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A COMPARITIVE STUDY OF EPIDURAL BUPIVACAINE PLUS BUTORPHANOL VERSUS BUPIVACAINE PLUS FENTANYL FOR PERIOPERATIVE ANALGESIA IN LOWER LIMB SURGERIES IN KING GEORGE HOSPITAL, ANDHRA MEDICALCOLEGE, VISAKHAPATNAM, AP.

Anaesthesiology

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KEYWORDS

AIMS AND OBJECTIVES-

To Assess And Compare Thesafety And Efficacy Of Post Operative Analgesia With Epidural Butrophanol And Fentanyl , To Compare Onset Duration Of Motor Blockade, Duration Of Analgesia And To Evaluate The Incidence Of Adverse Effects And Complications Associated With Them .

MATERIALS AND METHODS

Study pattern:

A prospective randomized study was conducted in the department of anesthesiology in association with department of orthopaedics at King George Hospital, Visakhapatnam from May 2017 to September 2018. Sixty patients, ASA **I** and **II,** aged 20-60 years of both sexes scheduled for elective lower limb orthopaedic surgeries were randomized into two groups.

Group A- receiving epidural anesthesia with bupivacaine and fentany1 (50mcg)

Group B- receiving epidural anesthesia with bupivacaine and butorphanol (2mg)

Exclusion criteria:

Patients requiring general anaesthesia Patients on anticoagulant therapy Patients with bleeding diathesis Patients with infections on the back Patients with spinal deformitiesPatients with history of peripheral neuropathy Patients with CNS disorders.

In group A-

A 18G epidural needle, was introduced in the midline in the L3-4 interspace, after entering the interspinous ligament, the stylet was removed and a 10m1 plastic syringe with 3m1 of air was firmly attached to the hub of the epidural needle. The unit was then carefully advanced with constant pressure on the plunger of plastic syringe. As soon as there was loss of resistance to the injection of air, the insertion of needle was stopped and an aspiration test was done to check for blood or CSF to exclude the presence of the needle tip in an epidural vein or in the subarachnoid space.The epidural catheter (20G) was then threaded through the epidural needle. After ensuring that 3cm of catheter was introduced into the epidural space, the needle was removed carefully over the catheter without dislodging the catheter. The catheter was then fixed to the back of the patient with a good sticking plaster. After positioning the patient in supine position 20m1 of 0.5% bupivacaine along with 1m1(50mcg) fentanyl was injected epidurally in aliquots of 5m1, each time ensuring that an aspiration was negative for blood or csf.

In group B —

Epidural space was identified as described for Group A, and 20m1 of 0.5% bupivacaine along with lml (2mg) Butorphanol was injected epidurally in aliquots of 5m1, each time ensuring that an aspiration was negative for blood or csf. Once the level of analgesia was assessed, Oxygen was administered through a polymask at 5-6 lts/min flow rate, through out the surgery. Bladder catheterization was done for all the patients after establishment of block.

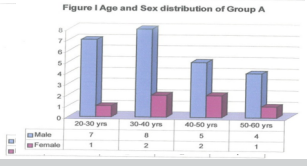
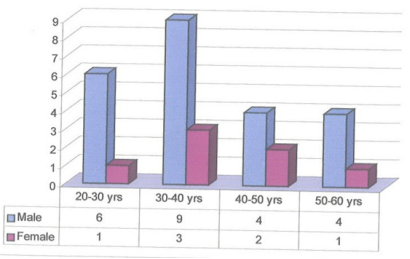


Figure II Age and Sex distribution of Group B



RESULTS

Table I Age and sex distribution

	GROUP A (FENTANYL)			GROUP B (BUTORPHANOL)		
Age in years	Male	Female	Total	Male	Female	Total
20 — 30	7	1	8	6	1	7
30 — 40	8	2	10	9	3	12
40 — 50	5	2	7	4	2	6
50 — 60	4	1	5	4	1	5
Total	24	6	30	23	7	30

Table I and Figure **I** and II shows the age distribution in our study. It was observed that, the mean age in Group A was 37±11 and the mean age in Group **B** was 38.43±10.56.

