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Comparative study between general and regional anesthesia in hypertensive patients on post-operative pain using vas score

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Abstract
Hypertensive patients can develop wide swings in blood pressure intraoperatively, which increase the risk of postoperative Cardiac and renal complications such as myocardial ischemia, cerebrovascular accidents and acute renal failure. Poorly or untreated hypertension over a period of many years leads to endothelial injury and vascular remodeling that can promote both arteriosclerosis and atherosclerosis. Structural changes in arteriolar walls play a primary role in hemodynamic response to anesthesia and explain greater changes in systemic vascular resistance and arterial pressure in hypertensive patients than normotensive patients with similar degree of sympathetic blockade. Hence based on above findings the present study was planned for Comparative Assessment of General and Regional Anesthesia in Patients Suffering from Hypertension Undergoing Surgeries.
The present study was conducted in Department of Anesthesiology, Government Medical College, Bettiah, Bihar, India. Total 50 cases of the patients suffering from hypertension were enrolled in the present study. The 25 cases were enrolled in the Group I as patients undergoing the General Anesthesia. The remaining 25 cases were enrolled in Group II as Regional anesthetic cases. The post-operative VAS pain score among the patients of both the groups were retrieved for the study.
The data generated from the present study concludes 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.

Keywords: general anaesthesia, hypertension, regional anaesthesia, visual analog scale (vas) pain, systolic blood pressure, diastolic blood pressure, etc

Introduction
Hypertension (HTN or HT), also known as high blood pressure (HBP), is a long-term medical condition in which the blood pressure in the arteries is persistently elevated. High blood pressure typically does not cause symptoms. Long-term high blood pressure, however, is a major risk factor for coronary artery disease, stroke, heart failure, atrial fibrillation, peripheral arterial disease, vision loss, chronic kidney disease, and dementia.
High blood pressure is classified as either primary (essential) hypertension or secondary hypertension. About 90–95% of cases are primary, defined as high blood pressure due to nonspecific lifestyle and genetic factors. Lifestyle factors that increase the risk include excess salt in the diet, excess body weight, smoking, and alcohol use. The remaining 5–10% of cases are categorized as secondary high blood pressure, defined as high blood pressure due to an identifiable cause, such as chronic kidney disease, narrowing of the kidney arteries, an endocrine disorder, or the use of birth control pills [1].
Blood pressure is expressed by two measurements, the systolic and diastolic pressures, which are the maximum and minimum pressures, respectively. For most adults, normal blood pressure at rest is within the range of 100–130 millimeters mercury (mmHg) systolic and 60–80 mmHg diastolic. For most adults, high blood pressure is present if the resting blood pressure is persistently at or above 130/80 or 140/90 mmHg. Different numbers apply to children. Ambulatory blood pressure monitoring over a 24-hour period appears more accurate than office-based blood pressure measurement [2].
Lifestyle changes and medications can lower blood pressure and decrease the risk of health complications. Lifestyle changes include weight loss, physical exercise, decreased salt intake, reducing alcohol intake, and a healthy diet. If lifestyle changes are not sufficient then blood pressure medications are used. Up to three medications can control blood pressure in 90% of people. The treatment of moderately high arterial blood pressure (defined as >160/100 mmHg) with medications is associated with an improved life expectancy. The effect of treatment of blood pressure between 130/80 mmHg and 160/100 mmHg is less clear, with some reviews finding benefit and others finding unclear benefit. High blood pressure affects between 16 and 37% of the population globally. In 2010 hypertension was believed to have been a factor in 18% of all deaths (9.4 million globally) [3].
Hypertension is rarely accompanied by symptoms, and its identification is usually through screening, or when seeking healthcare for an unrelated problem. Some people with high blood pressure report headaches (particularly at the back of the head and in the morning), as well as lightheadedness, vertigo, tinnitus (buzzing or hissing in the ears), altered vision or fainting episodes. These symptoms, however, might be related to associated anxiety rather than the high blood pressure itself [4].
On physical examination, hypertension may be associated with the presence of changes in the optic fundus seen by ophthalmoscopy [22]. The severity of the changes typical of hypertensive retinopathy is graded from I to IV; grades I

and II may be difficult to differentiate. The severity of the retinopathy correlates roughly with the duration or the severity of the hypertension [5].

