



COMPARISON OF THE EFFECTS OF INTRATHECAL FENTANYL VERSUS INTRATHECAL BUTORPHANOL AS AN ADJUNCTS TO 0.5 % HEAVY BUPIVACAINE IN KNEE ARTHROSCOPIC SURGERY

Anaesthesiology

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ABSTRACT

Introduction : Intrathecal administration of opioid as adjunct to bupivacaine is being used to achieve faster onset of anaesthesia and for effective post analgesic effects **Materials and Methods :** It is randomised controlled trial of 60 patients divided equally in each group - fentanyl and butorphanol and compared them on basis of VAS scoring, vitals like heart rate, mean arterial pressure and time taken to achieve quicker sensory and motor blockade and side effects of each group. **Results :** We found that fentanyl group of patients took less time to achieve sensory and motor blockade, but regression of anaesthesia and side effects were more as compared to butorphanol group **Conclusion :** Butorphanol intrathecal administration provides slow but effective and secured way of achieving post operative analgesia in patients posted for knee arthroscopy surgery.

KEYWORDS

fentanyl, butorphanol, Intrathecal, bupivacaine, analgesia, opioid

INTRODUCTION

Spinal anaesthesia is being used since its discovery in 1940s where local anaesthetic was infused through the subarachnoid space where nerve fibres get blocked^[1] depending on the concentration of drug, myelin content of nerve fibre in order of autonomic followed by sensory followed by motor.

Intrathecal administration of neuraxial opioids are being used since 1979 along with local anaesthetic as adjuncts to achieve post operative analgesia In this study we have used fentanyl and butorphanol as an adjunct with bupivacaine^[2] and have compared their efficacy in postoperative analgesia Fentanyl is a lipophilic opioid^[3] that is a highly selective mu agonist, it binds to MOP receptors, and inhibits release of neurotransmitter that help in sustained analgesia postoperatively.

Butorphanol^[4] is a mixed agonist - antagonist analgesic that acts on mu and kappa receptors and cause analgesia in prolonged manner with lesser side effects

MATERIAL AND METHODS

Our study is double blind randomised trial conducted on group of 60 patients divided equally in two groups - Fentanyl (Group 1) & Butorphanol (Group 2)

Inclusion criteria

1. Patients posted for knee arthroscopy surgery
2. Age group from 18 years to 50 years of age
3. Patients with ASA grade 1,2
4. BMI < 35kg/metre sq

Exclusion criteria

1. Patient refusal for participation
2. Patient with ASA grade 3&4
3. Patients with raised intracranial pressure, localised sepsis
4. Patient requiring longer duration of surgery
5. Patients with any undiagnosed mass, swelling or tumour in knee or any accompanied fracture
6. Patient with spine deformities, localised sepsis, or any allergic history to drug,
7. Patients with comorbidities like cardiac disease etc.

Group 1 : Patients receiving 15mg of 0.5% bupivacaine along with 25 mcg fentanyl

Group 2 : Patients receiving 15mg of 0.5% bupivacaine along with 200 mcg Butorphanol

Parameters were recorded on following basis

1. VAS score at 30 mins, 2 hrs, 6 hrs, 12 hrs, 24hrs post surgery
2. Vitals like Baseline Heart Rate, Mean Arterial pressure at 15 min, 45 mins and 90 mins time intervals
3. Onset of Sensory and Motor blockade
4. Side effects of Fentanyl and Butorphanol

Sensory blockade was measure with loss of pin prick sensation with

patient in supine position till level of T10 Motor blockade was measured with modified bromage scale

Patients posted for surgery were kept NPO(Nil per oral) for 8 hours, and spinal was given in left lateral position with help of 25G Quinke needle is midline approach in L3-4 spinal level after infiltrating 2ml of 2% lignocaine solution, patient was put supine immediately after and spinal level was checked with loss of pin prick sensation for sensory blockade and modified bromage scale for motor

After surgery patient was shifted to post operative room and kept under observation for next 90 mins for any complains of side effects like respiratory depression, nausea, vomiting, urinary retention, pruritis etc.

RESULTS

We have compared 30 patients in each group and following are the results

Table 1: Demographic data

Parameters	Group 1 (Fentanyl)	Group 2 (Butorphanol)	P value
Age(years)	35 +/- 2.1	37 +/- 2.23	0.79
Weight(kg)	65 +/- 1.83	67 +/- 1.48	0.85
Sex(M/F)	20/10	22/08	0.76
Duration of Surgery	105.24 +/- 15.88	108.45 +/- 14.67	0.87

There was no significant data in demographically in between the 2 groups, when compared on basis of age, weight, sex and duration of surgery, males patients were more as compared to female patients and duration of arthroscopic surgery lasted for 100 mins and more.