Figure III Comparison of Pulse rate with time

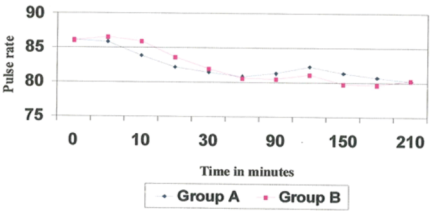


Table II Comparison of pulse rate

Time	GROUP A Mean ± SD	GROUP B Mean ± SD	P VALUE	Significance
0	86 ± 11	86 ± 11	0.9800	NS
5	86 ± 11	86 ± 11	0.8095	NS
10	84 ± 13	84 ± 13	0.5267	NS
15	82 ± 13	82 ± 13	0.6533	NS
30	81 ± 10	81 ± 10	0.8432	NS
60	81 ± 9	81 ± 9	0.9067	NS
90	81 ± 10	81 ± 10	0.7516	NS
120	82 ± 11	82 ± 11	0.6717	NS
150	81 ± 11	81 ± 11	0.4887	NS
180	81 ± 10	81 ± 10	0.6637	NS
210	80 ± 8.4	80 ± 8.4	0.9482	NS

The Table II and Figure III show the intraoperative mean pulse rate ± SD per minute. There is no significant change in the pulse rate.

Figure IV Comparison of systolic blood pressure

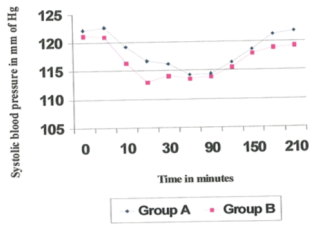


Table III Comparison of Systolic blood pressures				
Time	GROUP A Mean ± SD	GROUP B Mean ± SD	P VALUE	Significance
	122 ± 10	121 ± 10	0.7036	NS
	123 ± 7.4	121 ± 8.4	0.4196	NS
0	119 ± 12	116 ± 13	0.3735	NS
5	117 ± 12	113 ± 12	0.2399	NS
0	116± 11	114 ± 9.5	0.4199	NS
0	114± 8.4	114± 8.6	0.7406	NS
10	114 ± 8	114± 7.5	0.7915	NS
20	116 ± 8.5	116 ± 9.7	0.7137	NS
50	119 ± 10	118 ± 11	0.8100	NS
80	121 ± 10	119 ± 11	0.3990	NS
;10	122 ± 12	119 ± 11	0.4036	NS

Table III and Figure IV show the intraoperative mean systolic pressure in mm of Hg. There is no significant change in systolic blood pressure between the two groups throughout the intraoperative period.

Figure V Comparison of diastolic blood pressure

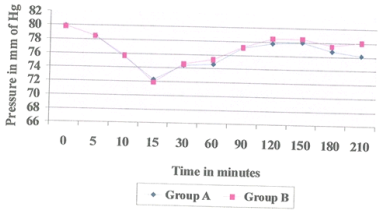


Table IV Comparison of diastolic blood pressure				
Time	GROUP A Mean ± SD	GROUP B Mean ± SD	P VALUE	Significance
,0	94 ± 7	80 ± 7	0.9714	NS
5	90 ± 6	79 ± 5	0.9636	NS
10	80 ± 8	76 ± 7	0.9438	NS
15	70 ± 5	72 ± 5	0.7343	NS
30	84 ± 5	75 ± 5	0.8652	NS
60	80 ± 5	75 ± 4	0.5708	NS
90	80 ± 5	77 ± 5	0.9610	NS
120	80 ± 3.8	79 ± 3.7	0.4137	NS
150	84 ± 4.5	79 ± 4.4	0.6424	NS
180	70 ± 5.3	78 ± 5.1	0.5537	NS
210	80 ± 6.7	78 ± 6.3	0.2557	NS

The Table IV and Figure V shows the intraoperative mean diastolic blood pressure changes. The difference in the means of diastolic blood pressure is statistically not significant.

