

RENAL PAPILLARY NECROSIS

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ACADEMIC CORDINATOR - ECNG

INTRODUCTION

- In 1877, **Dr Nikolaus Friedreich(1825-1882)**; student of Virchow, who also described Friedreich's ataxia , **first** described renal papillary necrosis (RPN) in patients with prostatic hypertrophy and secondary hydronephrosis.
- **Renal Papillary Necrosis (RPN)** is a clinicopathological disorder characterized by the **ischemic coagulative necrosis** of the renal papillae and the medullary pyramids.
- **Common symptoms** and manifestations may include: • Flank pain or renal colic • Hematuria • Pyuria • Dysuria • Fever and chills • Decreased urine output or oliguria • Symptoms of underlying predisposing conditions, such as diabetes or sickle cell disease.

Intrarenal arterial anatomy

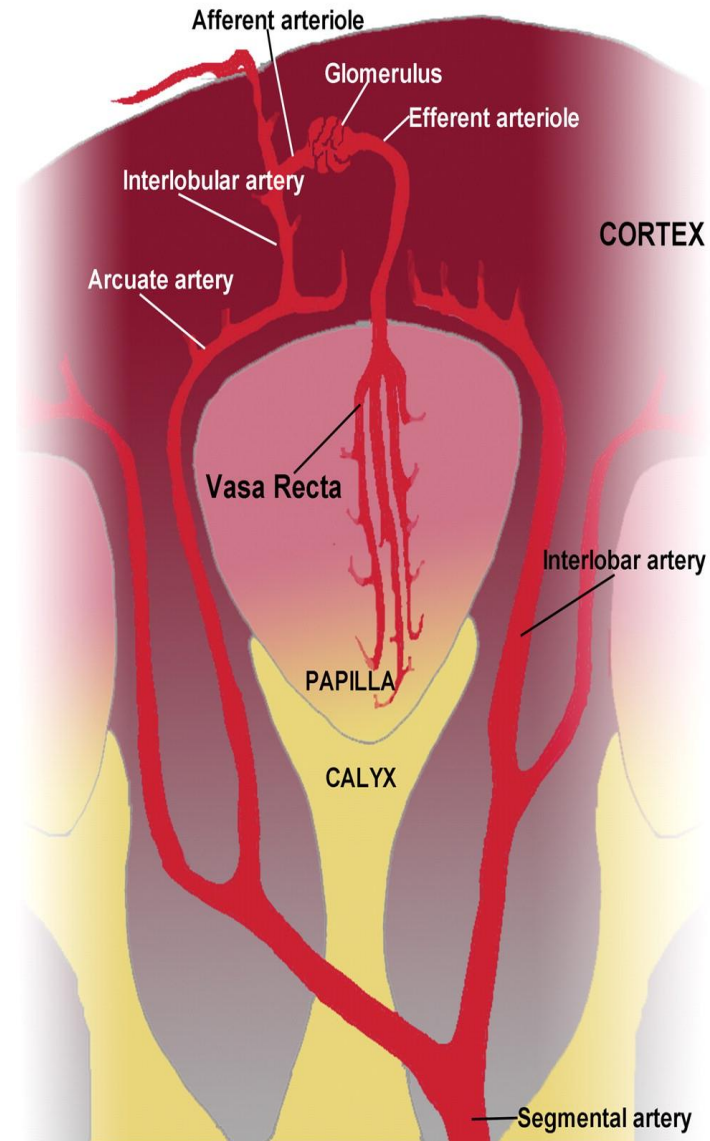
1. The main renal artery is divided into four or more segmental arteries that are further subdivided into lobar and interlobar arteries.

2. At the base of each renal pyramid, the interlobar arteries branch into arcuate arteries.

3. The arcuate arteries give rise to multiple radial arterial branches called interlobular arteries.

4. Blood leaves the glomerular capillary network via efferent arterioles, which either form a secondary capillary network around the urinary tubules in the cortex or descend into the renal medulla as long, straight vascular loops called vasa recta.

5. The vasa recta form wide and plentiful vascular bundles at the base of the medullary pyramid, but the bundles taper as they continue distally toward the apex and papilla; as a result, the papillary tip receives only a marginal blood supply.



