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Original Research Paper

Anaesthesiology

EVALUATE AND COMPARE THE ANALGESIC EFFICACY OF INTRATHECAL FENTANYL AND INTRATHECAL DEXMEDETOMIDINE AS AN ADJUVANT TO HYPERBARIC BUPIVACAINE IN INFRAUMBLICAL SURGERIES

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ABSTRACT

Background: The data comparing the efficacy of intrathecal fentanyl with intrathecal dexmedetomidine is studies very less in literature. In our study, we decided to compare 10 μg of dexmedetomidine and 25 μg of fentanyl as adjuvant to 0.5% hyperbaric bupivacaine in patients undergoing infraumblical surgeries. **Methods:**The study was conducted in two groups of patients. Hospital based prospective, randomized, double blind, interventional study. Hyperbaric with injection of hyperbaric Bupivacaine 0.5% 2.5ml (12.5mg) + Fentanyl 0.5ml (25μg) of total volume of 3ml in 50 subjects and Hyperbaric Bupivacaine 0.5% 2.5ml(12.5mg)+ Dexmedetomidine 0.5ml(10μg) of total volume of 3ml in 50 subjects. **Results:** We conclude that both fentanyl 25 g and dexmedetomidine 10 mcg are effective adjuvants to 0.5% intrathecal bupivacaine for patients undergoing infraumblical surgeries. However, Intrathecal dexmedetomidine was associated with significantly earlier onset of sensory block and prolonged duration of sensory and motor block. There was also significant prolonged duration of post operative analgesia in dexmedetmidine group when compared to fentanyl group with minimal side effects and reduced total analgesic requirement.

KEYWORDS :

INTRODUCTION

Intrathecal opioids are considered the gold standard in the treatment of post-operative pain. Opioids are often added to neuraxial local anaesthetics (LAs) in patients undergoing surgery without general anesthesia and in some institutions an opioid alone, typically morphine, is administered intrathecally as a single-dose injection.Duration of post-operative analgesia is prolonged with use of fentanyl than with spinal local anesthetic alone. It does not prolong motor block, so it allows early ambulation, thereby reducing the morbidity. The recommended intrathecal dose is 10–25 g, and the epidural loading dose is 50–100 g. The duration of action is 2–4 hours, and the risk of respiratory depression is very low and of short duration [20] . After the discovery of adrenergic pain modulating system in the spinal cord, adrenergic agonists (clonidine and dexmedetomidine) have been used neuraxially for perioperative analgesia. Dexmedetomidine is a highly selective 2 adrenergic agonist which possesses sedative, 6 analgesic and sympatholytic properties and gives prolonged analgesia when used intrathecally without respiratory depression[21] . Intrathecal dexmedetomidine has been found to be ten times more potent analgesic and anesthetic as compared to intrathecal clonidine and five times more potent than opioids like intrathecal fentanyl[22] . The data comparing the efficacy of intrathecal fentanyl with intrathecal dexmedetomidine is studies very less in literature. In our study, we decided to compare 10 μg of dexmedetomidine and 25 μg of fentanyl as adjuvant to 0.5% hyperbaric bupivacaine in patients undergoing infraumblical surgeries.

AIM AND OBJECTIVES

The present study is designed to evaluate and compare the analgesic efficacy of intrathecal fentanyl and intrathecal dexmedetomidine as an adjuvant to hyperbaric bupivacaine in infraumblical surgeries in terms of

Primary objectives:

1. Onset and duration of sensory and motor blockade
2. Duration of analgesia and requirement for rescue analgesics.
3. Sedation.

Secondary Objectives:

1. Perioperative complications like bradycardia, hypotension, shivering, nausea, vomiting, respiratory depression and pruritis

MATERIAL & METHODS

The present study included patients undergoing infraumblical surgeries under subarachnoid block at Department of Anesthesia, Sardar Patel Medical College, Bikaner, Rajasthan. The study was conducted after approval of ethical committee and research review board of the institution. Informed written consent was obtained from all patients.

