

A study to compare the haemo dynamic changes among mother and fetus with bupivacaine and bupivacaine with clonidine as analgesic during labour

Mohammed Asif¹, Shilpa Divakar Agnihotri^{2*}, Priyanka Basavaraj Chougule³

¹Associate Professor, ²Assistant Professor, ³Senior Resident Department of Anesthesiology, SDM College of Medical Sciences and Hospital, Sattur, Dharwad.

Email: statisticsclinic2018@gmail.com

Abstract

Background: Bupivacaine has direct action on both cardiac muscle and vascular smooth muscle. Effects of the drug on cardiac muscle are electrophysiological due to its action on fast sodium channels. Dose related negative inotropic effect on the heart. The action of clonidine is seen by decrease in systolic BP is more profound than diastolic BP. There is no paralysis of compensatory homeostatic reflex which makes it more desirable. Renal blood flow and GFR is maintained. **Objective:** To compare the haemo dynamic changes among Mother and Fetus with Bupivacaine and Bupivacaine with Clonidine as analgesic during labour. **Methodology:** : A prospective study was conducted at Sholapur Medical College during the period from November 2011 to October 2013 at Department of OBG , Sholapur Medical College, Sholarapur. A total of 100 study subjects who were healthy term parturients, admitted in the labour ward of the hospital with ASA grade I and II aged 20-35 years in active labour with minimum 3cm dilatation of cervix with cephalic presentation and singleton pregnancy were selected for labour analgesia. They were divided in two groups randomly. Group A (n=50) received Bupivacaine 0.125% alone Group B (n=50) received Bupivacaine 0.125% along with Clonidine 60 microgram. **Results:** In both the groups decreased pulse rate is noted after the injection of drug but it is insignificant statistically. Systolic blood pressure decreased after the injection of the drug in both the groups but in the first 15 minutes it is statistically insignificant and after 15 minutes fall in blood pressure is more in Group B which is statistically significant. Foetal heart rate as monitored by cardiotocograph, in both the groups is statistically insignificant. **Conclusion:** Hemodynamic stability is maintained when Clonidine is added in the dose of 60mcg along with 0.125% Bupivacaine in Extradural labour analgesia. Foetal heart rate and neonatal outcome were comparable in both the groups. **Key Words:** Haemodynamics, Labour analgesia,regnancy, Maternal , Fetal Outcome

*Address for Correspondence:

Dr. Shilpa Divakar Agnihotri, Assistant Professor, Department of Anesthesiology, SDM College of Medical Sciences and Hospital, Sattur, Dharwad.

Email: statisticsclinic2018@gmail.com

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INTRODUCTION

Pain in labour is an extremely agonising experience for most women. Various methods have been tried since time immemorial to alleviate this pain. However, this endeavour did not receive much support till the late 19th century, with analgesia for labour being opposed for both medical and religious reasons. It was also believed that pain had a biological value and attempts to abolish it would be detrimental to both the mother and foetus. However, the recognition of various physiological disturbances that can occur due to unrelieved labour pain brought about a change in this thinking. In view of this,

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the concept of labour analgesia came to be widely accepted.^{1,2} Bupivacaine was synthesized by A.F.Ekanstam and his colleagues in 1957 at A B Bofors, Sweden³. It was first clinically used by Telivuo in 1963. Bupivacaine is an amide type of local anaesthetic agent. Bupivacaine was the first local anaesthetic that had both the properties of acceptable onset of action, profound conduction blockade and longer duration of action. The onset of action of bupivacaine in epidural space is between 4 and 6 minutes, maximum anaesthesia is obtained between 15-20 minutes.

Bupivacaine has direct action on both cardiac muscle and vascular smooth muscle. Effects of the drug on cardiac muscle are electrophysiological due to its action on fast sodium channels. Dose related negative inotropic effect on the heart. At concentrations of 1-1.5 micrograms/ml, bupivacaine depresses ventricular contractility by 25%. 16 times more potent to produce ventricular arrhythmia than lignocaine. Cardiovascular depression due to toxicity of bupivacaine is often life threatening and management of toxicity is difficult.⁴ Clonidine is a centrally acting selective partial alpha₂ adrenergic agonist (220:1 alpha₂ to alpha₁). Clonidine produce clinical effects by binding to alpha-2 receptors of which are three subtypes- alpha-2A, alpha-2B, alpha-2C. The decrease in systolic BP is more profound than diastolic BP. There is no paralysis of compensatory homeostatic reflex which makes it more desirable. Renal blood flow and GFR is maintained.⁵

