

Effect of intrathecal labor analgesia using fentanyl 25µg alone and fentanyl 20µg plus bupivacaine 2.5mg on the progress of labor

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Abstract

Background: Labor pain is excruciating and leads to a spectrum of adverse physical and psychological stress to mother and fetus. Among the variety of labour analgesia techniques ranging from parenteral and inhalational agents, regional analgesia has an edge over other methods in achieving the above goals. In present study, we compared effect of intrathecal labor analgesia using fentanyl 25µg alone and fentanyl 20µg plus bupivacaine 2.5mg on the progress of labor at a tertiary hospital. **Material and Methods:** Present study was interventional, comparative study, conducted in primigravida, 20-35 years age, ASA (American society of Anaesthesiologists) status grade I/II, full-term, singleton pregnancies, vertex presentation, in active phase of labor with a cervical dilatation of more than 4 cm with normal fetal heart rate (FHR) tracings, willing to participate. 60 parturients were, randomly allocated in 2 groups. as Group F (n=30) - received an intrathecal injection of fentanyl 25 µg & Group BF (n=30) - received intrathecal injection of fentanyl 20 µg plus 0.5% hyperbaric bupivacaine 2.5 mg (0.5 ml). **Results:** General characteristics such as mean age (in years), mean weight (in kg), ASA grade I/II, onset of labour (spontaneous/induced), APGAR Scores (at 1 min/ at 5 min) were comparable in both groups & difference was not significant statistically. No maternal morbidity was noted. None of baby required resuscitation or NICU admission & were discharged successfully with mothers. Parameters such as onset time of labor analgesia (min), mean cervical dilatation rate cm/hour, mean duration of active phase of first stage of labor (min), mean duration of labor analgesia (min), need for rescue analgesia & need for local anesthesia for episiotomy were favourable in fentanyl plus bupivacaine group as compared to fentanyl alone & difference was significant statistically. Mean duration of second stage (min) & Mean duration of Third stage of labor (min) were comparable in both groups & difference was not significant statistically. **Conclusion:** Intrathecal labor analgesia using fentanyl 20µg plus bupivacaine 2.5mg had early onset of labor analgesia, faster cervical dilatation rate, less duration of active phase of first stage of labor & less need for rescue analgesia & less need for local anesthesia for episiotomy as compared to fentanyl 25µg alone. **Keywords:** Intrathecal labor analgesia, fentanyl, bupivacaine, progress of labor

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INTRODUCTION

Labor pain is excruciating and leads to a spectrum of adverse physical and psychological stress to mother and fetus. Painful uterine contractions cause hyperventilation and high catecholamine levels resulting in maternal and fetal hypoxemia. Effective labour analgesia is known to decrease inhibitory effect of endogenous maternal catecholamines on uterine contractility thus improves utero-placental flow, attenuates maternal acidosis and improves maternal well being.¹ In spite of the superior analgesia and improved safety of epidural labour analgesia, it has been associated with maternal and foetal

adverse effects, including prolongation of labour, higher incidence of instrumental assisted vaginal delivery.^{2,3,4} Among the variety of labour analgesia techniques ranging from parenteral and inhalational agents, regional analgesia has an edge over other methods in achieving the above goals. Lipophilic opioids like fentanyl have been used extensively intrathecally and epidurally for labor analgesia along with local anesthetics. fentanyl is a μ -receptor agonist exerts its effect intrathecally, by combining with opioid receptors in the dorsal horn of the spinal cord that could have a supraspinal spread and action.⁵ Addition of bupivacaine to intrathecal opioid prolongs duration of labour analgesia compared with either drug used alone.⁶ In present study, we compared effect of intrathecal labor analgesia using fentanyl 25 μ g alone and fentanyl 20 μ g plus bupivacaine 2.5mg on the progress of labor at a tertiary hospital.

MATERIAL AND METHODS

Present study was interventional, comparative study, conducted in Department of anaesthesiology & Department of Obstetrics and Gynaecology, PGIMER, Chandigarh, India. Study period was of 6 months (January 2021 to June 2021). Study permission was obtained from institutional ethical committee.

