

Pre-operative Evaluation and Management of the Patient with High Blood Pressure

Joyce Beltran-Keeling MD

Introduction

When asked for a consultation on the management of hypertension, a thorough history and physical examination of the patient must be performed and the type of surgery must be evaluated. If the patient does not have evidence to delay surgery, then appropriate advice regarding hypertensive management should be given to avoid electrolyte disturbances, hypotension and rebound effects. Careful preoperative evaluation will decrease the risk of perioperative cardiac complications.

Evaluation

A thorough history, careful physical examination, review of labs and other diagnostic studies will provide information regarding the severity of hypertension, related end organ involvement and evidence for secondary hypertension. Three reasons that may delay elective surgery include:

- Poorly controlled hypertension with a diastolic pressure greater than or equal to 110 mm Hg
- Evidence of end organ damage not previously discovered
- The etiology of secondary hypertension is undiagnosed.

Evaluation of Blood Pressure

First, arterial pressure should be measured using proper technique. This can be found in the 6th report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC VI).¹ Orthostatic readings should also be performed, especially in patients with prolonged bed rest as they may actually be hypotensive upon standing. Once accurate blood pressure is obtained, the severity should be addressed. In a 1979 landmark study, it was found that for noncardiac surgery, persistently hypertensive patients with diastolic pressures less than 110 mm Hg had no statistically significant increase in complications associated with blood pressure lability, cardiac arrhythmias, myocardial infarctions, heart failure or renal failure.² The JNC VI cited a blood pressure greater than 180/110 mm Hg as associated with an increased risk for perioperative ischemic events, however no clinical studies were cited to support this value.¹ Other sources cite similar recommendations to delay noncardiac surgeries in chronic hypertensive

patients when the diastolic is greater than or equal to 110.^{3,4}

Evaluation for Target End Organ Damage

Complications of hypertension in the heart, brain and kidney have as much potential to cause morbidity in the perioperative period as hypertension itself.⁵ Assessing end-organ damage can contribute to the assessment of severity of hypertension.⁴ A guideline for preoperative assessment of end organ damage and cardiac disease⁵, thereby requiring evaluation prior to surgery includes:

Cardiac symptoms (requiring cardiac evaluation)

- a history of angina or dyspnea on exertion
- findings on physical exam of a ventricular lift, heave or rales.

Central nervous system (CNS) changes (potentially requiring CNS evaluation including carotid dopplers)

- a history of transient ischemic attacks or stroke symptoms,
- findings of arteriovenous nicking, hemorrhages, exudates or papilledema on fundoscopic exam
- carotid bruits

Renal dysfunction (determining creatinine clearance)

- finding preoperative serum creatinine >2.0 mg/dl (was found to be 1 of 6 independent risk factors that predicted increased cardiovascular risk)⁶

Evidence for cardiac and cerebral abnormalities accompanied by renal insufficiency requires an appropriate work up. Renal insufficiency may require adjustments in medications and fluids accordingly.

Evaluation for Secondary Hypertension

Diagnosing secondary hypertension is important because treatment of hypertension usually rests with treatment of the underlying disease. The most common causes of secondary hypertension are renovascular hypertension, thyroid disease, primary hyperaldosteronism, Cushing's syndrome, pheochromocytoma and coarctation of the aorta.⁷ Renovascular hypertension is associated with abdominal bruits that lateralize or have a diastolic component. Cushing's syndrome has a number of physical findings including truncal obesity and purple striae.¹ Pheochromocytoma should be ruled out due to its high morbidity potential in the perioperative period.⁵ The findings that are consistent with

pheochromocytoma include: labile blood pressures, tachycardia, tremor, orthostatic hypotension, sweating, and pallor. Coarctation of the aorta is associated with delayed or absent femoral arterial pulses and decreased blood pressures in the lower extremities compared to the upper extremities, and a systolic murmur heard in the posterior left interscapular area. Again, these findings should prompt delay of surgery until the underlying cause is treated and the blood pressure is controlled.

Reevaluation for surgery should be performed when the blood pressure has been well controlled for at least two weeks.⁸ However, other authors recommend 3-4 weeks if possible to allow for normalization of the hypertensive vascular changes. If surgery cannot wait, then beta-blockers are recommended if there are no contraindications.^{4,5}

Evaluate type of surgery and type of anesthesia

It is also important to note that patients undergoing certain types of surgery are at greater risk for hypertensive events. This occurs most commonly with vascular procedures involving the carotid artery, abdominal aorta and certain peripheral vascular surgeries, as well as intraperitoneal and intrathoracic surgeries.² Spinal anesthesia and certain inhalation anesthetic agents (e.g., isoflurane, desflurane, and sevoflurane) may cause hypotension via peripheral vasodilatation³ and may be deleterious with concurrent hypovolemia. Awareness of these potential hypertensive events related to actual surgeries and hypotensive events related to anesthesia requires careful management of hypertensive agents in the preoperative period.

