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FACULTY OF NURSING

# Renal Artery Stenosis



BY:-

Arpit Kamal

Nursing Tutor

MSN Department

Rama College Of Nursing

# Definitions

- **Renal artery stenosis** is narrowing or complete occlusion of one or both renal arteries, defined by radiograph imaging at
  - greater than 60% stenosis on renal Doppler
  - or*
  - greater than 50% on angiography
- **Ischaemic nephropathy** is a chronic reduction in GFR that occurs from a narrowing in the renal artery.
- **Renovascular HTN** (RVHTN) is HTN mediated by high levels of renin and angiotensin II, produced by an underperfused kidney behind a stenosed renal artery.

# Epidemiology

- **RAS** has a prevalence of 0.2% to 5% in all hypertensive patients.
  - Atherosclerotic RAS accounts for 90% of all RAS.
    - ✦ Prevalence is as high as 25% in patients with CAD
    - ✦ 2% of ESRD pts is due to ischemic nephropathy
    - ✦ More common in people aged older than 50 years
    - ✦ Found more commonly in women than in men
  - Fibromuscular dysplasia accounts for 10% of clinical RAS
    - ✦ Females are 2 to 10 times more likely than males
    - ✦ Onset typically occurs before the age of 30

# Aetiology

- **Atherosclerotic RAS:**
  - Atherosclerosis
  - Diabetes mellitus
  - Dyslipidemia
  - Smoking
- **Fibromuscular dysplasia:**
  - Medial fibroplasia (histological finding in 90% of cases)
  - Intimal and adventitial fibroplasia (less common)
  - Smoking
- **Other causes:**
  - Post-transplant (site of vascular anastomosis)
  - Miscellaneous renal arterial disease
  - Renal artery aneurysm
  - Accessory renal artery
  - Takayasu's arteritis
  - Atheroemboli
  - Thromboemboli
  - Williams syndrome
  - Neurofibromatosis
  - Spontaneous renal artery dissection
  - Arteriovenous malformations
  - Arteriovenous fistulas
  - Trauma
  - Abdominal radiotherapy
  - Retroperitoneal fibrosis.

# Pathophysiology

- When the stenosis exceeds 50% reduction in vessel diameter → underperfusion of the kidney → the regulatory mechanism (renin-angiotensin system) fail → □ vascular resistance & □ sodium retention → worsening kidney function & difficult-to-control HTN
- RAS →
  - Atrophy of tubular cells
  - Fibrosis of the capillary tuft
  - Intra-renal arterial medial thickening.

# Classification

- **Anatomical:**
  - Unilateral
  - Unilateral in a single functional kidney
  - Bilateral
  - Proximal
  - Distal
- **Severity:**
  - Moderate stenosis ( $\geq 50\%$  of RA diameter)
  - Severe stenosis ( $\geq 75\%$ )
  - Total occlusion (100%)

# Presentation

➤ In many cases, RAS has no symptoms until it becomes severe.

## Signs & Symptoms:

- edema, usually in the legs, feet, or ankles
- drowsiness or tiredness
- generalized itching or numbness
- dry skin
- headaches
- weight loss
- appetite loss
- nausea
- vomiting
- sleep problems
- trouble concentrating
- darkened skin
- muscle cramps



# Diagnosis

- RAS should be considered if
  - Age <30 or >50 when they developed HTN
  - NO FHx of HTN
  - Refractory hypertension (No improvement with using 3 or more of Anti HTN medications)
- Clinically (bruit on auscultation)
- Labs:
  - Serum creatinine
  - Serum potassium
  - Urine analysis and sediment evaluation
  - Aldosterone-to-renin ratio
- Duplex ultrasound (US + Doppler)
- Catheter angiogram
- Computerized tomographic angiography (CTA) scan
- Magnetic resonance angiogram (MRA)

# Treatment

- **Atherosclerotic patient group:**
  - 1<sup>st</sup> line: Antihypertensive therapy + Life style modification + Statin + Antiplatelet agents
  - 2<sup>nd</sup> line: stenting + medical therapy + clopidogrel
  - 3<sup>rd</sup> line: surgery
- **Fibromuscular dysplasia :**
  - 1<sup>st</sup> line: Antihypertensive therapy + Life style modification + percutaneous renal artery balloon angioplasty
  - 2<sup>nd</sup> line: Surgery + renal artery stenting and dual antiplatelet therapy

THANK YOU