Clonidine augments the action of local anaesthetics in regional blockade by interrupting the neural transmission of painful stimuli. Its vasoconstricting effect decreases the absorption of local anaesthetics and eventually prolong the duration of action of local anaesthetics. It stimulates alpha-2 adrenoceptors to reduce central neural transmission. Inhibition of substance P release is believed to be involved in analgesic effect. All these properties make clonidine a better adjuvant than neuraxial opioids which are associated with respiratory depression, sedation, pruritis, nausea in mother and less APGAR scores in fetus.⁶

OBJECTIVE

To compare the haemodynamic changes among Mother and Fetus with Bupivacaine and Bupivacaine with Clonidine as analgesic during labour.

MATERIALS AND METHODS

A prospective study was conducted at Sholapur Medical College during the period from November 2011 to October 2013 at Department of OBG, Sholapur Medical

College, Sholapur. A total of 100 study subjects who were healthy term parturients, admitted in the labour ward of the hospital with ASA grade I and II aged 20-35 years in active labour with minimum 3cm dilatation of cervix with cephalic presentation and singleton pregnancy were selected for labour analgesia. They were divided in two groups randomly. Group A (n=50) received Bupivacaine 0.125% alone Group B (n=50) received Bupivacaine 0.125% along with Clonidine 60 microgram 10ml of 0.125% Bupivacaine / 0.125% Bupivacaine and Clonidine 60 mcg as first dose and further top ups of 5-7cc were given whenever VAS > 4 in parturients with Group A and Group B respectively. After admission to our hospital thorough medical, obstetric and anaesthetic history was taken which was later followed by a general and obstetric examination. Investigations like haemoglobin percentage, blood grouping and typing, urine analysis was done.

Exclusion criteria

- I. For epidural anaesthesia
 - i. Patient refusal
 - ii. Infection at the site of block
 - iii. Sensitivity to anaesthetic drugs
 - iv. Patient with bleeding disorder.
- II. Obstetric criteria
 - i. Cephalopelvic disproportion
 - ii. Eclampsia, Diabetes mellitus

The procedure plan was explained in their vernacular language and written informed consent was taken from the patient and reliable accompanying relative.

Group A patients were administered with 10 cc of 0.125% Bupivacaine alone and Group B patients were administered with 10 cc of 0.125% Bupivacaine along with 60mcg of Clonidine. Drugs were given through epidural catheter in graded doses checking for the response because no test dose was used. After the drug was injected to the parturients, they were monitored for vital parameters like – Pulse, Blood pressure, Respiratory rate, SpO₂. Foetal well being was assured by cardiotocogram. Pain scoring by VAS, Pulse rate, Blood pressure was done at interval of 1, 5, 10, 15, 30, 45, 60, 90, 120, 150, 180, 210, 240, 270 min. Duration of labour, ambulation, any complication, maternal and foetal outcome were noted.

The values were represented as mean±SD. For comparison between groups A and B, a students 't' test and 'z' test was applied. Differences were considered statistically significant if p < 0.05.

RESULTS

A comparative study of Epidural labour analgesia is done between Group A (0.125% Bupivacaine alone) and Group B (0.125% Bupivacaine with 60mcg Clonidine). In our present study, fifty cases of each were randomly allocated.

Table 1: Comparison of Maternal heart Rate in both the groups

Interval (min)	Group A (n=50)	Group B (n=50)	P value
1	94.78 ± 11.96	96.52 ± 4.59	NS
5	92.96 ± 9.13	93.74 ± 4.89	NS
10	92.16 ± 6.53	91.3 ± 4.912	NS
15	89.62 ± 8.35	87.26 ± 4.57	NS
30	91.44 ± 9.86	86.84 ± 4.58	S
60	94.26 ± 7.37	85.94 ± 4.53	S
90	90.5 ± 6.53	91.94 ± 6.05	NS
120	90.54 ± 5.91	93.84 ± 6.04	S
150	94.3 ± 4.62	89.46 ± 5.75	S
180	89.87 ± 6.92	87.43 ± 4.54	NS
210	88.61 ± 6.08	88.38 ± 7.10	NS
240	89.71 ± 3.95	86.18 ± 5.06	S
270	91.61 ± 5.38	85.66 ± 1.96	S
300	88.48 ± 8.54		
330	76.02 ± 0.12		

