CAN INCREASING CONCENTRATION OF EPIDURAL-PCA FENTANYL FOR LABOR IMPROVE ANALGESIA WITH MINIMAL EFFECT ON THE NEONATE?

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We have found that epidural fentanyl (2 μg/ml with bupivacaine 0.015% and epinephrine 2 μg/ml) required frequent rescue doses of 0.25% epidural bupivacaine to achieve satisfactory labor analgesia, whereas less local anesthetic was needed when sufentanil was used.[1] Because of the expense of sufentanil, this study aimed to determine whether increasing the concentration of the less expensive fentanyl would provide adequate analgesia with less local anesthetic and with no neonatal effect.

Methods: Following IRB approval and informed consent, we studied 58 primiparae (P) and 57 multiparae (M) during labor and delivery. Patients received no systemic opioids and were randomized in a double-blind design to three groups (which will have n=25 upon completion of the study) as shown in Table 1.

Table 1

	(P)	(M)	Fentanyl	Bupivacaine	Epinephrine
Group I	n = 19	n = 18	2 μg/ml	0.015%	2 μg/m
Group II	n = 20	n = 19	4 μg/ml	0.015%	2 μg/ml
Group III	n = 19	n = 20	6 μg/ml	0.015%	2 μg/ml

After a test dose, of 3 ml 1.5% lidocaine + 5 μg/ml epinephrine patients received a 12 ml loading dose of the study solution. An infusion was then started at 6 ml/hr with PCA dose of 2 ml and with lock-out time of 10 min via Abbott Life Care PCA pump. For inadequate analgesia, up to four 5-ml study solution boluses were given 10 min apart and infusion rate was increased by 2 ml/hr up to 3 times. If analgesia was still inadequate (pain score > 3), up to four 5-ml boluses of 0.25% bupivacaine were administered. First, 2nd stage and overall satisfaction, pain scores and side effects (itching, nausea, sedation) were assessed with a 10-point scale (0=none, 10=worst) every hour for the duration of the infusion. Data expressed as mean ± SD or % incidence, were analyzed by ANOVA or Chi square as appropriate with $p<0.05$ considered statistically significant.

Results: There were no differences among the groups with respect to demographic data, duration of infusion or 1st and 2nd stage of labor, pain scores, satisfaction scores or side effects. Apgar Scores did not differ among groups and averaged 8.4 at 1 min and 9.1 at 5 min. Neonatal neurobehavioral assessment total scores were ≥ 35 (max score=40) for all infants. Infusion characteristics are shown in Table 2.

Table 2: Infusion Characteristics

PRIMIPARAE	Total PCA Volume (ml)	Study Sol. Bolus Vol.(ml)	Total Study Sol. Volume (ml)	# of Pts Requiring 0.25% Bupivacaine	Total Vol. of 0.25% Bupivacaine (ml)
Group I (18)	7.8 ± 9.2	13.3 ± 9.0*	54.0 ± 39.0	12	4.2 ± 6.0
Group II (19)	4.4 ± 3.6	10.3 ± 7.4	38.6 ± 26.4	7	3.4 ± 5.8
Group III (19)	5.2 ± 4.7	6.5 ± 8.0	32.6 ± 30.2	10	1.6 ± 4.1
*Significantly greater than Group III, $p < 0.05$.					
MULTIPARAE					
Group I (19)	10.0 ± 10.0	13.9 ± 9.3	70.6 ± 42.6	3	4.4 ± 4.4
Group II (20)	8.7 ± 6.2	11.5 ± 10.4	63.0 ± 42.0	6	3.6 ± 5.6
Group III (19)	9.6 ± 9.6	7.4 ± 7.3	62.2 ± 35.0	4	4.4 ± 5.4
(For total additional bolus volume ANOVA p=0.07)					

Conclusion: These preliminary data show that increasing the concentration of fentanyl significantly decreased the bolus volume of study solution in the (P) but not the (M) group. Total volume of 0.25% bupivacaine required did not decrease, probably because most patients achieved satisfaction with the study solution boluses. Increasing the concentration of fentanyl did not affect the neonates or the outcome of labor and delivery.

Ref: 1. Cohen S, et al: Can J Anaesth, 43:341-346, 1996.