Hypertension with certain specific additional signs and symptoms may suggest secondary hypertension, i.e. hypertension due to an identifiable cause. For example, Cushing's syndrome frequently causes truncal obesity, glucose intolerance, moon face, a hump of fat behind the neck/shoulder (referred to as a buffalo hump), and purple abdominal stretch marks. Hyperthyroidism frequently causes weight loss with increased appetite, fast heart rate, bulging eyes, and tremor. Renal artery stenosis (RAS) may be associated with a localized abdominal bruit to the left or right of the midline (unilateral RAS), or in both locations (bilateral RAS). Coarctation of the aorta frequently causes a decreased blood pressure in the lower extremities relative to the arms, or delayed or absent femoral arterial pulses. Pheochromocytoma may cause abrupt ("paroxysmal") episodes of hypertension accompanied by headache, palpitations, pale appearance, and excessive sweating [6].

Severely elevated blood pressure (equal to or greater than a systolic 180 or diastolic of 110) is referred to as a hypertensive crisis. Hypertensive crisis is categorized as either hypertensive urgency or hypertensive emergency, according to the absence or presence of end organ damage, respectively. In hypertensive urgency, there is no evidence of end organ damage resulting from the elevated blood pressure. In these cases, oral medications are used to lower the BP gradually over 24 to 48 hours [7].

In hypertensive emergency, there is evidence of direct damage to one or more organs. The most affected organs include the brain, kidney, heart and lungs, producing symptoms which may include confusion, drowsiness, chest pain and breathlessness. In hypertensive emergency, the blood pressure must be reduced more rapidly to stop ongoing organ damage, however, there is a lack of randomized controlled trial evidence for this approach. Hypertension occurs in approximately 8–10% of pregnancies. Two blood pressure measurements six hours apart of greater than 140/90 mm Hg are diagnostic of hypertension in pregnancy. High blood pressure in pregnancy can be classified as pre-existing hypertension, gestational hypertension, or pre-eclampsia [8].

Pre-eclampsia is a serious condition of the second half of pregnancy and following delivery characterised by increased blood pressure and the presence of protein in the urine. It occurs in about 5% of pregnancies and is responsible for approximately 16% of all maternal deaths globally. Pre-eclampsia also doubles the risk of death of the baby around the time of birth. Usually there are no symptoms in pre-eclampsia and it is detected by routine screening. When symptoms of pre-eclampsia occur the most common are headache, visual disturbance (often "flashing lights"), vomiting, pain over the stomach, and swelling. Pre-eclampsia can occasionally progress to a life-threatening condition called eclampsia, which is a hypertensive emergency and has several serious complications including vision loss, brain swelling, seizures, kidney failure, pulmonary edema, and disseminated intravascular coagulation (a blood clotting disorder) [9]. In contrast, gestational hypertension is defined as new-onset hypertension during pregnancy without protein in the urine [

General anaesthesia or general anesthesia (see spelling differences) is a medically induced coma with loss of protective reflexes, resulting from the administration of one or more general anaesthetic agents. It is carried out to allow medical procedures that would otherwise be intolerably painful for the patient; or where the nature of the procedure itself precludes the patient being awake. A variety of drugs may be administered, with the overall aim of ensuring unconsciousness, amnesia, analgesia, loss of reflexes of the autonomic nervous system, and in some cases paralysis of skeletal muscles. The optimal combination of drugs for any given patient and procedure is typically selected by an anaesthetist, or another provider such as an operating department practitioner, anaesthetist practitioner, physician assistant or nurse anaesthetist (depending on local practice), in consultation with the patient and the surgeon, dentist, or other practitioner performing the operative procedure.

