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Evaluation of Intrathecal Bupivacaine with Bupivacaine and Nalbuphine For Post- Operative Analgesia in Inguinal Hernia Repair Surgery

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ABSTRACT

Background: Inguinal hernia repair is one of the common surgeries performed in general population under spinal anesthesia. Though Spinal anesthesia is relatively safe it has a short duration of action and can't be used when the surgery is expected to be prolonged. To overcome this drawback various adjuvants are being increasingly used. Spinal anesthesia with 0.5% hyperbaric Bupivacaine, along with adjuvants, is routinely administered for lower abdominal surgeries. Intrathecal Nalbuphine added to Bupivacaine (0.5% Hyperbaric) has the potential to provide good intraoperative analgesia & prolongs early post-operative analgesia. **Methods:** 30 ASA I and II patients of age group 20-65 years, scheduled for inguinal hernia repair were included in this study on the basis of a predefined inclusion and exclusion criteria. Patients were randomized in two equal groups of 30 each. Group I patients received bupivacaine 0.5% heavy 3.1 ml + intrathecal nalbuphine 0.4 ml (0.4mg) whereas patients in group II received bupivacaine 0.5% heavy 3.1ml + 0.4ml NS. Onset of sensory and motor blockade, duration of analgesia, need for rescue analgesia, hemodynamic parameters and incidence of adverse effects was compared in both the groups. P value less than 0.05 was taken as statistically significant. **Results:** Demographic parameters such as gender, height, weight and BMI were found to be comparable in both the groups. Moreover, ASA grades, duration of surgery, Time of onset of sensory and motor blocks were also found to be comparable. Duration of sensory and motor block and duration of postoperative analgesia was found to be significantly more in group I as compared to group II. Hemodynamic parameters and incidence of side effects was found to be comparable in both the groups. **Conclusion:** Addition of nalbuphine to Bupivacaine in patients undergoing inguinal hernia repair under spinal anesthesia is associated with prolonged duration of sensory and motor blockade as well as reduced need for giving rescue analgesia without increase in incidence of side effects.

Keywords: Inguinal Hernia Repair, Spinal Anesthesia, Bupivacaine, Nalbuphine.

INTRODUCTION

The sole essence of anesthesia is pain relief in perioperative period. Analgesia is one of the main demands of all the patients postoperatively. There has been a radical improvement in the quality of pain relief ever since W.T.G. Morton demonstrated anaesthesia.[1] There is still scope to make analgesia not only more effective but also less hazardous. Subarachnoid block is a preferred technique of anesthesia for lower abdominal surgeries, being simple to perform, rapid onset of action, good muscle relaxation, effectiveness and safety as its added advantages.[2]

Inguinal hernia repair surgery is one of the most common surgery performed in general population under spinal anesthesia. Postoperative analgesia is essential to provide comfort and restoration of functions like breathing, cough, movement and communication effectively. Though Spinal anesthesia is relatively safe it has a short duration of action and can't be used when the surgery is expected to be prolonged. To overcome this drawback various adjuvants are being increasingly used. Spinal anesthesia with 0.5% hyperbaric Bupivacaine, along with adjuvants, is routinely administered for lower abdominal surgeries.[3]

Many drugs were identified to be used as adjuvants to Bupivacaine spinal anesthesia such as opioids, Epinephrine, neostigmine, midazolam, ketamine, alpha 2 agonist (clonidine, dexmeditomidine) for prolongation of its action and post-operative analgesia as there is a complex system of interaction of different receptors for the transmission and inhibition of nociception in the spinal cord.[4,5] these drugs have limitations and their own side effects. However, Neuraxial opioids bind to intrathecal

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opioid receptors and produce effective pain relief postoperatively with minimal side effects.

