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Original Article

A prospective review of the labor analgesia programme in a teaching hospital

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ABSTRACT

Background: The structured labor analgesia programme in our tertiary care hospital has been in place for the past few years. We undertook this study to analyze the programme and to draw conclusions to further improve the outcomes.
Methods: A prospective analysis of the data pertaining to 200 patients participating in an ongoing labor analgesia programme in a tertiary care hospital from Nov 2008 to Aug 2009 was performed.
Results: Mean visual analog score (VAS) before epidural block was 8.34 ± 0.79. Post procedure the average VAS score was 2.20 ± 0.79. One hundred and fifty six (78%) parturients delivered vaginally, 18 (9%) required instrumentation with vacuum including 1 forceps delivery in a multiparous parturient. In 17parturients (8.7%) fetal distress led to a decision to perform LSCS for delivery. Multiparous patients were significantly more satisfied as compared to nulliparous patients ($p = 0.010$).
Conclusion: The study demonstrated excellent pain relief and patient satisfaction with minimal complications. The safety and efficacy of epidural bupivacaine in concentrations less than 0.625% combined with 25 mcg of fentanyl demonstrated in our study should be considered are commendation for the widespread adoption of the procedure in tertiary care hospitals.

Introduction

The level of pain experienced and the effectiveness of pain relief influences a woman's satisfaction with labor and delivery and may have immediate and long-term emotional and psychological effects.[1] Our study was carried out in a teaching hospital offering labor analgesia to booked parturients and was intended to assess the outcomes in our population using the labor epidural technique with low doses of bupivacaine and fentanyl.

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Materials & methods

This prospective observational study was performed after approval from the institutional ethical committee. Consenting parturients undergoing lumbar epidural analgesia with low dose bupivacaine and opioid regime were included in the study. The study was performed during the period from Nov 2008 to Aug 2009 in a tertiary teaching hospital.

Patients aged between 20 and 40 years, without any significant co-morbidity were included in the study. Exclusion criteria were patients with a known history of allergy to the drugs used in the study, any uncontrolled systemic illness, cardiac disease, hypertension, renal failure, diabetes, and immune-compromised conditions, infection at the site and any known contraindication to the procedure.

Blocks were performed in the sitting or left lateral position based on preference of the anesthesiologist. Monitoring included pulse oximetry, non-invasive blood pressure and fetal cardio-tocography. The epidural space was located at the L3–4 interspace using loss of resistance to air. The epidural catheter was threaded into place and the placement of the catheter was checked by aspirating, while observing for any blood/CSF. A test dose of 15 μg of epinephrine in 3 ml of local anesthetic was used. After careful aspiration to exclude intravascular/intrathecal injection, a 12 ml dose of 0.125% bupivacaine + 25 mcg fentanyl was injected, once the patient started complaining of pain, and the assessing gynecologist confirmed cervical dilatation of more than 4 cm. Subsequent doses of 0.0625% bupivacaine in a graded top up pattern were given as and when required. Break through pain was managed by giving 10 ml boluses of 0.125% bupivacaine.

The data collected included parity, preprocedural VAS and cervical dilatation at the time of request for analgesia. Primary outcome measures studied were assessment of the quality of pain relief obtained using the Visual Analog Score (based on a scale of 1–10 where the worst pain was designated as 10 and no pain, a value of one). Secondary outcomes like fetal bradycardia, evidence of motor blockade, effect on the duration of 2nd stage and eventual outcome and mode of delivery were also noted. Motor block was assessed using a modified Bromage scale

Score	Clinical evaluation
1	Complete block, unable to move feet or knees;
2	Ability to move feet only
3	Just able to move knees
4	Detectable weakness of hip flexion
5	Full flexion of hips and knees while supine

Statistical analysis

Assuming 80% relief in pain after procedure and 5% deviation on either side with 95% CI and 80% power of study the minimum sample size required is 105 pts. While in our study 200 patients were enrolled. All parameters described with 95% CI and qualitative variables were analyzed using Chi square test. Median scores of paired samples for pain relief (pre and post procedure VAS) were assessed using nonparametric Wilcoxon signed rank test.

Results

A total of 256 parturients in 37th week of gestation were registered for the study, 56 parturients were excluded from the study as per the exclusion criteria 19 had pregnancy induced hypertension, 14 had gestational diabetes, 11 were post LSCS, 9 were twins/breech and 3 were excluded because they had cardiac lesions.

The baseline characteristics of the study subjects were as per Table 1

A majority of the study subjects were nulliparous 146 (73%) 54 (27%) were multiparous (Table 1). The extent of cervical dilatation measured in these subjects ranged from 2 to 8 cm with a mean value of 4.02 ± 1.09 cm, of which 181 (90.5%) were less than 5 cm in both nulliparous and multiparous, and about 19 (9.5%) were >6 cm dilated at the time of initiation of labor analgesia (Table 2). Mean VAS before epidural block was 8.34 ± 0.79 (range 6–10) (Table 1).

