Machine Learning and Its Applications in Healthcare

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Atherosclerotic renal artery stenosis (ARAS) is a major cause of renovascular hypertension and ischemic nephropathy, frequently leading to end-stage renal disease. Diagnostic evaluations for hemodynamically significant renal artery stenosis should target patients at moderate to high risk of renovascular disease. Key clinical indicators include severe or resistant hypertension, an acute rise in blood pressure from a previously stable level, young-onset hypertension without a family history, an unexplained and sustained increase in serum creatinine by more than 30% following the initiation of renin-angiotensin system inhibitors, moderate to severe hypertension in individuals with diffuse atherosclerosis, renal asymmetry, and recurrent episodes of flash pulmonary edema. Interventions for renal artery stenosis carry substantial risks, especially for patients with chronic kidney disease. ARAS is a progressive condition that can lead to worsening stenosis and eventual renal failure. The primary management strategy for renovascular hypertension should focus on treating the underlying cause. Medical management is the preferred initial approach for ARAS-induced renovascular hypertension, as numerous studies have shown no significant renal or cardiovascular benefits from invasive procedures. Patients should receive comprehensive medical therapy to control hypertension, routine chronic kidney disease care, and aggressive treatment for secondary cardiovascular prevention, including the use of aspirin, statins, smoking cessation, and glycemic control in diabetic patients. While medical therapy and risk factor reduction are crucial, revascularization may be warranted for certain patients based on the severity of hemodynamic impairment and the potential for kidney function recovery, typically through percutaneous transluminal renal angioplasty with stenting or, in selected cases, surgery.

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