The first report on the use of intrathecal opioid for acute pain treatment was in 1979 by Wang and colleagues. Opioid analgesic activates opioid receptors located on the primary afferent neuron, resulting in the activation of pain modulating systems, their activation may either directly decrease neurotransmission or inhibit the release of excitatory neurotransmitters. In the spinal cord opioids act at synapses either presynaptically or postsynaptically. Opioid receptors are abundantly expressed in the substantia gelatinosa, where substance P release from the primary sensory neuron is inhibited by opiods.[6]

Nalbuphine, an opioid with mixed k agonist and μ antagonist properties, is related chemically to oxymorphone and naloxone, it is equal in potency as an analgesic to morphine in milligram basis based on a relative potency studies using intramuscular administration,[7] it is one forth as potent as nalorphine as an antagonist. The plasma half-life of Nalbuphine is 5 hours and in clinical studies the duration of analgesic activity has been reported to range from 3 to 6 hours. Studies have shown that the addition of intrathecal Nalbuphine 0.4mg to hyperbaric tetracaine for spinal anesthesia improved the quality of intraoperative and postoperative analgesia,[8] with minimal pruritus and respiratory depression.[9] Nalbuphine in contrast to other centrally acting opioid analgesic has minimal respiratory depressant effect because it is an opioid with mixed partial k receptor agonist & mu receptor antagonist. Intrathecal Nalbuphine added to Bupivacaine (0.5% Hyperbaric) has the potential to provide good intraoperative analgesia & prolongs early post-operative analgesia with decreased incidence & severity of mu-agonist side effects such as pruritus, nausea, vomiting & respiratory depression.[10]

Thus, we conducted the present study to evaluate the analgesic efficacy of intrathecal Nalbuphine with Bupivacaine and Bupivacaine alone for inguinal hernia repair surgeries.

MATERIALS AND METHODS

The study was conducted in the department of anesthesiology of a tertiary care medical college situated in an urban area. The institutional ethical committee duly approved the study and a written informed consent was obtained from the participants. The study was a hospital based randomized double-blind control study to evaluate intrathecal bupivacaine with bupivacaine and nalbuphine for postoperative analgesia in inguinal hernia repair surgery. The study was conducted over period of two year from November 2016 to October 2018.The patients undergoing inguinal hernioplasty surgeries under spinal anesthesia between study period were included in this study on the basis of a predefined inclusion and exclusion criteria. Group I (Study group) (patients receiving intrathecal Nalbuphine 0.4 ml (0.4mg) + Bupivacaine 0.5%heavy 3.1 ml = vol 3.5 ml) 30 patients. On the basis of pilot study minimum sample size was found to be 27 so 30 patients were included in each group in our study. A detailed history was obtained and thorough general and systemic examination was performed. The patients were divided into 2 groups on the basis of whether they were given nalbuphine or normal saline along with bupivacaine. Preanesthetic checkup was done one day prior to the surgery. Patients were evaluated for any systemic diseases and laboratory investigations recorded. Investigations like hemogram, urine routine and microscopic examination, KFT, LFT, ECG, CXR, BSL were performed prior to surgery. The procedure of spinal anesthesia was explained to the patients and written consent was obtained. Preparation of patients included period of overnight fasting. Patients were premedicated with Tab. Diazepam 5 mg orally, and Tab. Ranitidine 150 mg orally as a premedication night before surgery.

Patients were divided into 2 groups on the basis of the drug they received for spinal anesthesia.

Group I (study group) - 30 patients (n=30) received bupivacaine 0.5% heavy 3.1 ml + intrathecal nalbuphine 0.4 ml (0.4mg) = vol 3.5ml.

Group II (control group)- 30 patients (n=30) received bupivacaine 0.5% heavy 3.1ml + 0.4ml NS = vol 3.5ml

Anesthesia Technique:

Patients were shifted to operating room, IV access was obtained on the forearm with no.20 G IV cannula and all patients were preloaded with 15 ml/kg Ringer Lactate before the surgery. All patients were monitored with NIBP, pulse oximetry and ECG. Baseline vitals were recorded. Position of table was kept horizontal. Patients were given sitting position and under all aseptic precautions lumbar puncture was performed with 23G spinal needle at L3-L4 intervertebral space. After ensuring free flow of clear CSF the desired drug was injected. Drug was given over 10 to15 sec. patient were made to lie supine. Intra-operatively pulse rate, non-invasive blood pressure, electrocardiogram, SpO2 was recorded. Time of onset of sensory block was noted by loss of pin prick sensation whereas time of onset of motor block was assessed by Bromage scale. Total duration of surgery was noted. Further testing was performed at 15 min interval until the recovery to S2 dermatome. Duration of analgesia was measured from time of intrathecal administration of analgesic to the time of first request of analgesia. In post-operative period when patients complain of pain (VAS >4), inj. Diclofenac 50mg intramuscular was given as rescue analgesic. Preoperatively baseline parameters such as Pulse rate, Respiratory

rate, Blood pressure and oxygen saturation was recorded.

