

## Post-Operative Management of Hypertension

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Recommendations for hypertension management are frequently sought from the medical consultant in the inpatient setting. Essential hypertension comprises 95% of cases and is believed to be due to the combination of both genetic predisposition and environmental factors. One must resist the tendency to immediately choose an antihypertensive agent before taking a moment to consider, however, the possibility that an identifiable and treatable underlying cause of the elevation in blood pressure is present. These include chronic renal disease, renovascular disease (including renal artery stenosis and fibromuscular dysplasia), Cushing syndrome, pheochromocytoma, primary hyperaldosteronism, and coarctation of the aorta. Other possible contributing factors that should be considered are pain/anxiety/agitation, sleep apnea, excessive alcohol consumption (exerts a vasopressor effect), oral contraceptives (especially in older or obese women)/hormone replacement therapy, erythropoietin (related to direct vascular effects more than hematocrit or viscosity; changing administration from IV to SQ may help), decongestants, certain herbal remedies, and recent caffeine ingestion or tobacco use.<sup>1</sup>

When the use of an antihypertensive agent is deemed appropriate, a few general rules are recommended. Start with a small dose, and prescribe long-acting agents (QD dosing) whenever possible. Wait several half-lives before increasing the dose or adding another agent. According to the recommendations in the Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VI), adding a low dose of a second agent is more effective than continuing to increase the dose of the first agent. Adding a second agent provides additional antihypertensive efficacy and minimizes the likelihood of dose-dependent side effects.<sup>2</sup>

The extent to which blood pressure should be lowered has been a topic of controversy. JNC VI classifies "high normal" blood pressure as 130-139/85-89 and the goal blood pressure in a patient with diabetes as <130/85.<sup>2</sup> It has been suggested that excessive reduction of the diastolic pressure, on which coronary flow is dependent, may increase the risk of myocardial infarction ("J-curve" hypothesis). Subsequent studies showed no support for the J-curve phenomenon.<sup>3</sup> Other studies observed this

phenomenon only in patients with underlying left ventricular hypertrophy (diminishes the ability of the coronaries to dilate) or coronary artery disease.<sup>4</sup> In general, isolated systolic hypertension should be treated, but marked diastolic hypotension (<65 mmHg) should be avoided.

The choice of initial pharmacologic agent for the control of blood pressure has also been the subject of great debate. Based on available outcome data in 1996, the JNC VI recommendation is to first choose a diuretic or a beta-blocker if there is no indication for another drug class. Numerous randomized controlled trials have shown a decrease in morbidity and mortality using these agents. Generally, older patients and African-American patients have low renin concentrations and are more responsive to drugs that do not suppress renin, i.e. diuretics or calcium channel blockers. Also, if the initial agent chosen for a particular patient was not a diuretic, and an additional agent is needed, adding a diuretic enhances the effects of the first agent. One of the most common causes of resistant hypertension is volume overload from inadequate diuretic therapy. Reasons to consider an agent other than a diuretic are preexisting gout, hypercalcemia, or hypertriglyceridemia.<sup>2</sup>

In 1999, the World Health Organization-International Society of Hypertension concluded that the reduction in morbidity and mortality in hypertension treatment trials resulted from the degree of blood pressure lowering, not the use of specific medications. Therefore, any class of drug, i.e. diuretics, beta-blockers, calcium channel blockers, ACE inhibitors, or alpha-blockers, could be used as initial therapy. The debate continues, however, especially with regard to the use of calcium channel blockers as first-line antihypertensive therapy.<sup>5</sup>

Patients with diabetes have at least a two-fold increase in cardiovascular mortality that is further increased by concomitant hypertension. ACE inhibitors have been recommended as first-line treatment in these patients because they have been shown to confer additional protection against/improvement of diabetic nephropathy. The issue of whether or not the potentially dangerous effect of calcium channel blockers on cardiovascular events may be amplified in the diabetic patient remains unsolved. Some studies suggest that the long-acting calcium channel blockers do not have this deleterious effect.<sup>6</sup>

Elderly patients are more prone to hypotension and excessively tight or rapid control of blood pressure

should not be the goal. Initial doses of medications should be half the dose of that prescribed for younger patients.<sup>7</sup>

Special consideration should be given also to women of childbearing age who anticipate pregnancy within the next 12-18 months. ACE inhibitors, angiotensin II receptor blockers, or calcium channel blockers should be discontinued and should be replaced by drugs such as methyldopa. Diuretics may be continued only if they had been used prior to pregnancy. The initiation of diuretic use during pregnancy has been associated with oligohydramnios and electrolyte imbalances in the newborn and changes in glucose tolerance in the mother. Beta-blocker use during the first trimester is associated with fetal growth retardation.<sup>7</sup>

A hypertensive emergency is one in which significant, acute end-organ damage is present. Emergency reduction of blood pressure is indicated for hypertensive encephalopathy (eclampsia is the most common cause), left ventricular failure, and dissecting aneurysm. For the first two conditions, parenteral nitroprusside for a maximum of 2-3 days is recommended. For patients with dissecting aneurysm or any patient requiring strict blood pressure control and parenteral treatment, more prolonged treatment with parenteral nitrate and labetalol is preferable. In general, emergency reduction is considered when there is evidence of significant and acute damage to a major organ. Elevated blood pressure alone, when the patient is asymptomatic and without new or progressive target organ damage is not an emergency. These are situations in which the elevation in blood pressure may be longstanding and cerebral autoregulation has been lost. A sudden "emergency" reduction of blood pressure in this setting causes cerebral hypoperfusion and places the patient at risk for cerebral infarction.<sup>8</sup>

Lastly, when choosing a pharmacologic agent in a particular drug class, consideration should be given to the cost/insurance coverage of the drug, frequency of administration, i.e. compliance issues, and side-effect profile. In many cases, the patient is discharged from the hospital on the antihypertensive drug regimen recommended by the medical consultant. Consideration of the above issues will increase the probability of long-term blood pressure control and help achieve the ultimate goal, a decreased risk of fatal and non-fatal stroke, cardiac events, and death.

## References

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