Primary aldosteronism is usually recognized during evaluation of hypertension or hypokalemia and represents a potentially curable form of hypertension. Up to 5% of patients with hypertension have primary aldosteronism. These patients are usually between the ages of 30 and 50 years, and the female-to-male ratio is 2 : 1.

Clinical Presentation

Hypertension, hypokalemia, and metabolic alkalosis are the main clinical manifestations of hyperaldosteronism; most of the presenting symptoms are related to hypokalemia. Symptoms in patients with mild hypokalemia are fatigue, muscle weakness, nocturia, lassitude, and headaches. If more severe hypokalemia exists, polydipsia, polyuria, paresthesias, and even intermittent paralysis and tetany can occur. Blood pressure can range from minimally elevated to very high. A positive Trousseau or Chvostek sign may occur as a result of metabolic alkalosis.

Diagnosis and Treatment

Initially, hypokalemia in the presence of hypertension must be documented (Fig. 64-6). The patient must have adequate salt intake and discontinue diuretics before potassium measurement. A morning plasma aldosterone level (measured in ng/dL) and a PRA value (in ng/mL/hour) should be obtained. A ratio of serum aldosterone to PRA greater than 20 with a serum aldosterone level greater than 15 ng/dL suggests the diagnosis of hyperaldosteronism. Confirmatory tests for hyperaldosteronism should be performed, such as oral sodium loading, saline infusion, fludrocortisone suppression, or captopril challenge.

Once the diagnosis of primary aldosteronism has been demonstrated, it is important to distinguish between an aldosterone-producing adenoma and bilateral hyperplasia, because the former is treated with surgery and the latter is treated medically. A computed tomography (CT) scan of the adrenal glands should be performed to localize the tumor. The patient should undergo unilateral adrenalectomy if a discrete adenoma is observed in one adrenal gland and the contralateral gland is normal. Patients in whom biochemical and localization study findings are consistent with bilateral hyperplasia should be treated medically with a potassium-sparing diuretic, usually eplerenone or spironolactone. Hyperaldosteronism and hypertension secondary to activation of the renin-angiotensin system can occur in patients with accelerated hypertension, in those with renovascular hypertension, in those receiving estrogen therapies, and, rarely, in patients with renin-secreting tumors. Hyperaldosteronism without hypertension occurs in patients with Bartter's syndrome, sodium-wasting nephropathy, or renal tubular acidosis, as well as those who abuse diuretics or laxatives.

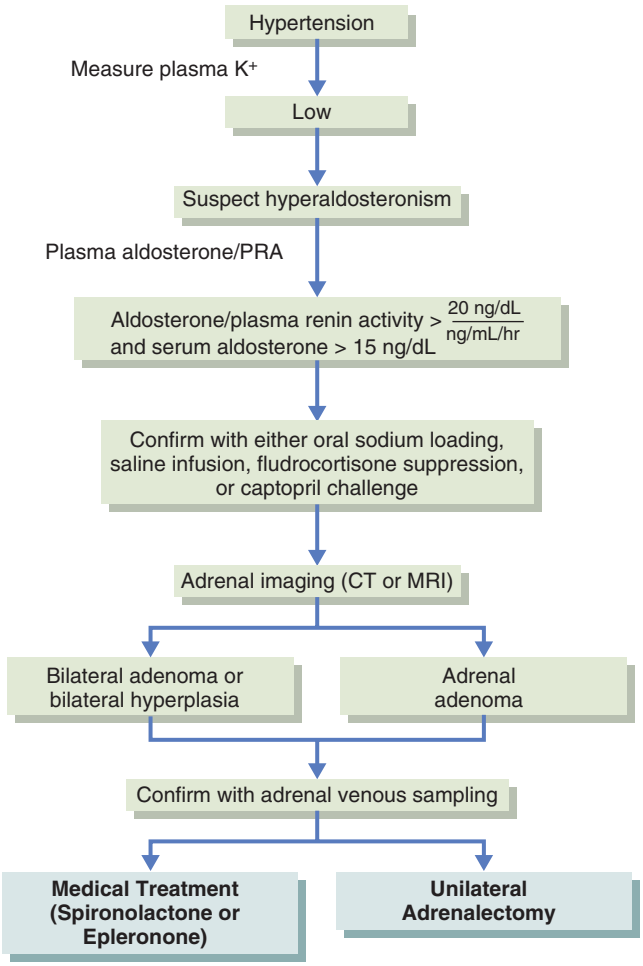

FIGURE 64-6 Flowchart for evaluation of a patient with probable primary hyperaldosteronism. Plasma aldosterone is measured in ng/dL, and plasma renin activity (PRA) is measured in ng/mL/hour. CT, Computed tomography; MRI, magnetic resonance imaging.

ADRENAL MEDULLARY HYPERFUNCTION

The adrenal medulla synthesizes the catecholamines norepinephrine, epinephrine, and dopamine from the amino acid tyrosine. Norepinephrine, the major catecholamine produced by the adrenal medulla, has predominantly α-agonist actions, causing vasoconstriction. Epinephrine acts primarily on the β-receptors, having positive inotropic and chronotropic effects on the heart and causing peripheral vasodilation and increasing plasma glucose concentrations in response to hypoglycemia. The action of circulating dopamine is unclear. Whereas norepinephrine is synthesized in the central nervous system and sympathetic postganglionic neurons, epinephrine is synthesized almost entirely in the adrenal medulla. The adrenal medullary contribution to total body norepinephrine secretion is relatively small. Hypofunction of the adrenal medulla has little physiologic effect, whereas hypersecretion of catecholamines produces the clinical syndrome of pheochromocytoma.

Pheochromocytoma

Pathophysiology

Although pheochromocytomas can occur in any sympathetic ganglion in the body, more than 90% arise from the adrenal medulla. Most extra-adrenal tumors occur in the mediastinum or abdomen. Bilateral adrenal pheochromocytomas are present in about 5% of the cases and may occur as part of familial syndromes. Pheochromocytoma occurs as part of multiple endocrine neoplasia type IIA or IIB. The former (Sipple's syndrome) is marked by medullary carcinoma of the thyroid, hyperparathyroidism, and pheochromocytoma; the latter is characterized by medullary carcinoma of the thyroid, mucosal neuromas, intestinal ganglioneuromas, marfanoid habitus, and pheochromocytoma. Pheochromocytomas are also associated with