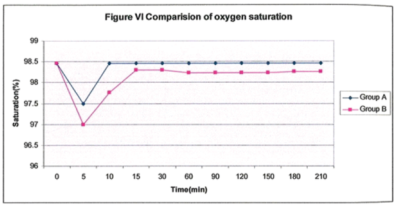


Table V Oxygen saturation				
Time	Group A (Mean ± SD)	Group B (Mean ± SD)	P value	Significance
0	98.5 ± 0.86	98.5 ± 0.9	1.00	NS
5	97.5 ± 0.86	97 ± 1.05	0.048	S
10	98 ± 0.9	97.8 ± 0.63	0.322	NS
15	98 ± 0.9	98 ± 0.8	1.00	NS
30	98 ± 0.9	98.3 ± 0.84	0.187	NS
60	98 ± 0.9	98.2 ± 0.82	0.372	NS
90	98.47 ± 0.86	98.2 ± 0.82	0.218	NS
120	98.5 ± 0.86	98.2 ± 0.82	0.172	NS
150	98 ± 0.9	98.2 ± 0.82	0.372	NS
180	98.5 ± 0.86	98.3 ± 0.82	0.360	NS
210	98.5 ± 0.86	98.3 ± 0.78	0.349	NS

Table V and Figure VI show mean ± SD of oxygen saturation of the two groups. Difference between them is statistically significant only in the first five minutes.

Figure VII: Comparison of Respiratory rate

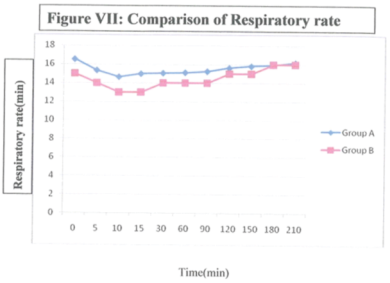


Table VI Respiratory rate				
Time	Group A (Mean ± SD)	Group B (Mean ± SD)	P value	Significance
0	16.5+1.14	16.6+1.07	0.0727	NS
5	15.4+1.13	15+1.06	0.1627	NS
10	14.7+1.09	14.4+1.07	0.2865	NS
15	15±0.83	14.8+0.95	0.3888	NS
30	15.1+0.83	15+0.93	0.6620	NS
60	15.1+0.83	15.1+0.82	1.00	NS
90	15.3+0.58	15.3+0.7	1.00	NS
120	15.6+0.56	15.7+0.6	0.5072	NS
150	15.8+0.53	15.9+0.58	0.4885	NS
180	16+0.49	16.1+0.55	0.4601	NS
210	16.2+0.55	16.5+0.55	0.1644	NS

Table VI and Figure VII show mean ± SD of respiratory rate of the two groups. Difference between them is statistically not significant

Figure VIII Sensory block onset

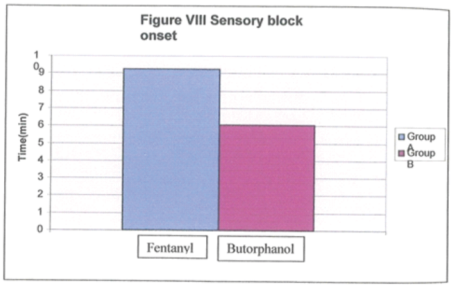
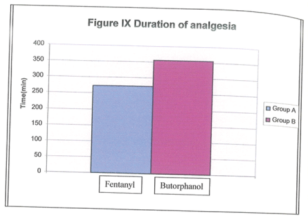


Table VII Sensory block				
Parameters	Group A	Group B	P Value	Significance
Height of patient	168.1±7.30	167.2±7.48	0.639	NS
Mean sensory level achieved	T8.53±1.11	T8.6±1.16	0.812	NS
Onset of sensory block	9.23±0.598	6.067±1.089	<0.0001	S
Two segment regression	150.3±7.16	153.8±6.91	0.0567	NS

The mean ± SD of height of the patient was 168.1±7.30 in Group A and 167.2±7.48 in Group B, the difference is not statistically significant. The mean sensory level achieved was T8.53±1.11 and T 8.6±1.16 in Group A and B respectively with a p value of 0.812 which is not significant. The time taken for onset of sensory block was 9.23±0.598 and 6.067±1.089 in Group A and B respectively with a p value of <0.0001 which is statistically significant .The time for two segment regression was 150.3±7.16 and153.8±6.91 in Group A and B respectively with a p value of 0.0567 which is not statistically significant.



