Nephrolithiasis Diagnosis and Management

Nephrolithiasis can be diagnosed by urinalysis with culture, non-contrast CT, and/or ultrasonography. Stones are treated based on size. Stones less than 10 mm are treated with conservative management. 10-20 mm stones are treated with ESWL or ureteroscopy, and stones above 20 mm are treated surgically.



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Diagnosis

Urinalysis with Culture

Urinal with Urinalysis-cup and Petri-dish

Urinalysis with culture can aid in the diagnosis of nephrolithiasis. Microscopic or gross hematuria is found in 85% of patients with nephrolithiasis. The presence of white blood cells (WBCs), bacteria, crystals, and altered urinary pH can point to a particular etiology. Elevated urinary pH can be the result of infection or colonization by urease producing organisms. A urinary pH below 5 predisposes one to uric acid stones.

Noncontrast CT

Nun-Contrast-con Cat-scanner

Non-contrast CT scan is the most frequently recommended test to visualize stones with a sensitivity of 95-100%. It has advantages compared to other imaging studies, including detection of other possible abnormalities (e.g., renal carcinoma, aortic aneurysm, pancreatitis), avoiding IV contrast, and detection of stone composition (which is useful to predict the response of ESWL).

Ultrasound

Ultrasound-machine

Ultrasound is another imaging study that helps to visualize small stones, especially in patients who should limit radiation exposure, such as pregnant women and children. Stones less than 5 mm in size are difficult to visualize and may require CT. Clinical suspicion is raised in the setting of perirenal urinoma (leaked urine outside the urinary tract), hydroureter >6mm in size or if the stone is visualized directly.

Management

< 10 mm

Less Than (10) Tin

Most stones less than <10 mm can be passed spontaneously within 4 to 6 weeks. Supportive care can be used to accelerate the excretion of the stone (e.g. hydration).

Supportive Care

Supportive IV bags

Supportive care includes hydration, painkillers (e.g., NSAIDs), antiemetics, and antispasmodics. Antispasmodics, such as alpha-blockers (e.g., doxazosin and tamsulosin) and calcium channel blockers (e.g., nifedipine), can be used to accelerate stone passage. These drugs work by relaxing the smooth muscle of the ureter, and are commonly used for distal ureter stones 5-10 mm.

10-20 mm

(10) Tin to (20) Dollar-bill

10-20 mm stones are usually treated with extracorporeal shock wave lithotripsy (ESWL) or ureteroscopy.

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Extracorporeal Shock Wave Lithotripsy

Lizard-gypsy

ESWL utilizes shock waves to destroy stones by tensile and compressive forces. The shattered stone will be excreted with urine. ESWL is recommended in symptomatic patients with a total stone burden ? 20 mm.

Ureteroscopy

U-rooster-scope

Ureteroscopy is a more invasive procedure than ESWL and is used if ESWL fails. It uses a small semi-rigid or flexible scope to visualize the stone and enters via the urethra to the ureter and/or kidneys. Stones are destroyed with a laser and/or gripped and removed.

> 20 mm

Greater Than (20) Dollar-bill

Most stones >20 mm are treated with surgery.

Surgery

Surgeon

Surgery is indicated in cases refractory to ESWL and Ureteroscopy or for stones > 20 mm. Open/ laparoscopic/ robotic surgery (nephrolithotomy / pyelolithotomy / ureterolithotomy) should not be recommended as the first-line treatment except for large or complex stones, in rare cases of anatomic abnormalities, and for patients who need concomitant reconstruction.

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