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ORIGINAL RESEARCH

Assessment of Post-Operative Pain after Spinal Anaesthesia with 0.5% Bupivacaine Combined with Neostigmine and 0.5% Bupivacaine alone in Infra Umbilical Surgeries

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ABSTRACT

Introduction: Stress factors in the operation room and block level mismatch with surgical area may contribute to discomfort, anxiety and restlessness in patients under spinal anaesthesia. Sedation is a valuable tool to provide general comfort for the patient. It usually provides freedom from specific discomfort and can impose some amount of amnesia for the block procedure and surgical procedure. Thus, legal use of sedation can make these surgeries under spinal anaesthesia more comfortable for the patient, the surgeon and the anaesthetist. Therefore, it can enhance the patient's acceptance of regional anaesthetic technique. Spinal anaesthesia itself can impart some sedative effects.Spinal subarachnoid block is one of the most versatile regional anaesthetic techniques available these days. Regional anaesthesia usually offers several advantages over general anaesthesia—blunts stress response to surgery, decreases intraoperative blood loss, lowers the incidence of postoperative thromboembolic events and provides analgesia in early postoperative period. Subarachnoid block provides profound anaesthesia for patients undergoing infraumbilical surgery.

Materials and Methodology: The present prospective study was undertaken to compare the effectiveness intrathecal neostigmine (50 mcg) combined with 0.5% bupivacaine (Hyperbaric) with 0.5% bupivacaine (Hyperbaric) alone in spinal anaesthesia for infra umbilical surgeries. After obtaining local ethical committee approval & a written informed valid consent, a prospective study was conducted on 100 patients (Random sampling based on type of surgery) undergoing infra umbilical surgery under spinal anaesthesia. The patients were randomly divided into following two groups with 50 subjects in each group where group-A received Intrathecal Bupivacaine 0.5% (Hyperbaric) 3ml + 50µg of neostigmine (0.1ml) and group-B were given Intrathecal Bupivacaine 0.5% (Hyperbaric) 3ml. The inclusion criteria of the study participants include those within age range of 30 – 60 years, ASA grade – I and II and those whose weight are in the range of 40 – 70 kgs. Unwilling patients, Patients who were contraindicated for spinal anaesthesia, pregnant females and those who had history of angina, palpitations, syncope and ECG abnormalities, finally those who are under beta blockers, calcium channel blockers and any other psychiatric medications are relatively excluded from the study. Quantitative data is presented with the help of Mean and

Standard deviation. Comparison within the study groups is performed by using an unpaired t test as per results of normality test. Qualitative data is analysed with the help of frequency and percentage table. Association within the study groups is evaluated by using Fisher test, student 't' test and Chi-Square test. 'p' value less than 0.05 is taken as significant statistically.

Results: No statistical difference was observed which was tested by applying unpaired t test (p>0.05). Group A had 27 (54%) male patients and 23 (46%) female patients whereas Group B had 28 (56%) male patients and 22 (44%) female patients. The gender distribution in the two groups as per Fisher's test were comparable and statistically not significant (p>0.05). Group A had 33 patients (66%) with Class I grading and 17 (34%) patients with Class II grading, whereas Group B had 35 (70%) patients with Class I grading and 15 (30%) patients with Class II grading. The ASA Grading of the patients between two groups were comparable and statistically not significant as per Fisher's test (p>0.05). Mean time until need for post-operative analgesic in Group A & Group B was 427.60±13.16 mins and 143.1±16.43 mins respectively. There was significant difference between groups as per unpaired t test (p<0.05).

Conclusion: There was significantly prolonged duration of analgesia and the time required for post-operative analgesic was significantly more with minimal side effects when intrathecal neostigmine (50 mcg) was combined with 0.5% bupivacaine (Hyperbaric) as compared to 0.5 % bupivacaine (hyperbaric) alone in spinal anaesthesia for infra umbilical surgeries.

Keywords: Spinal Anaesthesia, Neostigmine, Bupivacaine, Pain Assessment.

INTRODUCTION

Stress factors in the operation room and block level mismatch with surgical area may contribute to discomfort, anxiety and restlessness in patients under spinal anaesthesia.[1] Sedation is a valuable tool to provide general comfort for the patient. It usually provides freedom from specific discomfort and can impose some amount of amnesia for the block procedure and surgical procedure. Thus, legal use of sedation can make these surgeries under spinal anaesthesia more comfortable for the patient, the surgeon and the anaesthetist. Therefore, it can enhance the patient's acceptance of regional anaesthetic technique.[2] Spinal anaesthesia itself can impart some sedative effects.[3]

Spinal subarachnoid block is one of the most versatile regional anaesthetic techniques available these days. Regional anaesthesia usually offers several advantages over general anaesthesia—blunts stress response to surgery, decreases intraoperative blood loss, lowers the incidence of postoperative thromboembolic events and provides analgesia in early postoperative period. Subarachnoid block provides profound anaesthesia for patients undergoing infraumbilical surgery.

