

# **General Considerations in Urologic Endoscopic Surgeries**

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# Introduction

- **What is Minimally Invasive Surgery (MIS)?**
  - 1- Endoscopic surgeries
  - 2- Laparoscopic surgeries
  - 3- ...

# **DIAGNOSTIC PROCEDURES AND TESTS**

## **Endoscopy**

- Endoscopy allows for visualization of the affected structures.

# Endoscopic Instrumentation

- **1- Flexible instruments**

- Flexible cystoscope
- Flexible ureteroscope
- Flexible nephroscope

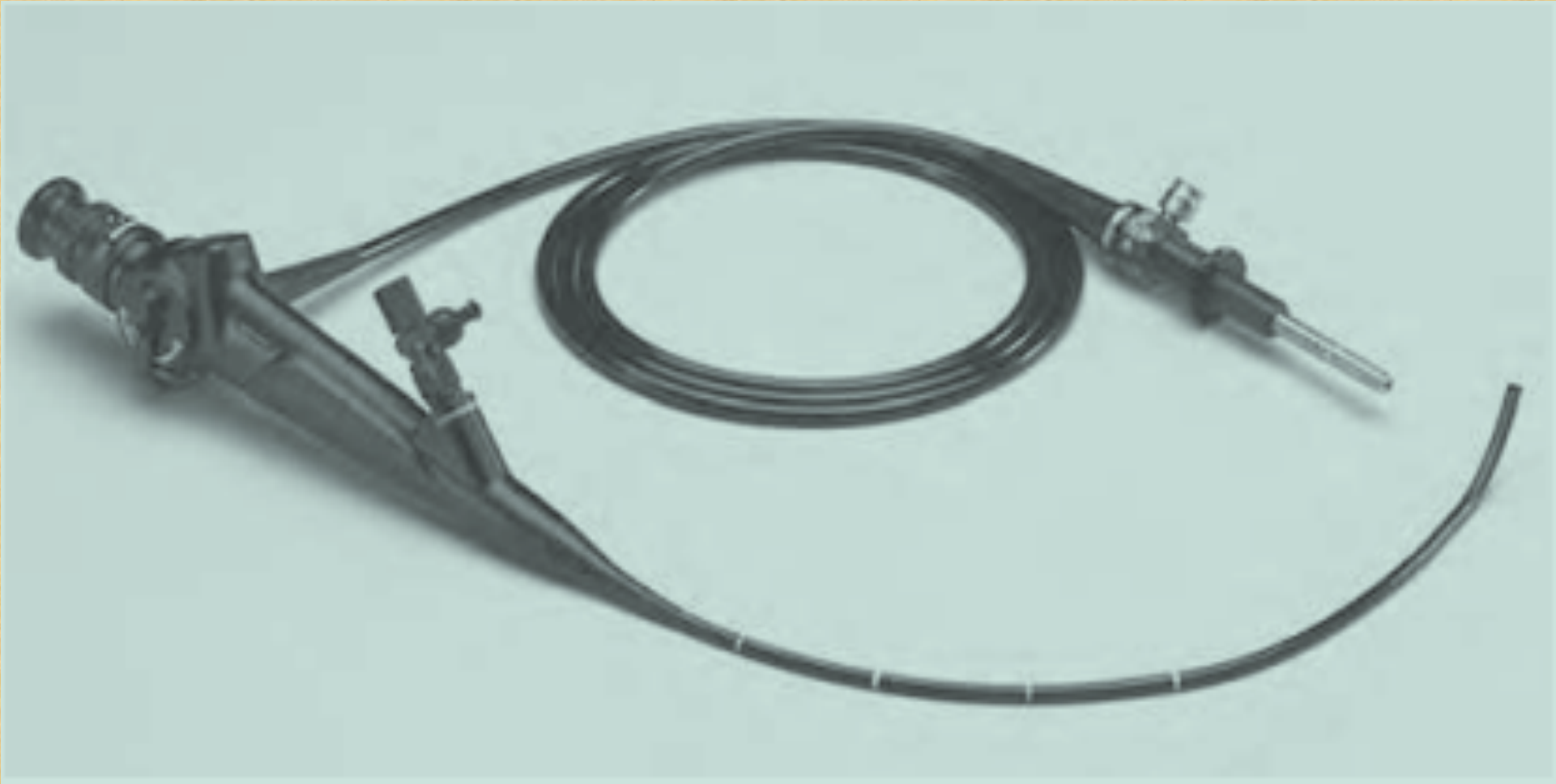
- **2- Rigid instrumentation**

- Rigid cystoscope
- Resectoscope

# **Flexible endoscopic instruments**

- Adult and pediatric: cystoscope, ureteroscope, and nephroscope.





