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Original Research Article

To study the effect of Intravenous Dexmedetomidine in prevention of intra-operative shivering in the patients undergoing lower abdominal surgeries under spinal anesthesia.

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Abstract:
Background & Method: The aim of this study is to study the effect of Intravenous Dexmedetomidine in prevention of intra-operative shivering in the patients undergoing lower abdominal surgeries under spinal anesthesia.

Result: The mean sedation score in control group was 1.32 ± 0.47, while in study group it was 4.44 ± 0.61. The difference was found to be statistically significant (P<0.05), with a higher sedation score in study group in comparison to control group. Statistically significant proportional difference was seen between control and study group for Grade 2, 3 and 4 (P < 0.05), with a higher proportion of patients in control group in comparison to study group.

Conclusion: Patients were randomly allocated in to two groups of 50 each, dexmedetomidine group and control group. Just after intrathecal injection drug were infused intravenously. Dexmedetomidine group was given an iv loading dose of dexmedetomidine 1mcg /kg administered over a 10 minute period followed by an infusion of 0.5mcg /kg body weight. The infusion was stopped at the end of the surgery. Control group were given normal saline slowly. Drug dexmedetomidine is effective in preventing shivering following spinal anesthesia The incidence of shivering in patients under spinal anesthesia after dexmedetomidine is 2% and in control group is 62 %.

Keywords: Intravenous, Dexmedetomidine, intra-operative, abdominal, spinal & anesthesia.

Study Designed: Observational Study.

1. INTRODUCTION

Shivering may be defined as an involuntary, repetitive activity in skeletal muscles. SHIVERING during spinal anesthesia is a common problem and may occur in 19%-33% of patients receiving spinal anesthesia.
Shivering is unpleasant for the patient, anaesthesiologist and the surgeon besides being physiologically stressful to the patient .shivering results in 200-500% increase in oxygen consumption along with raised co2 production, hyperventilation, lactic acidosis and cardiac output.the mechanism of shivering in patients undergoing surgery though not settled it is supposed to be mainly due to intraoperative heat loss, increased sympathetic tone, pain and systemic release of pyrogens.
Spinal anesthesia significantly impairs the thermoregulation system by inhibiting tonic vasoconstriction which plays a significant role in temperature regulation. It causes redistribution of core heat from the trunk(below the block level) to the peripheral tissues, these two predispose patients to hypothermia and shivering . Shivering usually occurs as a thermoregulatory response to cold, although non thermoregulatory shivering may also occur. Core temperature in humans varies with circadian rhythm (and with menstrual cycle in females), but is normally maintained within the narrow range of 36.5°C to 37.0°C. Shivering may occur following general or neuraxial anesthesia, and undoubtedly some of the causative factors are common to both[1].
Shivering is commonly encountered both after regional and general anesthesia with a little higher incidence in patients receiving general anesthesia[2].The shivering that occurs during general anesthesia and neuraxial anesthesia share some common pathways. Thus, it seems likely that agents that have proven successful in the treatment of shivering following general anesthesia might also be useful in the management of shivering during neuraxial anesthesia.
It is distressing and uncomfortable and is perceived by many as equivalent to the postoperative surgical pain. It can hamper the normal smooth recovery and can be quite detrimental in certain group of patients eg: patients with increased intracranial pressure,disruption of anastmotic sites and risk of dental damage from violent teeth chattering increased intraocular pressure, with limited cardio-respiratory reserve such as elderly patients[3,4].
Excessive shivering creates an imbalance between body's oxygen demand and supply ratio. The resultant increased demand, sometimes up to six times the normal, and relative deficit of oxygen supply can lead to various metabolic derangements such as hypoxemia, lactic acidosis, and hypercarbia thereby hampering a smooth recovery from anesthesia[2].

