AMALTAS
Institute of Medical Sciences
(A Unit Of Amaltas Educational Welfare Society)

अमलतास
सुपर स्पेशलिटी अस्पताल, देवास

MODALITIES OF TREATMENT OF UROLITHIASIS

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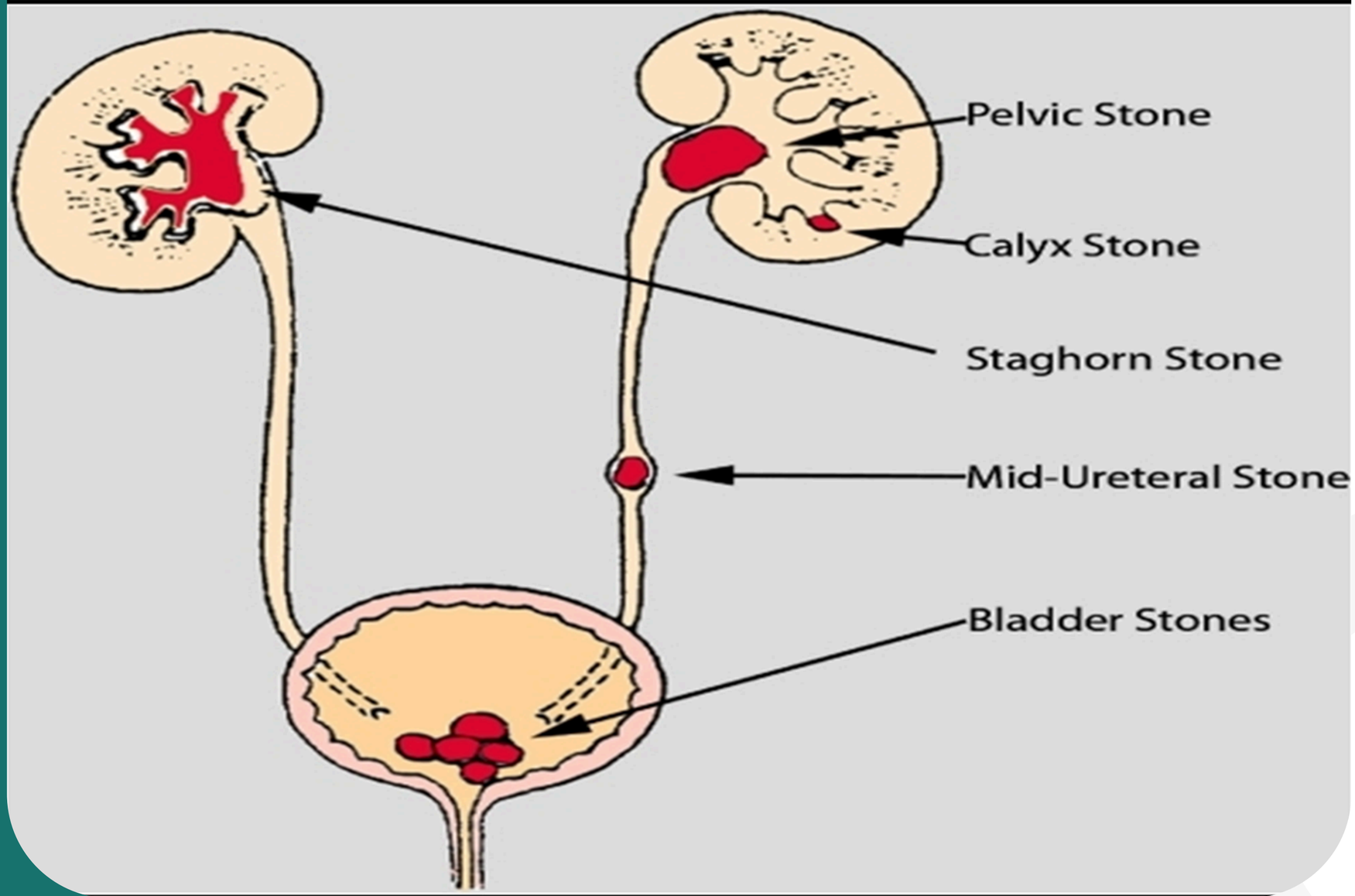
UROLITHIASIS

UROLITHIASIS (FROM GREEK OÛRON-URINE AND LITHOS-STONE) IS THE CONDITION WHERE URINARY STONES ARE FORMED OR LOCATED ANYWHERE IN THE URINARY SYSTEM.

Sites Of Calculus In Urinary System



INVESTIGATIONS TO DIAGNOSE URINARY STONE-

- Ultrasonography KUB
- Intravenous Urography (IVU)
- CT Urography

TREATMENT OF UROLITHIASIS-

- Conservative (Medical)
- Surgical

CONSERVATIVE TREATMENT

Conservative treatment is not successful in many cases but it is indicated in following situation-

- Non Obstructing stone
- Stones of size < 5 mm
- Small distal ureteric stone

CONSERVATIVE MEASURES INCLUDE:

1- Encourage fluid intake ≥ than 3L/day.
2- Analgesia (whether NSAID or centrally acting analgesia).
3- alpha blockers
4- Encourage exercise and movement. .
5- Alkalanization of urine.

With conservative treatment stones 5-8 mm in size often pass, especially if located in the distal ureter.

Review and ensure stone has passed by followup study
Absence of pain does not confirm stone expulsion.

SURGICAL TREATMENT OF NEPHROLITHIASIS (RENAL STONE)

- NON INVASIVE : ESWL
- MINIMALLY INVASIVE : PCNL
  MINIPERC
- INVASIVE : PYELOLITHOTOMY
  EXTENDED PYELOLITHOTOMY
  NEPHROLITHOTOMY

SURGICAL TREATMENT OF URETEROLITHIASIS

(URETERIC STONE)

- Non Invasive: ESWL
- Minimally Invasive : Endourological Procedure (URS)
  Laproscopic Ureterolithotomy
  Retrograde intrarenal surgery (RIRS)
- Invasive : Open Ureterolithotomy