***Flexible cystoscope***



***Flexible ureteroscope***



**Eyepiece**



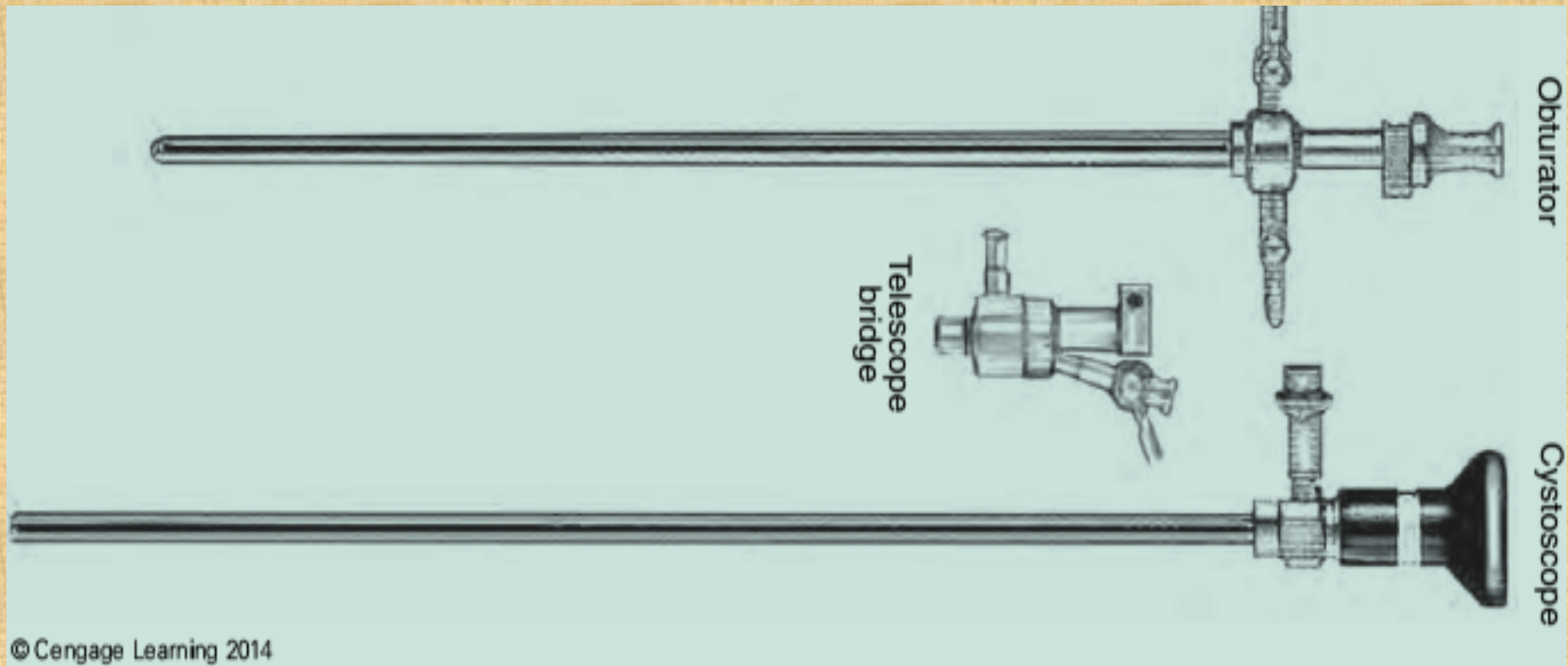
# **Rigid endoscopic instrumentation**

## **Cystoscope**

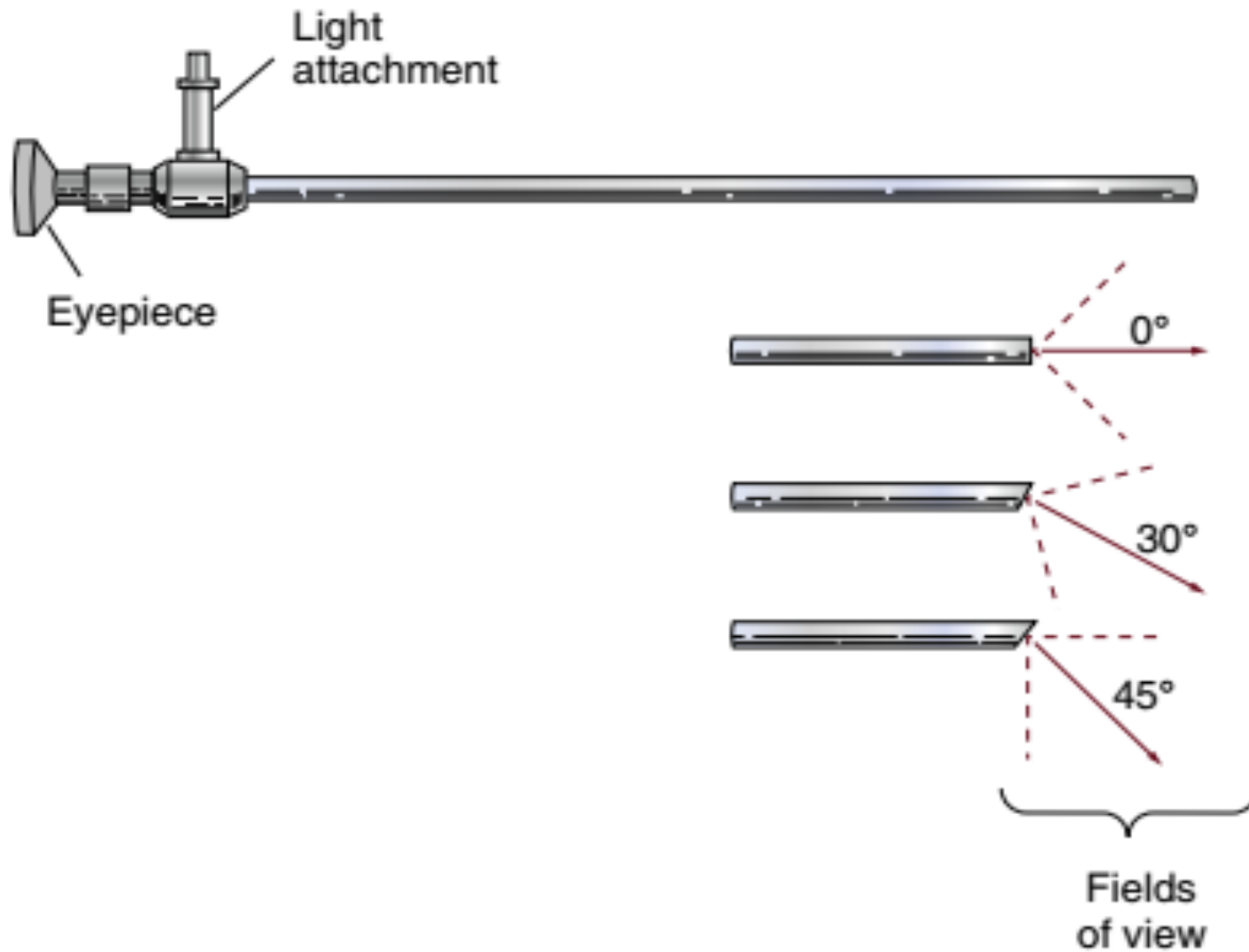
- Sheath
- Obturator
- Bridge
- Deflecting mechanism
- Telescopic lens



**Cystoscopy Sheath and Obturator**



**Rigid cystoscope, telescope bridge, and obturator**



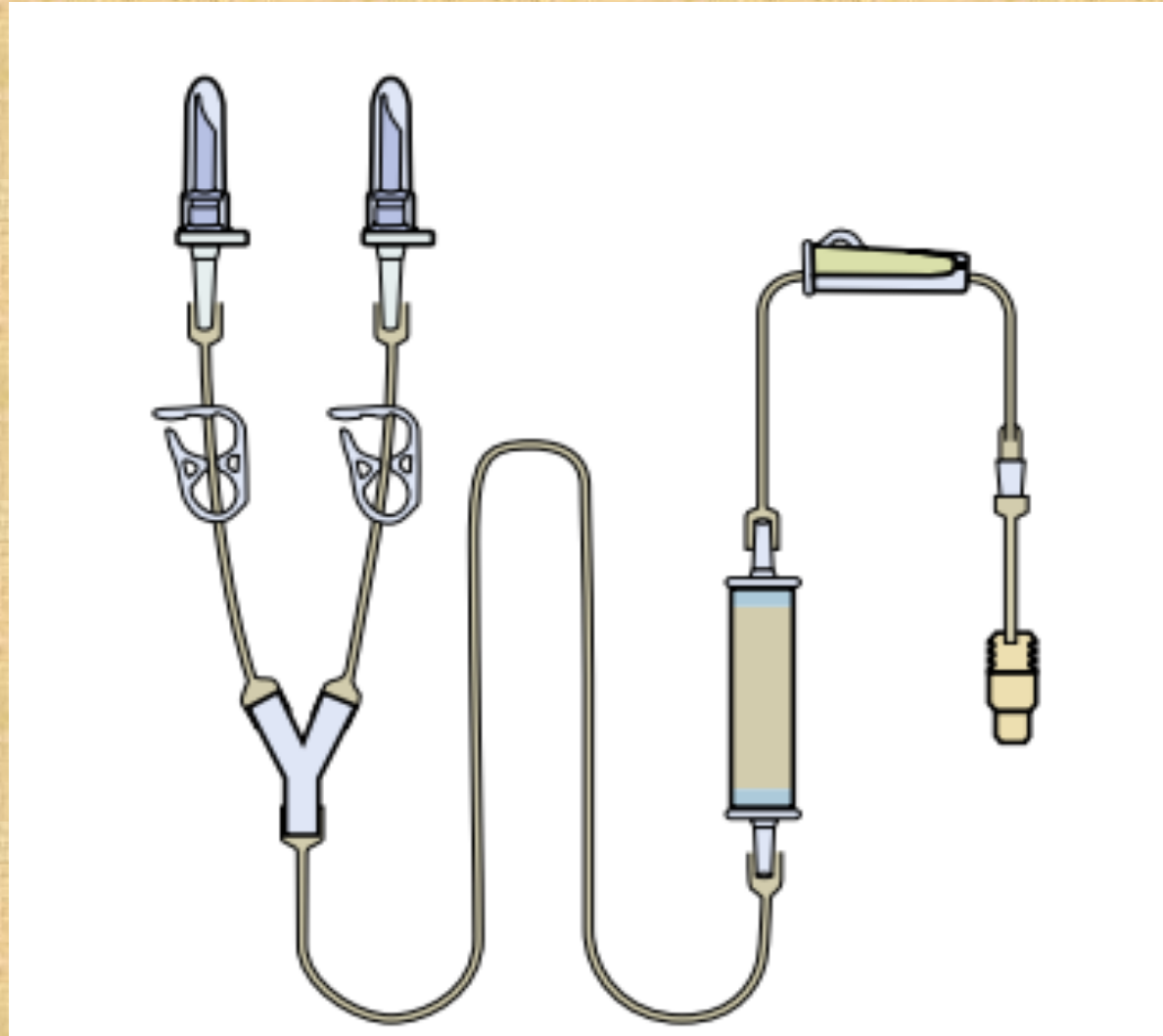
**Viewing angles of telescopes**





**Basic instruments for cystoscopy**

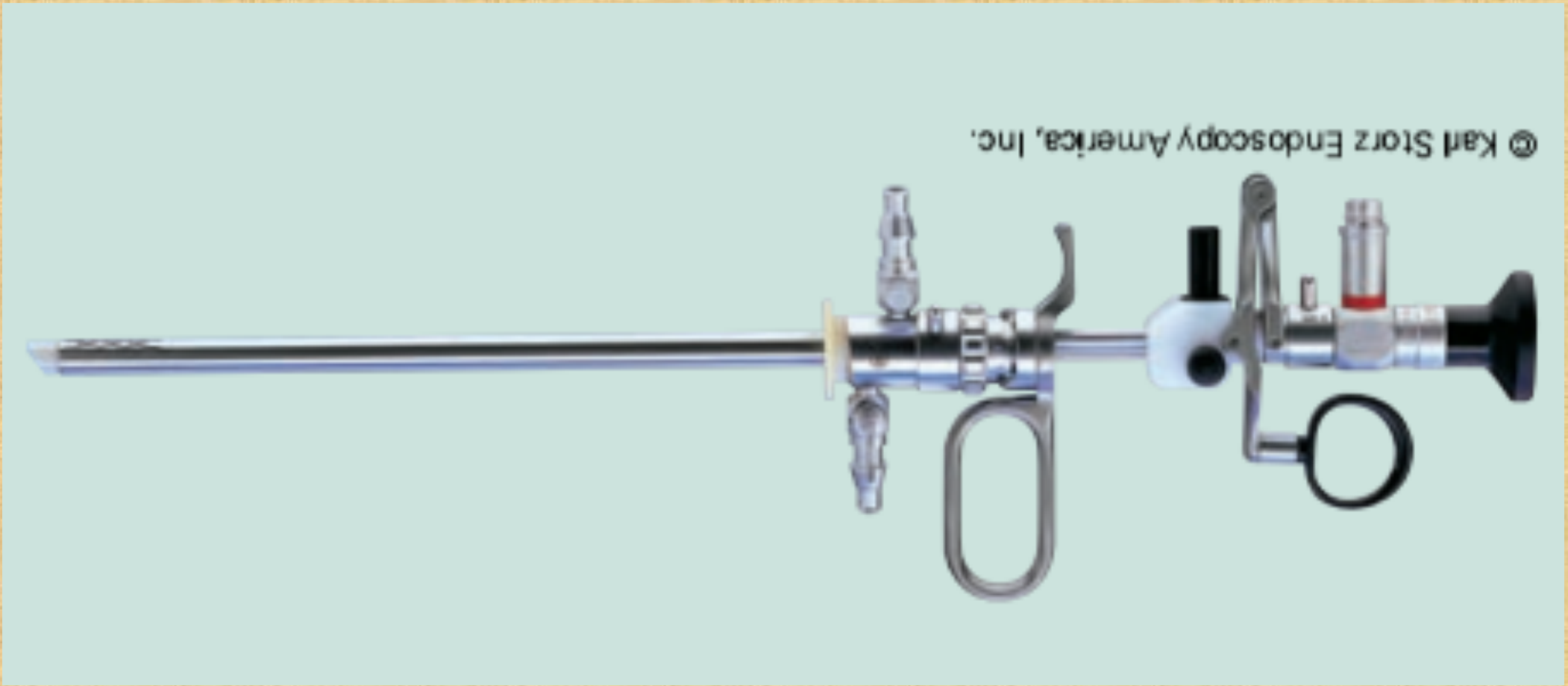




***Y-tubing for cystoscopy***

# Resectoscope

- Sheath
- Obturator
- Telescopic lens
- Bridge
- Working element



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**Resectoscope**



**Basic instruments for resectoscope**





CE



**NIDHI**<sup>®</sup>



- **Accessories**

- Luer-lok stopcocks
- Light source with cable
- Electrosurgical unit (ESU)
- Video equipment
- Tubing
- Continuous-flow pump

