in both groups in our study was fetal distress.

The causes of fetal distress in epidural group were due to obstetrical ones like cord around the neck or strong uterine contractions but not as a direct result of epidural like maternal hypotension etc. In pethidine group the causes of fetal distress were not only the obstetrical ones but also associated with pain related physiological responses. Sharma and associates reported that a significantly higher proportion of women randomized to epidural analgesia encountered forceps deliveries compared to meperidine analgesia (13% vs. 7%) with adjusted odds ratio being 1.86($p < 0.001$) and epidural women had prolonged second stage of labour which is not consistent with our findings.[14] Instrumental delivery due to prolong 2nd stage of labour were more in epidural group than traditional group but not significant. Liao and associates when compared with placebo or opioids, women receiving epidural analgesia had more instrumental vaginal births and caesarean sections for fetal distress, although there was no difference in the rates of caesarean section overall.[18]

In Jones' study it was observed that women receiving epidural analgesia were more likely to experience hypotension and fever, although none of these side-effects were evident in the present study.[19] Finally, a recent study conducted in Pakistan reported that epidural anaesthesia did not have any adverse effects on the foetal outcome. It also demonstrated that only two cases developed urinary retention in the postpartum period who were treated by continuous catheter drainage. One of them was associated with prolonged labour which lasted for more than twelve hours, culminating in instrumental delivery, while the other patient had postpartum haemorrhage as a result of cervical tear, which was sutured and followed by vaginal packing for 24 hours. Another complication seen was retained placenta, which occurred in two patients, necessitating manual removal. Removal was carried out under epidural analgesia, sparing the patient from general anaesthesia. The procedure was successful in both the patients and curettage was not required afterwards. [5]

The investigators, in general, are of the opinion that epidural analgesia is effective in reducing pain during labour. Epidural analgesia had maternal satisfaction with pain relief and no statistically significant impact on the risk of caesarean section and did not appear to have an immediate effect on neonatal status. Further research may be helpful to evaluate rare but potentially severe adverse effects of epidural analgesia on women in labour and long-term neonatal outcomes.[20]

Conclusion

Present study demonstrated that epidural analgesia with bupivacaine induces a much earlier onset of analgesia than does the traditional analgesia with pethidine-phenergan injection. The intensity of pain is dramatically reduced to a tolerable level following epidural analgesia. It is maintained at this level up to delivery which in the traditional analgesia is not attained. Epidural analgesia has fewer side-effects, where as traditional analgesia has more side-effects, which among others, include maternal nausea and or vomiting and neonatal respiratory depression manifested by low APGAR score.

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