In both the groups decreased pulse rate is noted after the injection of drug but it is insignificant statistically and none of the parturients required any medical intervention

Table 2: Comparison of Systolic Blood Pressure in both the groups

Interval (min)	Group A (n=50)	Group B (n=50)	P value
Baseline	108.72 ± 8.07	111.16 ± 4.7	NS
5	110.18 ± 6.7	107.76 ± 5.9	NS
10	107.68 ± 4.89	103.84 ± 2.51	S
15	101.6 ± 4.37	100.74 ± 3.18	S
30	104.88 ± 5.14	100.76 ± 2.45	S
60	104.84 ± 7.09	102.68 ± 3.17	NS
90	109.12 ± 7.66	104.08 ± 2.9	S
120	105.6 ± 5.77	103.16 ± 4.86	S
150	108.6 ± 5.24	102.4 ± 3.28	S
180	105.87 ± 7.31	104.25 ± 3.21	NS
210	106.09 ± 6.24	105.12 ± 3.86	NS
240	107.33 ± 3.84	105.29 ± 4.29	NS
270	107.0 ± 4.60	104.0 ± 4.16	NS
300	109.57 ± 3.15		
330	109.71 ± 0.75		

Systolic blood pressure decreased after the injection of the drug in both the groups but in the first 15 minutes it is statistically insignificant and after 15 minutes fall in blood pressure is more in Group B (Clonidine group) which is statistically significant but this fall is not more than 20% of the baseline blood pressure and none of the parturients in both the groups required vasopressors or ionotropes

Table 3: Comparison of Diastolic Blood Pressure in both the groups

Interval (min)	Group A (n=50)	Group B (n=50)	P
1	77.52 ± 6.44	75.64 ± 4.92	NS
5	77.68 ± 4.9	75.84 ± 4.8	NS
10	79.6 ± 3.63	74.88 ± 4.68	S
15	78.32 ± 5.87	76.52 ± 4.97	NS
30	79.56 ± 3.50	78.04 ± 4.8	NS
60	79.24 ± 3.24	77.56 ± 5.16	NS
90	80.04 ± 2.57	78.84 ± 4.42	NS
120	79.36 ± 4.41	77.4 ± 6.86	NS

150	76.72 ± 5.8	74.8 ± 4.42	NS
180	79.29 ± 4.07	77.53 ± 4.77	NS
210	79.31 ± 3.18	75.12 ± 5.06	S
240	71.33 ± 2.67	69.8 ± 0.49	NS
270	82.23 ± 2.73	71.42 ± 3.77	S
300	80.28 ± 1.06		
330	80 ± 0		

Diastolic blood pressure decreased after the injection of the drug in both the groups but in the first 15 minutes it is statistically insignificant and after 15 minutes fall in blood pressure is more in Group B (Clonidine group) which is statistically significant but this fall is not more than 20% of the baseline blood pressure and none of the parturients in both the groups required vasopressors or ionotropes.

Table 4: Comparison of Foetal Heart Rate in both the groups

Interval (min)	Group A (n=50)	Group B (n=50)	P
1	145 ± 4.54	146.42 ± 2.33	NS
5	144.62 ± 3.59	145.16 ± 3.04	NS
10	143.86 ± 2.89	143.74 ± 5.11	NS
15	143.12 ± 3.59	142.54 ± 7.11	NS
30	144.2 ± 4.17	145 ± 2.69	NS
60	143.48 ± 3.9	144.56 ± 2.55	NS
90	141.8 ± 3.97	144.34 ± 4.71	S
120	142.92 ± 4.58	143.6 ± 3.8	NS
150	145.06 ± 4.01	144.26 ± 2.27	NS
180	145.04 ± 4.67	142.71 ± 2.35	S
210	145.23 ± 3.30	142.20 ± 3.29	S
240	145.82 ± 5.87	145.46 ± 3.07	NS
270	144.07 ± 4.79	144 ± 0.81	NS
300	143.07 ± 4.8		
330	146.5 ± 5.50		

Foetal heart rate as monitored by cardiocograph, in both the groups is statistically insignificant. One of the foetus in Group B had distress and required caesarean section. The foetus with distress had meconium stained liquor and mother had no hemodynamic instability.