- **Irrigation fluid**

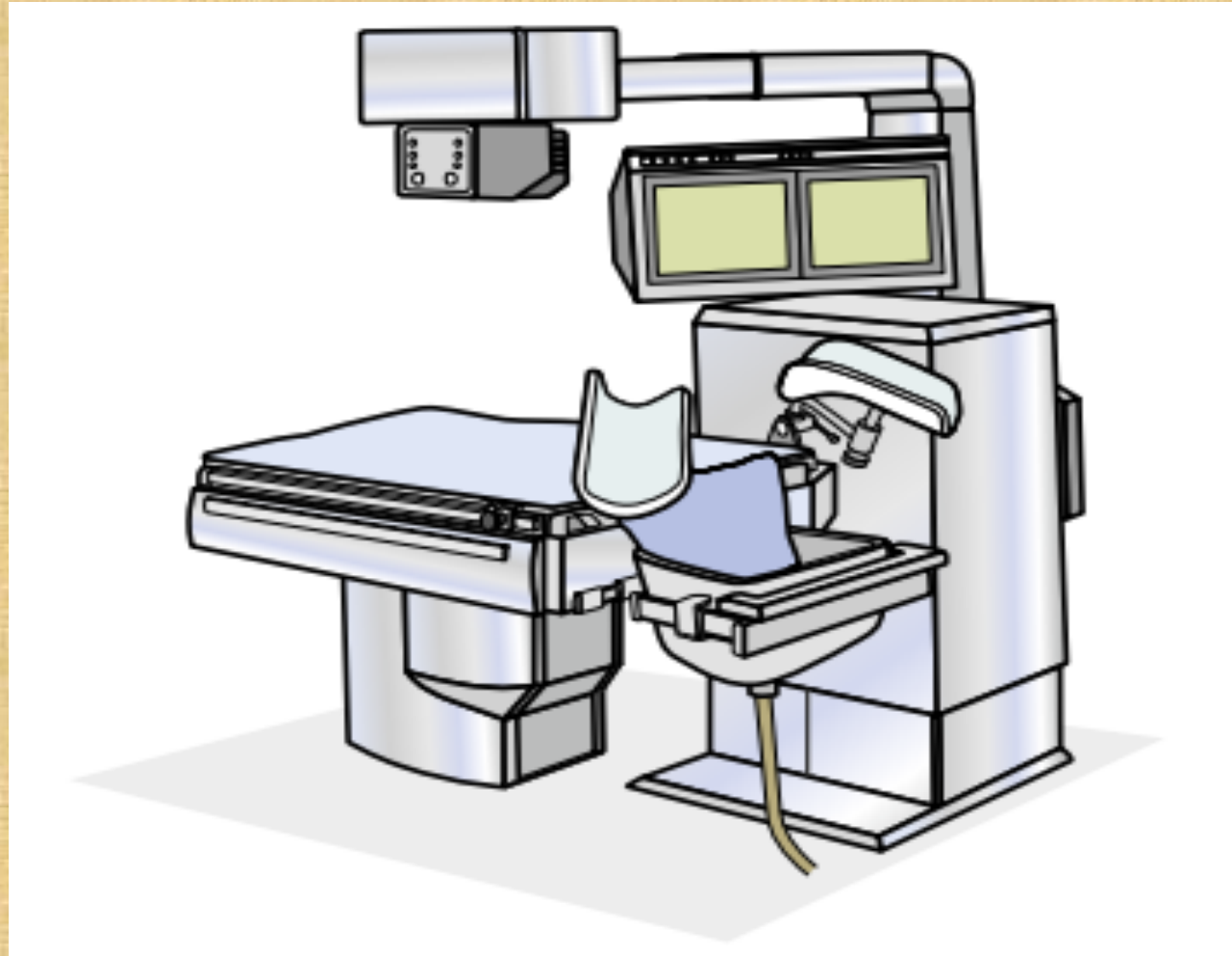
- 3–6 liters of water, saline, 3% sorbital, or 1.5% glycine
- O'Connor shield
- Pharmaceuticals



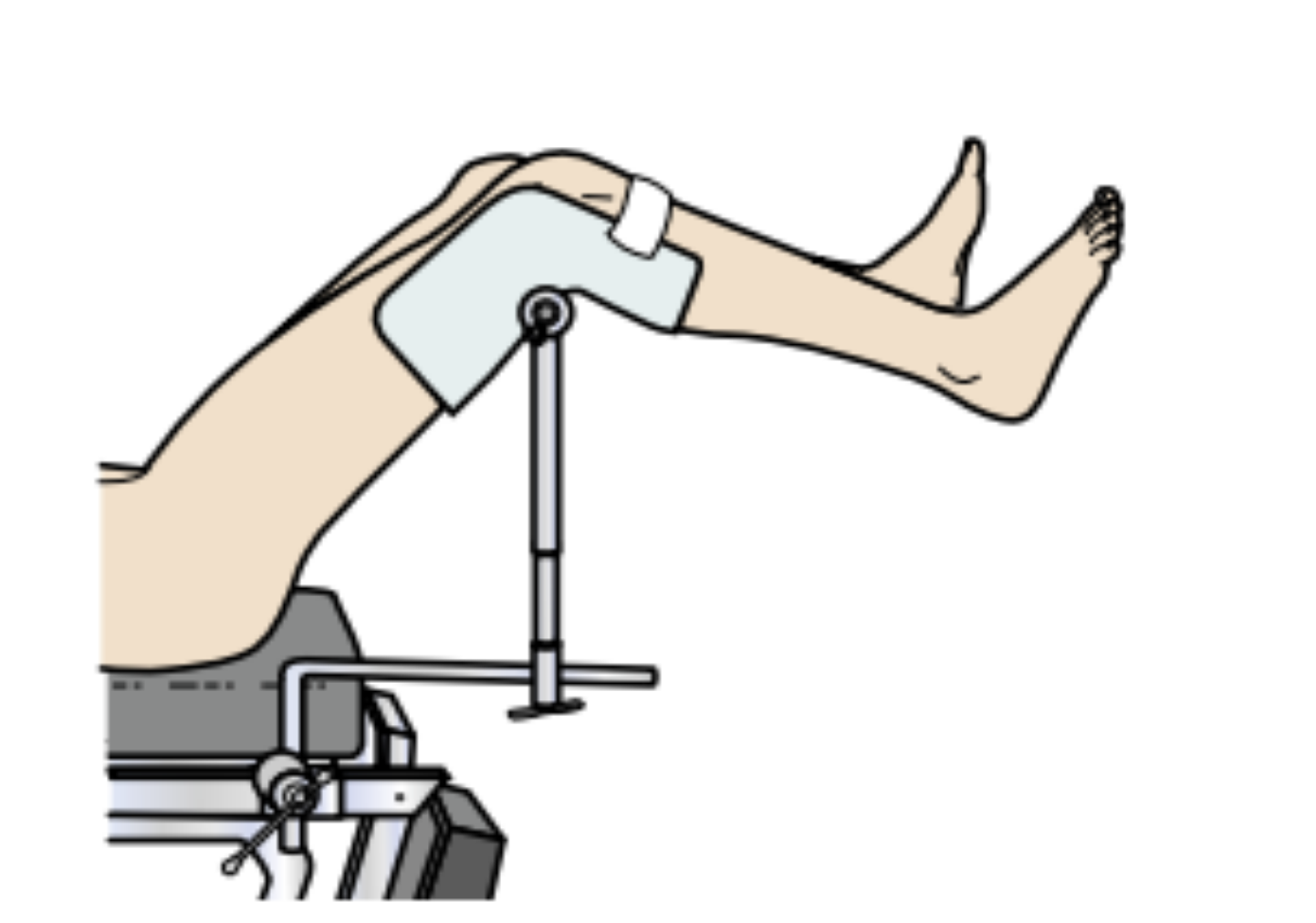
# The “cysto” room

- **Contains the specialty equipment and supplies required to perform endoscopic procedures, such as:**
  - Specialty cysto OR table that is fixed in position.
  - The mesh-bottomed fluid drain pan (also called a strainer or screen pan).
  - Advanced cysto rooms may have X-ray equipment.
  - Adjacent darkroom for developing X-rays.
  - Lead aprons and thyroid shields.
  - Back table
  - Drainage system
  - Adjustable sitting stool for the surgeon
  - Multiple X-ray view boxes
  - Built-in video, illumination, and electrosurgical equipment





**Urologic bed**



**Knee crutch stirrup**

# GU Endoscopy

- GU endoscopy is accomplished by **introducing the scope** through the male or female urethra with the patient in the **lithotomy position**.
- The main purpose of urinary tract endoscopy is **diagnosis**.

# Endoscopic Procedures

**A brief listing of some of the procedures that are possible endoscopically follows:**

- Retrograde urogram
- Visual diagnosis
- Biopsy
- Bleeding tissue fulguration
- TURP
- TURBT
- Placement of ureteral stents
- Calculi removal
- Urethral enlargement



- The **role of the surgical technologist** during the endoscopic procedure is **minimal**, but the responsibilities are of paramount **importance**.
- The surgical technologist is responsible for **assembling** all of the necessary items according to the type of procedure scheduled and the surgeon's preference.