Postoperatively blood pressure, pulse rate, intensity of pain and SPO2 were recorded at 30 min, 1 hr., 2hr, 4hr, 6hr, 8hr, 12hr, 16hr, 20hr and 24hr. Adverse effects such as hypotension, bradycardia, respiratory depression, urinary retention and allergic reactions were looked for and recorded accordingly. SSPS version 20 was used for statistical analysis. P value < 0.05 was taken as significant and P value <0.001 as highly significant.

Inclusion Criteria:

1. Patients of both gender between age group of 20-65 years and scheduled for inguinal hernioplasty under spinal anesthesia.
2. Patients who gave written consent to be part of study.
3. Height between 150-170 cms and weight 50-80 kgs.
4. ASA physical status I & II
5. Normal liver and renal function tests.

Exclusion Criteria:

1. Patient refusal.
2. Mental disorders
3. Morbid obesity
4. Abnormal LFT, KFT, hemodynamic instability
5. Contraindications for spinal anesthesia
6. Patient allergic to opioids, hypnotics
7. Neurological & cardiac problems

RESULTS

The analysis of demographic details of the patients showed that there were equal number of males (28 in each group) and females (2 in each group). The other parameters such as ASA grades, height, weight, body mass index and duration of surgery were all found to be comparable in both the groups with no statistically significant difference in both the groups.

Table 1: Demographic details of the studied cases

Characteristics		Group 1 (%)	Group 2 (%)	P Value
Mean age (years)		49.90 ± 11.99	49.90 ± 12.49	1.0000
Sex	Male	28 (93)	28 (93)	>0.05
	Female	02 (7)	2 (7)	
ASA	I	22 (73)	22 (73)	>0.05
	II	8 (27)	8 (27)	
Anthropometry	Weight	64.63 ± 4.46	62.07 ± 6.18	0.0709
	Height	161.27 ± 4.92	159.87± 4.59	0.2591
	BMI	24.86 ± 1.50	24.27 ±2.00	0.2013

Mean duration of surgery in Group1 was 58.83 ± 7.73 and in group 2 was 55.83 ± 9.01. on applying Chi-Square test, the difference between two groups was statistically not significant with respect to duration of surgery (p>0.05)

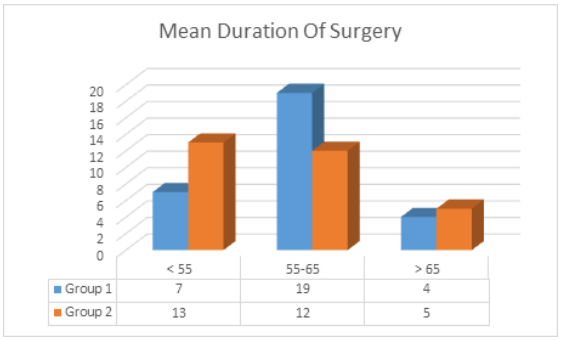

Figure 1: Mean Duration of Surgery in Studied cases.

Time of onset of sensory block was defined as the time from intrathecal injection of drug to the tingling sensation first experienced by the patient. The mean time for onset of sensory block was found to be 94.43 ±11.59 seconds in group 1 while 94.93 ±11.55 seconds in group 2. The difference in mean time for onset of sensory block was statistically insignificant. (P >0.05). Time of onset of motor block was defined as the time from intrathecal injection of drug to Bromage 1 (just able to move knee but not hip) In our study onset of motor blockade was found to be 123.27±8.05 in group 1 while124.17 ± 7.10 in group 2. The difference in mean time for onset of motor block was statistically not significant. (P >0.05).