Table 5: Comparison of Neonatal Outcome in Both the groups

Apgar score	Group A	Group B	P
1 min	8.34 ± 0.86	7.98 ± 0.76	(0.053)NS
5 min	10	10	(0)NS

Neonatal outcome at 1 minute and 5 minutes was noted. Average apgar score at 1 minute in Group A was 8.34 ± 0.87 and Group B was 7.98 ± 0.76 which is not statistically insignificant. Apgar score at 5 minutes was 10 in both the groups. There was no single episode of respiratory depression or NICU admission.

DISCUSSION

In our institute, 100 full term parturients, ASA – I and II, in active labour with minimum 3 cm cervical dilatation were considered for epidural labour analgesia. Out of which two groups of 50 each were formed randomly. Group A (n=50) received Bupivacaine 0.125% alone and Group B (n=50) received 0.125% Bupivacaine and 60mcg Clonidine. In our present study, both the groups had decreased pulse rate after the injection of drug but it was insignificant statistically and none of the parturients required any medical intervention. Similar results were noted by Chassard *et al*⁷, where in maternal heart rates were comparable in all the three groups (average 85, 82 and 86 were seen in plain Bupivacaine, Clonidine 100mcg and Clonidine 150mcg respectively) One patient in Clonidine 150mcg group had bradycardia and atropine

was administered to the patient which might be because of the higher Clonidine dose. According to O’Meara *et al*⁸, there appeared to be no direct effects of Clonidine on FHR and no episodes of maternal hypotension or bradycardia which could have resulted in an untoward outcome. Our test results were comparable to studies by K.Syal *et al*⁹, Cigarini *et al*¹⁰ and Landau R¹¹ *et al*. Blood pressure decreased after the injection of the drug in both the groups but in the first 15 minutes it is statistically insignificant and after 15 minutes fall in blood pressure is more in Group B (Clonidine group) which is statistically significant but this fall is not more than 20% of the baseline blood pressure and none of the parturients in both the groups required vasopressors or ionotropes Chassard *et al*⁷ in his study the mean arterial pressure was comparable in all the three groups (control, 100mcg

Clonidine and 150mcg Clonidine) initially but further significant decrease in MAP was noted, more so in the third group where 150mcg Clonidine was used. Two patients in Clonidine group had hypotension and was treated with ephedrine. According to O'Meara *et al*⁸, there appeared to be no direct effects of Clonidine on FHR and no episodes of maternal hypotension or bradycardia which could have resulted in an untoward outcome. Similar results as that of my study were noted in studies by K.Syal *et al*⁹ and Cigarini *et al*¹⁰. Foetal heart rate, as monitored by cardiotocograph, in both the groups were comparable and statistically insignificant. One of the foetus in Group B had distress and required caesarean section. The foetus with distress had meconium stained liquor and mother had no episodes of hypotension and bradycardia. M.R.Tremlet *et al*¹² in his study using low dose infusion Clonidine said that foetal cardiotocographic traces of concern was more in the Clonidine group but values just failed to reach statistical difference. There were no differences in FHR between the two groups in the study by O'Meara *et al*⁸. According to O'Meara *et al*⁸, there appeared to be no direct effects of Clonidine on FHR and no episodes of maternal hypotension or bradycardia which could have resulted in an untoward outcome. Similar results were obtained by Cellano and colleagues.¹³ Neonatal outcome at 1 minute and 5 minutes were noted. Apgar score at 1 minute in Group A (8.34 ± 0.87) and Group B (7.92 ± 0.84) were noted and it was not statistically significant. Apgar score at 5 minutes was 10 in both the groups. There was no single episode of respiratory depression or NICU admission. Neonatal outcome in K.Syal *et al* study⁹ in his study where Clonidine 60mcg was added to 0.125% Bupivacaine was similar with regards to Apgar at 1 and 5 minutes in both the groups. It is consistent to findings in other studies by Landau R *et al*¹¹ and Kizilasaran S *et al*¹⁴ where Clonidine was used as adjuvant to Ropivacaine and 0.125% Bupivacaine. There was no difference in Apgar scores of the neonates in both the groups as noted by O'Meara *et al*⁸.

CONCLUSION

Maternal heart rate changes were insignificant in the first 15 min and then later statistically significant changes were noted. When compared both the groups, Group B had fall in pulse rate but none of the parturients required any form of medical intervention. Maternal systolic and diastolic blood pressure was statistically insignificant in the first fifteen minutes and significant changes were noted after fifteen minutes. Hemodynamic stability is

maintained when Clonidine is added in the dose of 60mcg along with 0.125% Bupivacaine in Extradural labour analgesia. Foetal heart rate and neonatal outcome were comparable in both the groups.

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