

**RENAL
CALCULUS
MANAGEMENT**



Specific approaches

URINARY STONE	CHARACTERISTICS	PREDISPOSING FACTORS	THERAPEUTIC MEASURES
<p>Calcium Oxalate 35-40%</p>	<p>Small, often possible to get trapped in ureter, more frequent in men</p>	<ul style="list-style-type: none"> • Idiopathic • Hypercalciuria • Hyperoxaluria • Independent of urinary pH • Family history 	<ul style="list-style-type: none"> • Increase hydration • Reduce dietary oxalate • Give thiazide diuretics, cellulose phosphate,(chelate calcium and prevent GI absorption), potassium citrate(alkaline urine), cholestyramine(bind oxalate), calcium lactate(precipitate oxalate in GI tract) • Reduce daily sodium intake

Specific approaches

URINARY STONE	CHARACTERISTICS	PREDISPOSING FACTORS	THERAPEUTIC MEASURES
Calcium phosphate 8-10%	Mixed stones with struvite or oxalate stones	<ul style="list-style-type: none">• Alkaline urine• Primary hyperthyroidism	Treat underlying cause and other stones

Specific approaches

URINARY STONE	CHARACTERISTICS	PREDISPOSING FACTORS	THERAPEUTIC MEASURES
Struvite 10-15 %	3 to 4 times common in women \geq men, always in association with urinary tract infection	Urinary tract infections	<ul style="list-style-type: none">• Antimicrobial agents• Acetohydroxamic acid• Surgical interventions• Measures to acidify urine

Specific approaches

URINARY STONE	CHARACTERISTICS	PREDISPOSING FACTORS	THERAPEUTIC MEASURES
Uric acid 5-8 %	Predominant in Men, high incidence in jewish men	<ul style="list-style-type: none">• Gout• Acid urine• Inherited conditions	<ul style="list-style-type: none">• Reduce urinary concentration of uric acid.• Alkanize urine with potassium citrate.• Administer allopurinol.• Reduce dietary purines.

Specific approaches

URINARY STONE	CHARACTERISTICS	PREDISPOSING FACTORS	THERAPEUTIC MEASURES
Cystine 1-2 %	<ul style="list-style-type: none">• Genetic• Autosomal recessive defect• Defective absorption of GI• Cystine from GI tract and kidney excess concentrations causing stone formation	Acid urine	<ul style="list-style-type: none">• Increase hydration• Give α Pencillamine and Tiopronin to prevent cysteine crystallization• Potassium citrate to alkaline urine

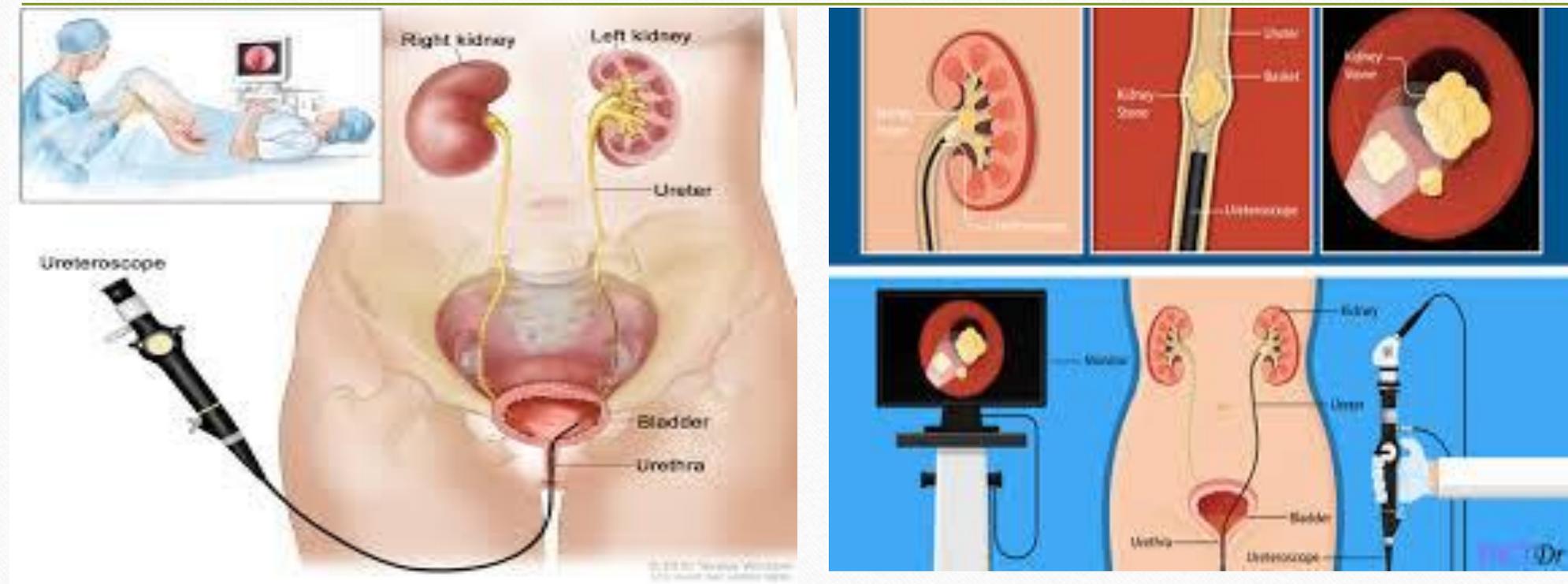
SURGICAL MANAGEMENT (CLOSED)



