Management of hypertension in patients undergoing surgery

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Hypertension is a major risk factor for causing coronary events, stroke, heart failure, peripheral arterial disease, dissecting aneurysm, chronic kidney disease, and mortality (1-4). Hypertension in the perioperative and postoperative period increases cardiovascular events, cerebrovascular events, bleeding, and mortality and should be controlled prior to major elective noncardiac surgery and cardiac surgery (5-7). The higher the blood pressure, the greater the risk. A systematic review and meta-analysis of 30 observational studies found that hypertension increased perioperative cardiovascular complications by 35% (8). As much as 25% of patients having major non-cardiac surgery have perioperative hypertension (9). As much as 80% of patients having cardiac surgery have perioperative hypertension (6,7). Hypertensive comorbidities associated with adverse perioperative outcomes include occult coronary artery disease (Q waves on the electrocardiogram), heart failure, left ventricular hypertrophy, serum creatinine higher than 2.0 mg/dL, and cerebrovascular disease (10).

Hypertension is the commonest avoidable medical reason for postponing surgery (9). However, there are no universally accepted guidelines stating the level of blood pressure at which elective surgery should be cancelled (9). Increased complications including myocardial infarction, myocardial ischemia, dysrhythmias, cerebrovascular events, and renal failure have been reported if the preoperative diastolic blood pressure is 110 mmHg or higher (11). It has been recommended to cancel elective surgery if the systolic blood pressure is 180 mmHg or higher or if the diastolic blood pressure is 110 mmHg or higher (8,10).

The frequency of acute postoperative hypertension has been reported to be between 9% to 64% in patients undergoing carotid endarterectomy, 22% to 54% in patients undergoing cardiac surgery, 20% in patients undergoing elective noncardiac surgery, 33% to 75% in patients undergoing abdominal aortic surgery, and 57% to 91% in patients undergoing intracranial neurosurgery (7). Preoperative hypertension is the most determinant in the development of postoperative hypertension in patients following carotid endarterectomy (12). In a study of 253 carotid endarterectomies, postoperative hypertension was associated with an increase in neurologic morbidity and mortality (12). In a study of 2,069 patients undergoing elective coronary artery bypass grafting surgery, 29.6% had preoperative isolated systolic hypertension (13). The patients with preoperative isolated systolic hypertension had a 40% increase in perioperative cardiovascular events (13).

Drugs used for the treatment of hypertension depends on associated comorbidities (1-4). For example, patients with coronary artery disease should be treated with beta blockers and angiotensin converting enzyme inhibitors or angiotensin receptor blockers plus thiazide-or thiazide-like diuretics or calcium channel blockers if additional antihypertensive medication is required (1-4,14). The blood pressure treatment goal I recommend depends on the comorbidities (15). There are no randomized clinical trial data showing what the optimal blood pressure should be at the time of surgery. On the basis of the available data, I favor a blood pressure of less than 130/80 mmHg at the time of surgery, especially in older persons (16).

The 2014 American College of Cardiology/American Heart Association guideline on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery recommend perioperative beta blocker therapy in patients being treated with beta blockers and starting beta blockers in patients with intermediate- or high-risk preoperative tests or with a Revised Cardiac Risk index of 3 or higher (17). Beta blockers should be initiated

more than 1 day prior to surgery (17). Beta blockers should not be started on the day of noncardiac surgery because of data from the Perioperative Ischemic Evaluation (POISE) trial (17,18). The 2014 American College of Cardiology guidelines also state that it is reasonable to continue angiotensin -converting enzyme inhibitors or angiotensin receptor blockers perioperatively (17). Use of angiotensin-converting enzyme inhibitors was not associated with respiratory complications or mortality after noncardiac surgery (19).

Numerous studies have demonstrated that perioperative use of beta blockers in patients undergoing major noncardiac surgery reduces 30-day and 1-year mortality (20-24). In 711 peripheral vascular surgery patients, perioperative beta blocker withdrawal was associated with a 2.7 times higher 1-year mortality while continuation of beta blockers reduced 1-year mortality 60% (24). In another study of 140 patients undergoing vascular surgery receiving perioperative beta blockers, 8 patients discontinued them postoperatively (25). Postoperative mortality was 50% in the patients who stopped beta blockers versus 1.5% in the patients who continued beta blockers (25).

Commonly used drugs for management of postoperative surgical hypertension include administration of intravenous nitroglycerin, sodium nitroprusside, beta blockers, hydralazine, and calcium channel blockers including clevidipine (26,27). Clevidipine is a rapid-acting, dihydropyridine L-type calcium channel blocker with a half-life of about 1 minute that reduces arterial pressure by direct arterial vasodilation with selective action on arteriolar resistance vessels and does not cause reflex tachycardia and tachyphylaxis (27). Its favorable pharmacodynamic and pharmacokinetic properties cause clevidipine to be an effective and safe drug for treating acute perioperative hypertension (26,27). A systematic review and meta-analysis concluded that clevidipine was the drug of choice for the management of acute postoperative hypertension (26). Three prospective, randomized, open-label, parallel comparison studies compared use of clevidipine to nitroglycerin or sodium nitroprusside perioperatively or to nicardipine postoperatively for acute hypertension treatment in 1,512 cardiac surgery patients (27). There was no difference in the incidence of myocardial infarction, stroke, or renal dysfunction between clevidipine and the other three drugs used (27). There was no difference in mortality between clevidipine, nitroglycerin, and nicardipine. Mortality, however, was higher in sodium nitroprusside-treated patients than in clevidipine-treated patients (27). Clevidipine was also more effective than nitroglycerin or sodium nitroprusside in maintaining blood pressure within the prespecified blood pressure range and had fewer blood pressure excursions beyond these blood pressure limits than nicardipine (27). Patients with intraoperative hypertension should be treated with intravenous medications until they can resume oral medications.

Antihypertensive drug therapy should not be stopped abruptly (25,28,29). Withdrawal syndromes have been reported after abrupt cessation of beta blockers, clonidine hydrochloride, methyldopa, guanabenz, and bethanidine sulfate (28). Accelerated angina pectoris, myocardial infarction, or ventricular arrhythmias may occur in patients with coronary artery disease after abrupt cessation of beta blockers (25,28,29). Abrupt cessation of clonidine hydrochloride, methyldopa, reserpine, and guanfacine may cause a hyperadrenergic state with severe hypertension, tachycardia, anxiety, and sweating (28,29).

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Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

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