Spinal anaesthesia (or spinal anesthesia), also called spinal block, subarachnoid block, intradural block and intrathecal block, is a form of neuraxial regional anaesthesia involving the injection of a local anaesthetic or opioid into the subarachnoid space, generally through a fine needle, usually 9 cm (3.5 in) long. It is a safe and effective form of anesthesia performed by nurse anesthetists and anesthesiologists which can be used as an alternative to general anesthesia commonly in surgeries involving the lower extremities and surgeries below the umbilicus. The local anesthetic or opioid injected into the cerebrospinal fluid provides anesthesia, analgesia, and motor and sensory blockade. The tip of the spinal needle has a point or small bevel. Recently, pencil point needles have been made available (Whitacre, Sprotte, Gertie Marx and others) [10].

Complications of spinal anesthesia can result from the physiologic effects on the nervous system and can also be related to placement technique. Most of the common side effects are minor and are self-resolving or easily treatable while major complications can result in more serious and permanent neurological damage and rarely death. These symptoms can occur immediately after administration of the anesthetic or arise up to 48 hours after surgery.

Regardless of the anaesthetic agent (drug) used, the desired effect is to block the transmission of afferent nerve signals from peripheral nociceptors. Sensory signals from the site are blocked, thereby eliminating pain. The degree of neuronal blockade depends on the amount and concentration of local anaesthetic used and the properties of the axon. Thin unmyelinated C-fibres associated with pain are blocked first, while thick, heavily myelinated A-alpha motor neurons are blocked moderately. Heavily myelinated, small preganglionic sympathetic fibers are blocked last. The desired result is total numbness of the area. A pressure sensation is permissible and often occurs due to incomplete blockade of the thicker A-beta mechanoreceptors. This allows surgical procedures to be performed with no painful sensation to the person undergoing the procedure. Some sedation is sometimes provided to help the patient relax and pass the time during the procedure, but with a successful spinal anaesthetic the surgery can be performed with the patient wide awake.

Hypertensive patients can develop wide swings in blood pressure intraoperatively, which increase the risk of postoperative Cardiac and renal complications such as myocardial ischemia, cerebrovascular accidents and acute renal failure. Poorly or untreated hypertension over a period of many years leads to endothelial injury and vascular remodeling that can promote both arteriosclerosis and

atherosclerosis. Structural changes in arteriolar walls play a primary role in hemodynamic response to anesthesia and explain greater changes in systemic vascular resistance and arterial pressure in hypertensive patients than normotensive patients with similar degree of sympathetic blockade [11].

Hence based on above findings the present study was planned for Comparative Assessment of General and Regional Anesthesia in Patients Suffered from Hypertension Undergoing Surgeries.

Methodology

The present study was conducted in Department of Anesthesiology, Government Medical College, Bettiah, Bihar, India. Total 50 cases of the patients suffering from hypertension were enrolled in the present study. The 25 cases were enrolled in the Group I as patients undergoing the General Anesthesia. The remaining 25 cases were enrolled in Group II as Regional anesthetic cases. The post-operative VAS pain score among the patients of both the groups were retrieved for the study.

Patients in group l were induced with Fentanyl 2µg kg-1 and propofol 2.5 mg kg-1. Anesthesia was maintained with 0.7-1.5% sevoflurane and atracurium after orotracheal intubation by atracurium 0.5 mg kg-1.

In group ll 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 [12].

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.

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Following was the inclusion and exclusion criteria for the present study.

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.

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.

Results & Discussion

A dilemma always existed to which antihypertensive agent has to be stopped before the surgery and which can be continued peri-operatively. Studies have been done to determine whether it is beneficial to continue calcium channel blockers and beta-blockers in patients undergoing general anesthesia. There is inadequate evidence on the effects of calcium channel blockers and beta-blockers on blood pressure in hypertensive patients undergoing spinal anesthesia.