SURGICAL TREATMENT OF VESICAL CALCULS

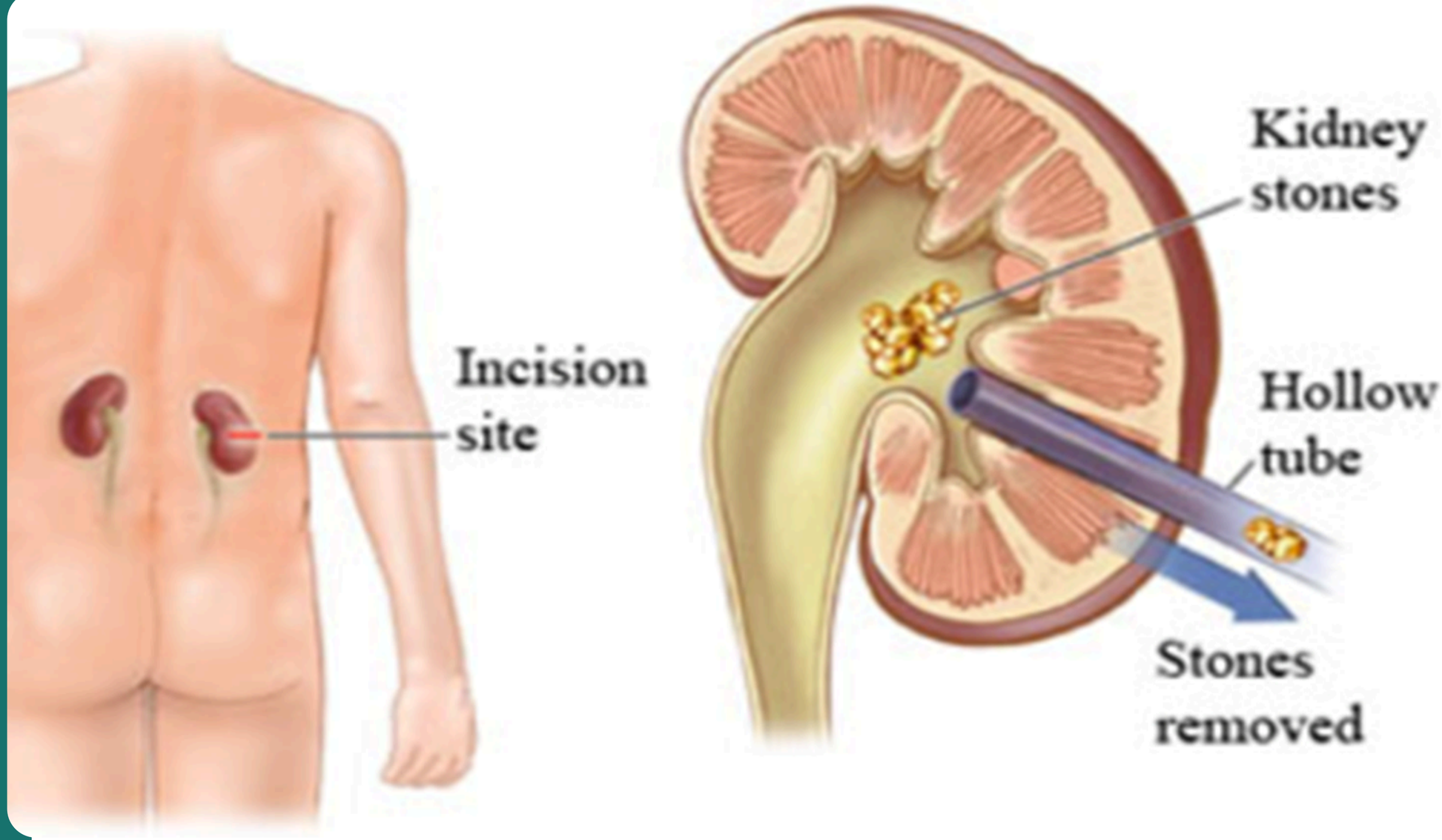
- Minimally Invasive : Transurethral Cystolithotripsy
  Percutaneous Cystolithotripsy
- Invasive : Suprapubic Cystolithotomy

INDICATIONS FOR PCNL IN RENAL CALCULI BASED ON VARIOUS TRIALS CONDUCTED ARE –

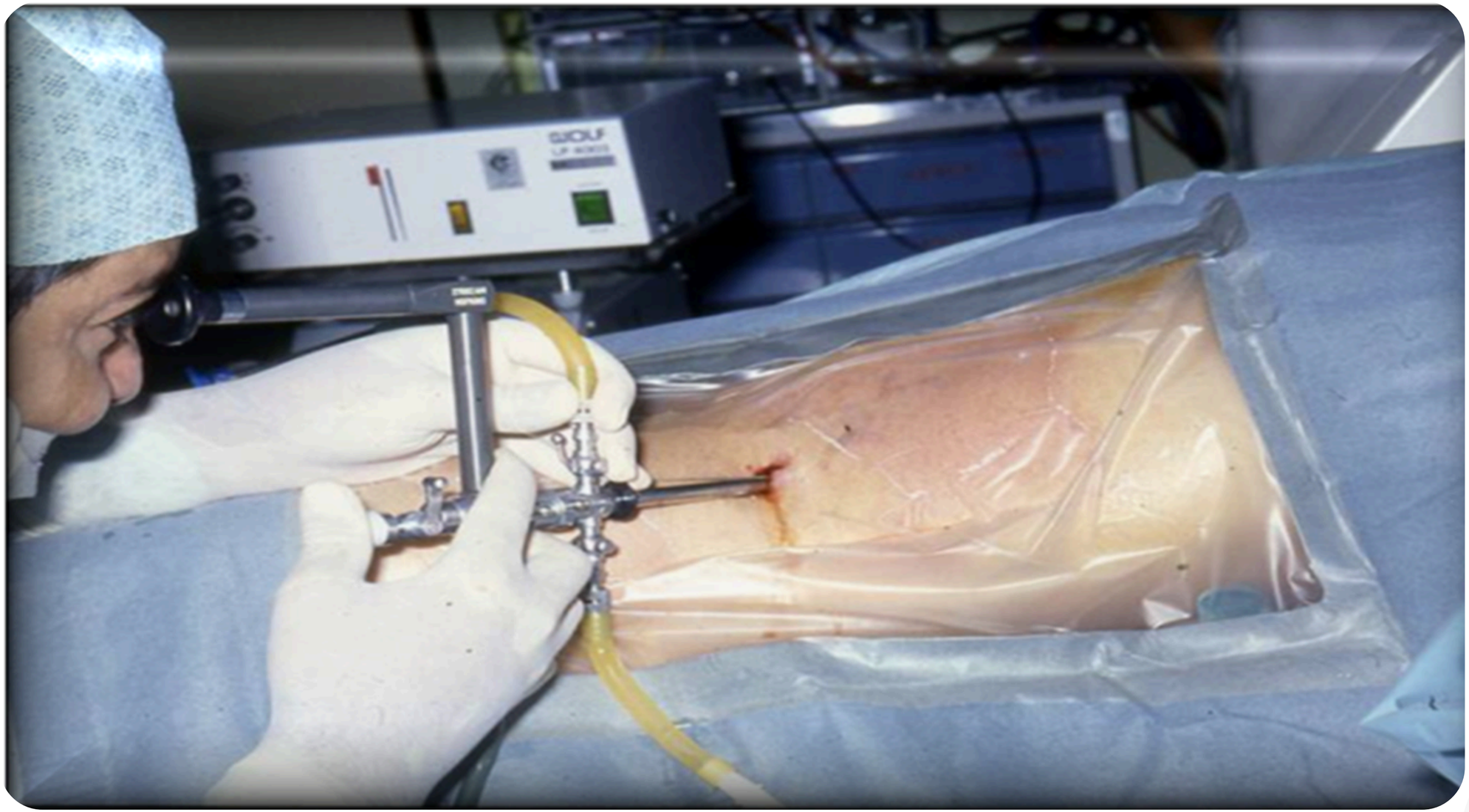
- Size greater than 2 cms
- Hard stones which are difficult to fragment by ESWL (eg-cystine, calcium oxalate monohydrate etc)
- Lower pole stones with unfavourable anatomy Calyceal diverticular stones.
- In horseshoe kidney

