

Treatment of Perioperative Hypertension in the Ambulatory Plastic Surgery Patient

“Managing Your OR” focuses on various aspects of aesthetic surgery in the ambulatory surgical setting.

Fifty million Americans have high blood pressure. A 1991 U.S. population survey (National Health and Nutrition Survey III) found that nearly 45% of Americans with hypertension are not being treated, and of the 53% who are taking antihypertensive drugs, only about half have well-controlled blood pressure.¹ Furthermore, more recent studies have shown that hypertension control rates have not continued to improve. Besides the lethal complications of stroke, heart failure, and end-stage renal disease (heart disease and stroke are the first and third leading causes of death in the United States),² poorly controlled hypertension is a special problem in head and neck surgery because it contributes to perioperative bleeding and hematoma formation.

Patients with previous normal blood pressure may first manifest hypertension as a result of the adrenergic arousal during a presurgical consultation or examination. In these patients, in those with hypertensive predisposing conditions (advancing age, smoking, kidney disease, a history of angina),³ and even in patients with seemingly well-controlled hypertension, troublesome perioperative hypertensive episodes may develop. It is important that these patients be evaluated and treated to a normotensive level by their primary physician before surgery. A recently completed study (1998) of 19,000 patients with hypertension, analyzing the association of high blood pressure with myocardial infarction, concluded that the goal of antihypertensive therapy should be an optimum blood pressure of 138/83.⁴

Cardioselective beta-blockers and diuretics are recommended as first-line treatment for hypertension. Angiotensin-converting enzyme inhibitors and calcium channel blockers (CCBs) have been shown to be just as effective and have fewer side effects in some patients. There is no drug that will work well in everyone, and individual response to a specific medication is unpredictable.⁴ Whatever drugs are used, patients who are con-

trolling their blood pressure adequately with medication should be maintained on their regimen until the time of surgery, and therapy should be reinstated as soon as possible after surgery.²

In spite of these precautions, hypertension can develop during the perioperative period. It is primarily caused by increased vascular resistance resulting from reflex changes in catecholamines and by rennin. Pain, bladder distension, hypercarbia from incomplete reversal of muscle relaxants, arousal agitation, and systemic hypothermia⁵ all can stimulate vasoconstriction and should be treated before a specific antihypertensive therapy is initiated. The specific goal in treating perioperative hypertension is the relaxation of systemic vasoconstriction with drugs that produce vasodilation. To be useful in the perioperative outpatient plastic surgery setting, appropriate antihypertensive drugs should be available in injectable form, have a wide margin of safety, be titratable and easy to control, and be compatible with other cardiovascular medications the patient may be taking.⁶

Using these criteria, I believe antihypertensive drugs most suitable to outpatient use are limited to two short-acting beta-blockers (esmolol and labetalol), a calcium channel blocker (nicardipine), and a few other miscellaneous useful drugs. These drugs can be used before, during, or after surgery as needed.

Beta-blockers are the first-line therapeutic agent for patients with both tachycardia and hypertension. Beta₁ blockade is specifically useful in the treatment of hypertension. The benefit of selective beta₁ blockade is unopposed stimulation of beta₂ receptors leading to vasodilation, which counteracts the alpha-adrenergic vasoconstrictive effects acting on the patient with hypertension. Asthma, chronic obstructive pulmonary disease, and second and third atrioventricular block are con-



William L. Higgins, MD, La Jolla, CA, is a board-certified anesthesiologist.

Table. Drugs for the treatment of perioperative hypertension

Drugs	Dosage	Comments
Esmolol (Brevibloc [®])	25 to 100 mg (0.5 to 2 mg/kg) IV every 5 minutes as required. Duration: 10 to 20 minutes.	Beta- ₁ selective, ultra short acting. Useful in acute hypertension.
Labetalol (Trandate [®])	2.5 to 20 mg (0.25 mg/kg) IV. Maximum effect within 5 minutes. Duration: 2 to 4 hours.	Both alpha- ₁ and beta-blocking agent. Decreases blood pressure without change in cardiac output or heart rate.
Nicardipine (Cardene [®])	Supplied in 25-mg ampules. Dilute ampule in 250 mL 5% dextrose water (makes solution of 0.1 mg/mL). Fill syringe and titrate 1 to 2 mL IV until response. Remainder can be infused at a rate of 10 mg/hr for 5 minutes, increased to 15 mg/hr for up to 15 minutes.	Predominantly arterial dilating CCB. Maintenance rate (if necessary) of approximately 3 mg/hr. Rapid onset and decline.
Clonidine (Catapres [®])	Preoperative oral dose of 0.2 mg for patients weighing less than 65 kg, 0.3 mg for patients weighing 65 to 80 kg, or 0.4 mg for patients weighing more than 80 kg.	Alpha-adrenergic agonist. Transdermal or oral forms only. Effective in blunting perioperative hypertension when given in adequate preoperative doses.
Chlorpromazine (Thorazine [®])	1 to 2 mg IV as needed. Duration: 6 to 8 hours.	Alpha-blocking effects. Potentiates depressant effects of sedatives, narcotics, and anesthetics.
Hydralazine (Apresoline [®])	5 mg IV every 10 to 15 minutes for 3 doses. Duration 2 to 4 hours.	Direct arterial relaxant. Often accompanied by tachycardia. Onset of action can be variable.