- Because endoscopic **equipment** is extremely **delicate**, it is often stored in **protective cases**, in a **nonsterile state**.

- **The surgical technologist is not required to “scrub in” for the endoscopy, but must organize the instruments and supplies on the sterile field for use by the surgeon. Some instruments must be assembled; all connections should be secure and fluidtight.**

# Responsibilities

- **Responsibilities may include:**
  - Positioning the patient for anesthesia and the procedure
  - Applying the dispersive electrode if one is necessary
  - Prepping the patient
  - Assisting the surgeon with draping
  - Receiving the nonsterile ends of the cables, cords, and tubings
  - Connecting such devices as the cautery cords, and so on
  - Turning on and setting the devices as directed

- The main role of the surgical technologist during the endoscopic procedure is to be certain that the irrigation fluid of choice is constantly available. The type of fluid used may change as the procedure progresses. Fluid inflow and outflow are monitored and should closely match.
- On completion of the procedure, several pieces of equipment must be disconnected and safely removed from the field. Drapes are then removed and discarded.

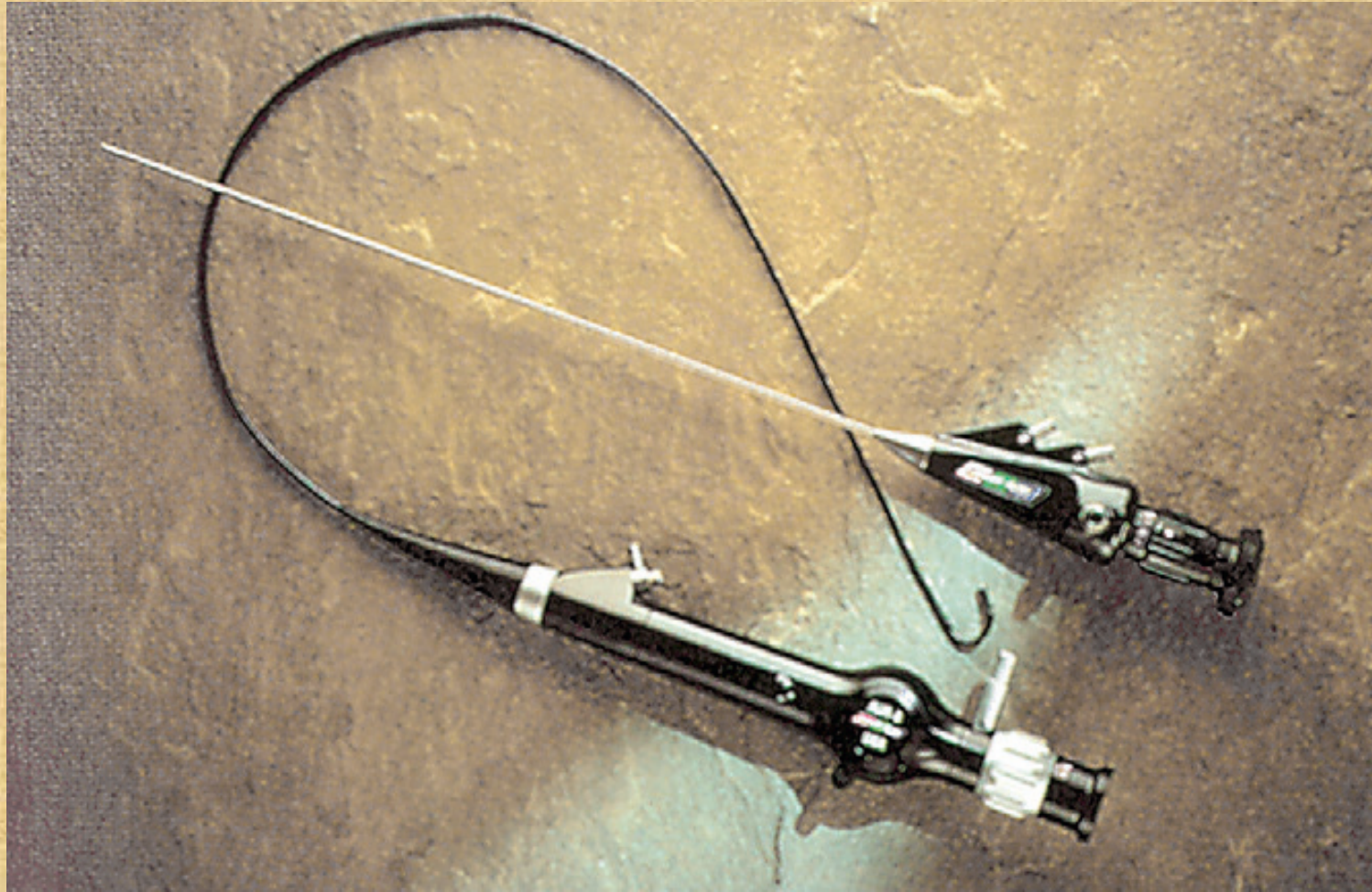


# Ureteroscopy (male patient)

- **Calculi**, or stones, are small solid particles that may form in one or both kidneys.
- It is possible for the stone to **remain** in its original location **or travel** through the urinary tract and become lodged at any point distal to the formation point.



- The size and location of the calculi will determine **signs and symptoms**, which can include painful and frequent urination, oliguria, flank pain (mild to severe with site of pain determined by location of the stone), nausea and vomiting, UTI, and hematuria.



**Flexible and rigid ureteropyeloscope**

- **Preoperative Diagnostic Tests and Procedures**

- Blood tests
- Urinalysis
- Urine culture
- Standard X-ray
- Ultrasound
- CT scan
- IVU



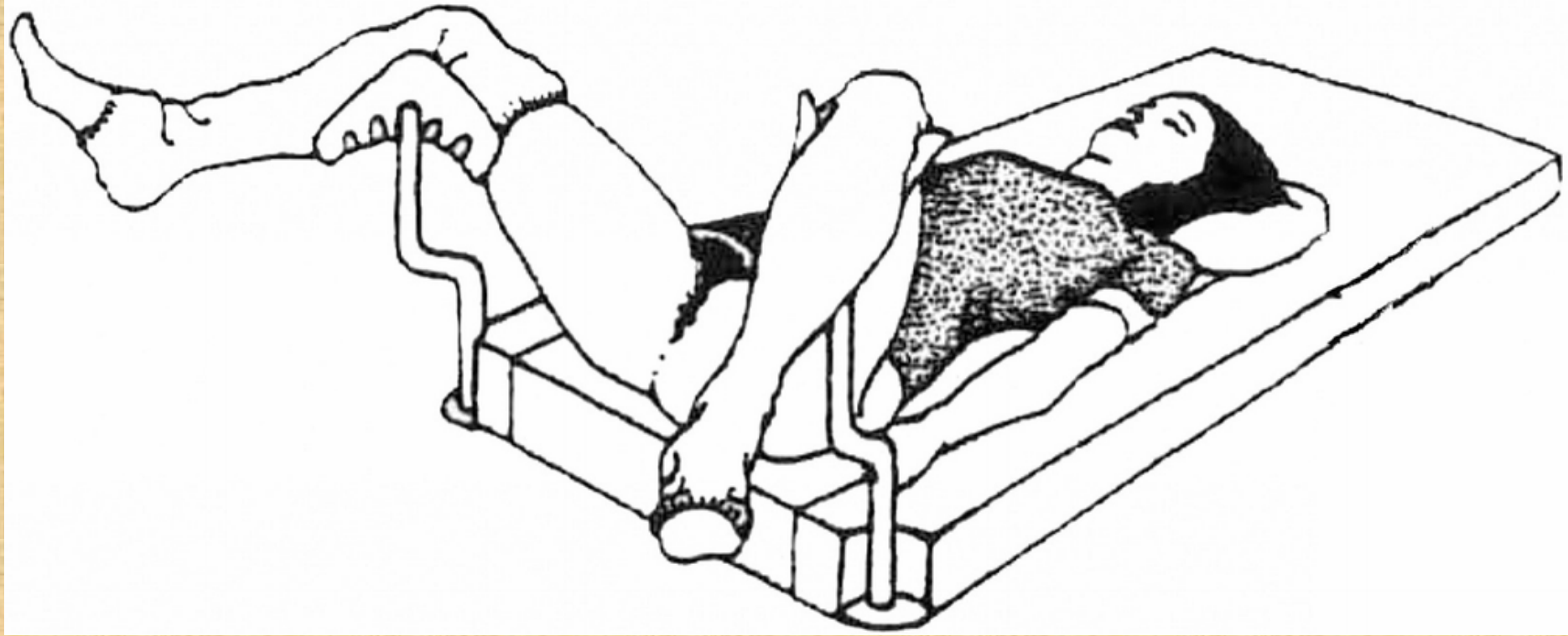
## Equipment, Instruments, and Supplies

- Ureteroscope
- Urethral dilators
- Lithotrite
- Basket stone forceps
- Holmium laser
- Foley catheter with drainage bag
- JJ ureteral stents (various sizes)
- Light source and cable
- Irrigation fluid
- Inflow and outflow tubings
- KY jelly
- Stopcock
- ESU and cautery cord
- Minor procedure back table pack
- 4 \* 4 radiopaque sponges



## Preoperative Preparation

- Position: Low lithotomy
- Anesthesia: General
- Skin prep: Penis and scrotum; surgeon may not require a prep
- Draping: cysto drape



# Surgical Procedure

1. The surgical technologist instills the local anesthetic jelly down the urethra of the male patient and applies the penile clamp. For female patients, the surgical technologist will use a sterile cotton applicator; the local anesthetic is squeezed out onto the tip, which is then placed in the urethral meatus.
2. Surgeon dilates the urethra if necessary.
3. The ureteroscope is inserted into the urethra and slowly advanced into the bladder and then into the ureter. The ureteroscope is advanced in the ureter up to the stone.