Table 2: VAS score

VAS score (0 to 100mm)	Group 1	Group 2	P value
30 min	23 +/- 13	11 +/- 9	<0.05
2 hrs	25 +/- 15	13 +/- 8	<0.05
6 hrs	28 +/- 18	16 +/- 6	<0.001
12 hrs	31 +/- 14	19 +/- 7	<0.001
24 hrs	33 +/- 15	21 +/- 9	<0.05

When 2 groups were compared on basis of the VAS score there was considerable difference seen, and increase of VAS score as time elapsed in both groups but analgesia was better in group 2 (butorphanol)

Table 3: Sensory blockade comparison

Parameters	Group 1 (Fentanyl)	Group 2 (Butorphanol)	P value
Highest sensory level of operated side	T8	T8	
Time to reach highest level (mins)	8 +/- 1.2	12 +/- 1.8	<0.05
Time to S2 regression	138 +/- 22	152 +/- 31	<0.01

Failed spinal	0/30	0/30	
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On comparison of 2 groups it was found that group 1 (fentanyl) took less time to reach highest spinal sensory level but also regressed faster as compared to group 2 (butorphanol)

Table 4 : Motor blockade comparison

Parameters	Group 1 (Fentanyl)	Group 2 (Butorphanol)	P value
Highest score			
Grade 0	0	0	
Grade 1	6	7	0.98
Grade 2	24	23	0.56
Grade 3	0	0	
Time to reach maximum score (mins)	9 +/- 1.5	15 +/- 1.8	0.039

On comparison of 2 groups no significant results were seen in bromage score in both groups but time to reach maximum score was earlier in group 1 as compared to group 2.

Table 5 : Vitals

Parameters	Group 1 (Fentanyl)	Group 2 (Butorphanol)	P value
Heart rate			
15 mins	62 +/- 7.8	69 +/- 8.2	0.29
45 mins	64 +/- 8.1	73 +/- 7.9	0.38
90 mins	67 +/- 8.5	77 +/- 9.3	0.45
Mean Arterial Pressure			
15 mins	61 +/- 8.9	70 +/- 10.7	0.63
45 mins	61 +/- 7.3	72 +/- 9.6	0.58
90 mins	62 +/- 9.7	74 +/- 11.4	0.46

No significant results were seen in comparison of both the groups on basis of Heart rate and Mean Arterial Pressure

Table 6 : Side effects

Parameters	Group 1 (Fentanyl)	Group 2 (Butorphanol)	P value
Nausea	1	0	1
Vomiting	1	0	1
Decreased BP	4	1	0.08
Decreased Heart Rate	3	1	0.10
Decreased gut motility	1	1	1
Respiratory depression	1	0	1
Pruritus	3	0	0.09

Almost similar side effects were observed in both the groups except fentanyl group showing more cases of bradycardia, hypotension, and pruritus.

DISCUSSION :

In our study the principle findings were that upon adding Fentanyl as adjunct in intrathecal bupivacaine, time to reach highest level^[5,6] T8 was just 8 mins as compared to 12 mins in butorphanol group and time to S2 regression was also earlier in this group motor blockade on other hand was similar in both groups. Time to reach maximum bromage score was 9 mins in group 1 compared to 15 mins in group 2, this happens due to full agonistic activity of fentanyl against mu receptors that causes earlier blockade when compared to butorphanol^[7] which has partial agonistic activity on the receptors

These results show that the post operative analgesia^[8] was better in butorphanol group at different time intervals when measured with VAS grading this effect is due to its agonistic activity at kappa receptor present at spinal cord which inhibits neurotransmitter release especially of substance P along with partial agonistic activity to mu receptors which gives potent and long lasting analgesia^[9,10]

In our study analgesic effect lasted for 324 mins in case of fentanyl group as compared to 468 mins in butorphanol group similar results were seen in Sandip Roy et al 2020 study^[11]

In our study no significant difference were observed in vitals as both being lipophilic opioid have easy solubility and action on receptors present on heart^[12], with fentanyl group showing slightly low heart rate and mean arterial pressure

In our study more sideeffects^[12] were observed in cases of group 1 like

respiratory depression was seen in 1 case, this is due to high affinity of fentanyl to mu receptors which upon increasing dose may cause respiratory depression^[13] this is contrast to butorphanol which has partial agonistic activity to mu and kappa and thus has ceiling effect preventing any excess dose to cause respiratory depression

Some other side effects like hypotension, bradycardia and itching^[14,15,16] were also seen more in group 1 cases

CONCLUSION

Intrathecal administration of butorphanol is secured and effective way of achieving longstanding post operative analgesia in patients, though time taken to achieve desired blockade level was slightly more when compared to fentanyl but side effects like, bradycardia, respiratory depression, pruritus were also less, which makes it more efficacious in patients posted for arthroscopy surgery.

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