URETEROSCOPY

- ❖ Involves first visualizing the stone and then destroying it.
- ❖ Access to the stone is accomplished by inserting a ureteroscope into the ureter and then inserting a laser, electrohydraulic lithotripter, or ultrasound device through the ureteroscope to fragment and remove the stones.
- ❖ A stent may be inserted and left in place for 48 hours or more after the procedure to keep the ureter patent.
- ❖ Hospital stays are generally brief, and some patients can be treated as outpatients.

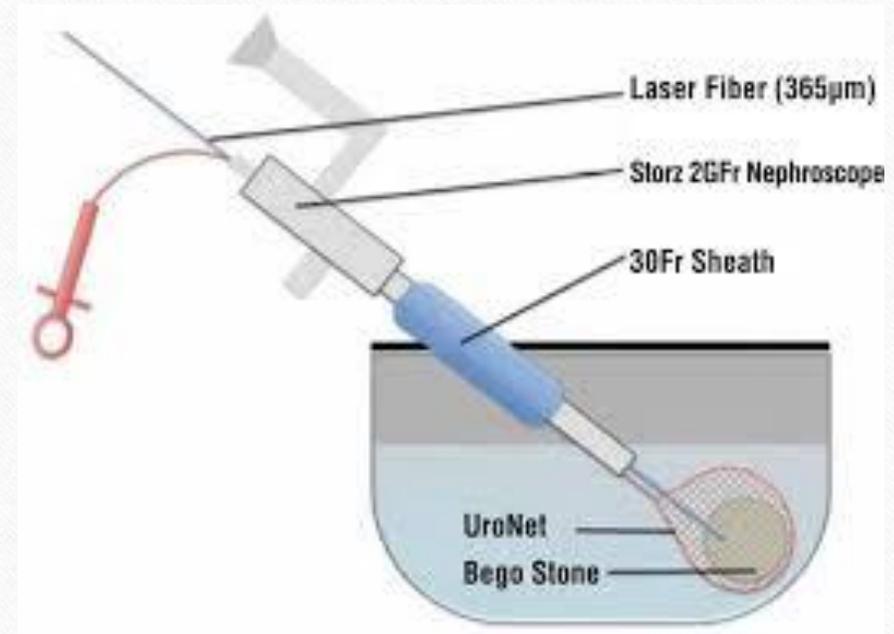
URETEROSCOPY



LITHOTRIPSY

LASER LITHOTRIPSY

- ❖ A newer treatment for calculi is laser lithotripsy. Lasers are used together with a ureteroscope to remove or loosen impacted stones. Constant water irrigation of the ureter is required to dissipate the heat