Advice on Medical Management

Aside from a thorough history and physical exam, medication for hypertension is essential in the prevention of potential perioperative morbidity and mortality. Many of the blood pressure recommendations which have been published are based on experts' opinions, case reports, experiences and theoretical assumptions due to lack of controlled trials for some of these medications in the perioperative period.⁹

Diuretics

Although the decision to withhold diuretics the day before surgery is still controversial, many authorities agree upon holding diuretics the morning of surgery because of the ease of administering the diuretic during surgery if volume overload occurs.⁸ If the patient has been on diuretics, electrolyte (potassium and magnesium) abnormalities must be corrected as

well as any volume deficits prior to undergoing surgery.¹⁰

Beta Blockers

Beta-blockers should be continued in the perioperative period to prevent rebound hypertension and arrhythmias due to its cardio-protective effects. In a landmark randomized, double blind, placebo-controlled trial, atenolol given perioperatively was found to reduce mortality and the incidence of cardiovascular complications in patients who have, or were at risk for, coronary artery disease undergoing noncardiac surgery.¹¹ In this study, patients whose heart rate was greater than 55, systolic pressure was greater than 100, and exhibited no evidence of congestive heart failure, third degree heart block or bronchospasm, received 5 mg of atenolol infused 30 minutes prior to surgery and again after surgery if the above criteria continued to be met, converting to oral therapy thereafter. It appears from the atenolol study that utilizing the drug was associated with decreased risk of myocardial ischemia and cardiac death. Significant consideration of the half-life of the drug should be taken into account when choosing a beta-blocker during the operative period. Conversion to intermittent boluses or continuous infusion of the beta blocker may be necessary for blood pressure maintenance and its cardio-protective effects.¹⁰ If surgery is urgent and a hypertensive agent is needed, rapid acting agents are recommended.⁴

Calcium Channel Blockers

Importantly, oral sublingual nifedipine should always be avoided in the perioperative period. This is due to its documented rapid and uncontrolled reduction in blood pressure.¹² Other calcium channel blockers may be continued perioperatively as withdrawal syndromes have been rarely associated with abrupt discontinuation of these medications.⁹ There is also no major morbidity associated with these medications and concurrent use of anesthetic agents.¹³

Angiotensin Converting Enzyme (ACE) Inhibitors and Angiotensin II Receptor Blockers

There has been controversy regarding the continued use of ACE inhibitors throughout the perioperative period. One study described an abnormal response to anesthesia induction and poor tolerance of hypovolemia, which led to certain ACE inhibitors being held before surgery.¹³ Another study recommended holding Lisinopril on the day of surgery, with reinstatement post-operatively providing no evidence of hypotension or renal injury.⁹ Further controlled studies are needed regarding the

perioperative role of both ACE inhibitors and Angiotensin II receptor blockers .

Centrally Acting Sympatholytics

Clonidine should be continued perioperatively to avoid the well-documented withdrawal effects of rebound hypertension. Like beta-blockers, attention must be given to the length of surgery and half-life of clonidine. Continuation of oral clonidine is recommended if the surgery does not interrupt scheduled oral dosing. If the patient is NPO for over 12 hours; it is recommended that the patient wean down the oral dose while initiating the transdermal clonidine patch three days prior to surgery.⁹ Of note, guanethidine was noted to cause potential drug interactions and some authors recommended discontinuing this medication 2 weeks prior to surgery.⁸

Conclusions

A thorough preoperative evaluation of the hypertensive patient includes accurate blood pressure measurement, assessment for end organ damage and identification of secondary hypertension. It is also important to look for volume and electrolyte deficits and potential effects associated with discontinuation of these medications (such as rebound hypertension associated with clonidine and beta-blockers and effects related to diuretics, ACE inhibitors and Angiotensin II receptor blockers). Alerting surgeons and anesthesiologists to potential complications will decrease the risk for perioperative morbidity and mortality.

References

1. The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Arch Intern Med 1997; 157:2413-2446.
2. Goldman L, Caldera DL: Risks of general anesthesia and elective operation in the hypertensive patient. Anesthesiology 1979;50:285-292.
3. Weitz HH. Perioperative cardiac complications. Medical Clinics of North America 2001;85:1151-1169.
4. Eagle KA, Brundage BH, Chaitman BR, et al. Guidelines for perioperative cardiovascular evaluation for noncardiac surgery: report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Perioperative Cardiovascular

Evaluation for Noncardiac Surgery). J Am Coll Cardiol 1996;27:910-948

5. Martin DE, Shanks GE. Strategies for the preoperative evaluation of the hypertensive patient. Anesthesiology Clinics of North America 1999;17:529-548.
6. Fleisher LA. Preoperative Evaluation of the Patient with Hypertension. JAMA 2002;287:2043-46.
7. Ripley EB, Sica DA. Hypertension. Heart Disease in Primary Care. 1st edition. Hess ML (editor). Baltimore: Williams & Wilkins. 1999:78-104
8. Reilly, D Preoperative cardiovascular problems. In Outpatient Medicine. 2nd edition. Fihn SD, DeWitt DE (eds). Philadelphia:W.B. Saunders. 1998:738-742
9. Spell NO; Stopping and restarting medications in the perioperative period. Medical clinics of North America 2001;85:1117-1128.
10. Cygan R, Waitzkin H: Stopping and restarting medications in the perioperative period. J Gen Intern Med 1987;2:270-283.
11. Mangano DT, Layug EL, Wallace A, et al: Effect of atenolol on mortality and cardiovascular morbidity after noncardiac surgery. N Engl J Med 1996;335:1713-1720.
12. Grossman E, Messerli FH, Grodzicki T, et al: Should a moratorium be placed on sublingual nifedipine capsules given for hypertensive emergencies and pseudoemergencies? JAMA 1996;276:1328-1331.
13. Smith MS, Muir H and Hall R. Perioperative management of drug therapy. Drugs 1996;51:238-243.