Inclusion criteria: Primigravida, 20-35 years age, ASA (American society of Anaesthesiologists) status grade I/II, full-term, singleton pregnancies, vertex presentation, in active phase of labor with a cervical dilatation of more than

4 cm with normal fetal heart rate (FHR) tracings, willing to participate.

Exclusion criteria: Pregnant women with any high risk obstetric or medical factor. Pregnant women posted for elective LSCS. Parturients delivered vaginally were included and women required LSCS were excluded.

60 parturients were enrolled in present study, randomly allocated in 2 groups.

1) Group F (n=30) - received an intrathecal injection of fentanyl 25 μ g

2) Group BF (n=30) - received intrathecal injection of fentanyl 20 μ g plus 0.5% hyperbaric bupivacaine 2.5 mg (0.5 ml)

After preloading with 500 ml RL solution, under all aseptic precautions, Single intrathecal injection was given in left lateral position, in L3-L4 interspace with a 25 G spinal needle. Maternal parameters such as maternal vitals, duration of sensory block, pain scores were recorded by anaesthetist. Labour was monitored with help of partograph (frequency and intensity of uterine contractions, dilation of the cervix, descent of the presenting part, oxytocin used and fetal heart rate recordings) by obstetrician. Every neonate was examined by neonatologist immediately after birth and APGAR scores were recorded. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Difference of proportions between qualitative variables were tested using chi-square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

RESULTS

In present study, 60 parturients were randomly allocated in group F (n=30) & Group BF (n=30). General characteristics such as mean age (in years), mean weight (in kg), ASA grade I/II, onset of labour (spontaneous/induced), APGAR Scores (at 1 min/ at 5 min) were comparable in both groups & difference was not significant statistically. No maternal morbidity was noted. None of baby required resuscitation or NICU admission & were discharged successfully with mothers.

Table 1: General characteristics

Parameters	Group F (n=30)	Group BF (n=30)	P value
Mean age (in years)	23.91 \pm 2.91	24.44 \pm 3.12	
Mean weight (in kg)	62.94 \pm 6.26	63.23 \pm 5.99	
ASA grade			
I	22 (73.33 %)	23 (76.67 %)	
II	8 (26.67 %)	7 (23.33 %)	
Onset of labour			
Spontaneous	24 (80 %)	23 (76.67 %)	
Induced	6 (20 %)	7 (23.33 %)	
APGAR Scores			
At 1 min	6.97 \pm 0.82	7.37 \pm 0.92	
At 5 min	8.69 \pm 0.63	8.83 \pm 0.67	

Parameters such as onset time of labor analgesia (min), mean cervical dilatation rate cm/hour, mean duration of active phase of first stage of labor (min), mean duration of labor analgesia (min), need for rescue analgesia & need for local anesthesia for episiotomy were favourable in fentanyl plus bupivacaine group as compared to fentanyl alone & difference was significant statistically. Mean duration of second stage (min) & Mean duration of Third stage of labor (min) were comparable in both groups & difference was not significant statistically.

Table 2: Characteristics of labor analgesia

Parameters	Group 1	Group 2	P value
Onset time of Labor Analgesia (min)	6.13 ± 2.64	3.29 ± 2.15	0.032*
Mean cervical dilatation rate cm/hour	1.42 ± 0.45	1.68 ± 0.41	0.047*
Mean duration of active phase of first stage of labor (min)	199.28 ± 35.3	188.13 ± 33.62	0.048*
Mean duration of second stage (min)	53.29 ± 18.31	49.86 ± 20.23	0.082
Mean duration of Third stage of labor	5.17 ± 1.2	4.88 ± 1.6	0.18
Mean duration of labor analgesia (min)	245.56 ± 29.48	288.40 ± 32.05	0.001*
Need for rescue analgesia	3 (10 %)	1 (3.33 %)	0.001*
Need for local anesthesia for episiotomy	5 (16.67 %)	2 (6.67 %)	0.001*