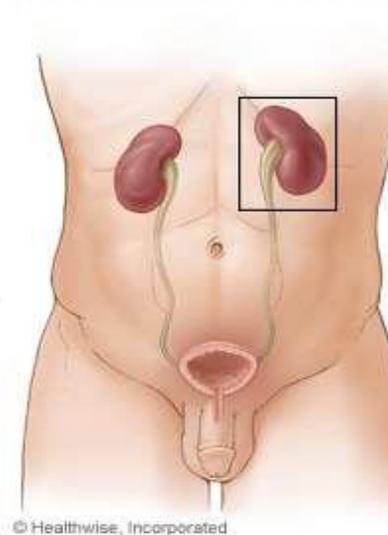


LITHOTRIPSY

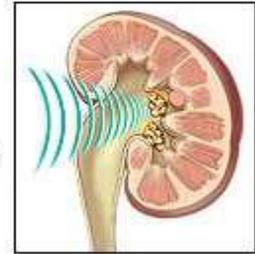


EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY (ESWL)

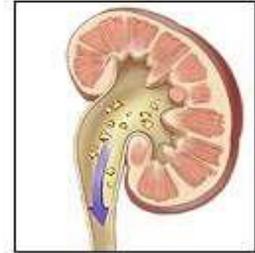
- ❖ ESWL is a noninvasive procedure used to break up stones in the calyx of the kidney.
- ❖ In ESWL, a high-energy amplitude of pressure, or shock wave, is generated by the abrupt release of energy and transmitted through water and soft tissues. When the shock wave encounters a substance of different intensity (a renal stone), a compression wave causes the surface of the stone to fragment. Repeated shock waves focused on the stone eventually reduce it to many small pieces.
- ❖ These small pieces are excreted in the urine, usually without difficulty. The fragments may be passed upto 3 months after the procedure
- ❖ Stone size should be 1.5-2 cm



Shock waves
break up
kidney stones



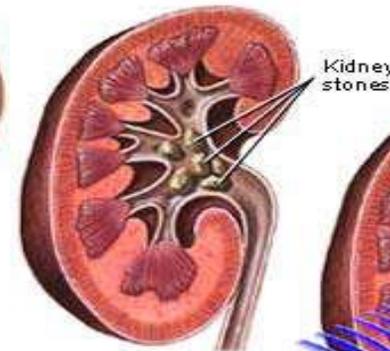
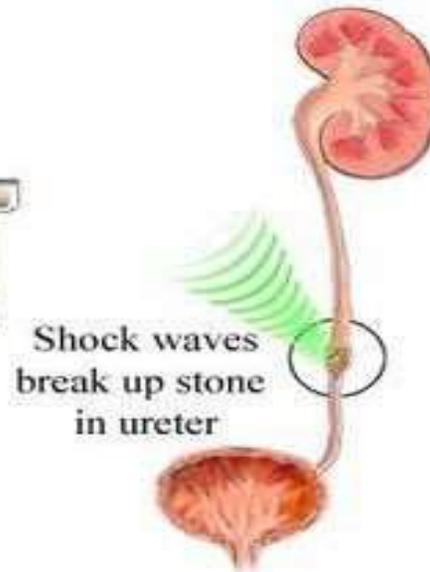
Small pieces
pass through
urinary tract



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Extracorporeal shock wave lithotripsy (ESWL) machine