POSITION OF PATIENT IN PCNL

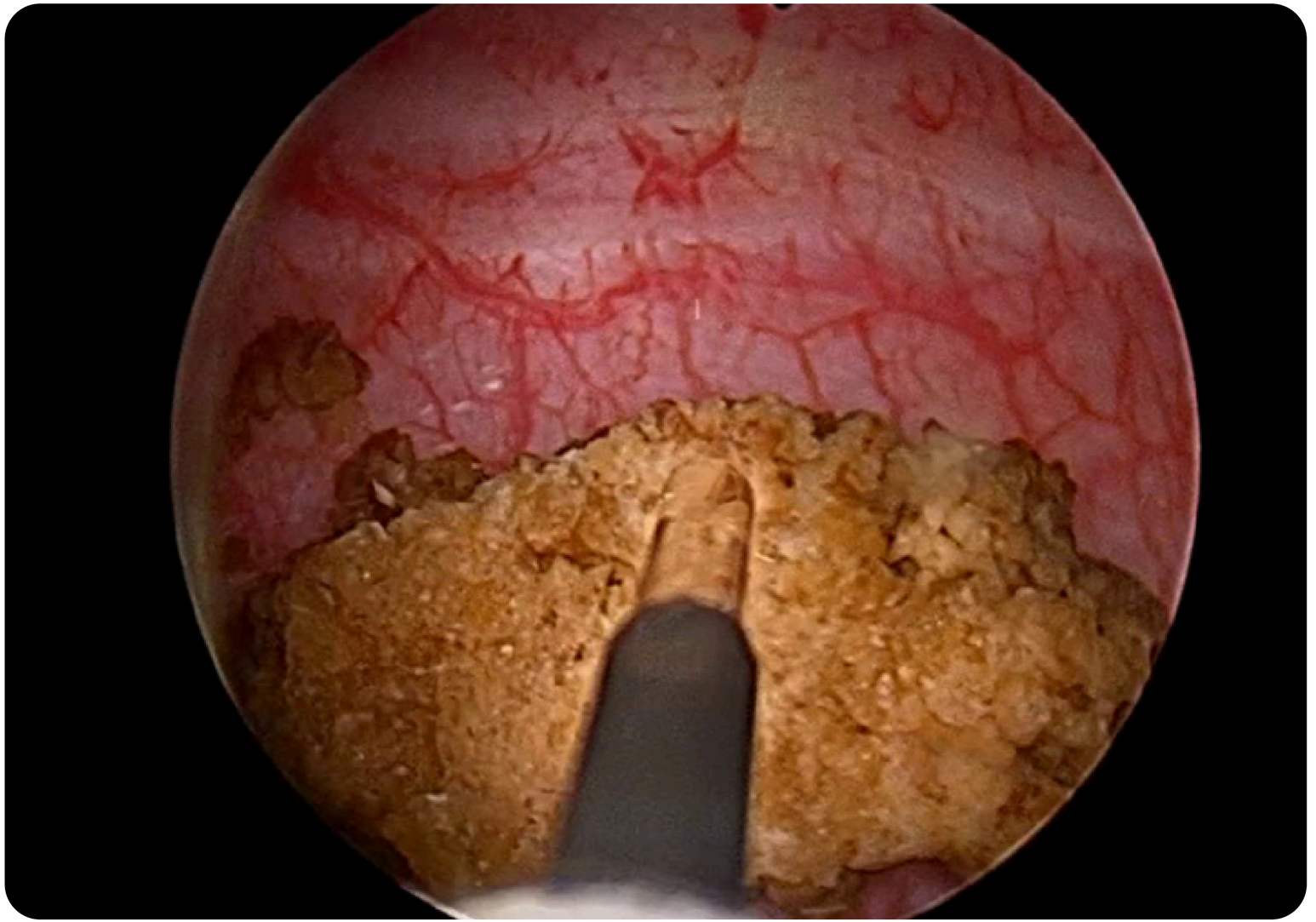
PCNL TRACT



PCNL TRACT



ENDOSCOPIC VIEW OF STONE



PCNL

TECHNIQUE

1-Access **2-Removal**

1)Access to the calyceal system:

- Fluoroscopic or ultrasonic control required.
- Generally through a lateral calyx, one of the inferior calyces in most instances.
- Approach through the upper polar calyces is useful for access to the pelvis and UPJ, but the risk of pleural injury is significantly increased.

- AN 18-GAUGE NEEDLE IS PLACED THROUGH THE FLANK INTO THE KIDNEY

- A GUIDE WIRE OF .035 OR .038 SIZE IS PASSED THROUGH THE NEEDLE.

- THE TRACT IS ENLARGED BY PASSING SERIAL OR TELESCOPIC TEFLON OR METAL DILATORS CO-AXIALLY OVER THE GUIDE WIRE.