Inclusion Criteria:-

- Patients aged 18-65yrs
- Patient's body weight 50-80 kg.
- Patient height >145 cm.
- ASA grade I-II.
- Undergoing infraumblical surgery

Exclusion Criteria:-

- All contraindications to spinal block; like patient refusal, infection at local site, hypovolemia, increased intracranial pressure, coagulopathies.
- Chronic history of headache and backache.
- Severe anemia, compromised renal, cardiac or respiratory status.
- Spinal deformity
- Known allergies to drug

Study Design:

Hospital based prospective, randomized, double blind, interventional study. The study was conducted in following two groups of patients.

Group	Drug (Injection)	Number of patients
F	Hyperbaric Bupivacaine .5% 2.5ml (12.5mg) + Fentanyl 0.5ml (25μg) Total volume =3ml.	50

D	Hyperbaric Bupivacaine 0.5% 2.5ml(12.5mg)+ Dexmedetomidine 0.5ml (10μg) Total volume =3ml.	50

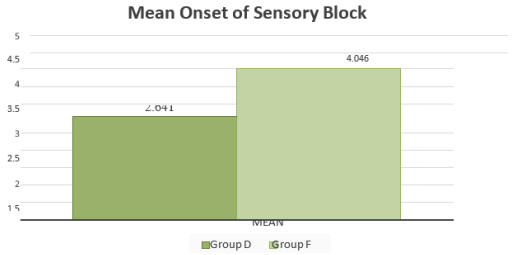
OBSERVATIONS

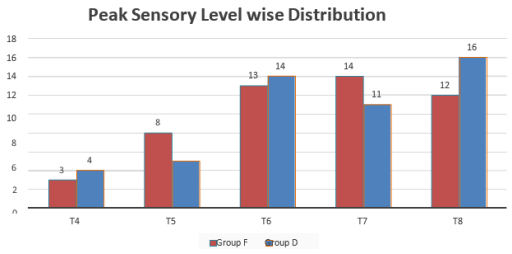
The current study was conducted for infraumbilical surgeries on 100 patients in two groups. Group D and Group F with 50 in each group.

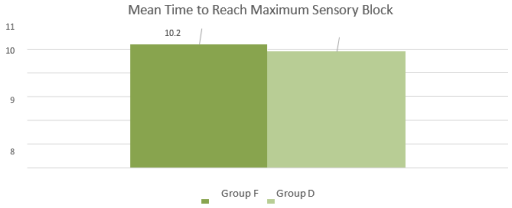
Sensory block characteristics:

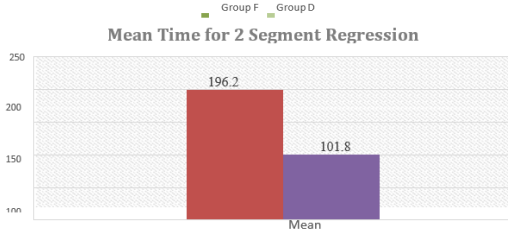
Variable	Group D (N=50)	Group F (N=50)	P value
Onset of sensory block (to reach T10) (min)	2.641±0.5314	4.046±0.5987	**<0.0001(HS)**
Peak sensory block level	T4 (T4-T8)	T4 (T4-T8)	0.7718(NS)
Time to reach maximum sensory block (min.)	10.20±1.24	9.91±1.17	0.2319(NS)
Two segment regression time (min.)	196.2±14.520	101.8±15.96	**<0.0001(HS)**
Regression to S1 level (min.)	401.6±24.53	198.6±17.451	**<0.0001(HS)**

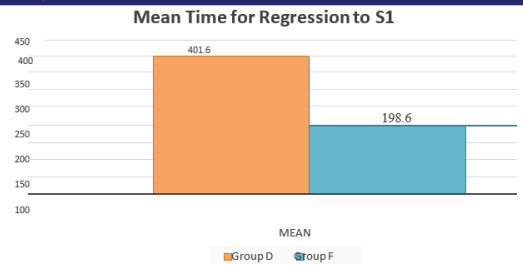
Mean time of onset of sensory block was faster in group D (2.641±0.5314) min han group F (4.046±0.5987) min and the difference was statistically highly significant(<0.0001).. The value of P was highly statistically significant. Time to regression to S1 level was substantially faster in group F 198.6±17.451 min compaired to group D which was 401.6±24.53 min and the difference was statistically highly significant.











