УДК 616.12-008.331:[617.3-089.5-032:611.829]

J. Sheron D. K. Silva

Scientific Guide: Assistant of the department T. I. Gorbachova

Educational Establishment
«Gomel State Medical University»
Gomel, Republic of Belarus

CHANGES IN BLOOD PRESSURE IN SPINAL ANESTHESIA INDUCED ORTHOPEDIC PATIENTS

Introduction

Hypotension is a common side effect of spinal anesthesia (SA) and it occurs in 16–33 % of cases [1]. It is caused by a decrease in systemic vascular resistance (SVR) and/or cardiac output (CO) [2]. Although many studies have been conducted on the effects of SA on blood pressure (BP), studies focusing on orthopedic patients undergoing surgery are not readily available. This study investigated the hemodynamic effect of SA in orthopedic patients age 18 to 65 by studying the effect intrathecal bupivacaine and its effect on BP changing patterns. As spinal anesthesia is commonly used in many different types of surgeries in all age ranges including pregnancy and old age it is important to fully understand its main complication.

Goal

This study aims on understanding and comparing the patterns of BP in orthopedic patients during SA and to help predict the loss of BP.

Material and methods of research

This study was performed in the Gomel regional clinical hospital orthopedics department. Permission was granted by the Gomel state medical university and the relating hospital to use the case histories of the patients. The need for informed consent was waived because of the purely observational nature of the study. 50 patients aged 18 to 65 years were used for this study who had procedures under SA. The gathered data was from the month of January 2023. Patients with cardiac arrhythmia, digital ischemia, allergic reactions to opiates or local anesthetics, perioperative blood loss that exceeded 1 L, and New York Heart Association class III–IV congestive heart failure were excluded from the study. As the response to SA is exaggerated in the elderly where a negative influence on a relatively higher resting sympathetic tone and decreased baroreceptor activity, patients over 65 were not chosen for this study. The patients received bupivacaine 0.5 % and doses range from 2.8 to 3.0 ml. The dose of bupivacaine, was based upon the clinical decision of the attending anesthesiologist based on patient characteristics and personal preference, and there was no randomization. Blood pressure was monitored every 5 minutes, starting from 20 minutes before giving SA and until the end of the operation. A decrease of > 25 % in mean arterial pressure (MAP) or systolic arterial pressure (SAP) was considered clinically significant. Patient characteristics are expressed as mean and range, and hemodynamic data as mean.

The results of the research and their discussion

Fifty patients were included in the study. In all patients a good quality reading of BP was obtained. This resulted in 50 patients with a complete data set. Out of the 50 patients the majority of patients (33) underwent knee surgery, either elective replacement or repair after a fracture. Patients received a dose of bupivacaine ranging from 2.8-3.0ml, 34 patients were males and 16 females and the assumption was made that the range of the dose of bupivacaine did not have a serious effect on BP. Data collection ended at the end of surgery with a mean duration

of 60 minutes. Hypotension was defined as a decrease in mean arterial pressure (MAP) > 25 % from baseline value or systolic arterial pressure (SAP) < 100 mmHg. The course of changes in BP after initiation of SA is depicted in figure 1.

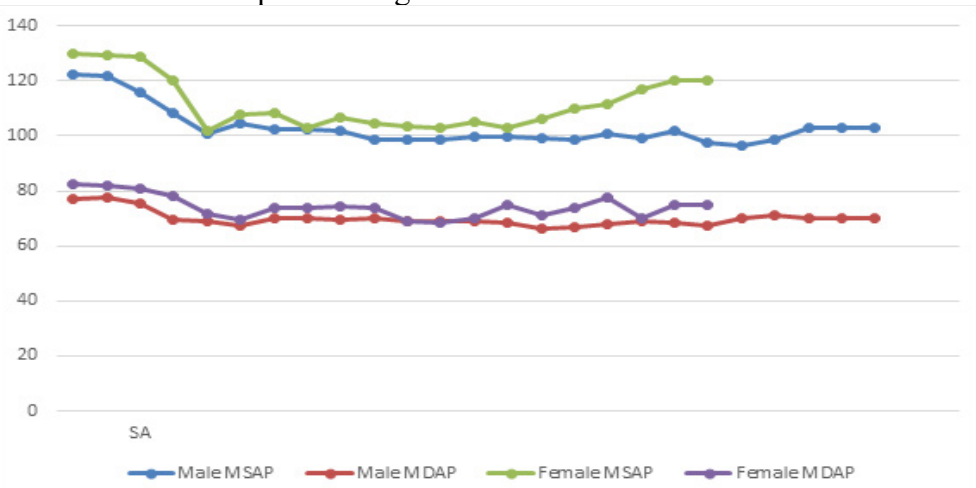

Figure 1 – Change of BP before and after SA

There is a considerable drop of BP after the onset of SA within the first 30 minutes and is seen in table 1. Although even without fluid correction BP came back up in most of the cases without any further complications. Risk factors for early hypotension and bradycardia after spinal anesthesia in nonobstetrical populations include a block height ≥ T5, age ≥ 40 years, female gender, weight, height, body mass index > 30 kg/m^2, ASA physical status II and above, history of hypertension, history of antihypertensive therapy, in case of ongoing beta-blockers therapy, diabetes mellitus, anemia, lower baseline heart rate < 60 beats/minute, baseline systolic blood pressure (SBP) < 100 mmHg, and spinal puncture above the level of L3 > L4 [3].