Table 2: Mean time of onset of sensory and motor block in both the groups

Parameters	Group 1	Group 2	P value
Onset of Sensory block (sec)	94.43 ± 11.59	94.93 ± 11.55	0.8677
Onset of motor block (sec)	123.27±8.05	124.17 ± 7.10	0.6478

The total duration of sensory block is defined as interval from intrathecal administration to point of regression up to S2. The mean duration of sensory block was found to be 227.27 ± 13.21minutes in group 1 while 193.43 ±10.93 minutes in group 2. The difference in mean duration of sensory block was statistically highly significant. (p<0.0001) The total duration of motor block is defined as the point at which the Bromage score becomes 0 after intrathecal injection of drug. Mean duration of motor block was (194.43± 10.98min) in Group 1 and (154.93 ± 10.21min) in Group 2. The difference was statistically highly significant(p=<0.0001).

Table 3: Mean Duration of sensory and motor block in both the groups

Parameters	Group 1	Group 2	P value
Duration of sensory block (min)	227.27 ± 13.21	193.43 ± 10.93	<0.0001
Duration of motor block (min)	194.43± 10.98	154.93 ± 10.21	<0.0001

After completion of surgical procedure, patients were asked for pain at surgical site for every 15 min. Time taken from administration of drug to time

patient first demanded analgesic was noted and it was considered as duration of effective analgesia. Duration of postoperative analgesia was significantly longer in Group 1 (363.83 ± 18.75) as compared with Group 2 (247.33 ± 13.81). This difference was statistically highly significant (P<0.0001).

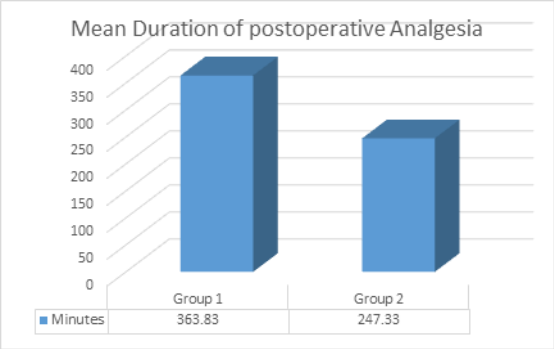

Figure 2: Mean duration of postoperative analgesia in both the groups.

The need to give rescue analgesia (diclofenac) was significantly decreased in group 1 as compared to group 2. difference in total doses of inj Diclofenac was highly significant (P<0.00001)

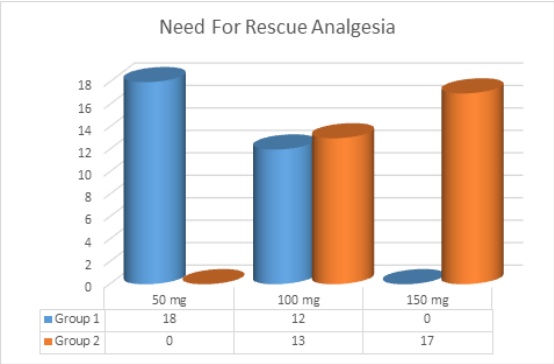

Figure 3: Need for rescue analgesia in studied cases.

Table 4: Mean Heart rate at different intervals in both groups.

Time Interval in minutes	Mean Heart rate (beats/minutes)		P value
	Group 1	Group 2	
Baseline	76.37 ± 6.29	74.67 ± 7.88	0.3596
2min	76.37 ±6.99	75.53 ±7.66	0.6589
5min	77.73 ± 7.83	76.60 ± 8.21	0.5875
7min	78.63 ±9.65	78.30 ± 9.75	0.8956
10min	76.83 ±11.25	78.60 ± 10.36	0.5286
15min	77.87 ±10.67	79.67 ± 11.49	0.5320
30min	74.30 ± 16.93	79.63± 10.37	0.1468
45min	79.33± 10.34	79.57 ± 8.77	0.9231
1hr	79.47 ± 9.91	78.43± 7.31	0.6454
1hr30min	79.10 ± 9.47	77.90 ± 7.34	0.5854
2hr	79.57± 8.76	77.47 ± 8.02	0.3368
4hr	78.87 ± 8.81	76.47 ± 7.61	0.2635
6hr	77.93 ± 7.61	76.27 ± 7.61	0.4017
8hr	77.53± 7.75	76.47 ± 7.39	0.5898
12hr	76.77 ± 7.36	75.9 ± 8.43	0.6718
16hr	76.9 ±7.56	75.57 ±6.95	0.4809
20hr	77.67 ± 8.48	76.6 ± 7.55	0.6077
24hr	77.93 ±7.72	76.90 ± 8.20	0.6183

