Renal Nutcracker Syndrome



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Pathophysiology

Compression of Left Renal Vein

Compressed Left Kidney Vine

Renal nutcracker syndrome occurs due to compression of the left renal vein.

Between Superior Mesenteric Artery and Aorta

Super-mouse Archer and A-orca

In nutcracker syndrome, the left renal vein is compressed between the superior mesenteric artery and the abdominal aorta.

Clinical Features

Hematuria

Red-urinal

Compression of the left renal vein will induce renal veinous hypertension. This elevated pressure will cause varicosities/ utilization of the collateral circulation in the renal pelvis and ureter. Collateral vessels generally have weaker walls and can rupture easily, causing hematuria.

Abdominal Pain

Abdominal Pain-bolt

Patients with nutcracker syndrome may present with abdominal or flank pain that can radiate to the posteromedial thigh and buttocks. It can be triggered by standing, sitting, walking, or riding a vehicle that shakes.

Left-sided Varicocele

Left Vine-seal

Left renal vein compression will induce renal vein hypertension, which triggers the development of varicocele. It is characterized by an abnormal enlargement of the pampiniform venous plexus in the scrotum. This will present on physical examination as a "bag of worms" above the testicle.

Diagnosis

Doppler Ultrasound

Doppler-weatherman using Ultrasound

Doppler ultrasonography is the preferred diagnostic tool used to diagnose suspected nutcracker syndrome. Diagnosis can be made by a pressure gradient of more than 3 mmHg between the left renal vein and the inferior vena cava. It has a sensitivity of 78% and a specificity of 100%. CT and MR Abdomen can also be used to visualize the anatomy.

Management

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Weight Gain

Up-arrow Scale

A rapid increase in body height and rapid weight loss are risk factors for the development of nutcracker syndrome. This is due to the loss of retroperitoneal fat, which reduces the aortomesenteric angle. This will increase the chance of compression of the left renal vein, which lies between the superior mesenteric artery and the aorta. Weight gain will change the position of the left kidney, resulting in the relief of tension in the left renal vein.

ACE Inhibitors

Ace with Inhibiting-chains

Patients can experience benign orthostatic proteinuria. The pathogenesis is not well understood, but it is thought to be related to mild glomerular lesions, renal congestion, or both. ACE inhibitors can be used to treat this condition by reducing renal vascular resistance, filtration fraction, and intraglomerular capillary pressure.

Stent Placement

Stent

Endovascular stenting is used to release pressure in the left renal vein. Improvement of symptoms can occur in patients 6 months after the procedure. Surgery is especially indicated in patients with gross hematuria, severe symptoms, or ineffective conservative measures after 24 months in patients aged <18 and after 6 months in adults.

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