4. Depending on the size of the stone, the surgeon will:

- a. “capture” and remove stone intact.
- b. break up the stone

5. Once the stone or pieces of stone have been removed, a JJ stent is inserted.

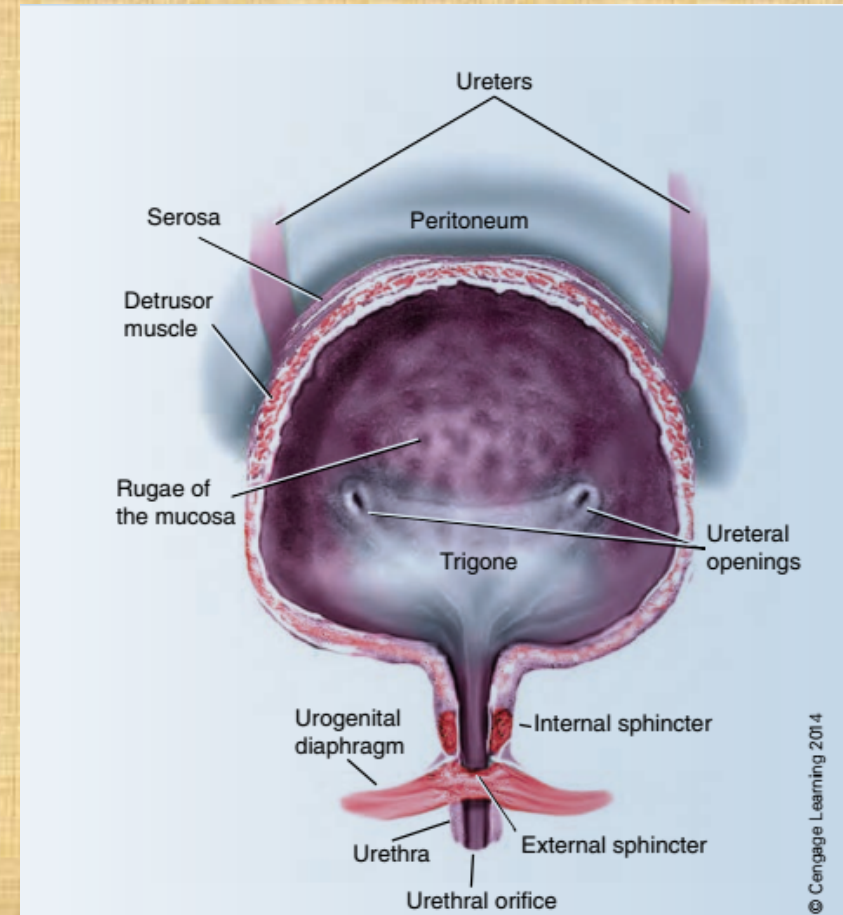


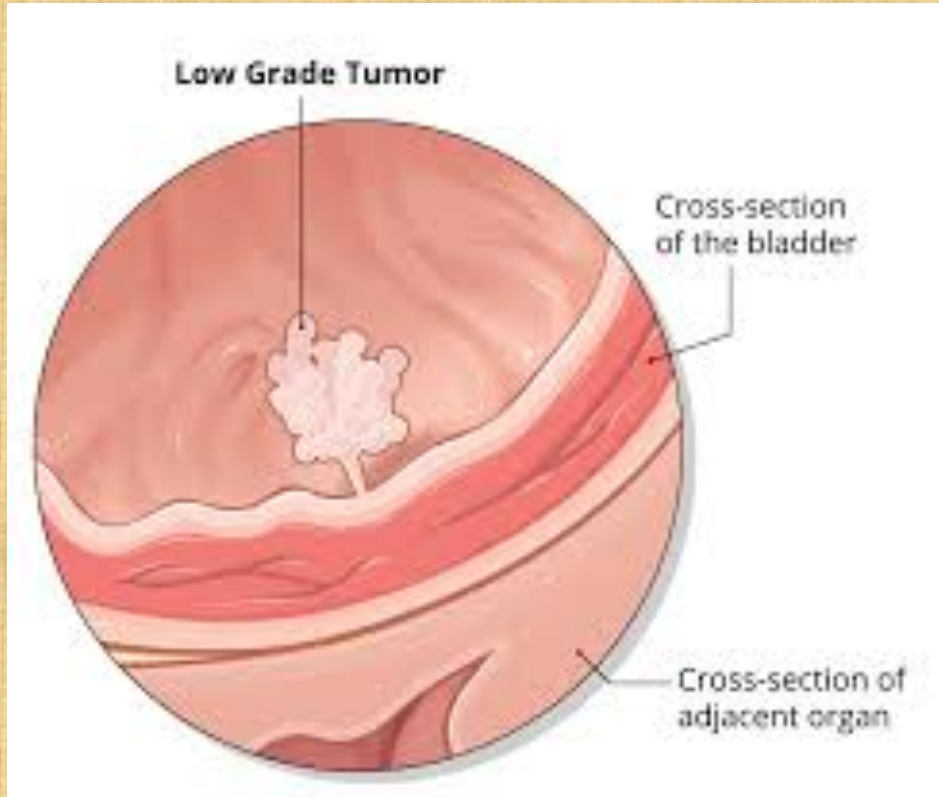
# Postoperative Considerations

- **Immediate Postoperative Care**
  - Patient is transported to the PACU.
  - Patient is discharged the same day of surgery

# TURBT

## Bladder and urethra





**Bladder Tumor**

## • Preoperative Diagnostic Tests and Procedures

- Cystoscopy **itself is a diagnostic procedure**, but can be performed for removing tissue biopsies, calculi, catheters, and tumors.
- Standard X-rays
- CT scan
- Ultrasound
- Laboratory tests: CBC, urinalysis, urine culture
- IVP



## Equipment, Instruments, and Supplies Unique to Procedure

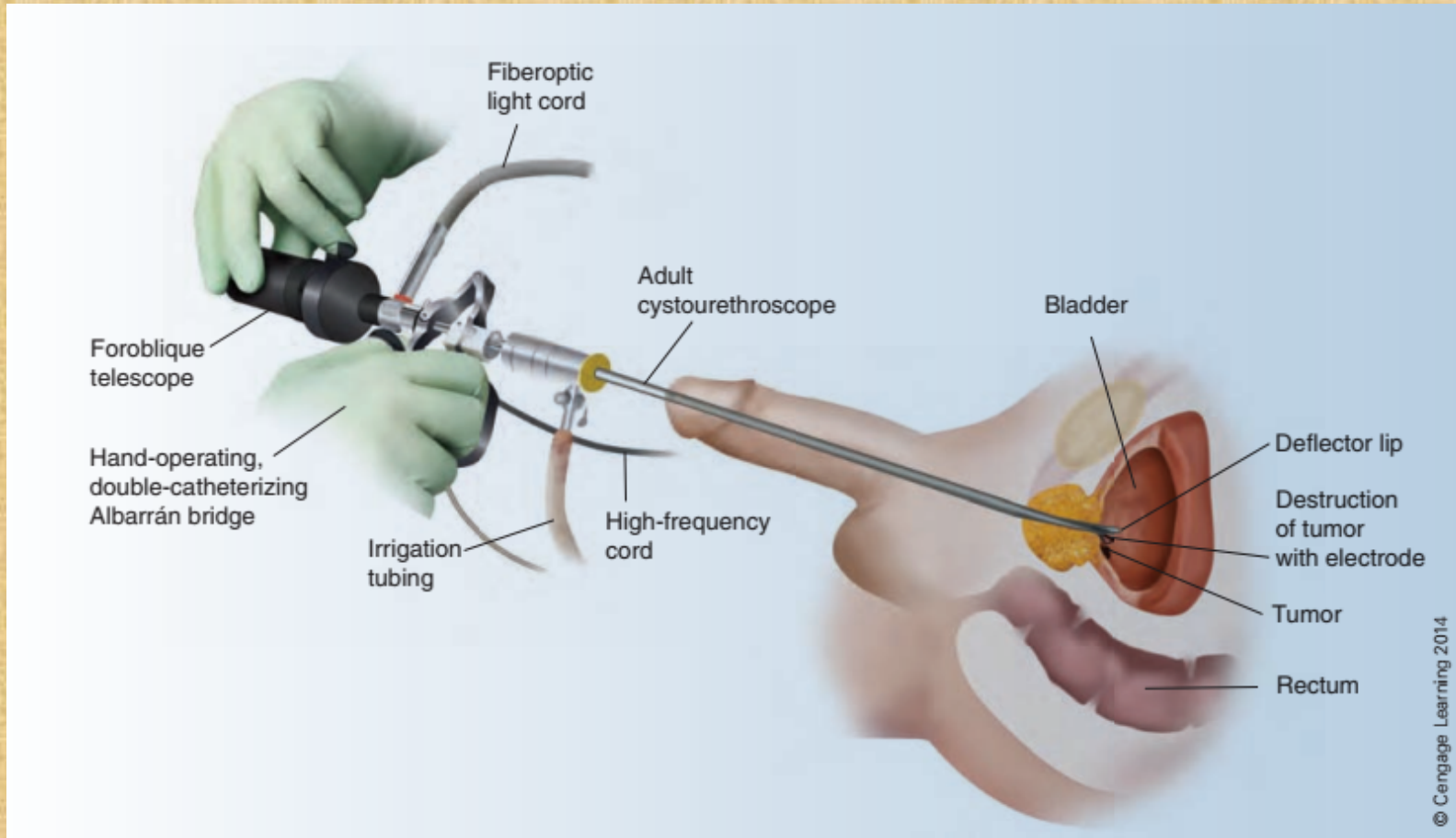
- Rigid or flexible cystoscope
- Fiberoptic light source
- Fiberoptic light cord
- Albarran bridge
- Foroblique telescope
- Cystoscopic instrumentation: Flexible grasping, biopsy, lithotrite and clamp forceps; flexible-stem electrode with ball, cone, and bayonet tips available
- Urethral sounds
- Ureteral catheter
- Stopcock
- Bags of irrigation solution (2000- or 3000-mL bags)
- Cystoscopic tubing
- Omnipaque
- Graduated pitcher
- Specimen cups
- Topical local anesthetic
- Penile clamp
- Sterile KY lubricant/jelly
- Sterile cotton applicators
- Ellik evacuators or Toomey syringes
- ESU
- Bugbee electrode for ESU
- Fluoroscopy
- Cystoscope drape
- Drain pan attached to cystoscopy OR table