"Simple" stones
too large to
pass through



Ultrasound
shock waves
crush stones



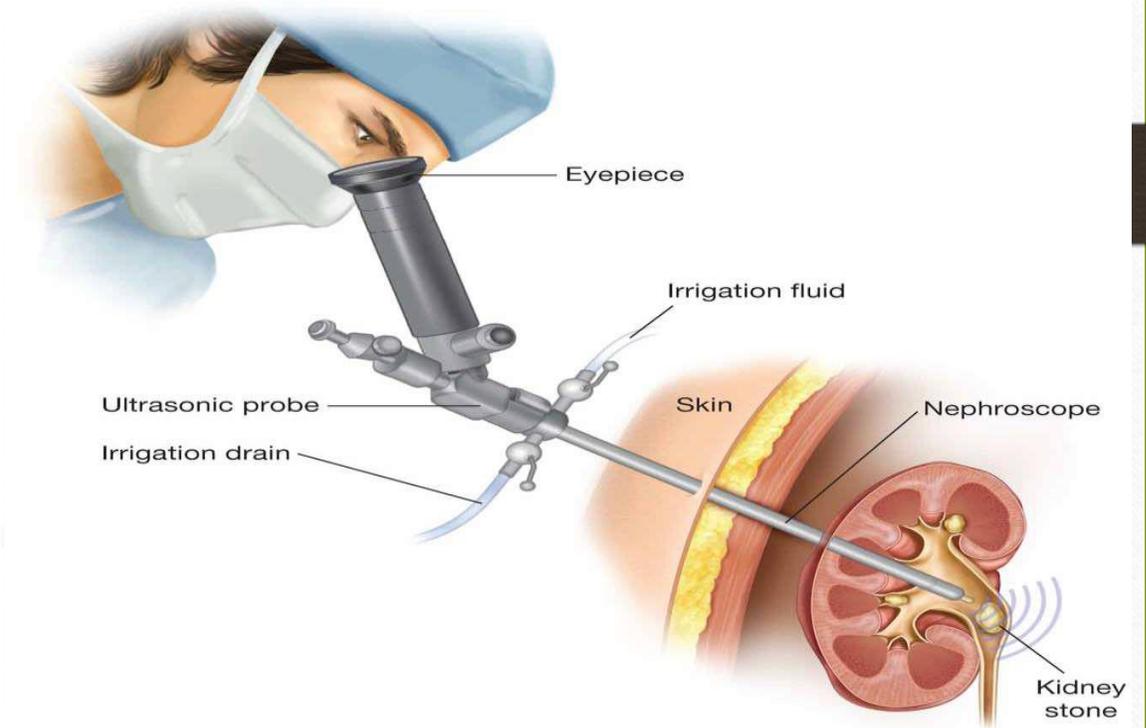
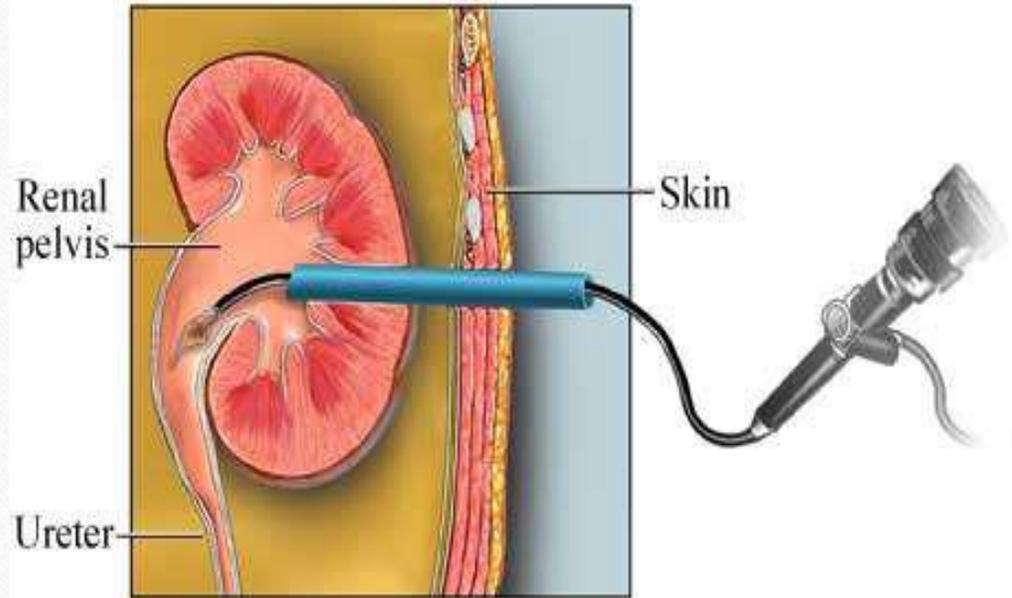
Smaller pieces
pass out of
body in urine

PERCUTANEOUS LITHOTRIPSY

- ❖ Percutaneous lithotripsy involves the insertion of a guide percutaneously (through the skin) under fluoroscopy near the area of the stone.
- ❖ An ultrasonic wave is aimed at the stone to break it into fragments.
- ❖ Stone size should be >2.5 cm

