

Review Article

Anesthesia Management in Hypertensive Patients

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OPEN ACCESS**Abstract**

Hypertension is a serious risk factor for cardiovascular morbidity and mortality in patients scheduled for elective surgery.

Although patients usually know their comorbidities when they apply for preoperative evaluation, the number of hypertensive patients without follow-up is too high to be ignored. Therefore, preoperative evaluation is very important. Hypertensive patients are treated with calcium channel blockers, ACE, ARB, diuretics and beta-blockers. While some of the patients are under control with a single drug, many of them are treated with combinations of antihypertensive drugs. Knowing the antihypertensives used by the patients is a guide in perioperative management. Since sudden hypotension in a hypertensive patient may affect vital organ perfusion, perioperative blood pressure values should be kept within 20% of preoperative values in order to prevent end-organ hypoperfusion. In the perioperative period, sudden blood pressure lability can lead to hypoperfusion and end-organ damage. Therefore, the cause of perioperative cardiac complications is related to perioperative hemodynamic instability rather than perioperatively developing hypertension.

In conclusion, preoperative diagnosis of hypertensive patients and detailed preoperative evaluation of diagnosed patients are very important in terms of preventing complications that may develop perioperative and postoperatively.

Keywords

- Hypertension;
- General anesthesia

INTRODUCTION

Hypertension is a systolic blood pressure above 140 mmHg or a diastolic blood pressure above 90 mmHg [1]. Essential hypertension includes 95% of all cases, and the remaining 5% is due to renovascular diseases, pheochromocytoma, aldosteronism, or genetic causes [2,3]. Stage 1 hypertension systolic blood pressure between 140-159 mmHg and/or diastolic blood pressure between 90-99 mmHg, stage 2 hypertension systolic blood pressure between 160-179 mmHg and/or 100-109 mmHg, stage 3 hypertension ≥ 180 mmHg and /or diastolic blood pressure is defined as ≥ 110 mmHg [4]. Hypertension is a preventable risk factor for premature deaths, which is known to affect 1.13 billion people worldwide [5]. It is responsible for 9 million deaths annually globally. More than 60% of the population over the age of 60 has HT, and only 20% of the patients are treated and under control [6,7]. It also causes a serious financial burden. It is thought that the economic burden will gradually increase in the coming years [8].

Hypertension is a serious risk factor for cardiovascular morbidity and mortality in patients scheduled for elective surgery. In the study conducted by Sprague in 1929, while the mortality of the presence of hypertension in the preoperative period was 30%, the discovery of antihypertensives and the increasing use

of them did not prevent it from being a serious cause of mortality, although it reduced mortality. In a study conducted in 2016, it was stated that essential hypertension is the most common chronic pathology in patients who are scheduled for surgery for any reason [9].

This systematic review, it is aimed to emphasize the importance of the presence of hypertension in the preoperative and perioperative periods in terms of cardiovascular risks and anesthesia management.

Pathophysiology of Hypertension

Hypertension includes sympathetic nervous system hyperactivation and activation of the immune and hormonal systems. However, its pathophysiology is not fully understood. The mechanism is associated with increased vascular resistance and endothelial dysfunction. Cardiovascular effects that may occur as a result of vasoreactivity should be considered by the anesthetist. Cardiovascular system regulation depends on three systems. These; the sympathetic nervous system, renin angiotensin aldosterone system (RAAS) and vasopressin.

During general anesthesia, the sympathetic nervous system is suppressed and the RAAS is activated. Suppression of the sympathetic system decreases vascular tone, increases the

capacitance and leads to hypotension. Meanwhile, angiotensin II, which is formed by the activation of the RAAS system, plays a role in preventing the formation of hypotension. The use of angiotensin 2 receptor blockers in hypertensive patients provides the prevention of hypertension during surgery. In a study conducted by Carp H. et al., it was observed that the plasma vasopressin level increased in patients who underwent epidural anesthesia and whose RAAS activation was blocked with enalaprilat [10]. Vasopressin increases the venous return by mesenteric vasoconstriction and thus compensates for inhibition of the sympathetic system and RAAS.

Cardiac adaptation mechanisms and effects in the hypertensive patient

Chronic arterial vasoconstriction and an increase in vascular resistance are caused by the activation of baroreflex mechanisms at higher blood pressure levels. Therefore, while hypertensive patients are highly sensitive to blood pressure drops, they tolerate hypertensive episodes well. The reduction in organ blood flow begins at higher blood pressure levels in hypertensive patients than in normotensive patients. This is a situation that jeopardizes vital organ perfusions [11,12].

Another important consequence of chronic hypertension in hypertensive patients is left ventricular hypertrophy caused by high left ventricular afterload [13]. The most common cause of heart failure with preserved ejection fraction is hypertension. It is more common in older women and women with hypertension than men [14]. It is more sensitive to the decrease in venous return and preload due to hypertrophy compared to normotensive or new-onset hypertensive patients. The hypertrophic heart needs more oxygen. Therefore, hypotension and tachycardia that may occur may cause myocardial ischemia, even if coronary stenosis is not present, it may lead to endocardial ischemia. The resulting diastolic heart failure is responsible for the severely reduced effort capacity. It is associated with increased BNP and norepinephrine levels [15]. Since conditions that cause tachycardia, such as surgical stress and pain, decrease diastolic filling time, left-sided pressures increase [16].

