Hypertensive Emergency

Emberlynn Liu, MD

Scenario: 57 year-old female with past medical history of end stage renal disease on scheduled dialysis, hypertension, diabetes, and hyperlipidemia presents to the emergency department. Patient is noted to be very agitated, complaining of intense chest and abdominal pain with no focal neurologic findings, and initial vitals show blood pressure of 255/100 mmHg and heart rate of 147 bpm. Is this a hypertensive emergency?

Background: A hypertensive crisis is defined as an acute rise in blood pressure with systolic above 180 or diastolic above 110.Many patients encountered in the emergency department may qualify based on this definition without having any symptoms. However, a patient in hypertensive emergency will also have signs and symptoms of **end-organ damage (encephalopathy, acute coronary syndrome, pulmonary edema, stroke, life-threatening arterial bleeding, or aortic dissection)**. A hypertensive emergency is now rare with estimates of one percent of hypertensive patients seen in the emergency department. In addition to the history and physical exam, further tests can also help evaluate for end-organ damage including EKG, chest x-ray, urinalysis, cardiac enzymes, CT head, and echocardiogram.

The goal for management of hypertensive emergencies depends on the specific end-organ damage noted. Generally speaking, lowering the blood pressure too quickly or too much may result in ischemic damage. The general guideline is to **reduce the mean arterial pressure gradually by about 10 to 20 percent in the first hour and by 5 to 15 percent over the next 23 hours**. An exception to this rule would be in the case of acute aortic dissection in which the systolic blood pressure should be rapidly lowered to a target of 100 to 120 mmHg to be attained within 20 minutes of diagnosis. An intravenous beta blocker (esmolol first line, also labetalol, propranolol and metoprolol) is given first to reduce heart rate below 60 bpm. Vasodilators (nitroprusside, clevidipine) are usually added to help achieve blood pressure goals.

Patients with neurologic signs and/or symptoms complicate the picture as their underlying etiology drives their management. In the case of ischemic stroke, antihypertensives are not given unless patient's initial blood pressures are **above 185/110 mmHg in those who are candidates for reperfusion therapy and above 220/120 in those who are not**. In patients with hemorrhagic stroke, intravenous **labetalol and nicardipine** are the agents of choice with goals dependent on initial blood pressure on presentation and suspicion of elevated ICP. Generally, targets are MAP of less than 110 mmHg or blood pressure of less than 160/90 mmHg.

The most common cardiac emergencies associated with elevated blood pressure are acute left ventricular dysfunction with pulmonary edema and acute coronary syndrome. In patients with acute LV dysfunction with pulmonary edema, the first line treatment is with intravenous vasodilators such as **nitroglycerin**. Hydralazine, labetalol and beta blockers should be avoided. Usually a 10-15 percent reduction in blood pressure can achieve symptomatic relief. In the setting of acute coronary syndrome, patients should receive nitrates (intravenous nitroglycerin) to reduce preload and improve coronary perfusion in addition to beta blockers (esmolol, etc.) to reduce cardiac oxygen demand by lowering heart rate and afterload.

Finally, in the setting of pre-eclampsia, aggressive management of blood pressures with a goal of systolic blood pressure less than 160 mmHg and/or diastolic blood pressure less than 110 mmHg is important as systolic blood pressures over 160 mmHg have been shown to be the most important factor associated with strokes in these patients. The first line agents for this goal are **labetalol and nicardipine**.

Outcome of case: Patient had nausea and vomiting at home for several days. She had been unable to take any of her four antihypertensives and had been unable to tolerate full dialysis sessions due to the nausea. Patient was started on a nitroglycerin drip at 50 mcg/min with titration based on blood pressure with goal reduction of 20%. Labs showed patient had a lactate of 4 and a troponin of 0.22. Chest x-ray, urinalysis, and EKG were unremarkable. Blood pressure was decreased to systolic blood pressure of 180s on drip with resolution of chest pain. Tachycardia was managed with labetalol. Patient tolerated the therapy well and was admitted to the cardiac intensive care unit for further management.

Useful Resource: (http://jama.jamanetwork.com/article.aspx?articleid=1791497)

Drug	Dose	Onset of Action	Duration of Action	Adverse Effects†	Special Indications
Vasodilators					
Sodium nitroprusside	0.25–10 µg/kg/min as IV infusion‡	Immediate	1–2 min	Nausea, vomiting, muscle twitching, sweating, thiocynate and cyanide intoxication	Most hypertensive emergencies; caution with high intracranial pressure or azotemia
Nicardipine hydrochloride	5–15 mg/h IV	5–10 min	15–30 min, may exceed 4 hrs	Tachycardia, headache, flushing, local phlebitis	Most hypertensive emergencies except acute heart failure; caution with coronary ischemia
Fenoldopam mesylate	0.1–0.3 µg/kg per min IV infusion	<5 min	30 min	Tachycardia, headache, nausea, flushing	Most hypertensive emergencies; caution with glaucoma
Nitroglycerin	5–100 µg/min as IV infusion‡	2–5 min	5–10 min	Headache, vomiting, methemoglobinemia, tolerance with prolonged use	Coronary ischemia
Enalaprilat	1.25–5 mg every 6 hrs IV	15–30 min	6–12 hrs	Precipitous fall in pressure in high-renin states; variable response	Acute left ventricular failure; avoid in acute myocardial infarction
Hydralazine hydrochloride	10–20 mg IV 10–40 mg IM	10–20 min IV 20–30 min IM	1–4 hrs IV 4–6 hrs IM	Tachycardia, flushing, headache, vomiting, aggravation of angina	Eclampsia
Adrenergic Inhibitors					
Labetalol hydrochloride	20–80 mg IV bolus every 10 min 0.5–2.0 mg/min IV infusion	5–10 min	3–6 hrs	Vomiting, scalp tingling, bronchoconstriction, dizziness, nausea, heart block, orthostatic hypotension	Most hypertensive emergencies except acute heart failure
Esmolol hydrochloride	250–500 µg/kg/min IV bolus, then 50–100 µg/kg/min by infusion; may repeat bolus after 5 min or increase infusion to 300 µg/min	1–2 min	10–30 min	Hypotension, nausea, asthma, first degree heart block, heart failure	Aortic dissection, perioperative
Phentolamine	5–15 mg IV bolus	1–2 min	10–30 min	Tachycardia, flushing, headache	Catecholamine excess

Sources / Further Reading:

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