2. MATERIAL & METHOD

This is a prospective, randomized observational study conducted at department of anesthesiology & critical care, Index Medical College, Hospital & Research centre in duration of 15 months from January 2015 to June 2016.
All the patients of ASA physical status I & II, aged between 20 years to 55 years of both sexes undergoing elective lower abdominal surgery using spinal anaesthesia will be taken.
Informed consent was taken for study . the patient was examined and evaluated on the day before surgery. Patient was fully explained for the procedure of anesthesia to ally anxiety and apprehension. After giving spinal anesthesia, patients will be randomly allotted in two groups of 50 each using a computer-generated random list. Just after intrathecal injection, all drugs will be infused intravenously. Group D will be given an i.v. bolus of dexmedetomidine 1 mcg per kg administered by a syringe pump over a 10-min period followed by an infusion of

0.4 mcg per kg per hr dexmedetomidine during the surgery. Group c receives normal saline . The infusions will be stopped at the completion of the closure of the skin. Supplemental oxygen will be delivered via a facemask during the operation and blood pressure, heart rate, orat temperature is noted at regular intervals.

Inclusuion Criteria

- Patients undergoing elective lower abdominal surgeries under spinal anesthesia.
- Patients between the age group of 20 to 55yrs.

American Society of Anesthesiologists physical status I

Exclusion Criteria

Patients below 20 and more than 55yrs of age.

● Contraindications to spinal anesthesia.

● Patients with thyroid disease, Addison's disease, Parkinson's disease, Raynaud's syndrome, cardiopulmonary, liver and kidney diseases. History of convulsions/epilepsy, bronchial asthma.

● History of allergy to the agents to be used.

● A need for blood transfusion during surgery.

● Initial core temperature <36.5 or >37.5 c

● Use of sedative-hypnotic agents, vasodilators, antidepressants therapy with selective serotonin re-uptake inhibitors and monoamine oxidase inhibitors, benzodiazepines.

● Patients with severe bradycardia and hypotension, heart block ,myocardial infarction.

● Pregnant women.

3. RESULTS

Table No. 1: Distribution according to age in both the groups

(N=100)

Age Group	Control Group		Case Group		Total	
	No.	%	No.	%	No.	%
21-30 years	1	2.0	5	10.0	6	6.0
31-40 ears	19	38.0	18	36.0	37	37.0
41-50 years	24	48.0	21	42.0	45	45.0
51-60 years	6	12.0	6	12.0	12	12.0
Total	50	100.0	50	100.0	100	100.0

The above table shows the distribution of patients in both the groups according to age. In control group, 1 (2%) patient was in age group 21-30 years, 19 (38%) were in the age group 31-40 years, 24 (48%) were in the age group 41-50 years and 6 (12%) were in the age group 51-60 years. In study group, 5 (10%) patients were in age group 21-30 years, 18 (36%) were in the age group 31-40 years, 21 (42%) were in the age group 41-50 years and 6 (12%) were in the age group 51-60 years. In both the groups, majority of the patients were in the age group 41-50 years.

Table No. 2: Distribution according to ASA Grade in both the groups

(N=100)

ASA Grade	Control Group		Case Group		Total	
	No.	%	No.	%	No.	%
Grade 1	43	86.0	45	90.0	88	88.0
Grade 2	7	14.0	5	10.0	12	12.0
Total	50	100.0	50	100.0	100	100.0

The above table shows the distribution of patients in both the groups according to ASA Grading.
In control group there were 43 (86%) patients in Grade 1 and 7 (14%) patients in Grade 2.
In study group there were 45 (90%) patients in Grade 1 and 5 (10%) patients in Grade 2.
Majority of the patients in both the groups were in ASA Grade 1.

Table No. 3: Mean comparison of mean sedation score between the two groups

(N=100)

Parameter	Control Group		Study Group		't' Value	P Value
	N	Mean ± SD	N	Mean ± SD		
Sedation score	50	1.32 ± 0.47	50	4.44 ± 0.61	28.579, df=98	0.000*

Unpaired 't' test applied. P value < 0.05 was taken as statistically significant

The above table showing the mean comparison of mean sedation score between the two groups.
The mean sedation score in control group was 1.32 ± 0.47, while in study group it was 4.44 ± 0.61. The difference was found to be statistically significant (P<0.05), with a higher sedation score in study group in comparison to control group.

