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Original Research Artic;e

Retrospective evaluation of general and regional anaesthesia among hypertensive patients undergoing surgery

M Vasantha Kumar[1],*, B Ravi[1]

[1] *Dept. of Anesthesiology, ACS Medical College and Hospital, Chennai, Tamil Nadu, India*

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ABSTRACT

Introduction: Hypertensive patients under the effect of general anaesthesia are traditionally found to be hemodynamically unstable in comparison to normotensive patients. The application of regional anaesthetics has been widely preferred by surgeons for lower-extremity surgery, but the use of general anaesthesia during such surgeries are also reported, regardless of evidence that regional anaesthesia is safe and may confer some advantages over general anaesthesia.

Materials and Methods: The data of 100 hypertensive patients collected from June 2017 to May 2019. The blood pressure, diastolic blood pressure, heart rate and SPO2 (%) recorded before surgery, during surgery and post-surgery. All the statistical analyses were performed using the SPSS 24.0 software.

Results: It was observed from the study that the systolic and diastolic blood pressure among the patients pre, during and post surgery under general anaesthesia was found to be stable throughout while the systolic blood pressure among the hypertensive patients under regional anaesthesia was found to be lower during surgery. However, the levels reached to the normal levels post surgery. The median Visual Analog Scale (VAS) pain score among the patients in general anaesthesia group was found to rise almost immediately after the completion of the surgery reaching a peak during the 3^{rd} hour of post surgery. However, the VAS pain score among the patients of the regional anaesthesia group was found to rise only after the 2^{nd} or 3^{rd} hour of post surgery.

Conclusion: The study therefore provides evidence that there were increased intra-operative fluctuations and reduced post operative pain among the patients in the regional anaesthesia group in comparison to those under general anaesthesia group.

1. Introduction

Hypertension is the most important risk factor for chronic disease burden in India.[1] Studies from various parts of India have reported high prevalence of hypertension. Hypertension (HTN) exerts a substantial public health burden on cardiovascular health status and healthcare systems in India. HTN is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease (CHD) deaths in India. The WHO rates HTN as one of the most important causes of premature death worldwide.[2,3] It has been found that hypertensive patients under the effect of general anaesthesia are traditionally found to be hemodynamically unstable in comparison to normotensive patients. The administration of general anaesthesia is also reported to cause abnormal cardiovascular response among the patients in comparison to those administered with regional anaesthesia.[4]

According to previous studies the application of regional anaesthetics has been widely preferred by surgeons for lower-extremity surgery, but the use of general anaesthesia during such surgeries are also reported, regardless of evidence that regional anaesthesia is safe and may confer some advantages over general anaesthesia.[5] The aim of this study was to retrospectively compare amid general anaesthesia and regional anaesthesia in hypertensive

* *Corresponding author.*
E-mail address: saratovvasanth@gmail.com (M. Vasantha Kumar).

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patients, the changes in the blood pressure, and heart rate level during preoperative, intra operative and post operative procedures. The study would also focus on the post operative VAS pain score among the hypertensive patients during general and regional anaesthesia.

2. Materials and Methods

2.1. Patients

The records of all the hypertensive patients who have undergone surgeries in department of surgery and orthopedics from June 2017 to May 2019 were retrieved. Data pertaining to various demographic information, type of anaesthesia used and all clinical parameters pre, during and post surgery were retrieved from the records. Among all the records of the patients retrieved for the study, the data of 100 hypertensive patients were selected for the study. Data pertaining to the types of hypertensive drugs such as Amlodipine, Losartan and Atenolol administered to the patients for maintaining the normal blood pressure level among patients before surgery were also collected from the records. The study cases were divided into two groups. The study cases were categorized in either one of the two groups based on the type of anaesthesia used. In the study, each and every patient is routed to the anaesthetic consultation before performing the surgery. The systolic blood pressure, diastolic blood pressure, heart rate and SPO_2 (%) recorded before surgery, during surgery and post surgery for all the patients were collected. The post operative VAS pain score among the patients of both the groups were retrieved for the study. The demographic and etiological characteristics of the study cases were also retrieved and recorded for the study.