Among all the local anaesthetics, 0.5% hyperbaric bupivacaine is the most commonly used drug for spinal anesthesia.[4] The most unique disadvantage of single injection SAB is the limited duration. Adjuvants have long been used along with local anaesthetics to prolong the duration of anaesthesia and analgesia. Prolongation of pain relief by various adjuvants like opioids (like morphine[5], fentanyl[6]), ketamine[7], clonidine[8], and neostigmine[9] were investigated by various investigators. However, each drug has its limitations and side effects, and the need for alternative methods and drugs always exist.

Like as intrathecal injection of neostigmine produces analgesic effects. The inhibition of spinal cholinesterase by neostigmine results in an increase of endogenous acetylcholine, which is most likely released from intrinsic cholinergic neurons within the dorsal horn of the spinal cord. These cholinergic neurons terminate in the vicinity of primary afferent express muscarinic receptors.10 The endogenous acetylcholine produces analgesic effect through

muscarinic presynaptic inhibition of glutamatergic afferents. Muscarinic receptor antagonists have been shown to reverse the analgesic effects of intrathecal neostigmine. A tonic cholinergic activity is an important prerequisite for the effectiveness of neostigmine. The enhanced analgesic efficacy of intrathecal neostigmine results from greater release of spinal acetylcholine from the more intense and prolonged discomfort of postoperative pain. So many studies in different parts of the world with significant variations had been done to assess different drugs to postoperative analgesia and to prolong duration of spinal Anaesthesia.[11]

Hence the present study was done at our tertiary care centre to assess the post-operative pain after intrathecal neostigmine (50 mcg) combined with 0.5 % bupivacaine (Hyperbaric) with 0.5 % bupivacaine (Hyperbaric) alone in spinal anaesthesia for infra umbilical surgeries.

MATERIALS AND METHODOLOGY

The present prospective study was undertaken to compare the effectiveness intrathecal neostigmine (50 mcg) combined with 0.5% bupivacaine (Hyperbaric) with 0.5% bupivacaine (Hyperbaric) alone in spinal anaesthesia for infra umbilical surgeries. After obtaining local ethical committee approval & a written informed valid consent, a prospective study was conducted on 100 patients (Random sampling based on type of surgery) undergoing infra umbilical surgery under spinal anaesthesia. The patients were randomly divided into following two groups with 50 subjects in each group where group-A received Intrathecal Bupivacaine 0.5% (Hyperbaric) 3ml + 50µg of neostigmine (0.1ml) and group-B were given Intrathecal Bupivacaine 0.5% (Hyperbaric) 3ml.

The inclusion criteria of the study participants include those within age range of 30 – 60 years, ASA grade – I and II and those whose weight are in the range of 40 – 70 kgs. Unwilling patients, Patients who were contraindicated for spinal anaesthesia, pregnant females and those who had history of angina, palpitations, syncope and ECG abnormalities, finally those who are under beta blockers, calcium channel blockers and any other psychiatric medications are relatively excluded from the study. Quantitative data is presented with the help of Mean and Standard deviation. Comparison within the study groups is performed by using an unpaired t test as per results of normality test. Qualitative data is analysed with the help of frequency and percentage table. Association within the study groups is evaluated by using Fisher test, student ‘t’ test and Chi-Square test. ‘p’ value less than 0.05 is taken as significant statistically.

RESULTS

Table – 1 shows comparison between age and weight among both the groups. No statistical difference was observed which was tested by applying unpaired t test ($p>0.05$).

In table – 2, comparison of the study participants based on gender distribution was observed. Group A had 27 (54%) male patients and 23 (46%) female patients whereas Group B had 28 (56%) male patients and 22 (44%) female patients. The gender distribution in the two groups as per Fisher’s test were comparable and statistically not significant ($p>0.05$).

The results shown in table -3 showed that Group A had 33 patients (66%) with Class I grading and 17 (34%) patients with Class II grading, whereas Group B had 35 (70%) patients with Class I grading and 15 (30%) patients with Class II grading. The ASA Grading of the patients between two groups were comparable and statistically not significant as per Fisher’s test ($p>0.05$).

Table – 4 illustrated the mean time until need for post-operative analgesic in Group A & Group B was 427.60±13.16 mins and 143.1±16.43 mins respectively. There was significant difference between groups as per unpaired t test (**$p<0.05$**).