AMPLATZ SHEATH IS PASSED OVER THE LAST DILATOR,

- THE NEPHROSCOPE IS PASSED THROUGH THE SHEATH TO VISUALIZE THE INSIDE OF THE COLLECTING SYSTEM.

Stone Removal

STONE REMOVAL

- Small stones can be removed intact with forceps or basket.

- For Larger ones, Lithotripsy is required for fragmentation

- Pneumatic
- Electrohydrolic
- LASER

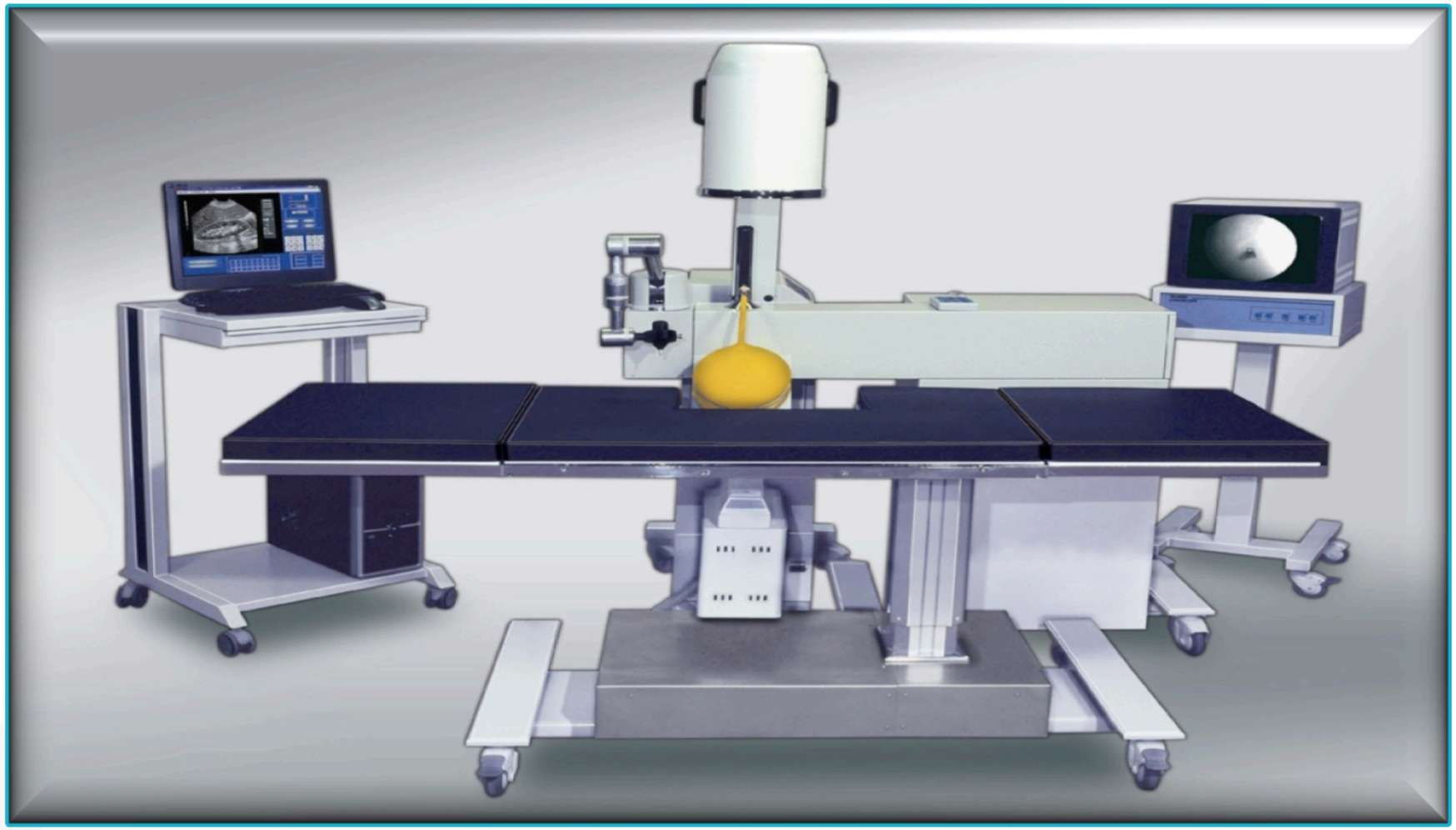
COMPLICATION OF PCNL

- Fever
- Bleeding
- Urinary leakage through nephrostomy site
- Problems due to residual stones
- Visceral injury
- Pneumothorex

ESWL

- HIPPOCRATIC OATH :

  I Will not cut, even for the stone, but leave such procedures for the practitioners of the craft



EXTRACORPOREAL SHOCK WAVE LITHOTRIPSY (ESWL)

- Truly non invasive therapy for urinary calculi.

  - **It is especially suitable for**

  Renal or upper ureteric stones,

  Stone size(10-15 mm) and

ALL LITHOTRIPTERS SHARE SIMILAR TECHNOLOGIC PRINCIPLES IN HAVING THREE MAIN COMPONENTS:

- an **energy source,**
- 2.a system to **focus the shock wave;** and
- 3.fluoroscopy or ultrasound to **visualize and localize the stone** in focus