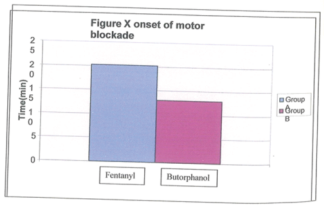


Table VIII Duration of analgesia(min)		
	Group A	Group B
Mean	273.17	355.17
S.D	17.79	18.68
P value	Significant(p<0.0001)	

Table VIII and Figure IX show mean ± SD of duration of analgesia of the two groups.Difference between them is statistically significant(<0.0001)

Table IX Motor blockade(min)				
Parameters	Group A	Group B	P value	Significance
Onset	20.13±3.75	13.00±1.58	<0.0001	S
Duration	205.17±16.11	213.33±15.61	z0.051	NS

Table IX and Figure X show mean ± SD of onset of motor blockade of the two groups. Time taken for the onset of motor blockade is less in Group **B** and is statistically significant with p<0.0001, duration of motor blockade is comparable in both the groups

Figure XI

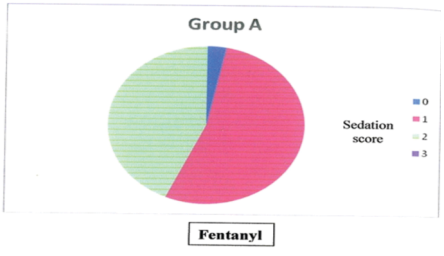


Figure XII

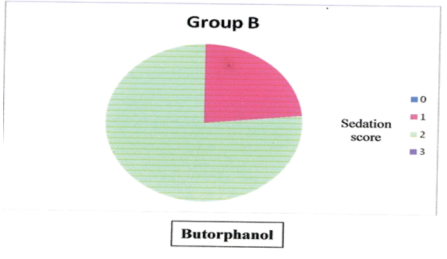


Table X SEDATION		
Grade	Group A	Group B
0	1(3%)	0
1	16(53%)	7(23.3%)
2	13(43%)	23(76.6%)
3	0	0

As shown in Table X and Figures XI and XII the sedation scores of 1 was more in Group A patients 53% as compared to 24%in group B and score of 2 was more in Group B 76% as compared to 43%in group A. As per chi square test the data has two degrees of freedom, chi square is equal to 6.8 and the P value is < 0.05 which is statistically significant.

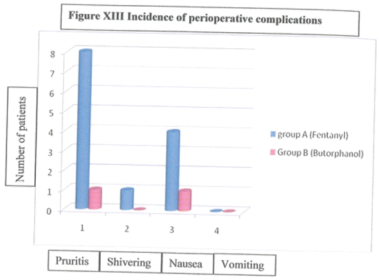


Table XI Perioperative complications				
	Pruritus	Shivering	Nausea	Vomiting
Group A(N-30)	8	1	4	0
Group B(N-30)	1	0	1	0

Table XI and figure XIII show that incidence of pruritus and nausea was more in fentanyl group

DISCUSSION

Central neuraxial blockade is an important tool in the armamentarium of the anesthesiologists as the alterations in physiology and biochemistry and there by morbidity and mortality brought about by central neuraxial blockade are minimal as compared to general anesthesia. Subarachnoid block is the most popular and widely practiced technique all over the world. But there has been resurgence of interest even in the epidural blockade as it can be used alone or in combination with general anesthesia and can be used for postoperative analgesia. Opioids acting on spinal cord receptors provide distinct advantage over its systemic administration as the quality of analgesia is better, sedation is less, function is preserved and outcome is improved. Side effects are no more frequent or severe as compared to systemic Opioids required to produce equivalent analgesia. For the epidural anesthesia, we have used combination of local anesthetic and opioid .Local anesthetics act by producing a reversible blockade of sodium channels in nervous tissue preventing the transmission of electrical impulses and produce sympathetic blockade, while epidural Opioids have their major site of action on pre and post synaptic receptors in the substantia gelatinosa of the dorsal horn producing selective block of nociceptive pathways. Studies have reported obtaining effective analgesia from the concomitant use of morphine bupivacaine and fentanyl-bupivacaine continuous epidural infusions .Another rationale for these combinations is to reduce dosage of the individual agents with concomitant reduction in the incidence and severity of side effects. Earlier studies have advocated routine combination of long and short acting local anesthetics together, as it significantly attenuated the 1 hour rebound increase in pain scores seen after short acting anesthesia alone. Epidural analgesia after surgery in addition to providing patient comfort can facilitate accelerated recovery — anesthesia approach labeled post operative rehabilitation by kehlet. With this approach post surgical patient receive not only effective pain relief but also early post operative intake of oral nutrition, reduction in perioperative stress responses and organ dysfunction, avoidance of fatigue with lowered incidence of DVT, early mobilization and postoperative discharge. Butorphanol has significant analgesic potency, narcotic antagonistic properties, an antitussive effect and reversibility with naloxone. Fentanyl is primarily a mu opiate receptor agonist, with an analgesic potency, greater than morphine, pethidine etc. Analgesia is produced principally through interaction with mu receptors at supraspinal

