

CASE 3.2
Hypertension | Level 2

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1. What is the subjective and objective evidence for the diagnosis of hypertension?**SUBJECTIVE FINDINGS:** None**OBJECTIVE FINDINGS:** Blood pressure measurements greater than the 99th percentile plus 5 mm Hg for age, gender, and height on three separate occasions (stage II hypertension); obesity (BMI 32.2 kg/m², 98th percentile)**RISK FACTORS:** Diet (fast food and energy drinks); family history of obesity and possible type 2 diabetes mellitus (T2DM) (mother); gestational diabetes (mother)**2. What are the criteria for a diagnosis of obesity in this patient?**

Obesity for a pediatric patient is based on BMI percentile for age and gender. A BMI percentile greater than 95 is considered obese. This patient's BMI is 32.2, which is greater than the 95th percentile (98.74%) for age and gender.

3. Devise a nonpharmacologic regimen for the treatment of hypertension in this patient.

The patient is currently asymptomatic. Therapeutic life modification is the primary focus for this patient (weight loss, exercise, and diet). The patient's BMI should be less than 85th percentile for age and gender, which would represent at least a ~25 kg (~62.5 lb) weight loss. Referral to nutritional counseling would be appropriate with potential referral to a physician specialist in weight loss. Exercise, including weight training and aerobic cardiovascular exercise, would be recommended after medical clearance. Limiting consumption of energy drinks and other drinks with high caffeine and sugar content should be stressed to the patient.

4. What other considerations should occur prior to initiating pharmacotherapy in this patient?

Treatment of blood pressure in children and adolescents is important, as uncontrolled blood pressure may lead to morbidity, such as hypertension and heart failure, in adult life. Assessment of blood pressure in children and obese patients can be difficult, and many factors can impact the correct assessment of hypertension. Using an appropriate

blood pressure cuff size is critical to accurate evaluation of blood pressure in a pediatric patient, and many variations exist in manufactured blood pressure cuffs. The cuff bladder length should cover 80% to 100% of the circumference of the child's upper right arm. Patients may also experience white coat hypertension and may benefit from continuous ambulatory blood pressure monitoring.

Because this patient has had blood pressure measurements on three separate occasions and they all have been elevated, this patient meets the criteria for stage II hypertension based on height percentile, age, and gender staging criteria for hypertension. He requires pharmacotherapy to prevent end organ damage, such as left ventricular hypertrophy (LVH). A complete renal evaluation to rule out kidney abnormalities is recommended. The evaluation includes a renal ultrasound, urinalysis, serum electrolytes, serum creatinine and BUN, and urine culture. A complete blood count is also necessary to rule out anemia as a result of kidney disease.

Although the patient denies the use of illicit drugs, a urine drug screen should be obtained to rule out the presence of drugs, which could cause hypertension. The use of highly caffeinated "energy drinks" can also increase blood pressure, and the patient's blood pressure should be evaluated without their presence. Over-the-counter medications, such as pseudoephedrine, can cause elevations in heart rate and blood pressure as can prescription medications used for attention deficit hyperactivity disorder. The use of these medications should be evaluated when assessing for hypertension.

Patients with stage II hypertension should have end organ damage assessed. LVH, as consequence of uncontrolled hypertension, should be evaluated by echocardiogram. An eye exam should be performed to rule out retinal vascular changes.

Additionally, due to the patient's obesity and patient's family history of obesity and possible T2DM, a fasting blood glucose, hemoglobin A_{1c}, fasting insulin level, and fasting lipid profile should be obtained. The patient should also be asked for any signs and symptoms related to T2DM, such as increased thirst or hunger or frequent urination.

5. Devise a pharmacologic regimen for the treatment of hypertension in this patient.

The dosing strategy for medications should be to initiate the patient on the lowest recommended dose with frequent reassessment of blood pressure and upward titration of the dose as necessary. Decreases in dose of medication or discontinuation of medication may occur if etiologies for hypertension (i.e., obesity) are minimized or eliminated.

Many options are available for treatment of hypertension, and medications should be selected based on patient-specific factors. Angiotensin-converting enzyme (ACE) inhibitors are common first-line medications because many patients with hypertension also have LVH or proteinuria, but ACE inhibitors should be used with caution in patients with significant renal scarring or dysfunction. This patient does not have any signs of kidney injury based on his serum creatinine value. He should have an echocardiogram to determine the presence of LVH. Beta-blockers can be used but should be avoided in a patient using insulin for diabetes, and they may also impair athletic performance by limiting heart rate. Because this patient may have problems with blood glucose management, as evidenced by the elevated blood glucose, and is also active in sports, a beta-blocker may not be the best first-line agent for pharmacotherapy. Calcium channel blockers, specifically the dihydropyridines, have also been used. These agents can also cause hypotension and peripheral edema.

As all of the medications listed can lower blood pressure, current recommendations state that initial choice of antihypertensive therapy can be based on practitioner experience, patient preference, and response to therapy.

Enalapril at a dose of 5 mg once daily would be appropriate first-line pharmacotherapy for this patient. Reassessment of blood pressure should occur on a weekly basis, and titration upward at 2.5 mg increments would be reasonable until goal blood pressure measurements are achieved. If enalapril does not achieve blood pressure goals at a maximum dose of 40 mg per day, a second agent may be added (again, based on the practitioner's preference and experience).