

To Compare The Cardiorespiratory Stability And Incidence Of Side Effects After Intrathecal (Subarachnoid) Administration Of Ketamine(Preservative Free) With 0.5% Bupivacaine Heavy And Fentanyl Citrate With 0.5% Bupivacaine Heavy For Lower Abdominal And Lower Limb Surgeries.

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Abstract:

Background: Regional anaesthesia is used for lower limb and lower abdominal surgeries. Many adjuncts can be added to local anaesthetics to increase efficacy and duration of subarachnoid blockade. Preservative free ketamine and fentanyl can be added to Bupivacaine to increase the quality of block.

Aim: To compare the cardiorespiratory stability and side effects between ketamine and fentanyl added to bupivacaine heavy.

Maximum level of sensory blockade, Maximum intensity of motor blockade Duration of analgesia(four segment regression time).

Haemodynamic changes

Methods: 80 Patients are randomly allocated to group K(25mg, preservative free ketamine, 0.5ml and 0.5% bupivacaine 2.0ml, n=40) and group F (25µg fentanyl, 0.5ml and 0.5% bupivacaine 2.0ml, n=40).

RESULTS: The onset of sensory block was earlier in group K than group F (68.25 sec Vs. 72.75 sec), P value <0.05. The incidence of hypotension is markedly lower in group K when compared to group F (20% Vs. 45%), P<0.01.

Conclusion: ketamine 25mg with 0.05% bupivacaine heavy intrathecally, maintains cardio respiratory stability compared to fentanyl with bupivacaine intrathecally with less incidence of side effects except nystagmus compared to fentanyl 25µg with 0.5% bupivacaine heavy intrathecally.

Keywords: Ketamine, fentanyl, bupivacaine, cardio respiratory stability, sensory block, motor block.

I. Introduction

Regional anaesthesia is used for lower limb and lower abdominal surgeries. Many adjuncts can be added to local anaesthetics to increase efficacy and duration of subarachnoid blockade. Preservative free ketamine and fentanyl can be added to Bupivacaine to increase the quality of block.

Fentanyl Citrate: It is a Phenylpiperidine derivative soluble in water, slightly soluble in alcohol, chloroform and ether, soluble in methyl alcohol. The injection has a pH of 4.0-7.5 and pka value of 8.3. It is available as ampoules of 2 ml and vial of 10 ml with 50µg/ml.

Ketamine: It works as an anaesthetic, sedative, amnestic, analgesic. It is a phencyclidine derivative that produces dissociative anaesthesia and has S+ and R- isomers. Ketamine is an NMDA receptor antagonist and was first used intrathecally by Bion in 1984.

II. Materials And Methods

This is a comparative study conducted in GGH, GUNTUR in various OT's "Compare the cardio respiratory stability and incidence of side effects after intrathecal administration of ketamine with bupivacaine and fentanyl with bupivacaine for lower abdominal and lower limb surgeries

Inclusion Criteria:

1. ASA physical status 1 or 2
2. Age 15-60 yrs
3. Elective surgeries

Exclusion Criteria:

1. Any contra indications to spinal anaesthesia.
2. Patients with history of pruritus or allergy to opioids/local anaesthetics/ketamine.
3. Patients who have received sedative medications in the last four hours. Patients on the anti-psychotic drugs.

80 Patients are allocated to group K (ketamine, n=40) and group F(fentanyl, n=40).Patients are allocated to group K (25mg, preservative free ketamine, 0.5ml and 0.5% bupivacaine 2.0ml, n=40) or group F(25µg fentanyl, 0.5ml and 0.5% bupivacaine 2.0ml, n=40).

Parameters studied are:

- Onset of sensory level(changed at 30 secs interval with 24 guage needle at T12 dermatome by hot and cold saline). Maximum level of sensory blockade.
- Maximum intensity of motor blockade as assessed by Bromage scale.
- Duration of analgesia(four segment regression time).
- Haemodynamic changes(SBP, DBP, MAP and Heart rate).
- Respiratory changes (respiratory rate and saturation).