Extracorporeal shock wave lithotripsy (ESWL) machine

Shock Wave Generator

↓ Waves travel through water

Body-Water Interface

↓ Similar impedence

↓ No energy dissipation

Entry Surface of Stone

↓ Sudden change in impedence

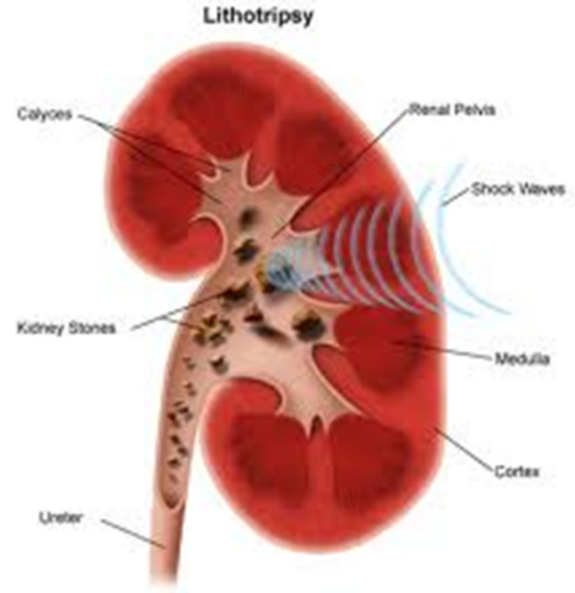
Release Compressive Energy

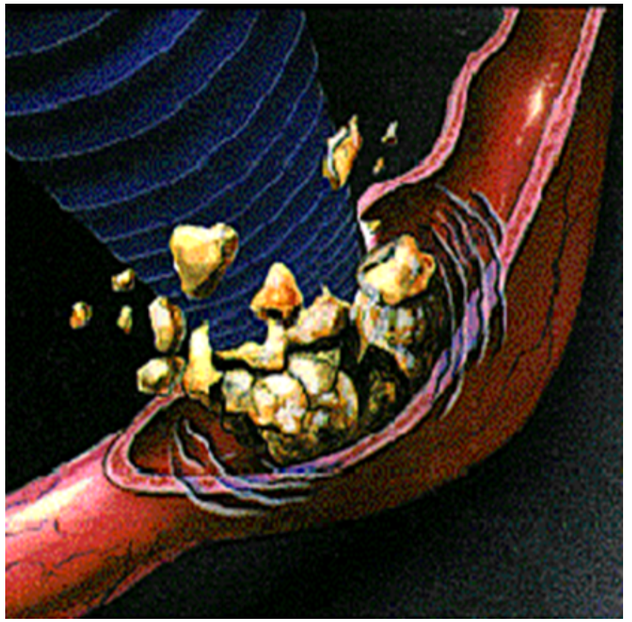
Exit Surface of The Stone

↓ Another Impedence Change

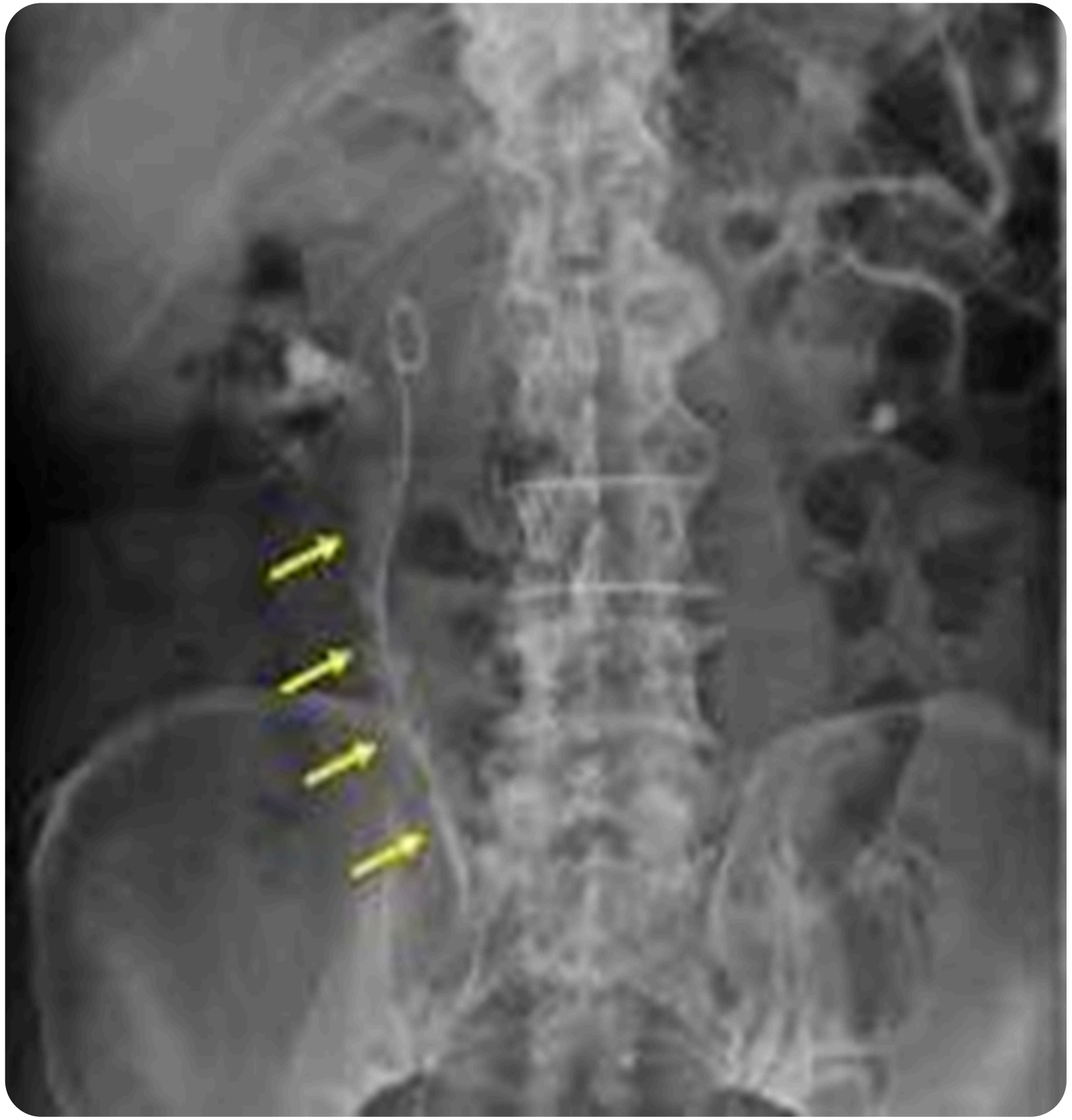
Shock Wave Energy Released as a Blast.

Repeat Cycles Cause the Stone to Disintegrate





STEINSTRESS



Absolute Contraindication to ESWL are-

- ACUTE URINARY TRACT INFECTION OR UROSEPSIS
- UNCORRECTED BLEEDING DISORDER OR COAGULOPATHIES
- PREGNANCY
- UNCORRECTED OBSTRUCTION DISTAL TO THE STONE

Poor results with E.S.W.L for renal calculi can occur due to

- LARGE CALCULI
- STONES WITHIN DEPENDANT OR OBSTRUCTED PORTIONS OF THE COLLECTING SYSTEM
- STONE COMPOSITION - CALCIUM OXALATE MONOHYDRATE OR BRUSHITE.
- OBESITY AND BODY HABITUS THAT INHIBITS IMAGING AND UNSATISFACTORY TARGETING OF THE STONE.