Motor block characteristics:

Variable	Group D (N=50)	Group F (N=500)	P value
Onset of complete motor blockade (Bromage 3) (min.)	10±0.93	10.226±0.625	<1.685(NS)
Duration of motor blockade (min.)	378.34±16.97	187.3±17.52	<0.0001(HS)

The mean time for onset of motor block Bromage 3 in Group D (10±0.93) min as compared to Group F(10.226±0.625)min and value of p was not significant. Also, table 3 is indicative of there was a highly significant difference in duration of motor blockade.

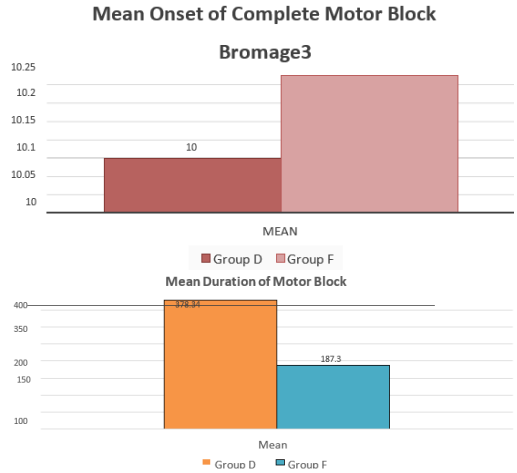


Table 4: Mean Sedation Score

Time (min.)	Group D (N=50)	Group F (N=50)	P value
30	2	2.0±0.00	--
60	2.34±0.48	2.0±0.00	<0.0001(HS)
90	2.38±0.49	2.0±0.00	<0.0001(HS)
120	2.02±0.14	2.0±0.00	<0.0001(HS)

Mean sedation score distribution reveals statistically higher level of sedation in group D as compaired to group F. The mean sedation score in group D was 2, 2.34, 2.38 and 2.02 at 30, 60, 90 and 120 min, respectively. While in group F mean sedation score of 2 for all patients at all the time intervals 30, 60, 90 and 120 minutes.

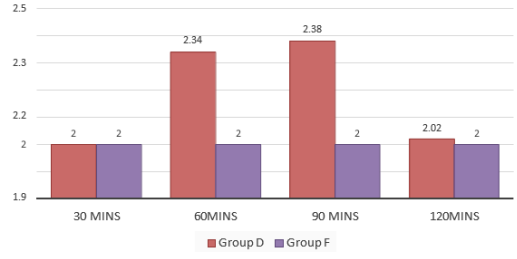


Chart 14: Mean Sedation Score

Table 5: Post-operative analgesia

Variable	Group D (N=50)	Group F (N=50)	P value
Duration of effective	445±26.26	268.44±27.40	<0.000

analgesia VAS<3 (min.)			1(HS)
Number of rescue analgesics	1.4±0.49	2.84±0.68	<0.000 1(HS)

As illustrated in Table 5, the mean duration of post operative analgesia (VAS<3) was statistically highly significant between group D and group F 445±26.26 min and 268.44±27.40 min, respectively. The requirement of 24 hour rescue analgesics in terms of total number of doses were significantly less in group D when compared to Group F which was 1.4±0.49 and 2.84±0.68 respectively.