No significant conclusion could be drawn regarding parity and outcome variables (Table 2).

Primary outcomes

The quality of pain relief was evident by the significant reduction in the average post procedural VAS scores.

181 parturients received epidural analgesia at less than 5 cm of cervical dilatation (Table 1). There were 14 nulliparous and 5 multiparous patients who complained of inadequate analgesia (average VAS >4) post procedure, all these parturients received labor epidural after they were well dilated (>6 cm). The mean pain score was 52% with 95% CI between 45.85% and 58.15%.

The 2nd stage of labor was assessed during this study and all the patients who underwent LSCS (26) were excluded from this comparison.

The duration of the second stage of labor was recorded in 176 patients excluding those who had to be taken up for LSCS.

Table 1 – Patient characteristics.

S. no	Parameter	Nulliparous	Multiparous	Total
1.	Patients – no. (%)	146 (73.0)	54 (27.0)	200
2.	Cervical dilatation (1–5 cm)	132 (66.0)	49 (24.5)	181
3.	Cervical dilatation (>6 cm)	14 (7.0)	05 (2.5)	19
4.	Mean Cervical dilatation (cm) Mean ± SD & Range	4.000 (1.114)	4.074 (1.043)	
5.	Mean VAS before epidural block	8.506 (0.707)	7.888 (0.839)	
6	Mean VAS after epidural block	2.15 (1.0243)	2.314 (0.948)	

Table 2 – Parity and outcome variables ($n = 200$).

S. no.	Characteristic	Primiparous ($n = 146$)	Multiparous ($n = 54$)	Chi square value	"p"
1.	Mean VAS	2.15 ± 1.02	2.31 ± 0.95	1.025	0.307
2.	Motor blockade	2 (1.36%)	8 (14.81%)	0.255	0.613
3.	Nausea & vomiting	2 (1.36%)	6 11.11%)	0.017	0.897
4.	Respiratory depression	0	0	–	–
5.	Patient satisfaction	42 (84%)	139 (95.2%)	6.617	0.010

In a majority of subjects the duration of labor was less than 60 min (71.8%). In 36 (20.68%) subjects the duration of labor ranged from 1 to 2 h, 10 subjects (5%) were in the range of 2–3 h, whereas in 3 subjects (1.7%) the duration of labor was >3 h. The duration of labor was slightly prolonged in the nulliparous parturients, though no such observation was noted in the multiparous subjects. No significant correlation was established between the post procedure VAS scores and the duration of labor. The incidence of instrumented delivery was notably higher in the group with prolonged labor.

It was observed that duration of labor had a significant role in the incidence of motor block ($p = 0.047$) (Table 3).

156 (78%) parturients delivered vaginally, 18 (9%) required the need for instrumentation with vacuum including 1 forceps delivery in a multiparous parturient.

Of the 18 subjects requiring the need for instrumented delivery, 3 subjects delivered with instrumentation within 1 h, including a forceps delivery in a multiparous subject. 14 required it within 1–3 h, and only 1 nulliparous subject needed the help of instrumental delivery after 3 h. The incidence of instrumented delivery was higher amongst nulliparous subjects, but this did not achieve statistical significance.

The incidence of fetal distress as observed by fetal bradycardia and late de-accelerations were 17 in number (12 in nulliparous and 5 in multiparous), comprising 8.7% of the cases and all underwent LSCS for delivery. Mean values of instrumental deliveries was 21.5% with 95% CI between 16.2% and 27.6%.

There was 1 case each of associated motor block in both groups, wherein the duration of labor proceeded beyond 2 h.

Table 3 – Duration of labor and outcome variables ($n = 174$).

S. no.	Characteristic	Duration of labor		Chi square value	"p"
		<60–120 min ($n = 161$)	120–180 min ($n = 13$)		
1.	Mean VAS	2.17 ± 1.03	2.28 ± 1.05	0.633	0.528
2.	Motor blockade	1 (0.62%)	6 (46.15%)	1.962	0.047
3.	Nausea & vomiting	2 (1.24%)	5 (38.46%)	1.372	0.241
4.	Respiratory depression	0	0	–	–
5.	Patient satisfaction	61 (91.0%)	96 (92.3%)	0.086	0.769

2 of the multiparous subjects were post LSCS and were taken up for LSCS when the duration of labor exceeded 2 h. There were no cases of associated maternal or fetal respiratory depression, as found out during follow up in the post op unit.

Motor blockade was observed in 10 (5%) subjects, nausea and vomiting was reported by 8 (4%) subjects. No incidence of respiratory depression was reported. The degree of motor block as assessed by the modified Bromage scale was scaled to be about 4 and 5, and a higher incidence was noted in parturients whose labor was longer than 120 min ($p < 0.05$) (Table 3).

Only 15/196 (7.3%) subjects were not satisfied. Statistically, no significant difference was observed for different outcome variables between nulliparous and multiparous parity status ($p > 0.05$) except for patient satisfaction which was observed to be significantly higher amongst multiparous as compared to nulliparous ($p = 0.010$). Mean satisfaction was 92.5% with 95% CI between 88.19% and 95.58%.