sites; fentanyl also binds, to a much lower degree, to kappa receptors located within the spinal cord. Demographic data of both the groups were comparable. Both the groups were comparable in term of age, height ASA grading and nature of surgery. The differences in the pulse rate, systolic and diastolic blood pressures throughout the procedure were not significant statistically. The mean time of onset of sensory effect in group A was 9.23±0.598 and in group B was 6.067±1.089 , onset was significantly faster in group B(p<0.0001) ,level of sensory block achieved and time taken for two segment regression were comparable and statistically insignificant. According to modified Bromage classification onset of motor block(Bromage **III)** in group A was 20.13±3.75 and in group B was 13±1.58, onset was significantly faster in group B (p<0.0001), duration of motor blockade(Bromage 0) in group A was 205.17±16.11 and in group B was 213.33±15.67,the values were comparable and statistically insignificant. Respiratory parameters show that there was significant fall in respiratory rate from

baseline in both the groups.Still it was never less than 10/min. Thus none of the patient from either group had respiratory depression and reading on pulse oximetry further supported this. Measurement of respiratory rate as an indication of respiratory depression is not as sensitive as the determination of minute ventilation or response to carbon dioxide, but usage of respiratory rate as a measure of respiratory depression is in agreement with previous studies. Sedation score in both the groups show that majority of patients in both the groups were asleep but arousable but in group **B** patients 76%1 had a score of 2 as compared to 43 % in group A whish is statistically significant with a p value of (<0.05). Duration of according to visual analogue score of more than 4 was 273.17±17.79 in Group A and 355.17±18.68 in Group **B,** duration was significantly more in Group **B** with a p value of (<0.0001). The incidence of pruritus and nausea is more in fentanyl group whereas incidence of complications in butorphanol group is less .

SUMMARY

A comparative study was conducted on ASA I and II adult patients of both sex in the age group of 20-60 years posted for various lower limb surgeries. After preloading, under aseptic precautions epidural catheter was placed in L3-4 space. In group A - 20m1 of 0.5% Bupivacaine injected into epidural space along with 1 ml of Fentanyl (50mcg). In Group B — 20 ml of Bupivacaine injected into the epidural space along with 1 ml of Butorphanol (2mg), patient positioned in supine position for five minutes. The various parameters studied and the results and observation of the two groups are depicted in the table. With regard to age, sex, height, blood pressure, the mean sensory level achieved, duration of motor blockade, respiratory rate and oxygen saturation the difference is considered to be not statistically significant, by conventional criteria. There is significant difference with regard to the onset of sensory and motor blockade both of which were faster with Butorphanol, the duration of analgesia and the level of sedation were more with Butorphanol.

Parameters	Group A	Group B	P value	Significance
Age	37±11	38.43±10.56	0.731	NS
Height	168.1±7.3	167.2±7.48	0.639	NS
Initial drug	20m1 bupivacaine +50mcg fentanyl	20m1 bupivacaine +2mg butorphanol		
Mean sensory level	T8.53±1.11	T8.6±1.16	0.812	NS
Onset of sensory block	9.23±0.598	6.067±1.089	<0.0001	S
Two segment regression	150.3±7.16	153.8±6.91	0.0567	NS
Duration of analgesia	237.17±17.79	355.17±18.68	<0.0001	S
Onset of motor blockade	20.13±3.75	13.00±1.58	<0.0001	S
Duration of motor blockade	205.17±16.11	213.33±15.61	>0.05	NS
Perioperative complications	Pruritis(8) Nausea(4)	Pruritis(1) Nausea(1)		
Sedation	Grade 1-53% Grade 2-43%	Grade 1-24% Grade 2-76%		

CONCLUSION

Both fentanyl and butorphanol are effective and safe drugs for perioperative epidural analgesia with minor side effects. The onset of sensory and motor block was faster with epidural butorphanol; duration of analgesia is longer with butorphanol but is associated with more sedation as compared to fentanyl. Epidural butorphanol is associated with fewer incidences of nausea and pruritus as compared to fentanyl.

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