Preoperatively the mean baseline heart rate in Group 1 (76.37±6.29 beats/min), and in Group 2 (74.67±7.88 beats/min) was found to be statistically comparable (p>0.05). Mean heart rate changes at all time intervals were found to be statistically insignificant and comparable (p>0.05) in between the two groups.

Pre-operatively the mean systolic blood pressure (SBP) between group1 (127.4 ± 7.91mmHg) and group 2 (128.87 ± 10.81mmHg) was found to be statistically comparable after applying T test (p>0.5501). Mean Systolic blood pressure (SBP) changes at all time intervals was found to be statistically insignificant and comparable after applying T test (p>0.05) between the two groups.

Table 5: Mean systolic blood pressure at different intervals in both groups.

Time Interval in minutes	Mean SBP (mm Hg)		P value
	Group 1	Group 2	
Baseline	127.4 ± 7.91	128.87 ± 10.81	0.5501
2min	123.53 ± 8.61	128.13 ± 10.63	0.0706
5min	117.77 ± 8.29	119.9 ± 11.24	0.0067
7min	113.6 ± 8	119.53 ± 11.24	0.0432
10min	111.57 ± 8.97	112.80 ± 10.76	0.6324
15min	109.83 ± 10.59	111.27 ± 10.31	0.6318
30min	114.17± 6.72	113.27 ± 8.94	0.3817
45min	116.7 ± 5.58	119.47 ±7.95	0.1237
1hr	118.2 ± 5.42	120.23 ± 8.27	0.2654
1hr30min	119.97±4.87	121.63±7.34	0.3063
2hr	121.70±5.26	124.67±6.02	0.0664
4hr	121.43±5.49	120.13±5.84	0.3780
6hr	121.90±6.67	120.9±6.73	0.84
8hr	123.30±5.63	127.00±9.23	0.0659
12hr	123.37±6.22	127.03±10.3	0.1011
16hr	124.00±7.18	126.50±10.37	0.2821
20hr	124.73±7.27	126.43±9.77	0.4476
24hr	126.00±6.66	127.30±8.60	0.5153

Table 6: Mean diastolic blood pressure at different intervals in both groups.

Time Interval in minutes	Mean DBP (mm Hg)		P value
	Group 1	Group 2	
Baseline	78.93 ± 5.65	79.77 ± 5.43	0.5594
2min	78.83±5.22	78.03±5.84	0.5780
5min	74.47±5.67	74.63±5.06	0.9086
7min	71.40±4.70	73.73±5.72	0.0901
10min	68.10±6.02	70.13±6.63	0.2194
15min	65.13±6.58	68.93±6.17	0.0246
30min	66.43±7.99	69.83±6.00	0.0674
45min	68.83±5.70	72.30±4.16	0.0927
1hr	71.27±5.46	72.90±5.65	0.2605
1hr30min	75.07±5.22	75.13±5.77	0.9665
2hr	75.13±5.81	76.93±6.02	0.2434
4hr	77.77±4.97	77.80±5.94	0.9831
6hr	78.97±5.14	77.00±6.30	0.1897
8hr	80.30±4.91	78.50±5.56	0.1890
12hr	81.47±4.58	77.87±6.48	0.0159
16hr	80.97±5.15	79.83±5.4	0.4062
20hr	81.87±5.61	80.17±5.45	0.2387
24hr	80.90±4.12	79.43±4.26	0.1795

Pre-operatively the mean diastolic blood pressure (DBP) between Group 1 (78.93 ± 5.65mmHg) and group 2 (79.77 ± 5.43mmHg) was found to be

statistically comparable after applying T test (p>0.05). Mean diastolic blood pressure (DBP) changes at all-time intervals were found to be statistically insignificant and comparable (p>0.05) between the two groups.