Treatment Of Ureteral Calculi

1.Transurethral ureteroscopic lithotripsy(URSL)-

THE TREND IN MEDICINE CONTINUES TO BE TOWARD NONOPERATIVE OR MINIMALLY INVASIVE SURGICAL PROCEDURES. AS PART OF THIS, THERE HAS BEEN A STEADY INCREASE IN THE NUMBER OF ENDOSCOPIC PROCEDURES PERFORMED WITHIN UPPER URINARY TRACT INCLUDING TRANSURETHRAL URETEROSCOPY.

Indications of URSL -

- SALVAGE FOR FAILED SHOCKWAVE LITHOTRIPSY (SWL).
- KNOWN HARD STONE (CALCIUM OXALATE MONOHYDRATE, CYSTINE, BRUSHITE).
- UNCORRECTABLE BLEEDING DIATHESIS.
- MULTIPLE PROXIMAL URETERAL STONES.
- STONES >1 CM (DECREASED RATE OF SUCCESS WITH SWL WHEN STONE IS >1 CM).
- RADIOLUCENT STONES.

URSL mainly used for treatment of ureteric stones especially in the fallowing situations

1- Mid and lower ureteric stones with

- FAILURE OF CONSERVATIVE EXPECTANT TREATMENT.
- WHERE ESWL IS CONTRAINDICATED.

2- Upper ureteric stones with

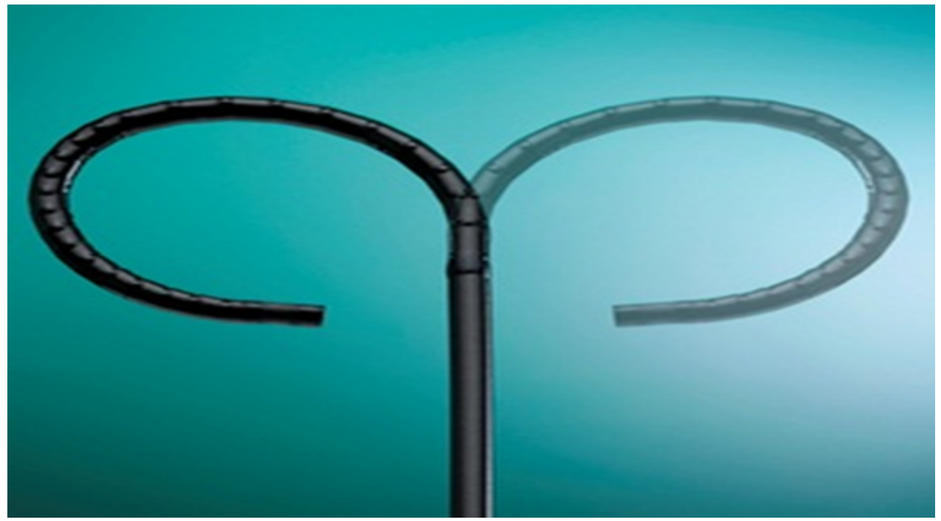
- FAILURE OF CONSERVATIVE AND ESWL TREATMENT.

Types of ureteroscopes used:

- URETEROSCOPES WHICH ARE USED CAN BE

A. RIGID URETEROSCOPES

B. FLEXIBLE URETEROSCOPES



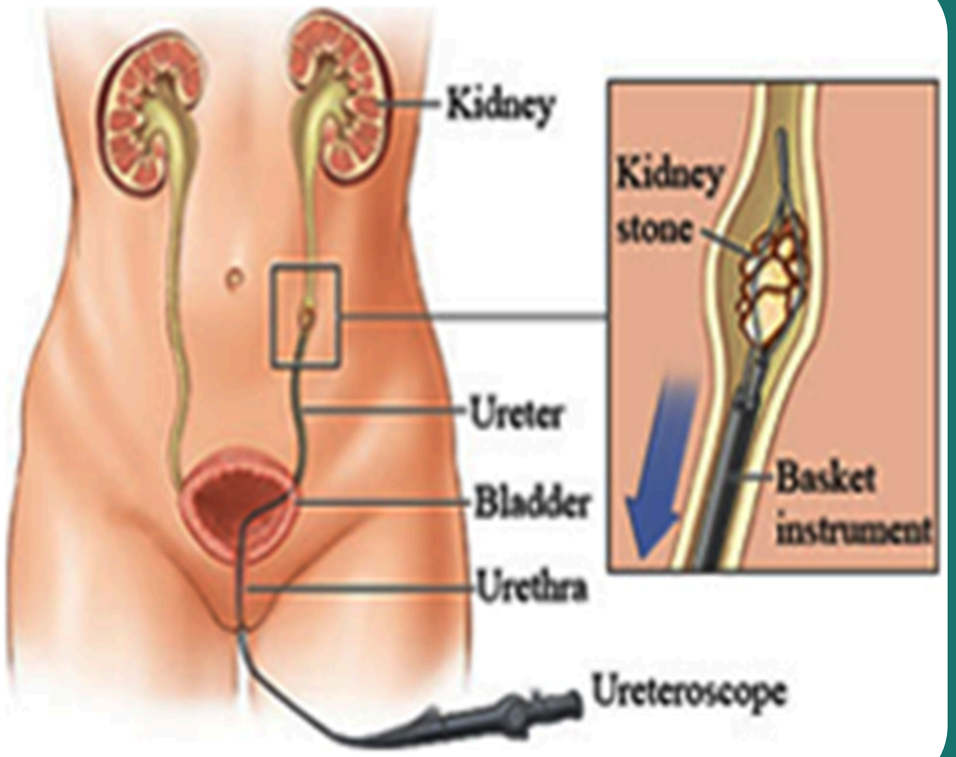
Procedure

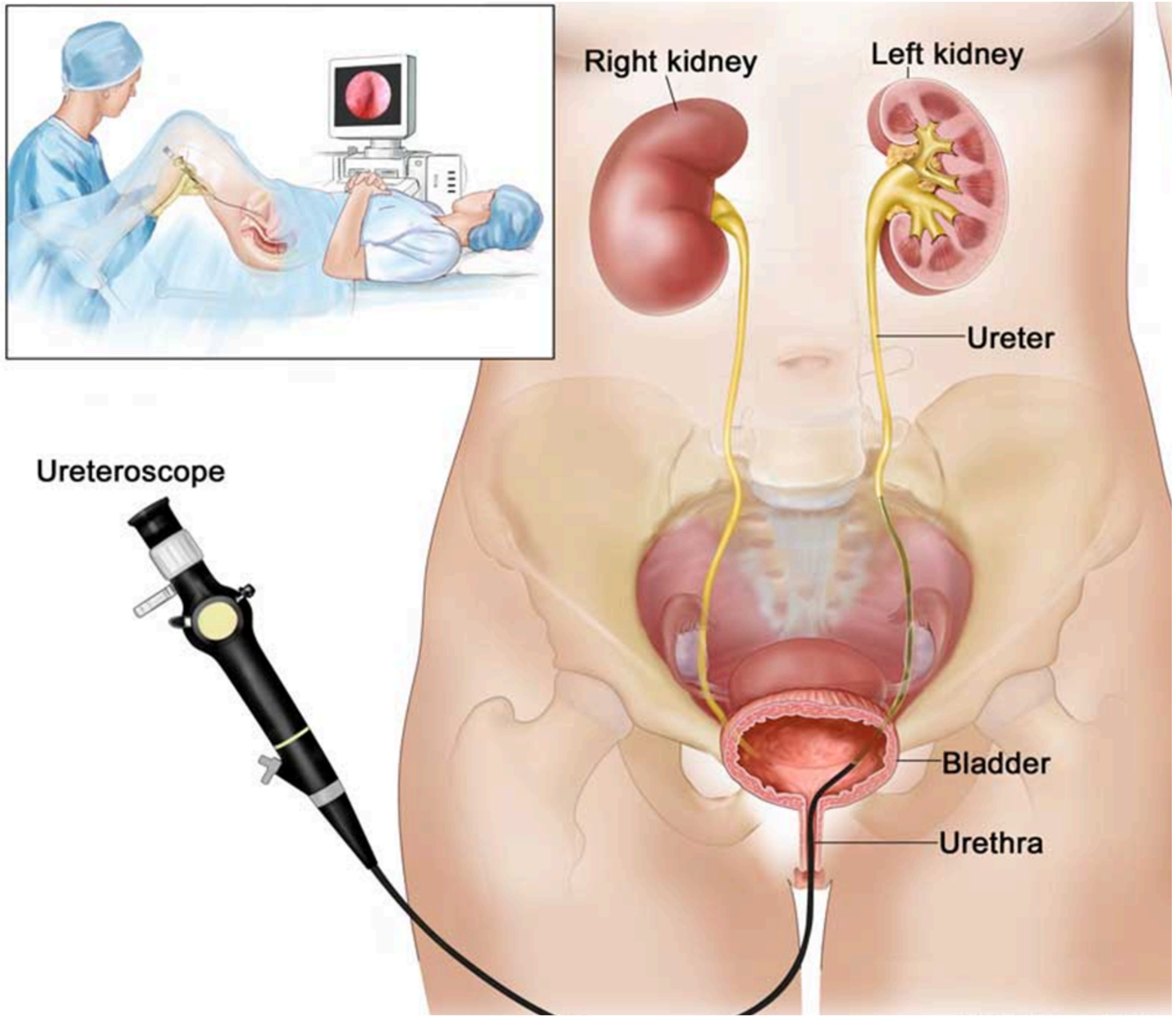
A SMALL ENDOSCOPE, WHICH MAY BE RIGID, SEMIRIGID, OR FLEXIBLE, IS PASSED INTO THE BLADDER AND UP THE URETER TO DIRECTLY VISUALIZE THE STONE.

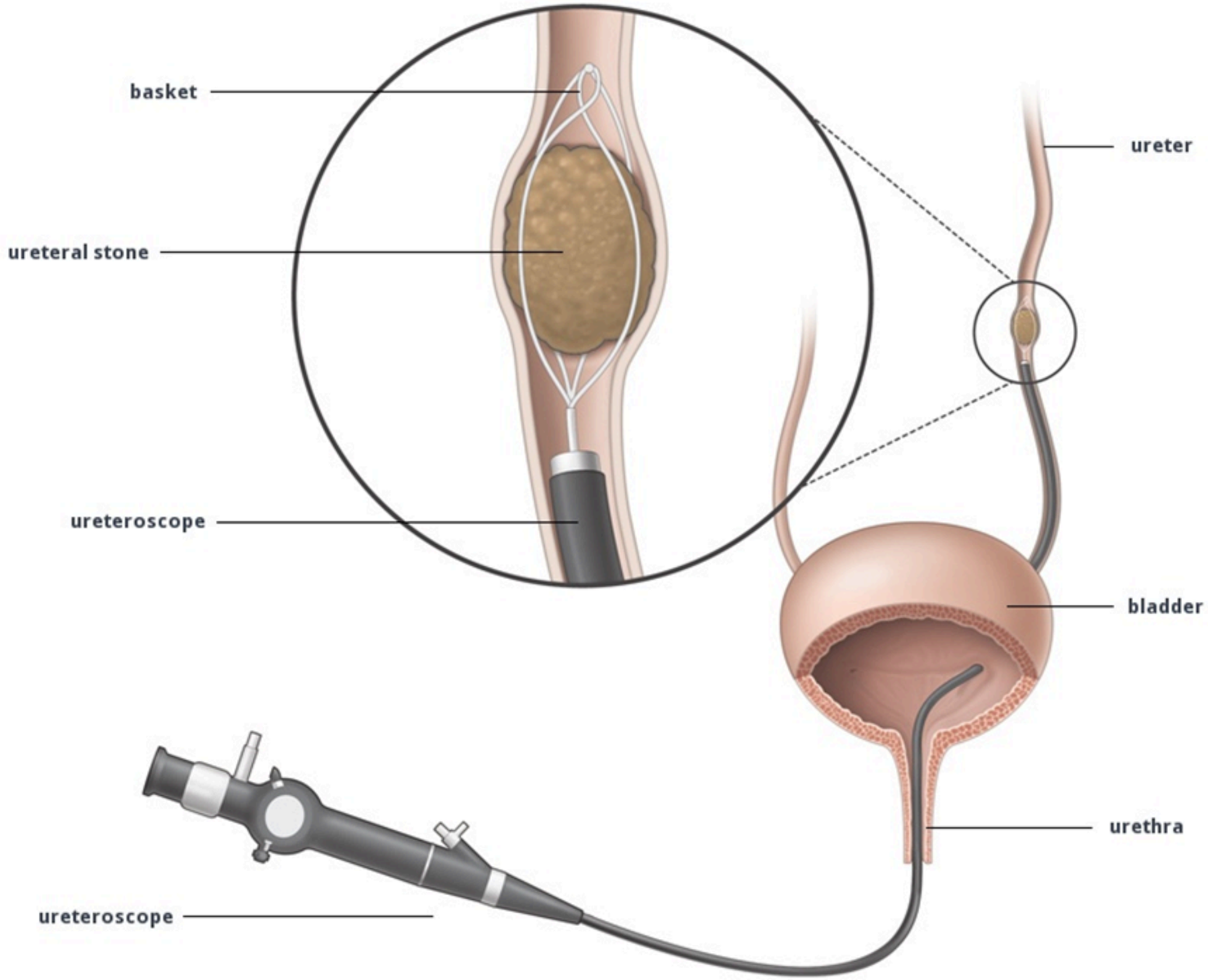
DIRECTLY EXTRACTED USING A BASKET OR GRASPER OR BROKEN INTO SMALL PIECES USING VARIOUS LITHOTRITES (EG, LASER, ULTRASONIC, ELECTROHYDRAULIC)