DISCUSSION

Most women experience moderate to severe pain during labour and delivery, often requiring some form of pharmacological analgesia.^{7,8} The pain of the late first stage and second stage of labor arises from the descent of the fetus in the birth canal, resulting in distension, stretching and tearing of tissues in the vagina and perineum.⁹ Pain relief not only provides patient's comfort, but also attenuates the release of stress hormones, whose actions can draw from the parturients' reserves as well as depriving the fetus of oxygen and nutrients.¹⁰ An ideal labour analgesic technique should provide adequate and satisfactory analgesia without any motor blockade or adverse maternal and foetal effects. "Walking epidural" is preferred for labor analgesia as it aids the progress and outcome of labor.¹¹ Ambika et al.,¹² noted that intrathecal fentanyl with bupivacaine group had early onset of labor analgesia, more duration of labor analgesia, better rate of cervical dilatation, APFAR scores and less duration of second stage than intrathecal fentanyl alone. Though no significant difference was noted for duration of active phase of first stage, duration of second stage and progress of labour in both groups. Similar findings were noted in present study. Potdar MP et al.,¹³ studied 120 primiparas with a singleton pregnancy in active labor were randomly allocated to three groups of 40 each and received CSE. Group F-received 25 µcg fentanyl intrathecally. Group BF-received 25 µcg fentanyl with 2.5 mg isobaric bupivacaine intrathecally. Group RF-received 25 µcg fentanyl with 2.5 mg isobaric ropivacaine intrathecally. The duration of spinal analgesia was significantly greater with Group RF 106.63 ± 17.99 min and Group BF 111.75 ± 23.58 min than the control Group F which was 60 ± 10.39 min with P = 0.001, but were comparable for Group BF and RF. The addition of bupivacaine or ropivacaine to fentanyl intrathecally increased duration and quality of analgesia, did not affect ambulation and bearing down. In study by Gowrisree K¹⁴ duration of the active phase of first stage of labor was slightly shortened in group A (intrathecal labor analgesia with fentanyl 25 µg) as compared to group B (fentanyl 20 µg plus bupivacaine 2.5 mg). Duration of the second stage of labor was slightly prolonged in group-B as compared to group A (22.2 vs 25.07min,) and significant.

Rate of cervical dilation was faster in group A as compared to group B (1.93 vs. 1.94 cm/h). They concluded that, rapid onset with satisfactory pain relief, VAS scores <4 and good maternal and fetal hemodynamics in both the groups and minimal motor block in group-B. Similar findings were noted in present study. In another study Mathur P et al.,¹⁵ studied 60 nulliparous parturients in the active phase of labor with a cervical dilatation of >3 cm were selected for this prospective study. Group SA (n = 30) received an intrathecal injection of 0.5% hyperbaric bupivacaine 2.5 mg and fentanyl 25 µg and compared with Group C (n = 30) who refused to give consent for neuraxial analgesia. Duration of the active phase of first stage of labor was shortened in group SA as compared to group C (115.50 vs.134.0 min, P < 0.05). Duration of second stage of labor was prolonged in group SA as compared to group C (18.03 vs. 10.13 min, P < 0.05). Rate of cervical dilation was faster in group SA as compared to group C (3.021 vs. 2.486 cm/h, P < 0.05). Mean visual analog score, pulse rate, and mean arterial pressure was significantly decreased as compared to the baseline in group SA. Single-shot intrathecal analgesia using fentanyl 25 µg and bupivacaine 2.5 mg in active phase of first stage of labor associated with fast cervical dilation rate and no delay in the progress of labor. Use of lower doses of bupivacaine is having least placental transfer property, due to high protein binding and minimal motor block compared to sensory block. It has become a popular choice for labor analgesia. Earlier, fentanyl used along with bupivacaine for labor analgesia extensively to decrease motor block, however the addition of opioids to local anesthetics has disadvantages of pruritus and respiratory depression was noted by Gupta R et al.¹⁶ In present study, minor complications observed were comparable in both groups. Present study limitations were small sample size. Also other factors like the timing of amniotomy, maternal fever, neonatal birth weight, which can influence the progress of labour & mode of delivery.

CONCLUSION

Intrathecal labor analgesia using fentanyl 20µg plus bupivacaine 2.5mg had early onset of labor analgesia, faster cervical dilatation rate, less duration of active phase of first stage of labor & less need for rescue analgesia &

less need for local anesthesia for episiotomy as compared to fentanyl 25µg alone. Hence, fentanyl 20µg plus bupivacaine 2.5mg seems to be a better choice as intrathecal labor analgesia when compared with fentanyl 25µg alone.