Initiation well before a planned procedure with careful titration peri-operatively to achieve adequate heart rate control while avoiding frank decrease in heart rate and hypotension is also suggested. So this is an effort to compare the incidence of hypotension and bradycardia in hypertensive patients on calcium channel blockers and beta-blockers with comparing the incidence of hypotension and bradycardia in normotensive patients after spinal anesthesia.

Patients with arterial hypertension generally exhibit exaggerated hypotension after induction of anaesthesia and excessive pressor response to stresses such as laryngoscopy and intubation, surgical incision and extubation. They are also more prone to hypertensive responses postoperatively (bladder distension, inadequate pain relief). Hypertensive episodes are often associated with arrhythmias and/or myocardial ischaemia. Hypo- and hypertension can cause cerebrovascular accidents. At least in theory, long-term treatment of hypertension returns vascular reactivity to more normal levels thereby improving cardiovascular stability. Effective long-term treatment of hypertension also brings cerebral autoregulation to more normal levels.

Intraoperative haemodynamic abnormalities are associated with peri- and postoperative cardiovascular events (cardiac death, myocardial infarction or stroke). Indeed, bradycardia, tachycardia, hypotension and hypertension (including pulmonary hypertension) have been correlated significantly with cardiovascular complications of coronary bypass surgery. As patients with uncontrolled hypertension are very likely to develop major haemodynamic abnormalities, these data suggest indirectly that preoperative treatment of hypertension should be beneficial [13].

Table 1: Basic Characteristics

Groups	Group I	Group II
Administration of	**General Anaesthesia**	**Regional Anaesthesia**
No. of Cases	25	25
Age (years)	43 – 64	41 – 63
Weight (kg)	74 – 86	71 – 83
Sex		
Males	5	12
Females	20	13
BMI kg/cm2	21.4 – 25.7	22.1 – 25.9
Alcohol Intake		
Yes	3	10
No	22	15
Smoking		
Yes	5	11
No	20	14

Table 2: Mean VAS Score

Groups	Group I	Group II
Administration of	**General Anaesthesia**	**Regional Anaesthesia**
No. of Cases	25	25
Time		
0 hr	1	1
1 hr	3	1
2 hr	4	1
3 hr	5	1
4 hr	3	2
5 hr	2	3
6 hr	1	4
8 hr	1	2
12 hr	1	1

A meta-analysis of 30 observational studies and extensive literature review by Howell *et al*. reported an odds ratio of 1.35 (95% CI 1.17-1.56) times higher perioperative cardiac complications in hypertensive patients compared to normotensives [14]. Prys-Roberts *et al*. and Goldman and Caldera *et al*. have demonstrated an increase in arrhythmias

and postoperative myocardial ischemia in hypertensive patients in the early 1970s [17, 18]. Aronson and colleagues have demonstrated a 30% increase in adverse outcome risk in patients with isolated systolic hypertension undergoing cardiac surgery [15]. Fontes *et al*. demonstrated increased pulse pressure as an independent risk factor associated with increased incidence of postoperative neurological complications and cardiac failure [16].

Haemodynamic swings are more common and exaggerated in hypertensive patients as compared to normotensives. Rightward shift of auto-regulation in hypertensive patients means that organ perfusion occurs at higher mean arterial pressures as compared to normotensives, and thus, intraoperative hypotension leads to hypoperfusion and target organ damage during hypotension [19].

Intra- and post-operative monitoring are for the detection and treatment of haemodynamic swings in hypertensive patients and to maintain the cardiac output. Invasive arterial blood pressure is usually not required unless the patient is undergoing a high-risk surgery or has a hypertensive crisis which requires treatment with vasoactive drugs. Similarly, central venous monitoring is usually reserved for cases with expected significant fluid shifts or if inotropic support is anticipated and/or required. Pulse contour algorithms-based cardiac output monitoring may not be reliable in hypertensive patients as these algorithms are based on a normal arterial compliance. Dynamic indices of preload such as stroke volume and pulse pressure variation have not been validated in hypertensive individuals [9].