REINSPECT THE URETER FOR ANY EVIDENCE OF DAMAGE AND PERFORATION

OPEN-END CATHETER OR INTERNAL STENT IS PLACED OVER THE GUIDE WIRE AND LEFT IN PLACE FOR A MINIMUM OF 3WEEKS




Right kidney
Left kidney
Ureter
Ureteroscope
Bladder
Urethra


basket
ureteral stone
ureteroscope
ureter
bladder
urethra
ureteroscope

Complication of URSL –

Complication do not occur frequently, BUT rarely

- Injuries may be perforation or avulsion and may cause ureteral stricture later .

Avulsion of ureter is most significant complication.

- Laser lithotripsy have thermal potential of creating thermal injury and stricture formation.

Laproscopic ureterolithotomy

- Laparoscopic urological surgery is increasingly replacing open surgery as a result of accumulated surgical experience.

Advantages of Laparoscopy -

- Lower postoperative morbidity
- Shorter hospital stay
- early recovery
- Better cosmetic results
- Comparably good functional results.

Laparoscopic Ureterolithotomy

Indications for this surgery are not common but there are certain patients for whom this may be an acceptable approach, such as

- Those with concomitant upper tract abnormalities (e.g., ureteral stricture, UPJ obstruction) requiring surgical repair.
- Stones that could not be accessed ureteroscopically.
- Stones that did not fragment with other treatment modalities.
- Large (>1.5 cm) proximal ureteral stones.
- Stone in morbid obese patient.

Both transperitoneal and retroperitoneal approaches have been described for laparoscopic ureterolithotomy..

Management of Bladdder Stone

TRANSURETHRALCYSTOLITHOTRIPSY :

- Cystolithotripsy is an therapeutic option in almost all bladder stone ,with the exeption of very large stones.

- In this procedure Scope is inserted into bladder through the urethra and stone is fregmented in to small pieces and irrigation of the stone fragments done from the bladder in a single operation.

II.Percutaneous cystolithotomy :

- This is the second approach in adult and primary approach in the pediaric patients. The percutaneous route allows the use of shorter and larger diameter endoscopic equipment, which allows rapid fragmentation and evacuation of the calculi .

- Percutaneous cystolithotomy is a minimally invasive procedure with a high rate of short hospitalization. Therefore, the procedure is cost effective and represents an attractive option in the treatment of bladder stone .

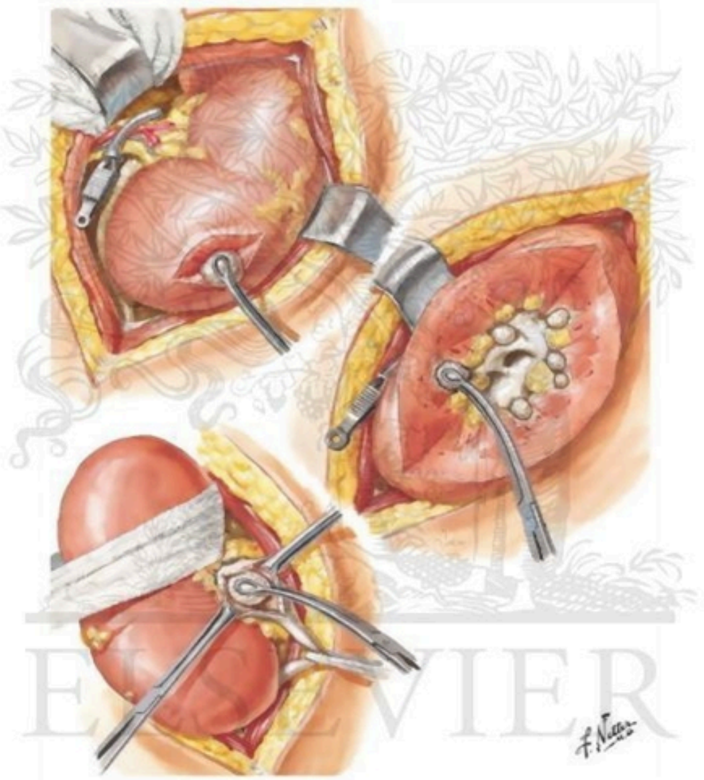
OPEN SURGERY FOR RENAL STONE

OPEN SURGERY

- This is the most invasive form of treatment for urolithiasis.

Open surgery has been used less and less often since the development of the previously mentioned techniques

- It now constitutes less than 1% of all interventions.



It is Indicated only in -

- Very large stone
- Lack of experience of surgeon
- Unavailability of instruments

Disadvantages Include-

- Longer hospitalization.
- Longer convalescence.
- Increased requirements for blood transfusion.
- Increse post operative morbidity.

Open Surgery cont…

(a) Pyelolithotomy: The renal pelvis is incised and the stone removed from the pelvis or calyx.

(b) Nephrolithotomy: An incision is made into the kidney substance to remove large stone.

(c) Partial or total nephrectomy: is required for a severely damaged kidney.

(d) Ureterolithotomy- An incision is made in the ureter after it stone has been exposed and the stone removed through it.

(e) SuprapubicCystolithotomy -Removal of bladder calculi through a suprapubic incision, is used only when stones cannot be crushed and removed transurethrally.

12.5 CM RENAL STONE

(अमलतास में ऑपरेशन द्वारा निकाली गई पथरी का फोटो 12.5 cm)

★★★★★

LASER MACHINE UROLOGY

★★★★★

THANK YOU