## • **Practical Considerations**

- Knees and legs of the patient are well padded
- The instruments and endoscopes should at least undergo high-level disinfection with 2% glutaraldehyde.
- The irrigating solution should be nonelectrolytic and isotonic
- The patient is requested to void just prior to transport to the OR.

# Surgical Procedure

1. The surgical technologist instills the local anesthetic jelly down the urethra.
2. The urethra is dilated with urethral sounds.
3. The tip of the cystoscope is lubricated with KY jelly and inserted into the urethra.
4. Other procedures are performed at this time if necessary.
5. The surgeon removes the cystoscope and inserts the Foley catheter with drainage bag



**Fulguration of a bladder tumor**



- The TURBT procedure is the same as for TURP
- **The instruments to be added** to the cystoscopy setup include the resectoscope that includes the sheath and obturator, working element (also called operating element), and cutting loops. A 24 Fr rigid cystoscope will be used; therefore, the Albarran bridge and Foroblique telescope will be needed as well as a biopsy forceps to excise bladder tissue specimens from various areas of the bladder

# TURP

- Benign prostatic **hypertrophy** (BPH) is considered to be a **normal part of aging** affecting most men over the age of 50.
- As a man matures, **the prostate increases in size**.
- Eventually, the **capsule** surrounding the prostate prevents it from expanding. As the urethra narrows, urination becomes more difficult, leading to urinary urgency, frequency, and retention. Retained urine can lead to chronic UTIs.
- **Prostate cancer** in the early stages is asymptomatic.
- As the tumor grows the patient will experience the same signs and symptoms as those with BPH.

- **Preoperative Diagnostic Tests and Procedures**

- Digital rectal examination
- PSA blood test
- Tissue biopsy
- FBS
- Urinalysis

# Practical Considerations

- The irrigating solution should be sterile, isotonic, nonhemolytic, and at body temperature or slightly warmed.
- The surgical technologist may need to practice filling and refilling the Ellik.
- It is recommended that the surgical technologist have 2–3 Ellik evacuators available.
- The surgical technologist should know how to efficiently assemble the resectoscope and know the connections for the irrigation tubing, light cord, and high-frequency ESU cord.
- The amount of time required for TURP is directly related to the size of the prostate gland and can range from 30 minutes to 3 hours.
- The surgical technologist should be aware of several intraoperative complications.



# TURP Complications

- Uncontrollable hemorrhage may obscure the visual field.
- A sudden jerk of one of the patient's legs.
- Accidental perforation of the prostatic capsule allows irrigating fluid to escape into the space surrounding the prostate.

- Systemic absorption of the irrigating fluid is a serious complication and referred to as TURP syndrome. **Early signs** include restlessness, confusion, nausea, and vomiting when the patient is regionally anesthetized.
- **Late signs** of systemic absorption of the irrigant affecting the neurological system are seizures, coma, and blindness.
- The anesthesia provider will administer furosemide to help reduce the amount of intravascular fluid. The patient will be transported to the ICU.

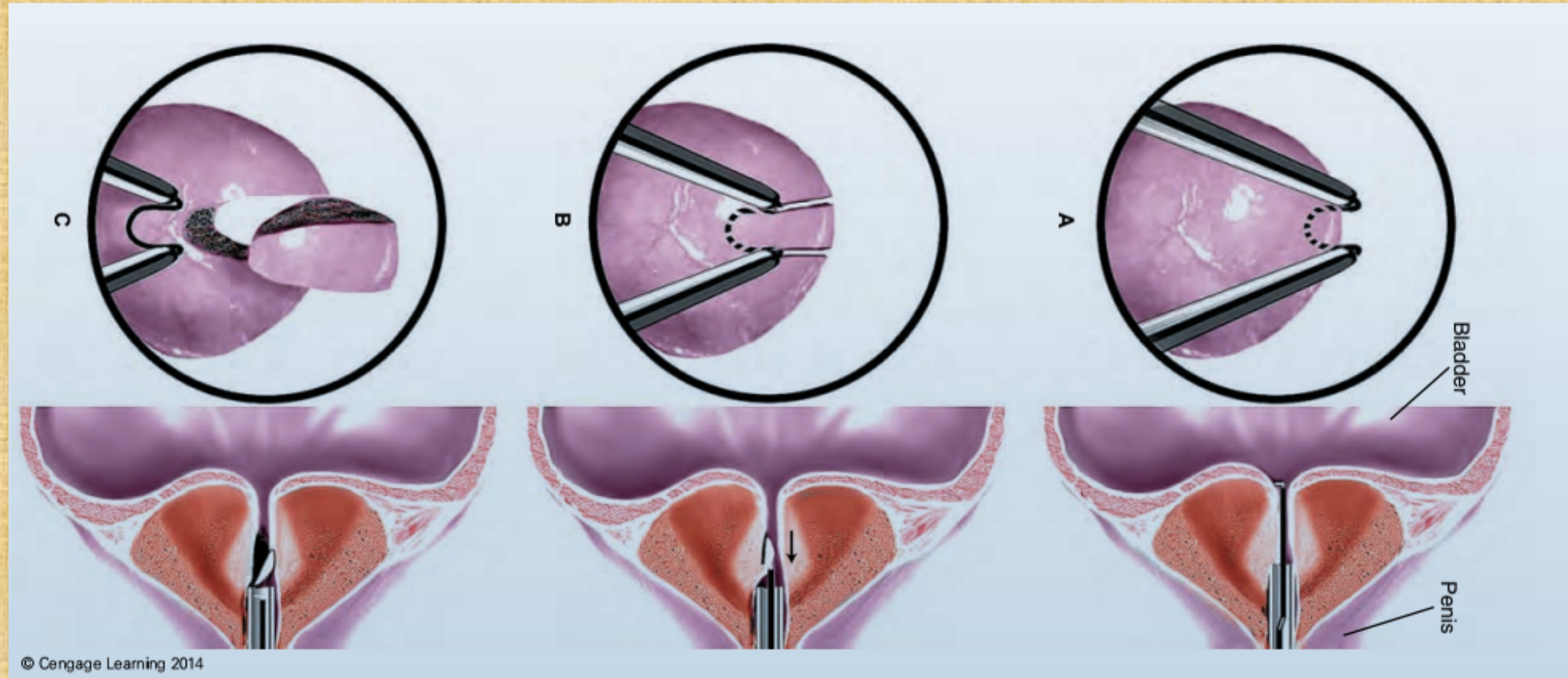
# Surgical Procedure

- Patient is **anesthetized** regionally or generally, placed in **lithotomy** position, prepped, and draped.
- The surgeon begins **electrodissection** of the prostate tissue, alternating between **coagulating and cutting** currents through the use of a foot pedal. A **loop electrode** is used to resect the tissue.

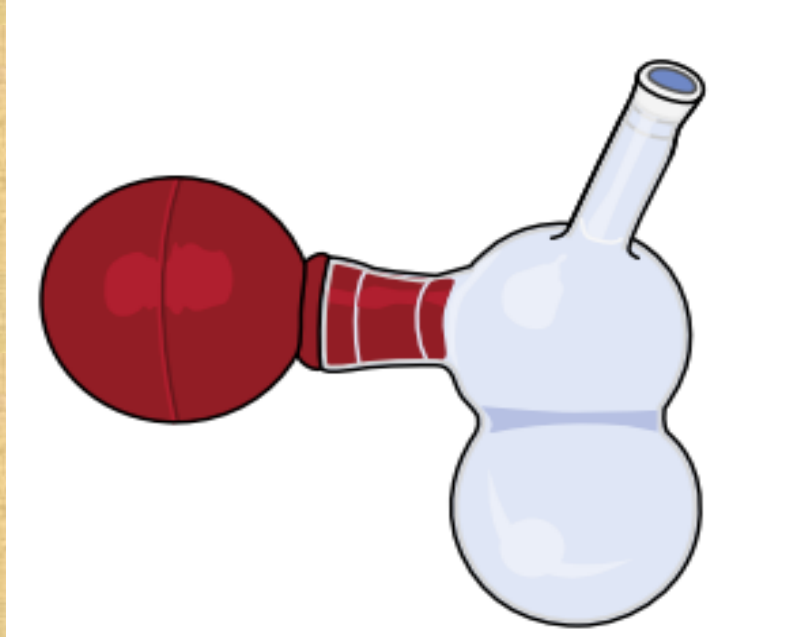
- The surgeon will **intermittently remove tissue** fragments by removing the resectoscope and allow the irrigation fluid to flow out.
- Once the resection of prostate tissue is **complete**, the bladder, prostatic fossa, and urethra are inspected for **debris and bleeding**.