Pre-operatively the mean arterial pressure (MAP) between Group 1 (95.07±5.06mmHg) and group 2 (96.10±5.29mmHg) was found to be statistically comparable after applying T test (p>0.05). Mean arterial pressure (MAP) changes at all time intervals were found to be statistically insignificant and comparable (p>0.05) between the two groups.

Table 7: Mean arterial pressure at different intervals in both groups.

Time Interval in minutes	Mean MAP (mm Hg)				P value
	Group 1		Group 2		
	Mean	SD	Mean	SD	
Baseline	95.07	5.06	96.10	5.29	0.44
2min	93.67	5.00	94.60	5.80	0.5
5min	88.80	5.03	89.67	5.69	0.53
7min	85.40	4.20	89.00	6.37	0.01
10min	82.50	5.43	84.37	7.31	0.26
15min	81.33	8.23	83.03	6.20	0.37
30min	82.83	4.51	83.93	5.49	0.35
45min	87.13	4.74	87.70	3.96	0.62
1hr	86.90	4.20	88.63	5.24	0.17
1hr30min	90.07	4.20	90.63	5.13	0.65
2hr	90.70	4.74	92.83	4.71	0.08
4hr	92.47	4.08	92.00	4.74	0.68
6hr	93.37	5.05	91.30	6.97	0.19
8hr	94.67	4.28	94.57	5.46	0.94
12hr	92.97	3.21	94.23	5.78	0.30
16hr	95.33	4.24	95.23	4.93	0.93
20hr	96.10	4.94	95.47	4.92	0.68
24hr	96.03	4.27	95.27	4.03	0.48

Pre-operatively the mean arterial oxygen saturation (SpO2) between the Group 1 (99.1 ± 0.96) and group 2 (98.93 ± 1.23) was found to be statistically comparable (p=0.5530). Mean SpO2(%) changes at all time intervals was found to be statistically insignificant and comparable (p>0.05) between the two groups.

Table 8: Mean SPO2 at different intervals in both groups.

Time interval in minutes	Mean SPO2 (%)		P value
	Group 1	Group 2	
Baseline	99.1 ± 0.96	98.93 ± 1.23	0.5530
2min	99.10±0.96	98.93±1.23	0.0016
5min	99.03±1.05	98.97±1.01	0.2640
7min	98.83±1.01	99.13±1.21	0.8087
10min	98.87±0.91	98.80±1.22	0.2848
15min	99.07±0.92	98.77±1.07	0.0733
30min	99.10±1.20	98.63±1.64	0.6715
45min	98.87±0.92	98.73±1.00	0.6884
1hr	98.90±1.05	98.80±0.86	0.1119
1hr30min	98.73±0.82	99.13±1.06	0.0841
2hr	99.13±0.98	98.70±0.88	0.4824
4hr	99.07±0.97	98.90±1.00	0.5318
6hr	99.13±0.88	98.97±0.81	0.5539
8hr	99.10±0.83	98.97±0.85	0.8905
12hr	99.00±0.87	98.97±0.79	0.4314
16hr	99.00±0.88	99.17±0.96	0.7695
20hr	99.10±1.12	99.03±0.73	0.8704
24hr	99.17±0.94	99.13±0.69	0.5134

Pre-operatively the mean Respiratory rate (RR) between the Group 1 (15.20 ± 1.49) and group 2 (15.57 ± 1.38) was found to be statistically comparable (p=0.3225).Mean Respiratory rate changes at all time intervals was found to be statistically insignificant and comparable (p>0.05) between the two groups.

Table 9: Mean respiratory rate at different intervals in both groups.