Table 1 – Decrease of BP at 30 minutes after onset of SA

BP	%/min change	Male	Female
Systolic blood pressure	Percent change at 10 minutes	5.31	0.58
	Percent change at 20 minutes	11.74	7.31
	Percent change at 30 minutes	17.67	21.41
Diastolic blood pressure	Percent change at 10 minutes	2.55	1.79
	Percent change at 20 minutes	10.35	5.01
	Percent change at 30 minutes	12.95	17.37

At the end of 30minutes loss of BP is seen 3.74 % higher in women compared to men. Several mechanisms are proposed to be the cause of the hypotensive response after SA. First, sympathetic blockage from T1 to L2 with subsequent arteriolar vasodilation leads to a reduction in SVR, contributing to intraoperative hypotension. Second, a decrease in venous vasomotor tone increases venous pooling and consequently reduces venous return, Finally, the physiological hemodynamic reserve capacity decreases with age, and limited cardiovascular compensation mechanisms contribute to a decline in CO and blood pressure in response to SA[4]. Complications of hypotension in SA may lead to unconsciousness and apnea. Furthermore, spinal anesthesia-induced hypotension in obstetrics leads to maternal hypotension, which may compromise uterine blood flow and fetal circulation, and thus cause fetal hypoxia, bradycardia and acidosis. To avoid this, as a high spinal block would surely have an effect on BP, SA must be performed at L2-3 or L3-4 and never at a higher interspace. We recommend necessary

precautions to be taken while administering spinal anesthesia in patients especially above the age of 40 as the higher incidence of hypotension can lead to deleterious cardiovascular effects, other end organ damage, and even sudden death.

Conclusion

1. Hypotension occurring during spinal anesthesia for orthopedic surgeries is the most common side effect of this type of anesthesia. This may require specific prevention and treatment measures which purely depend on the individual.

2. Female gender is a high risk factor for early hypertension within the first 30 minutes after SA.

3. Spinal anesthesia induced hypotension in orthopedic patients follows classic patterns of blood pressure.

4. There was no statistically significant difference in the incidence of hypotension occurrence between orthopedic surgeries as to other surgeries such as vascular surgeries.

LITERATURE

1.Carpenter RL, Caplan RA, Brown DL, Stephenson C, Wu R. Incidence and risk factors for side effects of spinal anesthesia. Anesthesiology. 1992 Jun;76(6):906-16. doi: 10.1097/00000542-199206000-00006. PMID: 1599111.

2.Hofhuizen C, Lemson J, Snoeck M, Scheffer GJ. Spinal anesthesia-induced hypotension is caused by a decrease in stroke volume in elderly patients. Local Reg Anesth. 2019 Mar 4;12:19-26. doi: 10.2147/LRA.S193925. PMID: 30881108; PMCID: PMC6404676.

3.JB Whiteside, FRCA, JAW Wildsmith, MD FRCA, Spinal anaesthesia: an update, Continuing Education in Anaesthesia Critical Care & Pain, Volume 5, Issue 2, April 2005, Pages 37–40, https://doi.org/10.1093/bjaceaccp/mki017.

4.Ogawa T, Spina RJ, Martin WH 3rd, Kohrt WM, Schechtman KB, Holloszy JO, Ehsani AA. Effects of aging, sex, and physical training on cardiovascular responses to exercise. Circulation. 1992 Aug;86(2):494-503. doi: 10.1161/01.cir.86.2.494. PMID: 1638717.

УДК 616.381-089.168.1:[616.859.1+616.33-008.3]-08

Rajkumar Nandhini

Scientific supervisor: PhD, associate professor S. V. Konkov;
assistant of the department T. I. Gorbacheva

Educational Establishment
«Gomel State Medical University»
Gomel, Republic of Belarus

EARLY POST OPERATIVE NAUSEA AND VOMITING IN PATIENT WITH SURGICAL INTERVENTIONS IN ABDOMEN REGION GUIDED WITH PROPOFOL

Introduction

Nausea and emetic episodes still persist as the most Common complaints following anaesthesia and surgery. Many adults find postoperative nausea and vomiting (PONV) even More distressing than postoperative pain. The overall incidence of postoperative nausea and vomiting in the recovery room is around 10 % but ranges from 20 to 30 % during the first 24 h after surgery according to recent reports. Despite the advances in modern anesthetic practice and surgical techniques, there is still room for improvement in identifying the causative factors as well as in the prophylaxis and treatment of this problem [1]. Studies in children and adults suggest that postoperative emetic sequalae occur less frequently with propofol [2]. The evidence is that propofol has only a minimal effect on vomiting in paediatric strabismus surgery, a clinical situation with a particularly high risk of PONV. Some studies shows the evidence that propofol, when used for induction or maintenance of anaesthesia, decreases the incidence of PONV compared with other anaesthetic techniques. Propofol is thought to be antiemetic and therefore