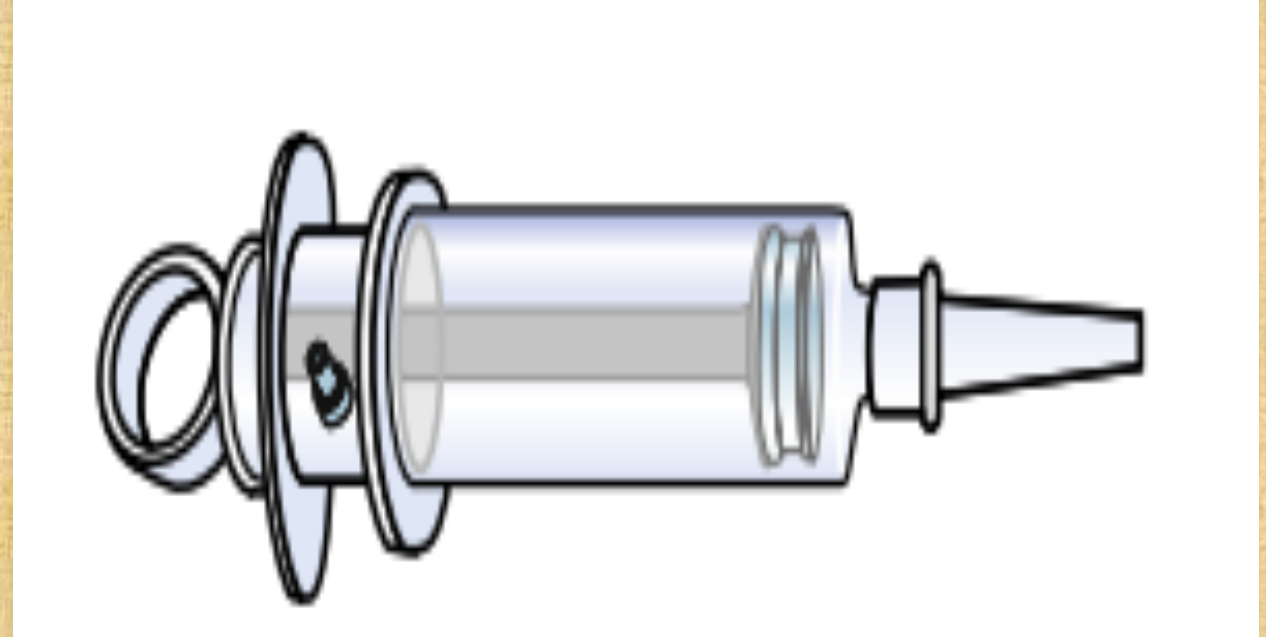
- The **Foley catheter** is inserted into the bladder. **Grossly bloody drainage** may be indicative of bleeding.
- Once the Foley is in place and the balloon is inflated, **the balloon is gently pulled against the bladder neck** and the external tubing is taped to the patient's leg to provide traction, which aids in reducing bleeding.



## Transurethral prostatectomy



**Ellik evacuator**



**Toomey irrigator**



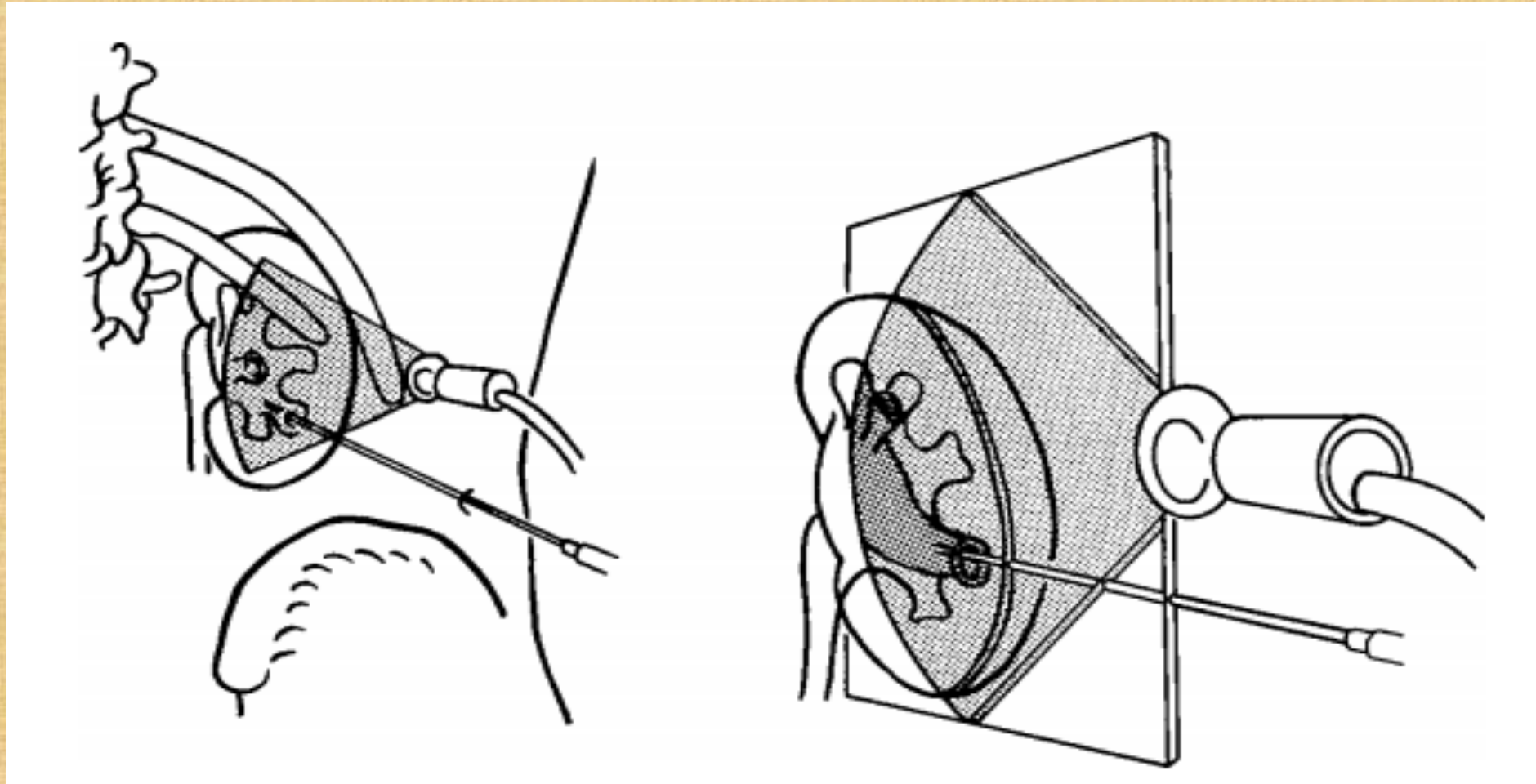
# Percutaneous Nephrolithotomy

- Percutaneous nephrolithotomy facilitates the removal or disintegration of renal stones using a rigid or flexible nephroscope passed through a percutaneous nephrostomy tract. Accessory instrumentation, such as the ultrasound wand, electrohydraulic lithotripter probe, laser fiber, stone basket, and stone grasper, is passed through the lumen of the nephroscope.
- The patient's position, which may be prone or up to 30 degrees prone-oblique, and the draping procedure depend on whether the surgery is performed in the radiology department or the OR and the type of x-ray equipment that will be used.