Time Interval in minutes	Mean Respiratory Rate (per minute)				P value
	Group 1		Group 2		
	Mean	SD	Mean	SD	
Baseline	15.20	1.49	15.57	1.38	0.3225
2min	15.67	1.79	15.50	1.63	0.7019
5min	15.50	1.93	15.53	1.91	0.9520
7min	15.03	2.01	15.07	1.96	0.9381
10min	15.23	1.68	15.37	1.88	0.7621
15min	15.23	1.74	15.20	1.79	0.9477
30min	15.83	1.70	15.77	1.70	0.89
45min	15.27	1.55	15.47	1.89	0.26
1hr	15.40	1.61	15.27	1.74	0.76
1hr30min	15.33	1.75	15.10	1.67	0.60
2hr	15.27	1.60	14.93	1.57	0.40
4hr	15.43	1.59	15.40	1.69	0.94
6hr	15.30	1.70	15.30	1.56	1.0
8hr	15.17	1.51	15.77	1.74	0.1591
12hr	15.40	1.40	15.47	1.43	0.8487
16hr	15.43	1.57	15.43	1.52	1.0
20hr	15.33	1.47	15.33	1.45	1.0
24hr	15.53	1.50	15.43	1.61	0.8043

VAS score was used to assess pain postoperatively initially every 30mins up to 5 hr and then every 2 hrs for next 8 hrs and then every 4 hrs till24 hrs. When score was found more than 4, Injection Diclofenac sodium 75mg was given IV as a rescue analgesic.24 hours VAS score in postoperative period was less in Group 1 (Nalbuphine) as compared to group 2. This difference was statistically significant (p<0.05).

Table 10: Difference in Mean VAS Scores at different intervals in both groups.

Time interval in minutes	P value
30min	0.9920
60min	0.9920
90min	0.9920
120min	0.12356
150min	< .00001
180min	< .00001
210min	< .00001
240min	< .00001
270min	< .00001
300min	0.63122

Side effects in form of Nausea and vomiting Bradycardia, Hypotension, respiratory depression, urticaria and urinary retention was 3%,7% 3%, 0%, 0%, 0% respectively in Group 1 and was 3%, 3%, 7%,0%,0% 0%. in group 2 included there was no significant difference in side effects between two groups.

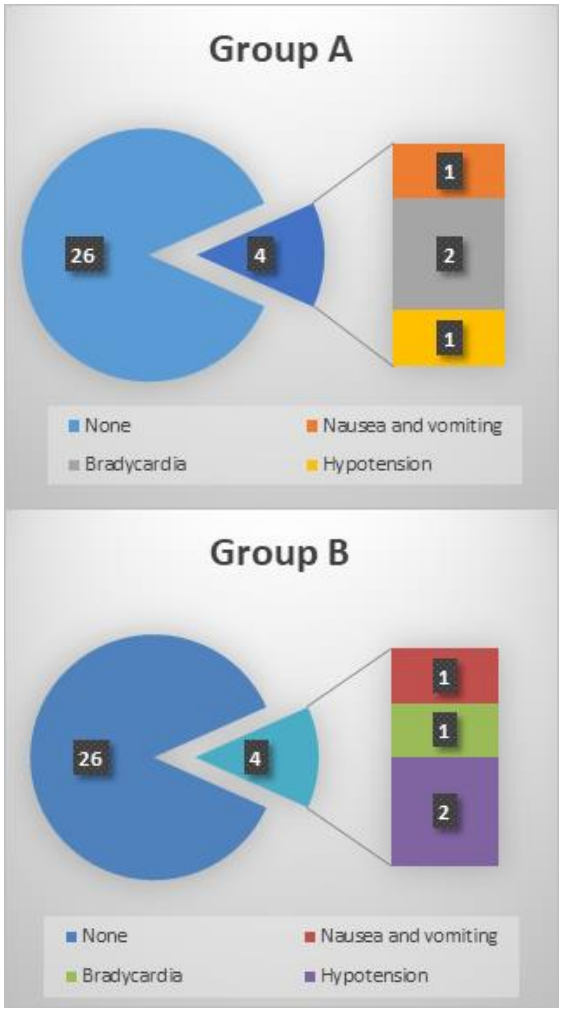

Figure 4: Comparison of adverse effects in both the groups.