Preoperative evaluation

Although patients usually know their comorbidities when they apply for preoperative evaluation, the number of hypertensive patients without follow-up is too high to be ignored. Therefore, blood pressure measurement is important in preoperative evaluation. The focus should be on symptoms associated with end-organ damage.

Preoperative use of antihypertensives

Hypertensive patients are treated with calcium channel blockers, ACE inhibitors, ARB, diuretics and beta-blockers. While some of the patients are under control with a single drug, many of them are treated with combinations of antihypertensive drugs. There is some disagreement regarding the use of antihypertensive drugs on the day of surgery. Generally, patients are told to take their antihypertensive medication with a sip of water.

In patients without symptoms of congestive heart failure (CHF), discontinuing diuretics is the accepted idea. However, it is decided whether a reduced or usual dose diuretic should be given in patients with CHF by preoperative examination, blood pressure measurement and lung auscultation.

Patients receiving chronic beta-blocker therapy should take their medications on the day of surgery. However, although beta-blocker therapy started in the short term before surgery has been shown to reduce the incidence of cardiac events, it should not be started just before surgery because it increases the risk of bradycardia, stroke, and death. Beta-blockers should be started at least 1 day before or ideally at least 1 week before surgery, never on the morning of surgery [17,18]. In addition, it has been reported that hypotension occurs during the induction of anesthesia in patients with hypertension who regularly use beta-blockers [19]. A recent study suggests that the decision to discontinue or continue preoperative beta-blockers should be made based on the revised cardiac risk index score and that this decision should be made in consultation with the attending physician [20].

It is known that regular use of ACEIs and ARBs with long half-lives increases the risk of hypotension during anesthesia induction. It should be decided whether to continue ARBs and ACEIs before surgery by evaluating the pros and cons [21]. In a study, it was shown that the use of ACEI and ARB may increase the risk of perioperative hypotension, stroke, myocardial damage and death. Therefore, some clinicians recommend discontinuation of ACEI and ARB in the preoperative period [22,23]. However, discussions about whether to discontinue ACEIs and ARBs in the preoperative period continue [4,24].

Since calcium channel blockers are well tolerated perioperatively and do not produce an exaggerated hypotensive response during anesthesia induction, they can be taken on the morning of surgery [25]. In a study by Tokoyaku Hojo et al., it was stated that regular use of calcium channel blockers in hypertensive patients using medication reduces the risk of hypotension during anesthesia induction [27]. The data obtained in the studies show that there is a decrease in the incidence of myocardial ischemia and supraventricular tachycardia, especially with the use of diltiazem [26].

Perioperative management

Perioperative hypertension is observed in 25% of hypertensive patients undergoing surgery [21]. The presence of hypertension before surgery increases the risk of death by 3.8 times in patients with known coronary artery disease or who are at high risk in this respect and undergoing non-cardiac surgery [22].

Since sudden hypotension in a hypertensive patient may affect vital organ perfusion, perioperative blood pressure values should be kept within 20% of preoperative values to prevent end-organ hypoperfusion [1,27]. It is important to know the preoperative blood pressure of chronic hypertensive patients.

While these patients can tolerate high blood pressure well, they cannot tolerate hypotension as well as normotensive individuals. Although there are not enough studies showing the effect of preoperative blood pressure level on mortality and morbidity, many clinicians prefer to postpone the operation in patients with systolic blood pressure above 180 mmHg and/or diastolic blood pressure above 110 mmHg, because preoperative blood pressure rises suddenly in the intraoperative period. It can cause hypoperfusion and end-organ damage due to blood pressure lability. In the preoperative evaluation of hypertension, it is important to know whether the patient is followed up for hypertension. While it is not considered necessary to postpone surgery in hypertensive patients unless there is target organ damage, it is recommended to postpone surgery in patients with uncontrolled hypertension with diastolic blood pressure above 110 mmHg and especially accompanied by comorbidities [7]. Studies have shown that it was not necessary to rapidly lower blood pressure or delay surgery in moderately hypertensive patients (<180/110 mmHg) [28]. When the preoperative blood pressure is >180/110 mmHg, surgery should be performed by maintaining the optimal level with preoperative antihypertensive drugs.

Studies have shown that peroperative cardiac complications are associated with peroperative hemodynamic instability rather than peroperative hypertension.

While it is recommended to postpone surgery in stage 3 hypertensive patients and in cases where end-organ damage is observed, in moderately hypertensive patients without end-organ damage or comorbid disease, such as stage 1 and 2, delaying surgery prolongs the hospital stay and causes serious disruptions in healthcare services worldwide. causes.

In emergency surgeries, preoperative blood pressure elevations, perioperative hypertension and hypotension rates should be evaluated in a way that would make the surgery safe and blood pressure regulation should be provided.

CONCLUSION

It is known that hypertension patients may develop hypertensive crisis during anesthesia, hypotension attacks may be observed, and end-organ damage that may have developed in the preoperative period may increase mortality and morbidity in the peroperative process. For this reason, it is necessary to evaluate the patients, to determine their comorbidities, and to evaluate the drugs they use. Although there is still debate about whether the antihypertensives used by the patients preoperatively should be discontinued in the pre-anesthesia period or when the last dose will be given, it is not recommended to discontinue long-term antihypertensives in recent studies.

In conclusion, preoperative diagnosis of hypertensive patients and detailed preoperative evaluation of diagnosed patients are very important in terms of preventing complications that may develop peroperative and postoperatively.

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