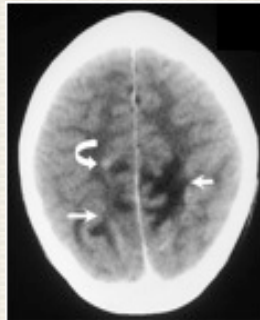
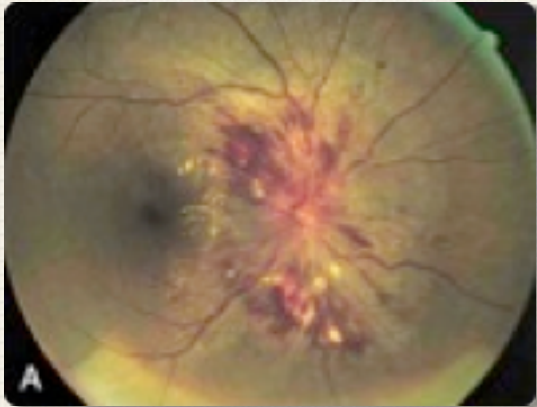


EMERGENCY MEDICINE CASES



EPISODE 41: HYPERTENSIVE EMERGENCIES WITH DR. CLARE ATZEMA AND DR. JOEL YAPHE

HYPERTENSIVE EMERGENCIES:

Our experts group these patients into two categories

- 1) microvascular disorders (e.g. encephalopathy, pre-eclampsia/eclampsia), which are characterized by small vessel dysregulation, with endothelial damage and local inflammation,
- 2) “macro” vascular disorders (i.e. CHF, aortic dissection, stroke, subarachnoid hemorrhage).

How does Hypertensive Encephalopathy present?

Suspect when the patient has severe hypertension (usually >180/110), severe headache +/- vomiting. Symptoms progress to confusion and altered mental status. Retinopathy may be present, and seizures can occur. The diagnosis is confirmed by normal CT, and if cerebral function improves with decreasing of the blood pressure.

The treatment goal is diastolic BP between 100-105 within 2-6 hours. Don't lower the BP more than 20% in the first hour.

TREATING THE BP

What are the general principles for lowering BP rapidly in the ED?

- 1) Blood pressure should *almost never be rapidly lowered* (except in aortic dissection).
- 2) Lower pressure by no more than 25%, to avoid ischemia in organs auto-regulated to higher BP.
- 3) Therapies that correct the cause (e.g. phentolamine if the BP is elevated by catecholamines) will be most effective.
- 4) Monitor the symptoms to determine whether the BP has been adequately lowered.

WHICH IV DRUG?

There are 3 major categories:

- 1) **B-blockers:** Labetolol is useful for most hypertensive emergencies. Give a 20mg slow IV push, then double the dose q10 min, up to 300mg. Be cautious in patients with asthma or COPD, and hepatic failure. Esmolol has quicker onset/offset, and may be safer in patients with mildly

reactive airways.

- 2) **Vasodilators:** Nitroglycerin is great for ACS and pulmonary edema, but arterio-dilates only at high doses. *Therefore for CHF patients, use higher doses to produce afterload reduction.* Nitroprusside dilates both arteries *and* veins, but generates cyanide w prolonged use of high doses as it breaks down. Starting dose is 0.3–0.5mcg/min, and max dose is 2 mcg/min (less in renal pts). Hydralazine also dilates arteries, but has less predictable effects, and raises HR. Phentolamine (an $\alpha 1$ blocker) arterio-dilates to counteract catecholamines (i.e. cocaine, pheochromocytoma).

- 3) **Calcium channel blockers:** Dihydropyridine CCBs lower blood pressure by vasodilation (i.e. amlodipine, nifedipine, and nicardipine in USA). The phenylalkylamine class of CCBs mainly have negative inotropic and negative chronotropic effects (i.e. diltiazem and verapamil).

Q: Does the choice of anti-hypertensive drug affect mortality and morbidity?

According to a Cochrane review of 15 RCTs (869 pts), there was no evidence that any class of IV antihypertensive drugs reduces mortality/morbidity, and no superiority was found among drug classes(1). The CLUE trial (2) has since shown advantages of nicardipine (less hypotension, bradycardia and AV blocking were observed) over labetalol for treatment of acute hypertension with end organ damage.

What is the drug of choice for hypertensive encephalopathy, aortic dissection & pre-eclampsia/eclampsia?

Dr. Yaphe recommended labetalol for most situations (see page 1 for dose). Our experts recommend using the drug you are most familiar with, if the clinical context is appropriate.

How to manage patients with high BP and impaired renal function

If creatinine is high, check urine for proteinuria or active sediment, and the CBC and retinas for other indications of acute renal failure. It may be impossible to tell if renal failure is acute if no recent bloodwork is available. For these patients, our experts recommend very close follow-up with an internist, or hospital admission for further workup. Use caution and an individualized approach.

What about high BP and CHF?

Start with high doses of nitroglycerine (see page 1 for explanation) to achieve arterial dilatation. Give up to 6 sublingual doses while IV drip is prepared. Non-invasive positive pressure ventilation is also key to managing the pulmonary edema.

Tips for Aortic Dissection:

BP can be very high, so verify and monitor by an arterial line in the *right radial artery*. If target HR of 60 and systolic BP of <110 (3) are not achieved by IV meds (labetolol, followed by nitroprusside), add morphine and consider esmolol if the HR is still not below 60. Use diltiazem if a B-blocker cannot be used. **Pearl:** if aortic root is involved (check for a new murmur!) avoid B-blockers, as tamponade may be imminent.

How do we treat pre-

eclampsia? Def'n: Pre-eclampsia is BP >160 /110, along with proteinuria (or low platelets, elevated LFT or Cr) or pulmonary, liver, cerebral or visual symptoms, in a patient >20 weeks pregnant. Eclampsia is the same, but with seizures. Labetolol is best for BP reduction along with Mg⁺, although hydralazine (5mg IV slow push over 1-2 minutes, repeat 5-10mg prn) can be used as a second line. Give 2g/hr IV Mg⁺ as seizure prophylaxis. Goal is still only 25% BP reduction, and consult OB as delivery is the definitive Rx!

SAH AND ICH

Patients with SAH and intracranial hemorrhage (ICH) may rebleed if BP is too high, and may stroke if BP drops too rapidly. Our experts recommend slow BP reduction only if necessary, and diligent correction of other metabolic disturbances (hyperglycemia, acidosis, fever, etc).

Should INTERACT 2 trial change practice for blood pressure management subarachnoid hemorrhage?

While INTERACT 1 showed lowering BP slows hematoma growth, INTERACT 2 showed no benefit. INTERACT 2 study suggested blood pressure may be safely reduced to

systolic of 140, but no benefit was shown for re-bleeding (4). Therefore, our experts suggest using AHA guidelines (5), which suggest at target systolic BP of 160. If you decide to lower the BP, avoid nitroprusside, because it causes a relative decrease in cerebral perfusion pressure, due to a peripheral shunt effect. Each patient should be approached individually. Use labetalol or nifedipine, *go slowly*, and *monitor closely*.

Patients with **ICH** are at high risk for ischemia with BP reduction. The AHA guidelines divide patients into 3 groups:

- 1) for SBP >200 or MAP >150 — consider lowering BP by IV infusion under close monitoring,
- 2) ICH with suspected raised ICP and high BP — get ICP monitoring first, before lowering BP,
- 3) SBP >180 or MAP >130 but no suspicion of high ICP — consider a slower, more modest BP reduction using IV medications.

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