PERCUTANEOUS LITHOTRIPSY

Percutaneous Nephrolithotomy



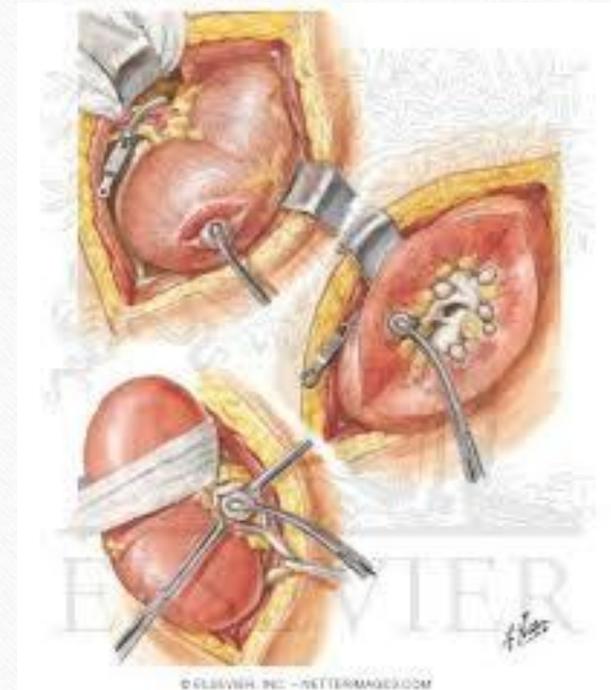
SURGICAL MANAGEMENT (OPEN)



OPEN SURGICAL PROCEDURE

If the stone is too large or if endourologic and lithotripsy procedures fail to remove it, an open surgical procedure is performed

- ❖ **Ureterolithotomy** is the surgical removal of a stone from the ureter through a flank incision for higher stones or an abdominal incision for lower ones. A Penrose drain and ureteral catheter are usually placed postoperatively for healing and drainage of urine.
- ❖ **Cystolithotomy** is the removal of bladder calculi through a suprapubic incision, is used only when stones cannot be crushed and removed transurethrally. Stricture (abnormal narrowing) is the most common postoperative complication.
- ❖ **Pyelo-lithotomy**: A stone is removed from the renal pelvis.
- ❖ **Nephrolithotomy**: A stone removed from the renal calyx.



POST OPERATIVE COMPLICATIONS

❖ IMMEDIATE

- Pain
- Urinary infection
- Obstructive uropathy
- Haematuria
- Urinoma- urinoma happens as a result of ureteral tear which allows the entry of free fluid into the retroperitoneum
- Renal and perirenal haematoma
- Surrounding organ injury

POST OPERATIVE COMPLICATIONS

❖ DELAYED

- Renal functional loss
- Hypertension
- Residual calculi
- Recurrent calculi

NURSING MANAGEMENT

❖ NURSING DIAGNOSIS

1. Acute pain related to irritation and spasm from stone movement in the urinary tract as manifested by complaints of pain, facial grimacing and restlessness.
2. Anxiety related to uncertain outcome and lack of knowledge regarding possible surgery as manifested by expressions.
3. Ineffective therapeutic regimen management related to lack of knowledge as manifested by repeated questions.
4. Impaired urinary elimination related to trauma or blockage of ureters or urethra as manifested by decreased urinary output and bloody urine.
5. Risk for infection related to introduction of bacteria following manipulations of the urinary tract and obstructed urinary blood flow

PREVENTION

- Avoid protein intake; usually protein is restricted to 60g/day to decrease urinary excretion of calcium and uric acid.
- A sodium intake of 3 to 4 g/day is recommended. Table salt and high-sodium foods should be reduced, because sodium competes with calcium for reabsorption in the kidneys.
- Low-calcium diets are not generally recommended, except for true absorptive hypercalciuria. Evidence shows that limiting calcium, especially in women, can lead to osteoporosis and does not prevent renal stones.
- Avoid intake of oxalate-containing foods (eg, spinach, strawberries, rhubarb, tea, peanuts, wheat bran).
- During the day, drink fluids (ideally water) every 1 to 2 hours.
- Drink two glasses of water at bedtime and an additional glass at each nighttime awakening to prevent urine from becoming too concentrated during the night.
- Avoid activities leading to sudden increases in environmental temperatures that may cause excessive sweating and dehydration.
- Contact your primary health care provider at the first sign of a urinary tract infection

ASSIGNMENT

Write down the nursing process for the given nursing diagnosis.

LOVE YOUR KIDNEYS