III. Observations And Results

80 ASA 1 or 2 patients scheduled to undergo lower abdominal and lower limb surgeries were allocated into group K (ketamine, n=40) and group F (fentanyl, n=40). After preloading with 500ml of lactated Ringer's solution, subarachnoid block was established with a 25 Guage spinal needle at L3-L4 interspace using 2ml of 0.5% hyperbaric Bupivacaine with 25 µg(0.5ml) of fentanyl in group F. For group K 0.5% bupivacaine heavy with 25mg of ketamine (preservative free) is used. Percentage t-test and Chi-square test were used for pertinent tables

Physical characteristics of patients

Sl.No.	Parameter	Group K	Group F
1.	Age(Years)	40.6±11.8	37.75±13
2.	Weight(Kg)	54.4±6.7	54.7±6.4
3.	Height(Cm)	158.6±4.7	159.0±4.3

Baseline Parameters of patients

Sl.No.	Parameter	Group K	Group F
1	Systolic blood pressure(mmHg)	122.7±14.6	120.7±8.5
2	Diastolic blood pressure(mmHg)	82±7.7	79.9±4.8
3.	Mean arterial pressure (mmHg)	95.5±9	93.5±4.7
4.	Heart rate(/min)	83.9±6.4	84.6±6.8
5.	Respiratory rate(/min)	17.8±1.6	17.8±1.6
6.	Hemoglobin Oxygen saturation	96-100%	96-100%

Data of patients with significant Hypotension

	Group K (n=40)	Group F (n=40)
Pt's with significant hypotension	8	18
Pt's without significant	32	22
Total	40	40

Chi-square value - 5.69, Degree of freedom – 1, P value =0.01

Data of patients with significant hypotension

	Parameters	Group K (n=40)	Group F (n=40)
1.	Incidence	20%	45%
2	Time to onset(min) of hypotension	15.0±5.9	24.3±5.6
3	Fall in MAP (%)	23.0±2.9	25.9±6.1

Data of Sensory block

S.No.	Parameter	Group K (n=40)	Group F (n=40)
1.	Onset (Sec)	68.25 ±13.57	72.75±17.82
2.	Max. level of sensory blockade	T6(T4-T10)	T6(T4-T10)
3.	Duration (min)	108.2±4.6	99.0±14.2
4.	Time for first analgesic(min)	168.3±12.8	150.2±5.5

The onset of sensory block was earlier in group K than group F (68.25 sec vs. 72.75 sec), P value <0.05. A median sensory level of T6 was observed in both groups. .

Hunt Co, Naulty J.S. , Boder AM¹ in 1989 undertook a study to evaluate the potential of fentanyl administered in the subarachnoid to improve intraoperative and post operative analgesia in the immediate post caesarean period.

The incidence of hypotension is markedly lower in group K when compared to group F (20% vs. 45%), P<0.01. Among the hypotensive patients, the mean percentage change in MAP is similar in both the groups (23% vs. 25.9%), but the time to maximum fall in MAP is earlier in group K than group F (15 minutes vs. 24.3 minutes), P<0.05.

The mean percentage fall in the heart rate was more in group F (30.25±1.64) than group K (26.33±1.46), but is statistically not significant.

The duration of sensory block is longer in group K than in group F (108.2 mins and 99 mins respectively), P<0.05 which is statistically significant^{5,6}.

IV. Discussion

In our study we evaluated the effect of ketamine and fentanyl as adjuvant for spinal anesthesia. In the group K, there was statistically significant decrease in the heart rate compared to the baseline value from 20th minute to 120th minute (P<0.05). In the group F, there was statistically significant decrease in the heart rate compared to the baseline value from 5th to 120th minute (P<0.05). These observations are similar to other studies.^{2,3,4.}

In the group K, there was statistically significant decrease in the mean arterial blood pressure compared to the baseline value from 10th minute to 30th minute (P<0.05). In the group F, there was statistically significant decrease in the mean arterial blood pressure compared to the baseline value from 5th minute to 120 minute (P<0.05). When compared between the groups, the mean percentage fall in the mean arterial pressure from the base line value was statistically significant in the group F at 2nd min and from 15th minute to 120th minute (P<0.05) following subarachnoid block.

A significantly high incidence of hypotension was observed in group F (37.5%) when compared to group K (20%), P<0.05. Hypotension occurred at 15th minute and 24th minute following the subarachnoid block in group K and group F respectively.

In our study the onset of sensory block was earlier in group K (68.25±13.57sec), when compared to group F(72.75±17.82sec, P<0.05). Bansal et al²⁶ also reported similar onset of action^{7,8}.

Herman NL, Choi KC, Affleck PJ et al⁹. in 1999 showed that analgesia, pruritus, and ventilation exhibit a dose response relationship in parturients receiving intrathecal fentanyl during labour. The incidence of pruritis and shivering are more in group F. The incidence of nystagmus is more in group K.

V. Conclusion

In conclusion ketamine 25mg with 0.05% bupivacaine heavy intrathecally, maintains cardio respiratory stability compared to fentanyl with bupivacaine intrathecally with less incidence of side effects except nystagmus compared to fentanyl 25µg with 0.5% bupivacaine heavy intrathecally.

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