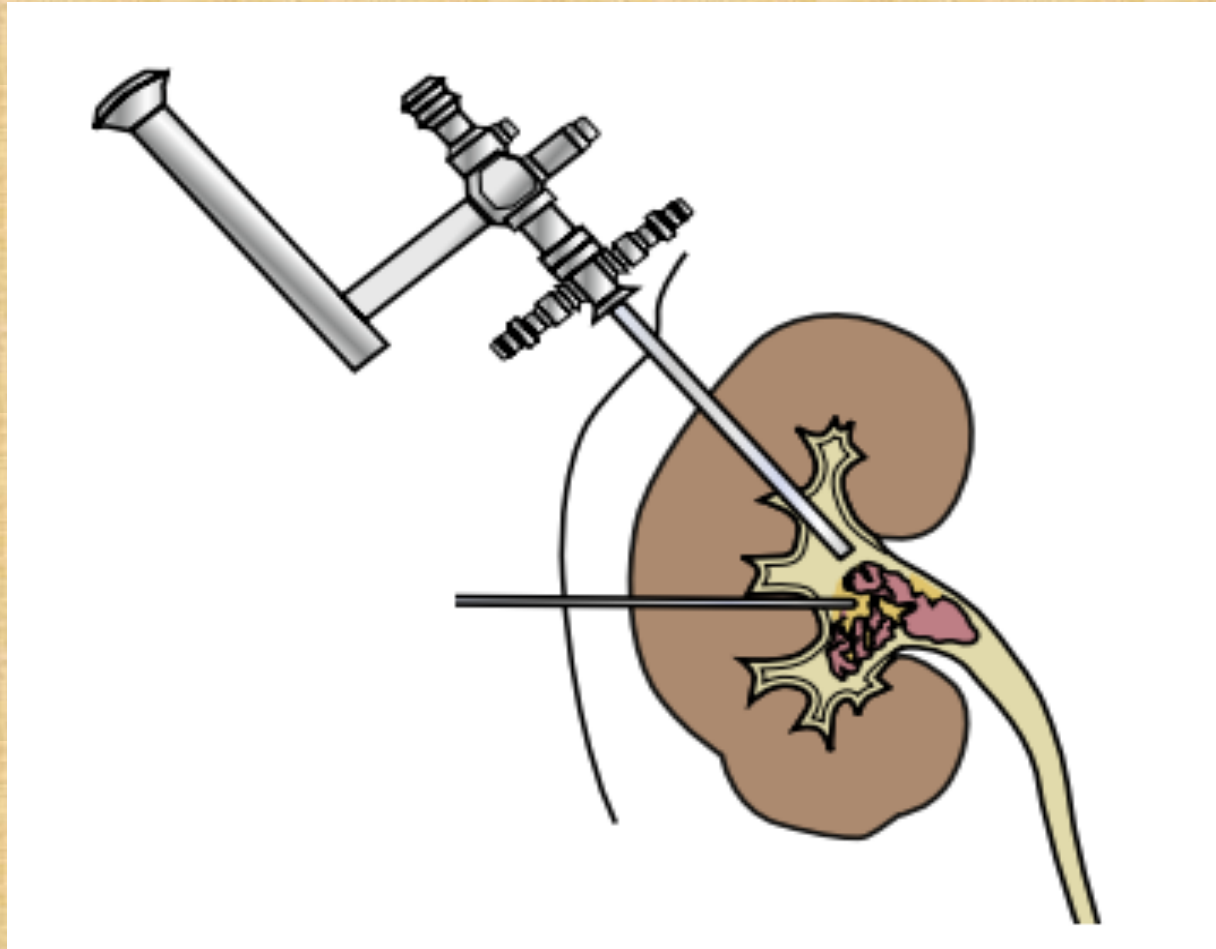
- Ideally the patient is in good health and not obese and the calculus is 1 cm or less in diameter, free-floating, radiopaque, and solitary. However, there is a high population of obese patients who undergo percutaneous nephrolithotomy. Advances in technology complemented by the experience gained by the urology team have allowed patients with more complex problems to be managed in this manner. Patients who have undergone previous renal surgery, have stone recurrence, or have an established nephrostomy tract may also benefit from this procedure.





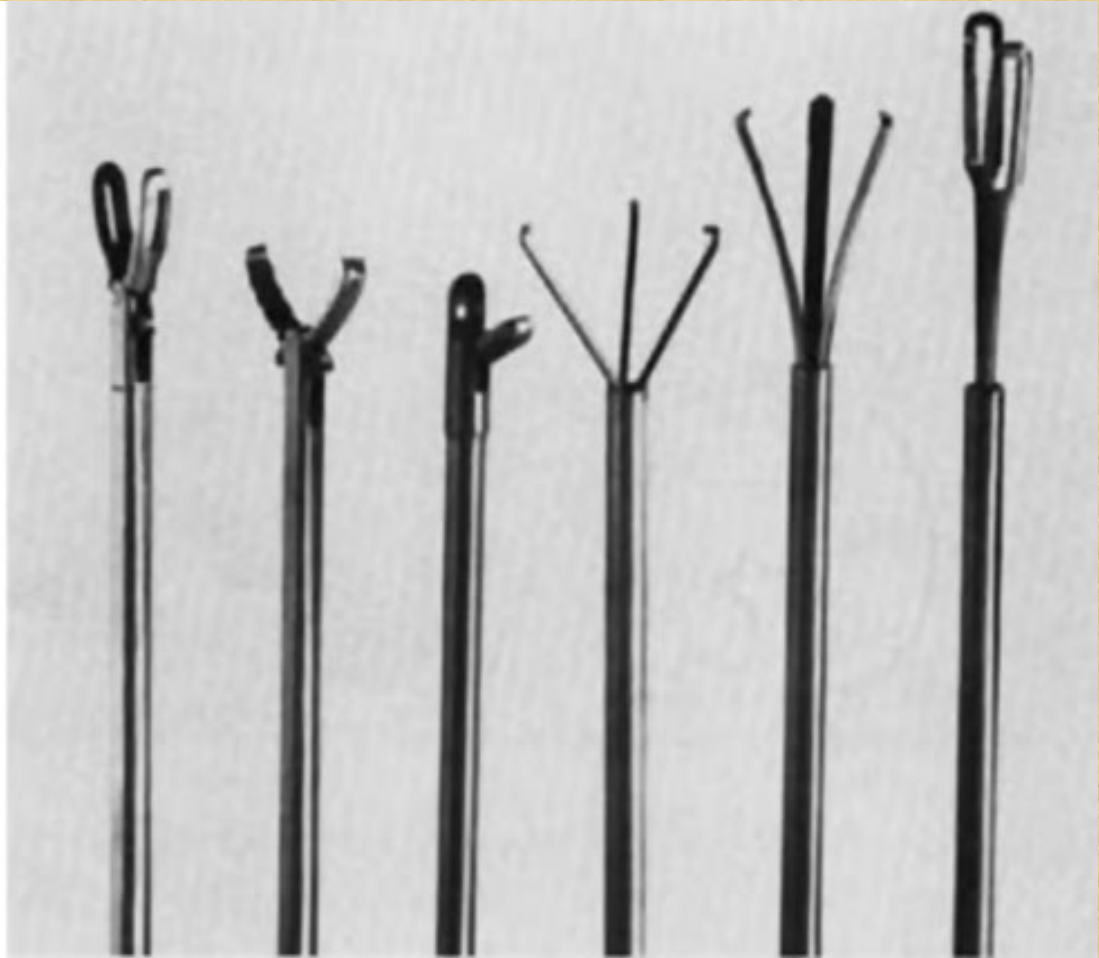
**Ultrasonically guided puncture of a dorsal lower calyx**





**Percutaneous nephroscopy**

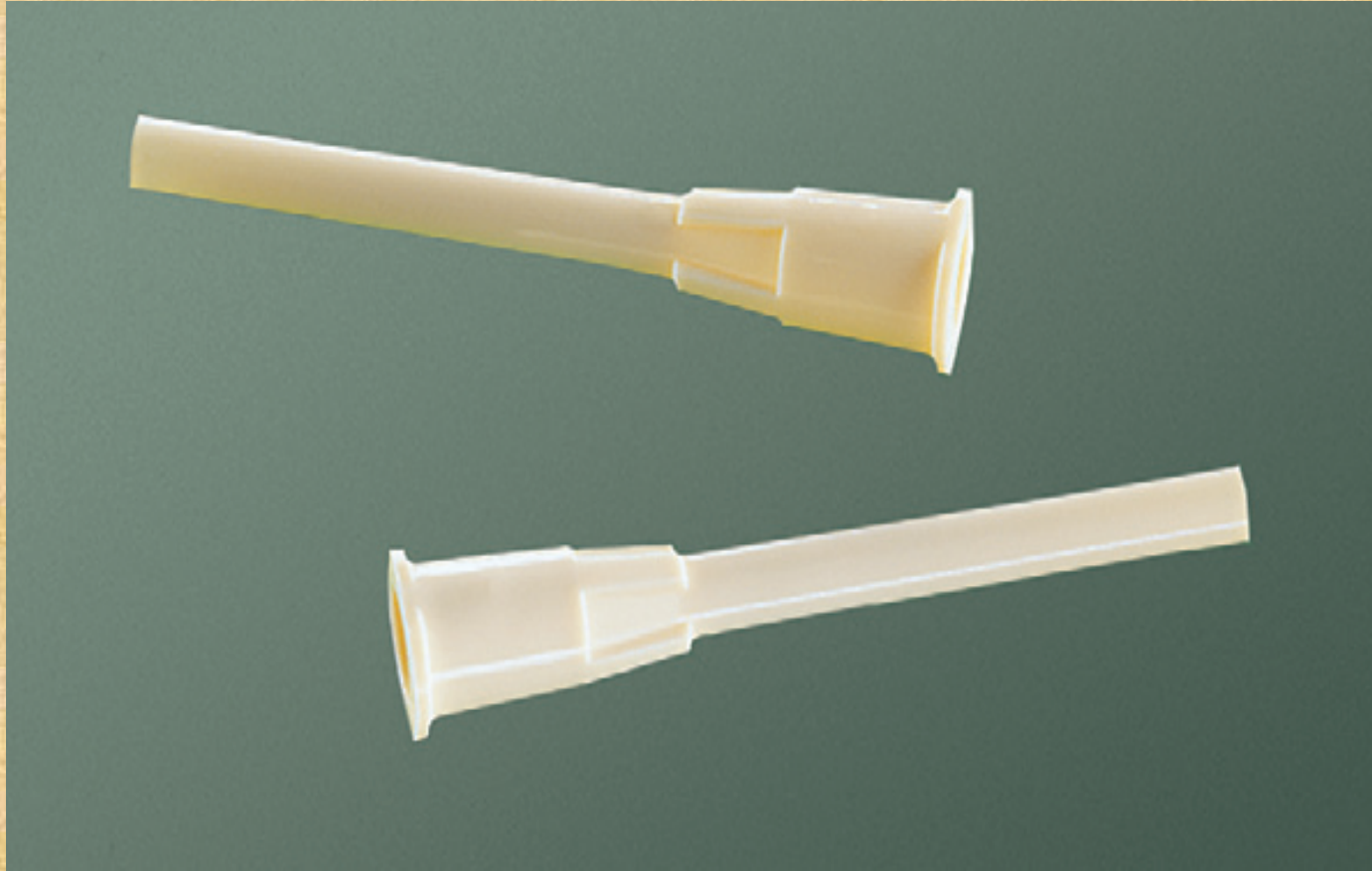




**Nephroscopes and Graspers**



**Ureteral catheters**



**Adapters**



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