IV, Intravenous.

traindications to beta blockade.¹ Appropriate beta-blockers with dosages and comments are listed in the Table.^{7,8}

The CCBs are derived from three distinct chemical compounds. The phenyl alkylamines (eg, verapamil), the benzothiazepines (eg, diltiazem), and dihydropyridines (eg, nifedipine, nicardipine). Verapamil and diltiazem are available as intravenous injectables, but because of their depressant effects on heart contractility and conduction, they should not be used in the treatment of perioperative hypertension. The dihydropyridines are predominantly vasodilators of peripheral resistance arteries.^{5,9,10}

Sublingual administration of nifedipine (Procardia[®]) 10 mg also requires special mention. This method has long been used and advocated as a safe treatment for hypertension in the recovery room. However, sublingual absorption is unpredictable, and adverse effects such as cerebral vascular ischemia, stroke, severe hypertension, acute myocardial infarction and conduction disturbances, fetal distress, and death have been reported with its use.

The Food and Drug Administration has never approved this method of administering nifedipine, and the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure has recommended that the practice be stopped.¹¹

Nicardipine (Cardene[®]) is the only intravenous dihydropyridine CCB currently available for the treatment of perioperative hypertension in the United States. It offers rapid and efficient control of blood pressure. Nicardipine has one tenth of the myocardial depressant activity of nifedipine. It is a safer drug to add to beta-blocker therapy than other CCBs. It also improves cerebral blood flow and is particularly useful for hypertensive therapy in patients with a history of ischemic stroke. The preparation and dosage of nicardipine and other useful drugs/dosages are listed in the Table.^{9,12-15}

After nonspecific causes of postoperative hypertension have been treated appropriately (analgesics, anxiolytics, bladder drainage) after surgery, the most useful drugs

available today for the specific treatment of hypertension in the patient undergoing plastic surgery on an outpatient basis are (1) the short-term beta-blockers (esmolol and labetalol) and (2) the CCB nifedipine (Cardene®), because of its ability to produce controllable vasodilation without cardiac depressant effects.

Previously untreated patients in whom mild hypertension persists can be discharged with a beginning oral dose of the beta₁-selective beta-blocker atenolol (Tenormin® 50 mg daily) if not contraindicated, or other drugs as recommended by the patient's primary physician. Treated or untreated patients with minimal persistent anxiety-related systolic elevation can be discharged with a mild tranquilizer (Valium® 2.5 to 5 mg two times daily). However, if significant blood pressure elevation persists, an overnight hospital admission is recommended for further observation and treatment in consultation with the primary physician. ■

References

1. Dustan, PD, Rocella EJ, Garrison HH. Controlling hypertension—a research success story. *Arch Intern Med* 1996;156:1926-35.
2. The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Arch Intern Med* 1997;157:2413-46.
3. Rose DK, Cohen MM, Debper MM. Cardiovascular events in the postanesthesia care unit, contribution of risk factors. *Anesthesiology* 1996;84:772-81.
4. Pickering TG. Advances in the treatment of hypertension. *JAMA* 1999;281:114-6.
5. Levy JH, Huraux C, Norlander M. Treatment of perioperative hypertension. In: Epstein M, ed. *Calcium antagonists in clinical medicine*. 2nd ed. Philadelphia: Hanley and Belfus; 1997:345-55.
6. Rupp MR, Severinghaus JW. Hypothermia. In: Miller RD, ed. *Anesthesia*. 2nd ed. New York: Churchill Livingstone; 1986:2002-3.
7. Barash PG. Cardiovascular pharmacology: what's new and useful. In: University of California Anesthesiology review course. San Diego, May 1996:83-93.
8. Stoelting RK. *Pharmacology and physiology in anesthetic practice*. 3rd ed. Philadelphia: Lippincott-Rowen; 1999.
9. Raspa RF, Wilson C. Calcium channel blockers in the treatment of hypertension. *Am Fam Physician* 1993;48:461-70.
10. Wallin JD, Fletcher E, Ram CV. Intravenous nifedipine for the treatment of severe hypertension: a double-blind, placebo-controlled multicenter trial. *Arch Intern Med* 1989;149:2662-9.
11. Grossman E, Messerli FH, Grodzicki T, Kower P. Should a moratorium be placed on sublingual nifedipine capsules given for hypertensive emergencies and pseudoemergencies? *JAMA* 1996;276:1328-31.
12. Marten TJ. Physician-administered office anesthesia. In: Cornell BF, ed. *Clinics in plastic surgery* 1991;18:877-88.
13. Omoigui S. *The anesthesia drugs handbook*. 2nd ed. St. Louis: Mosby-Year Book; 1995.
14. Blakely KR, Klein KW, White PF, Trott S, Rohrich RJ. A total intravenous anesthetic technique for outpatient facial laser resurfacing. *Anesth Analg* 1998;90:827-9.
15. Beninger FG, Pritchard SJ. Clonidine in the management of blood pressure during rhytidectomy. *Anesthetic Surg* 1998;18:89-94.

Reprint orders: Mosby, Inc., 11830 Westline Industrial Drive, St. Louis, MO 63146-3318; phone (314) 453-4350; reprint no. 70/1/99004