2.2. Inclusion criteria

Patients with hypertension as a comorbidity undergoing surgeries were included. Patient aged between 30 to less than 70 years were included under study.

2.3. Exclusion criteria

Patients with incomplete clinical data were excluded from the study. Patients with other diseases were also excluded. Patient aged less than 30 years and more than 70 years were excluded.

2.4. Anaesthetic management and intra-operative care

The cases selected for the study included hypertensive patients who were operated for fibroeadenoma, lipoma over chest wall, infected sebaceous cyst over chest wall, infected sebaceous cyst over back, lipoma over back, fracture clavicle, fracture proximal humerus, under general anaesthesia and those who were operated for Inguinal hernia, femoral hernia, hydrocele, circumcision, fracture tibia, fracture fibula, metatarsal fracture, calcaneal fracture under regional anaesthesia. In all the selected cases premedication of hypertensive drugs such as Amlodipine, Losartan and Atenolol was allowed orally before introduction of anesthesia. General anesthesia was initiated with Fentanyl 2μg kg-1 and propofol 2.5 mg kg-1. Anesthesia was kept up with 0.7-1.5% end-tidal sevoflurane after orotracheal intubation encouraged by atracurium 0.5 mg kg-1. Regional anaesthesia was administered using spinal block with a 25 Gauge spinal needle between the L3–L4 intervertebral spaces. Regional anaesthesia was achieved by 3.2ml-3.6ml accordingly hyperbaric bupivacaine injection.[6]

2.5. Statistical analysis

The quantitative data from the study were presented either as mean or percentages. The statistical significance between the demographic and etiological parameters was calculated using Chi-square test in order to determine any variability in the study subjects. The statistical significance of the difference in the VAS pain score among the regional anaesthesia and general anaesthesia group was calculated using t-test. The statistical analyses were performed using the SPSS 24.0 software. All the test were considered significant for $p<0.05$.

3. Results

The study was performed using the medical records of 100 patients with hypertension retrieved from the department of surgery and orthopedics undergoing surgery under either general or regional anaesthesia. It has been observed from the study that 52% of the study subjects were performed the surgery under general anaesthesia while 48% of the study subjects were performed surgery under regional anaesthesia. The mean age $\pm$ SD of the study subjects performed surgery under general and regional anaesthesia was observed to be 55.7 $\pm$ 8.3 years and 53 $\pm$ 10.4 years respectively. The mean value $\pm$ SD of BMI of the study subjects in the general and regional anaesthesia group was observed to be 24.8 $\pm$ 2.2 and 23.3 $\pm$ 2.8 respectively. The percentage of male in the regional anaesthesia group was found to be higher in comparison to the general anaesthesia group and vice-versa. The percentage of study subjects without the habits of alcohol consumption and smoking was found to be higher among both the general and regional anaesthesia group (Table 1).

The level of the systolic blood pressure, diastolic blood pressure, heart rate and SPO2 (%) level among the hypertensive patients pre surgery, during surgery and post surgey was measured. It was observed from the study that the systolic blood pressure among the patients pre, during and post surgery under general anaesthesia was found to be stable throughout while the systolic blood pressure among the hypertensive patients under regional anaesthesia was

found to be lower during surgery. However, the levels reached to the normal levels post surgery (Figure 1A). A similar observation was also observed for the diastolic blood pressure where the level was observed to decline during surgery among patients of regional anaesthesia group. The patients of the general anaesthesia group was observed to have a more or less stable diatolic blood pressure level pre, during and post surgery (Figure 1 B). The heart rate among the hypertensive patients in the general anaesthesia group during surgery was observed to increase which became stable post surgery. The heart rate of the patients in the regional anaesthesia group was found to be more or less similar pre, during and post surgery in the hypertensive patients (Figure 1 C).