CAUSES

[pneumonic - **POSTCARD**]

Pyelonephritis

Obstruction of the urinary tract

Sickle cell hemoglobinopathies, including sickle cell trait

Tuberculosis

Cirrhosis of the liver, Chronic alcoholism

Analgesic abuse

Renal transplant rejection, Radiation

Diabetes mellitus (commonest – accounts for more than 50% of the cases of renal papillary necrosis)

Key Pathophysiological Mechanisms:

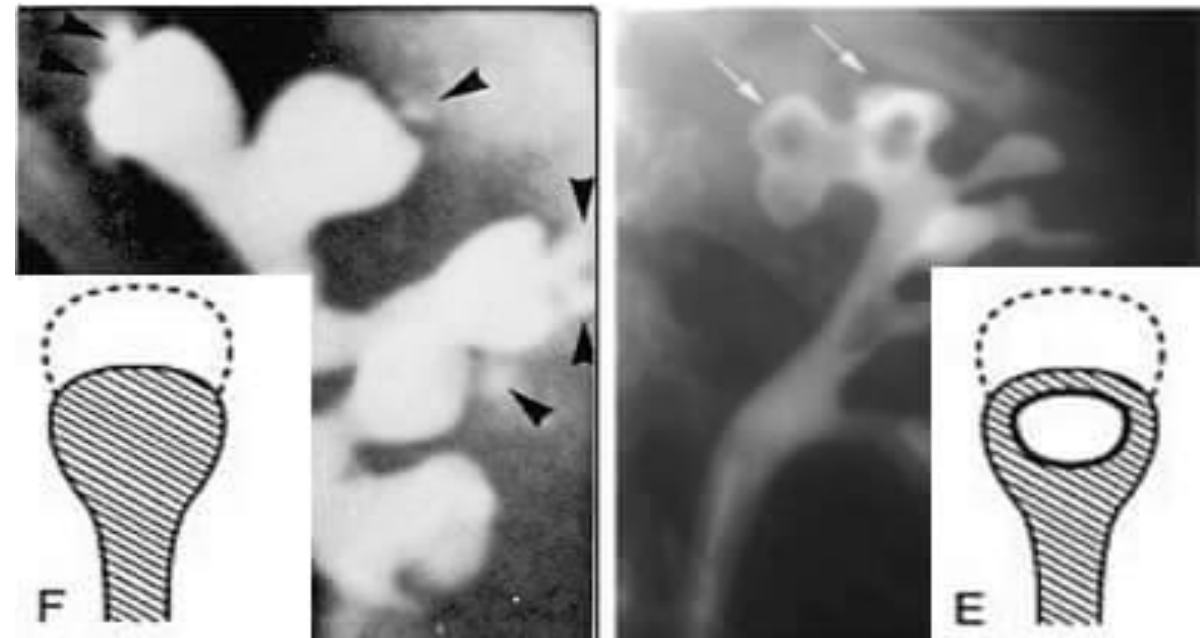
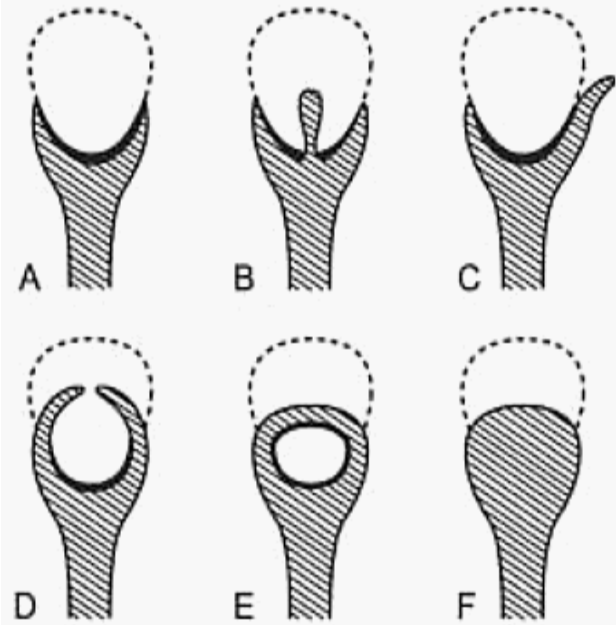
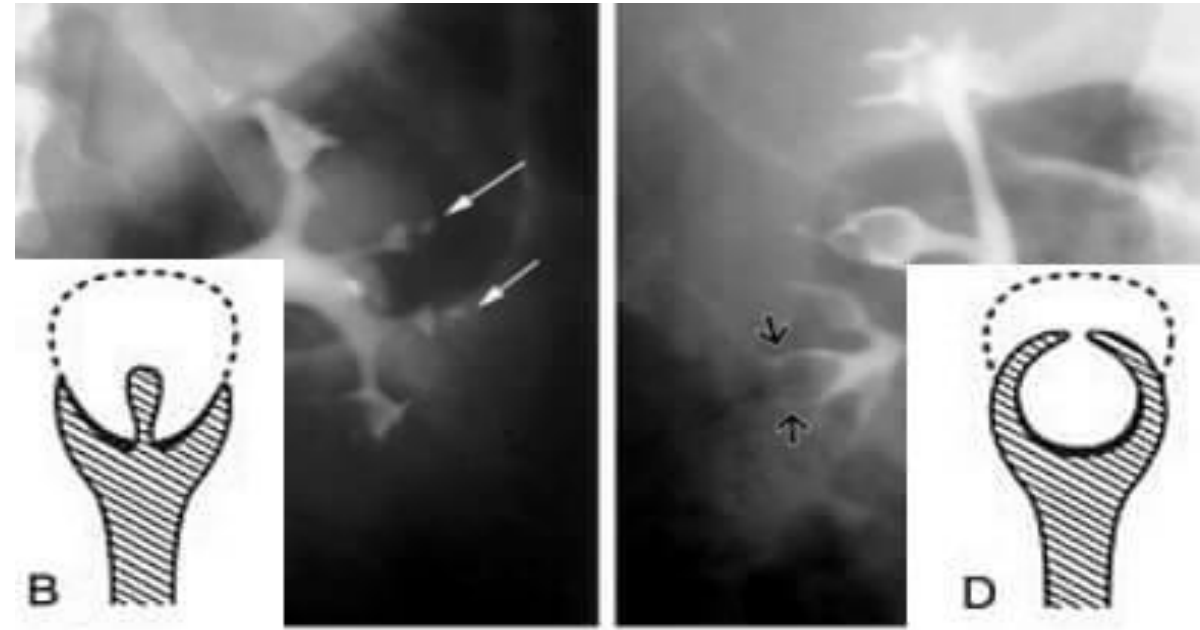
Ischemic Infarction: The papilla receives blood solely from the vasa recta, making it highly susceptible to ischemia.