A retrospective study has found that intraoperative hypotension, but not hypertension, is associated with a higher mortality in hypertensive patients undergoing non-cardiac surgery [20]. Even short periods of hypotension (mean arterial pressure <55 mmHg) have been associated with myocardial and renal injury after non-cardiac surgery [21]. This is not to imply that hypertensive surges should not be treated as Charlson *et al*., [22] have shown that hypertensive patients and diabetic patients who had a cumulative 1 hour decrease in mean arterial pressure >20 mmHg or <1 hour decrease of >20 mmHg and >15 minutes increase of >20 mmHg were at greatest risk for post-operative adverse events.

No anaesthetic is superior to another though sevoflurane has been reported to confer cardioprotection and better haemodynamic stability as compared to propofol. It is important to maintain an adequate depth of anaesthesia with monitoring such as bispectral index or end-tidal minimum anaesthetic concentration that allows appropriate titration of anaesthetic agents. Similarly, for spinal/epidural anaesthesia, one must avoid precipitous and sudden fall of blood pressure. In general, since the lower limit of safe blood pressure in hypertensive patients is unknown, it is advisable to keep the blood pressure within 20%–30% of baseline values [23].

Although not specifically evaluated in hypertensive patients, where possible, supraglottic airway devices such as laryngeal mask airway and its prototypes may be used because of less haemodynamic perturbations compared to laryngoscopy and intubation. Hypertensive surges more >20% from baseline are associated with adverse outcome [15] and should be urgently treated with the goal of blood pressure reduction. Initial management should be to increase the depth of anaesthesia and give additional analgesics; however, if this fails to resolve the hypertensive surges, then drugs that modify the vascular system may be used to reduce the blood pressure [Table 3] [36, 38], with the goal being not >20%–25% reduction within the first 30–60 minutes and gradual return to baseline over the next 24–48 hours. Metoprolol has been used in hypertension due to acute coronary syndromes, but use in other settings is not well documented. Nifedipine can cause uncontrolled hypotension and reflex tachycardia and is not indicated in most hypertensive crises.

Conclusion

The data generated from the present study concludes 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. Hypertension is a modifiable risk factor for cardiovascular diseases and outcomes, and the same is true of the patient presenting for surgery. Greater understanding of the disease process and the fact that anaesthesiologists have better drugs and monitors at their disposal to treat and evaluate the effects of such treatment has pushed the envelope continuously as to what constitutes a blood pressure which warrants cancellation of elective non-cardiac cases.

References

1. Poulter NR, Prabhakaran D, Caulfield M. "Hypertension". Lancet. 2015; 386(9995):801-12. Doi: 10.1016/s0140-6736(14)61468-9. PMID 25832858.
2. Naish J, Court DS. Medical sciences (2 ed.), 2014, p. 562. ISBN 9780702052491.
3. Campbell NR, Lackland DT, Lisheng L, Niebylski ML, Nilsson PM, Zhang XH. "Using the Global Burden of Disease study to assist development of nation-specific fact sheets to promote prevention and control of hypertension and reduction in dietary salt: a resource from the World Hypertension League". Journal of Clinical Hypertension. 2015; 17(3):165-7. doi:10.1111/jch.12479. PMID 25644474.
4. Marshall IJ, Wolfe CD, McKevitt C. "Lay perspectives on hypertension and drug adherence: systematic review of qualitative research". BMJ, 2012; 345:e3953. doi:10.1136/bmj.e3953. PMC 3392078. PMID 22777025.
5. Fisher ND, Williams GH. "Hypertensive vascular disease". In Kasper DL, Braunwald E, Fauci AS, *et al*. (eds.). Harrison's Principles of Internal Medicine (16th ed.). New York, NY: McGraw-Hill, 2005, pp. 1463-81. ISBN 978-0-07-139140-5.
6. O'Brien E, Beevers DG, Lip GY. ABC of hypertension. London: BMJ Books, 2007. ISBN 978-1-4051-3061-5.
7. Marik PE, Varon J. "Hypertensive crises: challenges and management". Chest. 2007; 131(6):1949-62. doi:10.1378/chest.06-2490. PMID 17565029. Archived from the original on 4 December 2012.
8. "Management of hypertension in pregnant and postpartum women". Www. Uptodate.com. Archived from the original on, 2016. Retrieved 30 July 2015.
9. Gibson P. "Hypertension and Pregnancy". eMedicine Obstetrics and Gynecology. Medscape. Archived from the original on, 2009. Retrieved 16 June 2009.
10. Serpell MG, Fettes PDW, Wildsmith JAW. "Pencil point spinal needles and neurological damage". British Journal of Anaesthesia. 2002; 89(5):800-801.

