

## Q: Does elevated blood pressure at the time of surgery increase perioperative cardiac risk?

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**A:** Elevated blood pressure by itself has not been shown to increase the incidence of perioperative cardiac events, although conclusions depend on the specific outcomes measured. However, target-organ damage caused by chronic hypertension does confer increased cardiac risk.

### Proceed when hypertension is mild or moderate

Current guidelines based on ample evidence indicate no benefit to delaying surgery in patients with mild or moderate hypertension (systolic blood pressure < 180 mm Hg and diastolic blood pressure < 110 mm Hg) without associated cardiovascular abnormalities.<sup>1,2</sup>

### Outcomes less clear with severe hypertension

In contrast, scant evidence is available to guide the clinician on the proper course of action in patients who present with severe elevations in blood pressure at the time of surgery.

Prys-Roberts and colleagues in 1971 compared the development of ischemia on continuous electrocardiographic recording among treated and untreated hypertensive patients who presented for elective surgery, with normotensive patients serving as controls.<sup>3</sup> The 7 untreated hypertensive patients had a mean arterial pressure (MAP) of 129.5 mm Hg; the 9 treated patients had a MAP of 129.0 mm Hg. Myocardial ischemia was documented in 3 of 9 treated patients, 5 of 7 untreated patients, and none of the 15 control patients. No adverse cardiac events occurred in any group. Every patient who experienced ischemia had a 50% or greater decrease in MAP after induction of anesthesia. Although the study was observational in nature and included few patients, it represents the only such study to include patients with an extreme elevation of blood pressure.

Authors of larger studies in which hypertension was not identified as a predictor of cardiovascular complications acknowledged the lack of inclusion of patients with severe hypertension. In an evaluation of hypertensive patients with differing levels of blood

pressure control who presented for surgery, Goldman and Caldera found that only five had diastolic blood pressure greater than 110 mm Hg.<sup>4</sup> In this study, no increase in the incidence of perioperative myocardial infarction or death was observed in any group regardless of treatment or blood pressure control.

### Target-organ damage carries high risk

Hypertension is causally linked to occult and symptomatic coronary artery disease, heart failure, renal insufficiency, and cerebrovascular disease. These diseases place the patient at higher risk for adverse cardiac events, and constitute four of the six criteria for the Revised Cardiac Risk Index (RCRI), which is the current recommended tool for assessing perioperative cardiac risk.<sup>5</sup> Patients with longstanding uncontrolled hypertension, especially those with severe hypertension, are at greater risk for target-organ damage.

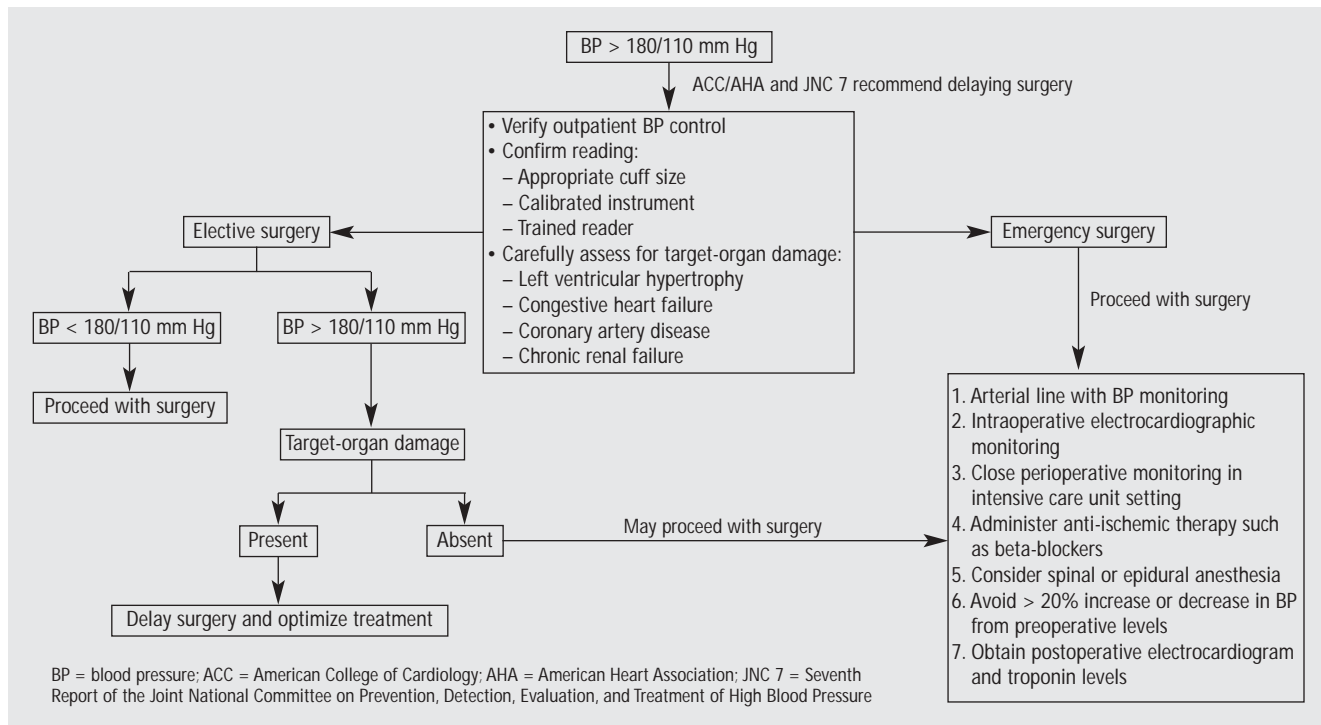
More controversial is the appropriate course in these patients with uncontrolled or severe hypertension. Guidelines recommend antihypertensive treatment, although no evidence suggests that treatment modifies cardiac risk. Also, it remains to be determined whether blood pressure control needs to be achieved over a period of weeks or if gaining control in the immediate preoperative period is sufficient.

### Severe hypertension: Assess for target-organ damage

A reasonable strategy for managing patients with severe or uncontrolled hypertension therefore starts with an assessment of target-organ damage (**Figure**).<sup>6</sup> If the extent of target-organ damage is unknown or if an assessment cannot be performed before elective surgery, then surgery should be postponed until the cardiac risk can be determined. If a patient has one or more of the RCRI criteria, conventional wisdom is to treat with beta-blockade.<sup>5</sup> Again, the optimal time-frame for achieving control of blood pressure is not known. Whether treatment by itself (regardless of the achieved blood pressure) is adequate to reduce risk, or whether treatment must result in a blood pressure decline into the range defined as mild or moderate hypertension, is also not known.

Finally, if a patient has no evidence of end-organ damage and is otherwise fit, there is no evidence to suggest that surgery should be cancelled until better blood pressure control is obtained.

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**FIGURE.** Proposed management of patients with uncontrolled hypertension before surgery. Reproduced with permission of John Wiley & Sons, Inc., from Shafi T. Perioperative management of hypertension. *The Hospitalist*. Copyright © 2006, The Society of Hospital Medicine.

**Teamwork is essential**

Close communication between the surgeon, anesthesiologist, and medical consultant is necessary to elaborate the need for close invasive arterial pressure monitoring, as well as aggressive treatment of blood pressure to prevent the precipitous drop in MAP that can lead to ischemia.

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