The VAS pain score among the study subjects post surgery among the patients with general or regional anaesthesia revealed that the median VAS pain score among the patients in general anaesthesia group was found to rise almost immediately after the completion of the surgery reaching a peak during the 3rd hour of post surgery. However, the VAS pain score among the patients of the regional anaesthesia group was found to rise only after the 2^{nd} or 3^{rd} hour of post surgery attaining a peak post 6 hours of surgery. There was a significant difference observed in the VAS pain score among the patients of the general and regional anaesthesia group before the administration of analgesic drug (Table 2). As per the case records the rescue analgesic among the patients was administered when the VAS score was found to be more than 5 post surgery. The VAS pain score was found to reduce among the study subjects in both the general and regional anaesthesia group post rescue analgesic.

Table 1: Table representing the demographic, etiological and clinical characteristics of the study subjects with hypertension

		General Anaesthesia (mean±SD/ percentage)	**Regional Anaesthesia (mean±SD/ percentage)**	**P-value** a
Age		55.7±8.3	53±10.4	
Gender	Male	30.7%	70.8%	**<0.05**
	Female	69.3%	29.2%	
BMI		24.8±2.2	23.3±2.8	
Alcohol	Yes	19.3%	25%	0.48
	No	80.7%	75%	
Smoking	Yes	42.3%	37.5%	0.62
	No	57.7%	62.5%	

Chi-square test (p-value less than 0.05 considered significance).

4. Discussion

High blood pressure (BP) is ranked as the third most important risk factor for attributable burden of disease in south Asia (2010).[2] Global Burden of Diseases (GBD) has reported that in 2017, high systolic BP was the leading risk factor globally, accounting for 10.2 million [95% uncertainty intervals (UI) 9.16 – 11.3 million] deaths and 208 million (UI 188 – 227 million) disability adjusted life years (DALYs)[2]. It was observed from the study that the systolic and diastolic blood pressure among the patients pre, during and post surgery under general anaesthesia was found to be stable throughout while the systolic blood pressure among the hypertensive patients under regional anaesthesia was found to be lower during surgery. It was reported that in hypertensive patients undergoing general anaesthesia, elevated pulse pressure (PP) (>60 mmHg) and/or diastolic dysfunction (DD) could be risk factors for intraoperative hemodynamic instability. This study reported that in comparison to controls, hemodynamic instability was significantly higher in hypertensives. Hypertensive patients with and without diastolic dysfunction (DD) had similar hemodynamic instability index.[7] In an earlier study, general and regional anaesthesia was administered for elective lumbar spine surgery. The hemodynamic changes such as the changes in the maximum blood pressure and maximum heart beat were examined and recorded. The study reported that the maximum blood pressure among the patients administered with regional anaesthesia was found to decrease post surgery while those administered using general anaesthesia was found to increase post surgery. The maximum heart rate among the patients administered regional anaesthesia was found to decrease among the patients post surgery while that among general anaesthesia patients were found to increase post surgery[8] which was found to be consistent with our study.

The VAS pain score among the study subjects post surgery among the patients with general or regional anaesthesia revealed that the mean VAS pain score among the patients in general anaesthesia group was found to rise almost immediately after the completion of the surgery while the VAS pain score among the patients of the regional anaesthesia group was found to rise only after the 2^{nd} or 3^{rd} hour of post surgery. Our observation was found to be consistent with previous study, where it was reported that VAS pain score was significantly lower in the group spinal regional anaesthesia group compared to the general anaesthesia group. The patients received general anaesthesia also reported a significantly higher rate of unsatisfactory postoperative comfort than those receiving spinal regional anaesthesia. A nother previous study reported that spinal regional anaesthesia may be associated with less postoperative pain and postoperative nausea and vomiting compared with general anaesthesia .[9] Among patients with hypertension pain control is very necessary to lessen adverse autonomic reflexes, in which the administration of regional anaesthesia is found to be useful for perioperative analgesia. According to a previous study, it is preferred to avoid using regional anaesthesia among hypertension patients for most of the surgeries because of

Table 2: Table representing the median VAS pain score among the study subject post-surgery performed using either General or Regional anaesthesia.

