

Renal Calculi Interventions

Renal calculi is characterized as flank pain caused by the formation of kidney stones within the urinary tract (refer to the Picmonic on "Renal Calculi Assessment"). Drug therapy includes opioids, NSAIDs, and antibiotics. To prevent recurrent stone formation, increasing fluid intake is recommended to keep urine diluted and free-flowing. Additional interventions include lithotripsy and surgical removal of kidney stones. Identifying the cause of renal calculi is critical for treatment planning. A low sodium diet is recommended to prevent recurrent kidney stone formation. Although most stones smaller than 4 mm will pass spontaneously, it may take weeks for the stone to pass.



PLAY PICMONIC

Interventions

Increase Fluid Intake

Up-arrow Fluid Intake

Increasing fluid intake for adequate hydration is recommended in patients with renal calculi. Adequate hydration helps keep urine diluted and free flowing to decrease the risk of recurrent stone formation. Unless contraindicated, encourage the patient to intake 3 L/day for urine output of 2 L/day. Since they may contribute to dehydration and recurrent renal calculi, instruct the patient to avoid colas, coffee, and tea. Avoid forcing fluids to prevent increasing pain or worsening renal colic.

Opioids

Poppy-droid

The passing of kidney stones may cause significant discomfort and pain. Opioids are prescribed to help relieve renal colic pain caused by kidney stones.

NSAIDs

N-sad

During the inflammatory process, prostaglandins are released and cause redness and pain. NSAIDs decrease the release of prostaglandin E and lessens spasms caused by renal calculi (refer to the Picmonic on "Ibuprofen (NSAIDs).") The anti-inflammatory and antipyretic properties of NSAIDs are indicated to help relieve pain caused by the passing of kidney stones.

Antibiotics

ABX-guy

Antibiotics are given to treat kidney infections related to renal calculi. Acetohydroxamic acid may be prescribed to prevent further stone formation. The medication inhibits bacterial chemical activity that promotes stone formation.

Lithotripsy

Lizard-gypsy

Lithotripsy is a procedure indicated to fragment kidney stones for elimination from the urinary tract. Procedures include laser lithotripsy, extracorporeal shock-wave lithotripsy (ESWL), percutaneous ultrasonic lithotripsy, and electrohydraulic lithotripsy. Since hematuria is common after lithotripsy procedure, a ureteral stent is inserted afterwards to prevent sand build up leading to obstruction and bleeding.

Surgical Stone Removal

Surgeon Removing Stone with Scalpel

Surgical stone removal is indicated for patients with renal calculi experiencing severe pain, infection, and obstruction. Depending on the location of the stone, surgical procedures to remove the stone include nephrolithotomy, pyelolithotomy, ureterolithotomy, and cystotomy. Since the renal structures are highly vascularized, it is critical to monitor the patient for hemorrhage during surgery. An endourologic procedure may be done to remove kidney stones located in the bladder. Cystoscopy is indicated to remove small stones, while cystolithotripsy is done to remove larger stones. Ureteroscopes are used to remove stones located in the renal pelvis and upper urinary tract.

Considerations

Identify Type CT-KUB

[Magnifying-glass Typewriter](#)

Identifying the patient's type of renal calculi is critical for determining the treatment plan for the underlying disease. Certain medications are prescribed to treat and prevent further stone formation. Patients with calcium oxalate kidney stones are prescribed thiazide diuretics, cellulose phosphate, potassium citrate, cholestyramine, and calcium lactate. Allopurinol and potassium citrate are indicated to help treat uric acid stones. Alpha-penicillamine, tiopronin, and potassium citrate are given to individuals with renal calculi caused by excessive levels of cystine. The diagnostic tool CT-KUB (kidney, ureters, and bladder) is a noncontrast spiral CT scan, which is commonly used. The CT-KUB is a quick and noninvasive procedure that does not involve IV contrast.

Low Sodium Diet

[Low Salt-shaker and Nutritional-plate](#)

High levels of sodium increase calcium in the urine, and too much calcium in the urine can lead to stone formations. Therefore, dietary sodium restriction is recommended for patients with renal calculi.
