

Surgical Treatment of Urolithiasis

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Percutaneous Nephrolithotomy (PCNL)

PCNL is a good option used for large stones in the kidney or upper ureter. It can also be used when other approaches have failed to break or clear the stone.

The procedure entails creating a small tract into the kidney from small incision in the body side wall by either fluoroscopic or ultrasound guidance .

The conventional PCNL is done in a prone position, but lateral or supine position can be utilized to allows direct access to the stone containing calyx.

Indications and contraindications:

The usual indications for PCNL are :

- 1-Stones larger than 20 mm, staghorn or partial staghorn calculi.
- 2- Stones in the lower pole or stone in calyceal diverticulum.
- 3- Calculi associated with congenital anomalies such as stone contained within an obstructed collecting system or a horseshoe kidney.
- 4- Large impacted proximal ureteric stones
- 5- When other approaches are not feasible or have failed.

The contraindications for PCNL include: **pregnancy, bleeding disorders and uncontrolled urinary tract infections**

Complications:

1. Infection and urosepsis
- 2- Bleeding
- 3-Extravasation of fluid
4. Intravascular fluid overload
- 5.Injury to adjacent organs like liver, spleen, pleura or bowel.

Ureterorenoscopy (URS)

Ureteroscopic removal of ureteral stones with a basket or forceps is a relatively quick procedure with a lower morbidity rate than lithotripsy . Rigid and flexible

ureteroscopes are nowadays available , The stone disintegrations is carried out intracorporeal by the Holmium:Yttrium Aluminum Garnet (Ho:YAG) laser lithotripsy or ballistic lithotripters.

ureteroscopes can be used for the treatment of proximal as well as distal ureteric stones. Flexible URS has been also demonstrated as being an efficient treatment for ESWL refractory renal calculi.

The URS complications rate is very low. The most common complications are: **sepsis, stricture, ureteral injury and urinary tract infection .**

While ESWL is less invasive and has the lowest complication rates, a stone-free state can be achieved faster with URS. Stone-free rates might be advantageous for larger calculi with URS.

Retrograde Intrarenal Surgery (RIRS)

Retrograde intrarenal surgery (RIRS) performed using a flexible ureterorenoscope that passed into the renal pelvis through the ureter. Kidney stones were fragmented to dust with the aid of a holmium laser (Ho YAG Laser).

RIRS is associated with fewer complications and less morbidity when compared with PCNL and it should be used to treat large stones.

Open, laparoscopic and robotic-assisted surgery

With the advances in ESWL and endourological surgery, such as URS and PCNL, during the past 20 years, the indications for open stone surgery have markedly diminished. open, laparoscopic or robotic-assisted surgery is a viable option increasingly used in situations including complex stone burden, failed previous ESWL or endourological procedures, anatomical abnormalities, morbid obesity and those requiring concomitant reconstruction surgery .

open, laparoscopic or robotic-assisted surgery are being used to remove both renal and ureteric stones.

Emergency treatment

Emergency presentation with obstructive stones and suspicion of urinary tract infection requires drainage with a ureteral stent (double J stent) or a nephrostomy tube. A urine sample for culture and sensitivity should be sent and an appropriate course of antibiotic treatment can be completed before plans for definitive stone therapy.