Table 1: Comparison of study group as per age (years) and weight (kg)

Variable	Group A			Group B			Unpaired T test	P value
	N	Mean	SD	N	Mean	SD		
Age (years)	50	44.16	14.72	50	45.88	10.73	0.667	0.51
Weight (kg)	50	70.88	6.52	50	68.28	8.99	1.65	0.10

Table 2: Comparison of Sex of patients within groups

Sex	Group A		Group B		Fisher test value	p Value
	N	%	N	%		
Male	27	54%	28	56%	0.843	p>0.05
Female	23	46%	22	44%		
Total	50	100%	50	100%		

Table 3: Distribution of patients according to ASA Grading

ASA Grading	Group A		Group B		p Value
	N	%	N	%	
I	33	66%	35	70%	p>0.05
II	17	34%	15	30%	
Total	50	100%	50	100%	

Table 4: Time until need for post-operative analgesic in study groups

Parameter	Group A		Group B		Unpaired t test	p Value
	Mean	SD	Mean	SD		
Time until need for post-operative analgesic (mins)	427.60	13.16	143.1	16.43	95.56	**<0.05**

DISCUSSION

Acute post-operative pain is a complex physiological reaction to tissue injury, visceral distension or disease. It is manifested by autonomic, psychological and behavioural responses that result in patient specific unpleasant, unwanted sensory and subjective emotional experience. Postoperative pain leads to delayed mobilization and its associated complications. With the development of an expanding awareness of the epidemiology and pathophysiology of pain, more attention is focused on the multimodal management of pain to improve the quality of pain relief, augment functionality, leading to early mobilization, and reduce physiological and emotional morbidity.

In the present study the mean age and weight was 44.16 (SD 14.72), 70.88 (SD6.52) in group A and 45.88 (SD 10.73), 68.28 (SD 8.99) in group B respectively and it was comparable in both the groups. No statistical difference was found by applying unpaired t test (p>0.05). In a comparative study done by YoganarasimhaN et al[11] between intrathecal clonidine and neostigmine with intrathecal bupivacaine the demographic and duration of surgery was comparable in both the groups.

Group A had 27 (54%) male patients and 23 (46%) female patients whereas Group B had 28 (56%) male patients and 22 (44%) female patients. Group A had 33 patients (66%) with Class I grading and 17 (34%) patients with Class II grading, whereas Group B had 35 (70%) patients with Class I grading and 15 (30%) patients with Class II grading. The gender distribution and ASA Grading of the patients between two groups were comparable and statistically not significant.

The mean total duration of analgesia was prolonged in Group A (362 ± 32 min) compared to Group B (300.64 ± 12.07 min). This difference was statistically significant after applying

unpaired t test ($p<0.05$) whereas the study of Yoganarasimha N et al[11] observed that the mean total duration of analgesia was prolonged in the group that received intrathecal clonidine and bupivacaine compared to the group that received neostigmine and bupivacaine.
The mean time until need for post-operative analgesic in Group A & Group B was 427.60±13.16 mins and 143.1±16.43 mins respectively. There was significant difference between groups as per unpaired t test ($p<0.05$).
Shah JR et al[12] in a comparative study to know the effects of intrathecal 0.5% Bupivacaine 2.5cc with 0.5cc normal saline and 0.5% Bupivacaine 2.5cc with 25µg fentanyl for various lower abdominal surgeries observed the time to feel first pain and time of analgesic requirement is prolonged significantly in the group that received bupivacaine and fentanyl compared to the group that received bupivacaine and saline. The duration of sensory and motor block as well as duration of effective analgesia was significantly longer in the bupivacaine–fentanyl group as compared with both bupivacaine–normal saline groups. In a study done by *Bhavsar*M et al[13] the analgesic requirement in first 24 hours was significantly low in the group that received fentanyl and neostigmine as well.
In a study done by Bhavsar M et al[13] evaluating the analgesic efficacy of combined use of intrathecal fentanyl and neostigmine as an adjunct to Bupivacaine for postoperative pain relief for abdominal hysterectomy under ASA I/II the authors observed significant delay post-operative analgesia in the group that received fentanyl and neostigmine as compared to the group that received saline. Patients were observed for side effects such as nausea, vomiting, hypotension, bradycardia, pruritus etc. Combined use of intrathecal fentanyl and neostigmine as an adjunct to Bupivacaine at very low dose is quite effective in terms of prolong duration of rescue analgesia with lower rates of side effects.
Shah JR et al[12] in a comparative study observed that addition of intrathecal fentanyl to bupivacaine was more advantageous than bupivacaine with normal saline with special regard to its analgesic properties among surgical patients.

CONCLUSION

There was significantly prolonged duration of analgesia and the time required for post-operative analgesic was significantly more with minimal side effects when intrathecal neostigmine (50 mcg) was combined with 0.5% bupivacaine (Hyperbaric) as compared to 0.5 % bupivacaine (hyperbaric) alone in spinal anaesthesia for infra umbilical surgeries.

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