Time post-Surgery	Median value of VAS pain score among General Anaesthesia patients	Median value of VAS pain score among Regional Anaesthesia patients	p-value
0 hrs.	1	1	**<0.05**
1 hrs.	3	1	**<0.05**
2 hrs.	5	1	**<0.05**
3 hrs.	6	1	**<0.05**
4 hrs.	3	3	**-**
5 hrs.	2	4	**-**
6 hrs.	1	6	-
7 hrs.	1	2	-
8 hrs.	1	1	-
9 hrs.	1	1	-
10 hrs.	1	1	-
11 hrs.	1	1	-
12 hrs.	1	1	-

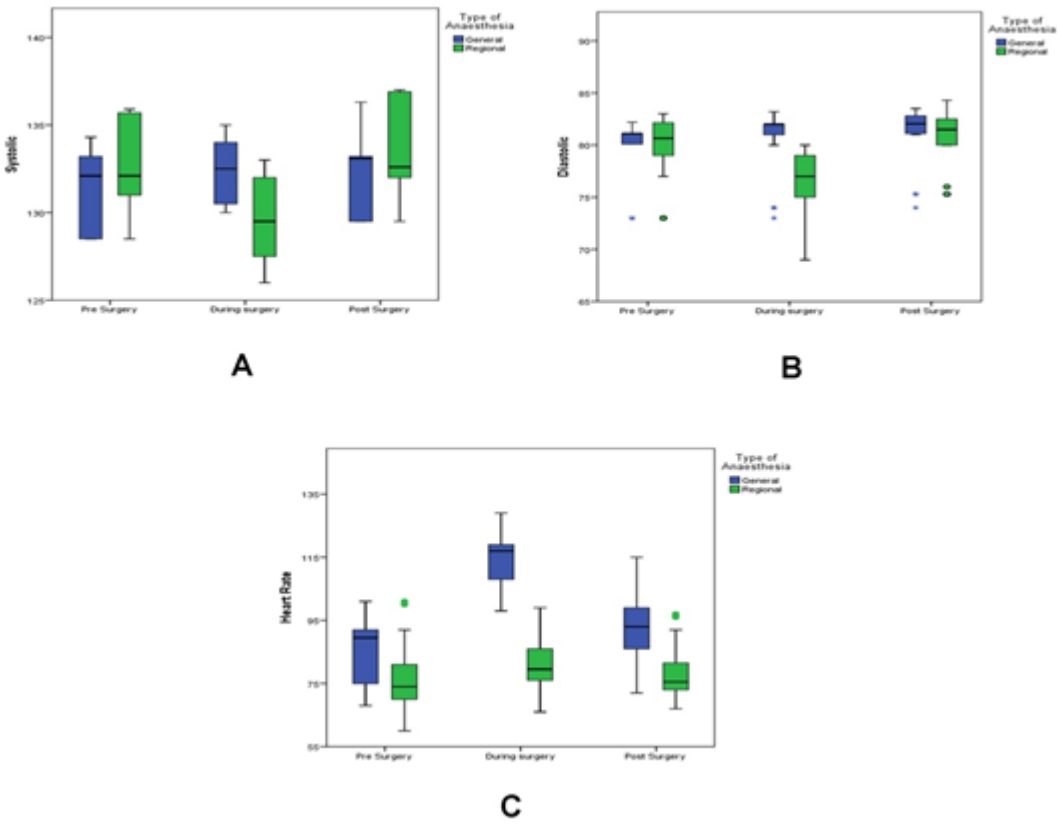

Fig. 1: Figure representing the **(A)** Systolic blood pressure, **(B)** Diastolic blood pressure, and **(C)** Heart rate among the study subjects pre, during and post-surgery performed using either general or regional anaesthesia.

the presence of intense sympatholytic effects.[10]

5. Conclusion

The study therefore provides evidence that there were increased intra-operative fluctuations and reduced post operative pain among the patients in the regional anaesthesia group in comparison to those under general anaesthesia group.

6. Source of Funding

None.

7. Conflict of interest

None.

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Author biography

M Vasantha Kumar Assistant Professor

B Ravi Professor

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