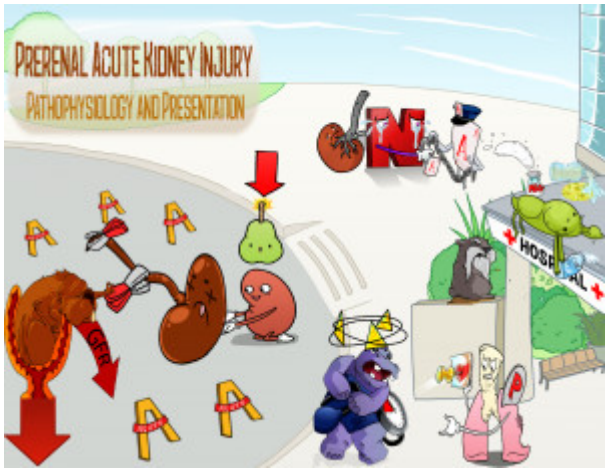
Prerenal Acute Kidney Injury Pathophysiology and Presentation

Prerenal acute kidney injury (AKI, azotemia) is a medical condition which results from low blood flow to the kidneys. Any condition that severely limits blood flow to the kidneys can cause prerenal acute kidney injury. This decreased renal perfusion leads to decreased glomerular filtration rate (GFR), which causes a compensatory increase in sodium and water reabsorption. Patients may present with edema, dyspnea, hypotension + tachycardia, altered mental status, or oliguria. Common etiologies include NSAIDs, renal artery stenosis, and ACE inhibitors.



PLAY PICMONIC

Pathophysiology

Decreased Renal Perfusion
Down-arrow Kidney Pear-fuse
Decreased renal blood flow is the main reason for the kidney damage, hence the term "prerenal".

Decreased GFR
Down-Arrow Gopher
Glomerular Filtration Rate (GFR) is an estimate of how much blood is being filtered by the kidneys' glomeruli. Since less blood is traveling to the kidneys, glomerular filtration rate will decrease.

Increased Sodium and Water Reabsorption
Salt and Water Bottle Sponge
Since the kidneys are being hypoperfused, their immediate response is to conserve fluids. This response aims to increase the total amount of blood in circulation in order to reestablish adequate blood flow to the kidneys. As a result, salt and water reabsorption increases.

Presentation

Edema
Edamame
As a result of increased water and salt reabsorption, patients become volume overloaded. This volume overload manifests as edema.

Dyspnea
Disc-P-lungs
Volume overload can manifest as pulmonary edema. Pulmonary edema will lead to characteristic dyspnea.

Hypotension with Tachycardia
Hippo-BP with Tac-heart-card
Even though the kidneys actively aim to reabsorb fluid, a significant amount of fluid end up in the extravascular space as edema and not in the circulating intravascular space. The low intravascular volume manifests as hypotension. The heart aims to correct the hypotension by increasing the overall heart rate so patients become tachycardic.

Altered Mental Status
Delta Halo
Due to electrolyte abnormalities caused in part by pathologic fluid resorption, altered mental status can occur.

Oliguria
Old-gopher
Due to the increased water and salt reabsorbtion, patients will experience low urine output. The low urine output is termed oliguria.

Sign up for FREE at picmonic.com

Etiologies

NSAIDs

N-sad

Chronic NSAID use can cause prerenal kidney injury. NSAIDs inhibit the formation of prostaglandins. Prostaglandins cause vasodilatation of the afferent arteriole. By inhibiting the formation of prostaglandins, NSAIDs inhibits vasodilatation of the afferent arteriole and lead to low renal perfusion.

Renal Artery Stenosis

Kidney Artery of Stone

Medical conditions such as renal artery stenosis limit kidney perfusion. Renal artery stenosis is a common cause of prerenal acute kidney injury.

ACE Inhibitors

Ace with Inhibiting-chains

Chronic ACE inhibitor use can cause prerenal kidney injury. ACE inhibitors prevent the formation of Angiotensin II. Recall that Angiotensin II vasoconstricts the efferent arteriole thus increasing overall renal perfusion. In the absence of angiotensin II, the efferent arteriole is dilated which results in low GFR.

Sign up for FREE at picmonic.com