

APPROACH TO PEDIATRIC HYPERTENSION

1. General Presentation

Hypertension in children and adolescents is defined as having an average systolic and/or diastolic blood pressure that is at the 95th percentile or higher matched with the patient's gender, age and height. The high values must be obtained on three or more occasions. Hypertensive urgency is defined as severely elevated blood pressure with no evidence of target organ damage, but may cause end organ damage if left untreated. Hypertensive crisis/emergency is defined as elevated blood pressure above the 99th percentile for age and sex, with evidence of target organ damage.

Pediatric essential hypertension is on the rise due to the increasing prevalence of obesity among children. Essential hypertension is more common in adolescents and adults, while younger children often suffer from an underlying disease. Secondary hypertension can result from renal disease, endocrine causes, congenital heart disease, elevated intracranial pressure and exogenous medication/toxins. In children, it is extremely important to rule out secondary causes of hypertension before diagnosing essential hypertension.

Some common target organs that become damaged from hypertension include central nervous system, kidneys and cardiovascular system.

Pediatric hypertension is often asymptomatic, but some common symptoms may include [headache](#), nosebleeds, irritability, and impaired academic and athletic performances. Secondary hypertension may present with signs and symptoms of the underlying disease.

2. Questions to Ask

a) Presenting condition

- In the past, are your blood pressure readings normal? (a gradual rise with age is normal, sudden increase may suggest a secondary cause or malignant hypertension, which is common in adolescent boys of African descent)
- Ask about end organ damage symptoms (headache or weakness or dizziness for cerebrovascular disease, blurred vision for retina disease, angina pectoris for coronary artery disease, dyspnea from pulmonary edema for congestive heart failure)
- Do you experience flushing, sweating, fevers, palpitations or muscles cramps? (endocrine disorder causing secondary hypertension)
- Do you have diabetes mellitus? (increased risks for cardiovascular disease)
- Ask about risk factors including weight, diet (salt intake, coffee, tea), exercise, smoking, alcohol consumption, sleep problems (sleep apnea is associated with overweight and high blood pressure)

b) History

- Ask about growth and development (abnormality may indicate endocrinopathies)
- Have you been injured recently? (head trauma with resultant hemorrhage cause an increase in intracranial pressure and can mimic hypertension; renal trauma causing renal thrombosis can cause hypertension)
- Did you have blood in your urine? Do you wet your bed? (hematuria or enuresis may indicate a renal cause of hypertension)
- Ask about medications, drugs, herbal or nutritional supplements (anti-inflammatory agents, decongestants, stimulants, antidepressants, oral contraceptives, immunosuppressive agents)
- Ask about family history (essential hypertension, diabetes, obesity, renal disease, congenital heart disease, hyperlipidemia, stroke and endocrinopathy)
- Ask about history of umbilical artery / vein catheterization as an infant (renal thrombosis)

3. Differential Diagnosis

α) Common causes of secondary hypertension

- Coarctation of the aorta
- Renal vein thrombosis
- Renal artery stenosis
- Renovascular hypertension
- Renal parenchymal disease
- Renal tumor
- Pheochromocytoma
- Primary hyperaldosteronism
- Cushing's syndrome

Table 1. Common Causes of Pediatric Hypertension by Age Group

Age Group	Cause
Newborn	Renal: thrombosis, stenosis, anomalies
	Heart: coarctation of the aorta
	Endocrine: pheochromocytoma, Cushing disease
Preschool/kindergarten (<6 y)	Renal: parenchymal disease, vascular disease
	Heart: coarctation of the aorta
	Endocrine: pheochromocytoma, Cushing disease
	Renal: parenchymal, vascular
School age (6–10 y)	Endocrine: pheochromocytoma, Cushing disease
Adolescence	Essential hypertension
	Renal: parenchymal, vascular
	Endocrine: pheochromocytoma, Cushing disease
	Drugs of abuse

β) Diseases that mimic hypertensive encephalopathy

- Meningitis
- Brain tumor
- Intracerebral hemorrhage
- Epidural hemorrhage
- Stroke

4. Procedure for Investigation

a) Physical exam

- Measure height and weight to determine age percentile
- Measure blood pressure, if elevated (95th percentile or higher), must be confirmed with two additional visits, with two measurements at each visit (For diagnostic values refer to [Blood Pressure Table for Children and Adolescents](#) from the National Heart Lung and Blood Institute)
- Obtain four-limb blood pressures (if different between upper and lower extremities or right and left arms may indicate aortic coarctation)
- Measure respiratory rate, heart rate, and oxygen saturation
- Perform a comprehensive physical exam, including heart and lung (congestive heart failure or structural disease), abdominal (masses or pregnancy, bruit for renal vascular disease), fundoscopic and neurological examination (end organ damage)

b) Laboratory Tests

- Urinalysis (determine if renal causes)
- CBC (for anemia, may indicate chronic disease)
- Urine pregnancy test for pubertal girls
- Basic metabolic profile and electrolyte (determine if endocrinal causes)
- Creatinine, BUN
- Fasting lipid and glucose levels (for diabetes and preexisting metabolic problems)
- Renal Ultrasound
- Chest Xray and ECG to rule out cardiac diseases if suspected
- CT of head if positive neurological findings

References

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