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Opinion Article

The anatomy, function and clinical significance of the renal artery

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ABOUT THE STUDY

The renal arteries are a pair of arteries that supply blood to the kidneys. They are essential for the proper functioning of the kidneys, which are responsible for filtering waste and excess fluids from the blood. The renal arteries arise from the abdominal aorta, which is the largest artery in the abdomen. In this article, we will discuss the anatomy, function, and clinical significance of the renal arteries.

Anatomy

The renal arteries arise from the abdominal aorta, which is located just below the diaphragm. The right renal artery arises from the lateral aspect of the aorta, while the left renal artery arises from the posterior aspect of the aorta. The two renal arteries run laterally towards the kidneys, and each divides into four or five segmental arteries before entering the renal hilum. The renal hilum is the entrance to the kidney, located on the medial border of the kidney. The renal artery enters the renal hilum and branches into the segmental arteries, which further divide into interlobar arteries. The interlobar arteries run along the renal columns, which are extensions of the renal cortex, that project into the renal medulla. The interlobar arteries then divide into arcuate arteries, which run along the base of the renal pyramids. The arcuate arteries give off interlobular arteries, which penetrate the renal cortex and supply the glomeruli, which are the site of filtration in the kidney.

Function

The renal artery supplies blood to the kidneys, which are responsible for filtering waste and excess fluids from the blood. The kidneys receive approximately 20% of the cardiac output, which is the amount of blood pumped by the heart per minute. The high blood flow to the kidneys is necessary for their function as filters, as it allows for the efficient removal of waste and excess fluids from the blood. The renal arteries also regulate blood pressure and electrolyte balance. The kidneys produce renin, an enzyme that converts angiotensinogen to angiotensin I. Angiotensin I is then converted to angiotensin II by the Angiotensin-Converting Enzyme (ACE) in the lungs. Angiotensin II is a potent vasoconstrictor that increases blood pressure. It also stimulates the secretion of aldosterone from the adrenal cortex, which increases sodium reabsorption in the kidneys and water retention. The regulation of blood pressure and electrolyte balance by the renal arteries is essential for the maintenance of homeostasis in the body.

Clinical significance

The renal arteries can be affected by various pathological conditions that can lead to renal dysfunction or failure. One such condition is renal artery stenosis, which is a narrowing of the renal artery. Renal artery stenosis can be caused by atherosclerosis, fibromuscular dysplasia, or external compression of the artery. The narrowing of the renal artery reduces blood flow to the kidney, which can lead to hypertension, renal ischemia, and renal failure.

Renal artery stenosis can be diagnosed by various imaging modalities, such as ultrasound, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), or angiography. Treatment options for renal artery stenosis include medication, such as ACE inhibitors or angiotensin receptor blockers, or revascularization procedures, such as angioplasty or stenting. Another condition that can affect the renal arteries is renal artery aneurysm. Renal artery aneurysm is a dilation of the renal artery that can be caused by atherosclerosis, fibromuscular dysplasia, or connective tissue disorders. Renal artery aneurysm can be asymptomatic or can present with flank pain, hematuria, or hypertension.

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