Table 6 Mean post –operative VAS score:

Time (hours)	Group D (N=50)	Group F (N=50)	P value
2	0	0±0.00	--
4	0.96±0.68	3.84±0.91	<0.0001(HS)
6	2.98±0.32	1.8±0.41	<0.0001(HS)
8	1.38±0.49	2.18±0.44	<0.0001(HS)
12	1.3±0.47	3.52±0.84	<0.0001(HS)
24	1.54±0.68	1.92±1.60	0.1254(NS)

Mean post operative mean VAS in group D was 0.96 at 4 hours and 2.98 at 6 hours which decreased to 1.38 at 8 hours showing administration of rescue analgesic between post operative 6-8 interval and it remained 1.3 and 1.54 at 12 and 24 hourly respectively. In group F mean VAS score was 3.84 at 4 hours which decreased to 1.8 at 6 hours showing some intervention (rescur analgecic) between post operative 4-6 hours interval. Mean VAS score at 8 ,12 and 24 hours was 2.18,3.52 and 1.92, respectively which was again shows requirement of analgesic between 12 and 24 hours. The result were highly significant at4,6,8 and 12 hours.

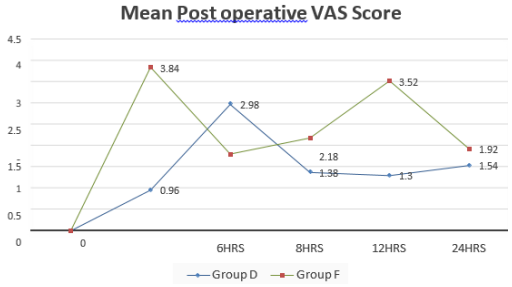
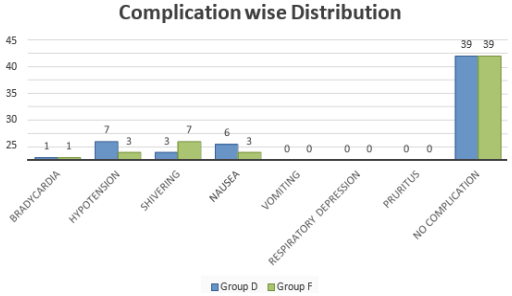


Table 11: Complication wise distribution

Complications	Group D	Group F	P value
Bradycardia	1	1	--
Hypotension	7	3	0.18352(NS)
Shivering	3	7	0.18352(NS)
Nausea	6	3	0.29372(NS)
Vomiting	0	0	--
Respiratory depression	0	0	--
Pruritus	0	0	--
No Complication	39	39	--
Total	50	50	

The complications in group D (11 patients) and group F (11patients) was statistically not significant. However, complications occurred with regard to hypotension (7 patients in group D and 3 patients in group F).In group D and group F, 6 and 3 patients respectively had nausea , and Bradycardia was observed in one patient from each group. Seven patients had shivering in group F and 3 patient in group D.



CONCLUSION

The aim of current study was to compare the onset and duration of sensory and motor block , analgesia efficacy & hemodynamics following the use of intrathecal fentanyl and dexmedetomidine as adjuvants to 0.5 % hyperbaric bupivacaine in infraumblical Surgeries. After ethical committee approval and informed patient consent prospective, randomized study was conducted on 100 patients undergoing infraumblical surgeries following spinal anaesthesia.

Patients were randomly allocated into two groups with 50 patients in each group. Group F received hyperbaric bupivacaine 0.5% 12,5 mg + 25 g fentanyl and group D received hyperbaric bupivacaine 0.5% 12.5 mg + 10 mcg dexmedetomidine. Hemodynamics at baseline, after spinal , 5 min. , 10 min. , 15 min. , 20 min. , 25 min. , 30 min. , 60min , 90 min and 120 min were recorded. Systolic BP, HR, RR and oxygen saturation are preserved in both groups.

We conclude that both fentanyl 25 g and dexmedetomidine 10 mcg are effective adjuvants to 0.5% intrathecal bupivacaine for patients undergoing infraumblical surgeries. However, Intrathecal dexmedetomidine was associated with significantly earlier onset of sensory block and prolonged duration of sensory and motor block. There was also significant prolonged duration of post operative analgesia in dexmedetmidine group when compared to fentanyl group with minimal side effects and reduced total analgesic requirement.