Chronic Obstruction/Pressure: Increased pressure in the renal pelvis can compress the vasa recta, reducing blood flow to the papillary tip.

Toxic Injury: Analgesic abuse (especially NSAIDs) suppresses vasodilatory prostaglandins, leading to localized vasoconstriction and papillary hypoxia.

Metabolic Disruptions: Hypertonicity in **diabetic kidneys** can worsen vascular damage, while **Sickle Cell Hemoglobinopathies** promote sickling in the vasa recta due to low oxygen tension, causing infarction.

RADIOLOGICAL FINDINGS



Normal (A), Central excavation with ball-on-tee appearance (B), Forniceal excavation (C), Lobster claw appearance (D), Signet ring appearance (E), and sloughed papilla with clubbed calix (F)

TREATMENT

- **Treatment of underlying conditions:** Management strategies may include optimizing glycemic control in diabetes, discontinuing nephrotoxic medications, relieving urinary tract obstruction, and treating infections.
- **Pain management:** Analgesics and antispasmodic medications.
- **Fluid and electrolyte management.**
- **Antibiotic therapy:** Treatment of urinary tract infections or pyelonephritis contributing to papillary necrosis.
- **Surgical intervention:** In cases of severe urinary tract obstruction or complications such as renal abscess formation.
- **Prognosis and complications :** Depends on the underlying cause, extent of renal involvement, and promptness of treatment.