REFERENCES

1. Anabah T, Olufolabi A, Boyd J, George R. Low-dose spinal anaesthesia provides effective labour analgesia and does not limit ambulation. *Southern Af J Anaes Analg*. 2015;21(1):19-22.
2. Sultan P, Murphy C, Halpern, Carvalho B. Effect of low concentrations versus high concentrations of local anaesthetics for labour analgesia on obstetric and anaesthetic outcomes: A meta-analysis. *Can J Anesth* 2013;60:840-54.
3. Anim-Somuah M, Smyth R, Howell C. Epidural versus non-epidural or no analgesia in labour. *Cochrane Database Syst Rev* 2005;4:CD000331.
4. Comparative Obstetric Mobile Epidural Trial (COMET) Study Group UK. Effect of low-dose mobile versus traditional epidural techniques on mode of delivery: A randomised controlled trial. *Lancet* 2001;358:19-23.
5. M. D. Owen, O. O' zsarac, S. S, ahin, N. Uc, kunkaya, N. Kaplan, and I. Ma gunaci, "Low-dose clonidine and neostigmine prolong the duration of intrathecal bupivacaine-fentanyl for labor analgesia," *Anesthesiology*, vol. 92, no. 2, pp. 361–366, 2000.
6. Campbell DC, William RC, Datta S. The addition of bupivacaine to intrathecal sufentanil for labor analgesia. *Anaesth Analg* 1995;81:305-9.
7. Kuczkowski KM, Chandra S. Maternal satisfaction with single-dose spinal analgesia for labor pain in Indonesia: a landmark study. *J Anesth*. 2008;22(1):55-8.
8. Fyneface-Ogan S, Gogo Job O, Enyindah CE. Comparative effects of single shot intrathecal bupivacaine with dexmedetomidine and bupivacaine with fentanyl on labor outcome. *ISRN Anesthesiol*. 2012;2012.
9. Reena kasturi, Bandyopadhyay KH, Afzal M, Mishra AK, Paul A. Labor epidural analgesia: Past, present and future. *Indian J Pain* 2014;28:71-81.
10. H. E. Onah, S. N. Obi, T. C. Oguanuo, H. A. Ezike, C. M. Ogbuokiri, and J. O. Ezugworie, "Pain perception among parturients in Enugu, South-Eastern Nigeria," *Journal of Obstetrics and Gynaecology*, vol. 27, no. 6, pp. 585–588, 2007.
11. Douglas MJ. Walking epidural analgesia in labour. *Can J Anaesth* 1998;45:607-11.
12. Ambika, Lalit Mohan Negi, Priyanshu Sharma, Jassa Ram, Kamlesh Chaudhary. Study of progress of labor with intrathecal labor analgesia using fentanyl 25µg alone versus fentanyl 20µg plus bupivacaine 2.5mg. *MedPulse International Journal of Anesthesiology*. March 2021; 17(3): 103-106.
13. Potdar MP, Kamat LL, Jha T. Intrathecal isobaric ropivacaine-fentanyl versus intrathecal isobaric bupivacaine-fentanyl for labor analgesia: A controlled comparative double-blinded study. *J Obstet Anaesth Crit Care* 2014;4:12-7.
14. Gowrisree Kadimi, Gopal Reddy Narra, Effect of intrathecal labor analgesia using fentanyl 25µg alone and fentanyl 20µg plus bupivacaine 2.5mg on the progress of labor. *MedPulse International Journal of Anesthesiology*. May 2019; 10(2): 107-111.
15. Mathur P, Jain N, Prajapat L, Jain K, Garg D, Khandelwal V. Effect of intrathecal labor analgesia using fentanyl 25 µg and bupivacaine 2.5 mg on progress of labor. *J Obstet Anaesth Crit Care* 2017;7:47-51.
16. Gupta R, Verma R, Bogra J, Kohli M, Raman R, Kushwaha JK. A Comparative study of intrathecal dexmedetomidine and fentanyl as adjuvants to Bupivacaine. *J Anaesthesiol Clin Pharmacol* 2011;27:339-43.

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