Table No. 4: Comparison of Shivering Grade between the two groups

(N=100)

Shivering Grade	Control Group		Case Group		Z Value	P Value
	No.	%	No.	%		
Grade 0	11	22.0	49	98.0	6.44	0.000*
Grade 1	0	0.0	0	0.0	0.00	1.00, NS
Grade 2	13	26.0	0	0.0	3.87	0.00*
Grade 3	13	26.0	0	0.0	3.87	0.00*
Grade 4	13	26.0	1	2.0	3.42	0.001*
Total	50	100.0	50	100.0		

Z test for two sample proportion applied. P value < 0.05 was taken as statistically significant

The above table shows the distribution of patients in both the groups according to shivering grading.

Shivering is graded on a scale similar to that validated by Tsai and Chu:

0 = no shivering
1 = piloerection or peripheral vasoconstriction but no visible shivering
2 = muscular activity in only one muscle group
3 = muscular activity in more than one muscle group but not generalized
4 = shivering involving the whole body

In control group, 11 (22%) patients were in shivering grade 0, 13 (26%) were in grade 2, 13 (26%) were in grade 3 and 13 (26%) were in grade 4.

In study group, 49 (98%) patients were in shivering grade 0, and only 1 (2%) patient was in grade 4.

Majority of the patients in the control group experienced shivering.

Statistically significant proportional difference was seen between control and study group for Grade 0 ($P < 0.05$), with a higher proportion of patients in study group in comparison to control group.

Statistically significant proportional difference was seen between control and study group for Grade 2, 3 and 4 ($P < 0.05$), with a higher proportion of patients in control group in comparison to study group.

4. DISCUSSION

Spinal anesthesia is a safe and popular anesthesia technique used world over for various surgeries. Spinal anesthesia is a type of central neuraxial blockade, the other commonly used technique being epidural anesthesia.

One of the common problem of spinal anesthesia is shivering. Shivering is unpleasant for the patient, anesthesiologist and the surgeon besides being physiologically stressful to the patient[5].

The redistribution of core temperature during SPINAL anesthesia is typically restricted to the legs and therefore core temperature decreases about half as much during spinal anesthesia as during general anesthesia[6].

Vasoconstriction and shivering are restricted to the upper body during spinal anesthesia as they are inhibited below the level of blockade through sympathetic and somatic neural block[7].

The mechanism of shivering under regional anesthesia is not fully understood and is still a topic of interest among researchers .the possible mechanism include cessation of central thermoregulation , internal redistribution of body heat, heat loss to the environment[6,7&8].

Variety of factors contributes to decrease the core body temperature in patients in receiving spinal anesthesia. These include sympathetic block causing peripheral vasodilation and increased cutaneous blood flow resulting in increased cutaneous blood flow resulting in increased heat loss through skin, cold operating room, rapid iv infusion of cold iv fluids direct effect of cold anesthetic solution upon the thermosensitive structure of the spinal cord[9&10].

Combinations of all these factors make unwarmed surgical patients hypothermic.

In our present study, two groups are comparable to each other with respect to age, height, sex, weight, ASA physical status and duration of surgery. This demographic profile , between two

groups, are statistically insignificant ($p>0.05$) in our patients was quite similar with other research investigation and provided us the uniform platform to evenly compare the results obtained.

In our study since we are making an attempt to study the efficacy of intravenous dexmedetomidine in prevention of shivering in patients of lower abdominal surgeries under spinal anesthesia. So, non-pharmacological methods were not adapted to prevent shivering as it may hamper our study.

Research indicates that during perioperative period when core temperature changes rapidly at different sites the relationship between the temperatures measured at various body sites may differ.

5. CONCLUSION

Patients were randomly allocated in to two groups of 50 each, dexmedetomidine group and control group. Just after intrathecal injection drug were infused intravenously. Dexmedetomidine group was given an iv loading dose of dexmedetomidine 1mcg /kg administered over a 10 minute period followed by an infusion of 0.5mcg /kg body weight. The infusion was stopped at the end of the surgery. Control group were given normal saline slowly. Drug dexmedetomidine is effective in preventing shivering following spinal anesthesia The incidence of shivering in patients under spinal anesthesia after dexmedetomidine is 2% and in control group is 62 %.

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