DISCUSSION

Subarachnoid block is the technique of choice for lower abdomen surgeries. as it is very economical and easy to administer. Regional anesthesia has various advantages over general anesthesia such as reduced incidence of deep vein thrombosis, pulmonary embolism, reduced cardiac complications in high risk patients, reduced bleeding & transfusion requirement. Perioperative and postoperative pain management is one of the important tasks to the anesthesiologist. Pain relief is necessary for both humanitarian and therapeutic reasons. Elective inguinal hernia repair is one of the most common surgical procedures performed. In many centers, inguinal hernia repair is performed as a day care procedure. A good postoperative analgesic regimen is critically important to facilitate earlier patient mobilization and recovery and to improve postoperative outcome.[11]

The aim of good postoperative analgesia is to produce a long lasting, continuous effective analgesia with minimum side effects. Adding, an intrathecal adjuvant to local anesthetics forms a reliable method to prolong the duration of anesthesia. A number of adjuvants to local anesthetics for spinal anesthesia like opioids (fentanyl and buprenorphine), benzodiazepines (midazolam), ketamine and neostigmine have been used.[12]

However intrathecal opioids have been demonstrated to provide effective analgesia in the postoperative period. Nalbuphine is an opioid drug with mixed μ antagonist and k agonist properties. Nalbuphine has the potential to maintain or even enhance μ-opioid based analgesia while simultaneously minimizes the μ-opioid related side effects like euphoria or respiratory depression. It has little to no incidence of dysphoria, dissociation and hallucinations.[13]

Nalbuphine and other k agonists have provided potent analgesia in certain models of visceral nociception. They demonstrate complicated interactions with μ opiates that suggest dose-dependent synergies and significant antagonisms at larger doses. Hence, Nalbuphine was considered as an adjuvant drug in terms of its ability to prolong postoperative analgesia, produce an antagonism of the side effects attendant to spinal opiates, e.g. respiratory depression, pruritus and urinary retention.[14]

Rashmi Dubey et al conducted a prospective study to asses, evaluate and compare the analgesic effect of intrathecal nalbuphine when added to hyperbaric intrathecal bupivacaine and bupivacaine alone and to evaluate the onset, quality and duration of sensory and motor blockade achieved with hyperbaric bupivacaine and nalbuphine combination when administered intrathecally for spinal anesthesia in lower abdominal surgery. The authors found that there was no significant difference between 2 groups for onset of motor and sensory blockade but mean time of postoperative analgesia in Study Group was highly significant than Control Group. The findings were similar to the findings of our study.[15] Similar conclusions were reported by the authors such as Pallavi Ahluwalia et al and Sheila Shakooh et al.[15,17]

Apeksha A. Patwal et al did a single blinded randomized study to evaluate the effects of intrathecal Nalbuphine added to hyperbaric bupivacaine in comparison with hyperbaric bupivacaine alone in patients undergoing abdominal hysterectomy. The authors found that that Duration of sensory block was (242.5± 22.46 min) in Group BN as compared to (153.33± 25.33 min) in Group B which was statistically very significant. These results were similar to our study in which we found that mean duration of sensory block was significantly high in patients receiving bupivacaine and nalbuphine as compared to those who were given bupivacaine alone.[18]

Hala Mostafa Gomaa Nashwa Nabil et al,[19] conducted a study between post-operative analgesia after intrathecal nalbuphine with bupivacaine and

intrathecal fentanyl with bupivacaine in cesarean section. They found that the duration of post-operative analgesia was more prolonged in nalbuphine plus bupivacaine group (166.33) as compared to the bupivacaine alone group (155.83). The finding was similar to the findings of our study. Hemodynamical stability was observed In Similar study done by Jyothi B et al a comparison of analgesic effect of different doses of intrathecal nalbuphine hydrochloride with bupivacaine and bupivacaine alone in lower abdominal and orthopedic surgeries.[20]

CONCLUSION

Addition of nalbuphine to bupivacaine provides prolonged sensory and motor block as compared to bupivacaine alone. Moreover, addition of nalbuphine was found to be associated with significant increase in duration of analgesia. Moreover, no significant increase in side effects was noted in patients in whom nalbuphine was given along with bupivacaine for spinal anesthesia.

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