doi:10.1093/bja/89.5.800.
11. Visnja Vesek Adam, Elvira Grizel J Stojcic, Viviana Mrsic, Katarina Sakic, Branka Maldini, Ana Maric. Bilateral Vs. unilateral spinal anesthesia for varicose vein surgery in hypertensive patients. Periodicum Biologorum, 2011; 113:349-353.
12. Acikel A, Ozturk T, Goker A, Hayran GG, Keles GT. Comparison of Patient Satisfaction Between General and Spinal Anaesthesia in Emergency Caesarean Deliveries. Turk J Anaesthesiol Reanim. 2017; 45(1):41-46.
13. https://academic.oup.com/bjaed/article/4/5/139/291003
14. Aronson S, Boisvert D, Lapp W. Isolated systolic hypertension is associated with adverse outcomes from coronary artery bypass grafting surgery. Anaesth Analog, 2002; 94:1079-84.
15. Fontes ML, Aronson S, Mathew JP, *et al*. Pulse pressure and risk of adverse outcome in coronary bypass surgery. Anesth Analg, 2008; 107:1122-29.
16. Viljoen JF, Estafanous FG, Tarazi RC. Acute hypertension immediately after coronary.
17. Goldman L, Caldera DL. Risks of general anesthesia and elective operation in the hypertensive patient. Anesthesiology, 1979; 50:285-92.
18. Khuri SF, Daley J, Henderson W, *et al*. The National Veterans Administration Surgical Risk Study: risk adjustment for the comparative assessment of the quality of surgical care. J Am Coll Surg, 1995; 180:519-31.
19. Lapage KG, Wouters PF. The patient with hypertension undergoing surgery. Curr Opin Anaesthesiol, 2016; 29:397-402.
20. Monk TG, Bronsert MR, Henderson WG, Mangione MP, Sum-Ping ST, Bentt DR, *et al*. Association between intraoperative hypotension and hypertension and 30-day postoperative mortality in noncardiac surgery. Anesthesiology, 2015; 123:307-19. 34.
21. Walsh M, Devereaux PJ, Garg AX, Kurz A, Turan A, Rodseth RN, *et al*. Relationship between intraoperative mean arterial pressure and clinical outcomes after non-cardiac surgery: Toward an empirical definition of hypotension. Anesthesiology 2013; 119:507-15.
22. Charlson ME, MacKenzie CR, Gold JP, Ales KL, Topkins M, Shires GT, *et al*. Intraoperative blood pressure. What patterns identify patients at risk for postoperative complications? Ann Surg, 1990; 212:567-80.
23. Kristensen SD, Knuuti J, Saraste A, Anker S, Bøtker HE, De Hert S, *et al*. 2014 ESC/ESA Guidelines on non-cardiac surgery: Cardiovascular assessment and management. The Joint Task Force on non-cardiac surgery: Cardiovascular assessment and management of the European Society of Cardiology (ESC) and the European Society of Anaesthesiology (ESA). Eur J Anaesthesiol, 2014; 31:517-73.