Discussion

In this study a labor analgesia programme which was already in existence at a teaching institute has been analyzed. The lumbar epidural technique was resorted to, because of the relative simplicity of this technique compared to CSE. The American College of Obstetricians and Gynecologists in June 2006 recommended that neuraxial analgesia may be used early in labor and does not increase the risk of caesarian delivery.[2] The current best available evidence in nulliparous women at term with singleton fetus in vertex presentation supports the view that epidural analgesia is safe in laboring women with cervix dilated 2 cm or more.[3,4]

In our study, this was supported in both the 1st and 2nd the stages of labor. The quality of pain relief as perceived by patients was significant, both in nulliparous patients and multiparous patients. It was observed that <8% had unsatisfactory pain relief. In comparison Pan et al,[5] in their retrospective analysis found the overall failure rate to be 12%. Epidural analgesia provides the most effective pain relief for labor relative to other forms of analgesia.[6]

In our study the 2nd stage of labor was specifically observed to detect any adverse effects of the low dose epidural regime. In a majority of the subjects the duration of labor was within 60 min (71.8%). In 36 (20.68%) subjects the duration of labor ranged from 1 to 2 h, 10 subjects (5%) were in the range of 2–3 h, whereas in 3 subjects (1.7%) the duration of labor was >3 h. We therefore concluded that there was no significant prolongation of the 2nd stage of labor in our study as per the

definitions of prolonged labor stated in American College of Obstetricians and Gynecologists (ACOG) guidelines.[7]

Halpern et al, in a recent study have concluded that neuraxial analgesia does not interfere with the progress or outcome of labor, and there is no need to withhold neuraxial analgesia until the active stage of labor.[8] Our study is in agreement with these findings.

In a Cochrane Collaboration Review, more women in the epidural group had caesarean sections for fetal distress (11 trials, 4816 women) in comparison with non-epidural (parenteral opioids) or no analgesia, although there was no evidence of a significant difference between groups in the overall caesarean section rate (seven trials, 8417 women).[9]

In our study 26 patients underwent LSCS after initiation of epidural analgesia and on re-evaluation it was found that 12 were cases of borderline cephalo pelvic disproportion who had been given a trial of labor, 9 cases were attributed to secondary arrest of labor, 2 cases of fetal depression were reported and 3 cases of prolonged labor.

Complications of block

In the present study lower limb motor weakness was observed in 10 subjects (5%) of our patients. It was observed to be more prevalent in those requiring prolonged epidural analgesia, or repeated intermittent boluses, with the VAS scores ranging within 4–5.

Nausea & vomiting was assessed as a part of patient acceptability, showed 8 subjects (4%) who felt nauseous which was transient in nature and subsided without medication.

Nausea and vomiting are known common side effects induced by pregnancy.[10] In addition, pain is a major cause of nausea.[11] Recent studies have shown that epidural analgesia in early labor can decrease intra-partum nausea and vomiting more significantly than a later initiation of labor analgesia.[12]

In our study population no cases of respiratory depression in the mother was observed. 17 cases of fetal distress as noted by fetal HR depression were observed during the period of labor analgesia given to the mother.

In this regard, Capona et al[13] noted that transient fetal heart rate changes have been described immediately after the administration of intrathecal or epidural opioids. Maternal hypotension may also occur at the onset of epidural analgesia. The indirect fetal effects of epidural and intrathecal opioids may be more significant than the direct effects. Maternal hypotension may cause a decrease in utero-placental perfusion and fetal oxygenation. If the mother has severe respiratory depression and hypoxemia, fetal hypoxemia and hypoxia will follow.[14] Whether the occurrence of transient fetal heart rate changes or maternal hypotension immediately after the epidural block may influence the neonatal outcome at birth, needs verification.

Fetal bradycardia usually resolves with conservative therapy, including discontinuing exogenous oxytocin and the administration of an intravenous fluid bolus. Nitroglycerine has been used successfully to treat uterine hypertonus associated with the initiation of neuraxial analgesia.[15]

In this regard a study in Poland, studying the course and outcome in term nulliparas resorting to epidural analgesia, confirmed that incidence of fetal distress during second stage of labor was significantly higher in the epidural group (12.69 vs. 6.99%, $P = 0.02$), but the incidence of fetal distress during first stage of labor did not differ in both groups. They however concluded that epidural labor analgesia is associated with slower progress of labor but this finding had no adverse effect on perinatal outcome and complications.[16]

Conclusion

In our study we demonstrated excellent pain relief and patient satisfaction with minimal complications.

The safety and efficacy of epidural bupivacaine in concentrations less than 0.625% combined with 25 mcg of fentanyl demonstrated in our study should be considered a recommendation for the widespread adoption of the procedure in tertiary care hospitals.

Conflicts of interest

All authors have none to declare.

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