Urology

KÚCH FN Brno

FAKULTNÍ NEMOCNICE BRNO

TRAUMACENTRUM

MUNI MED

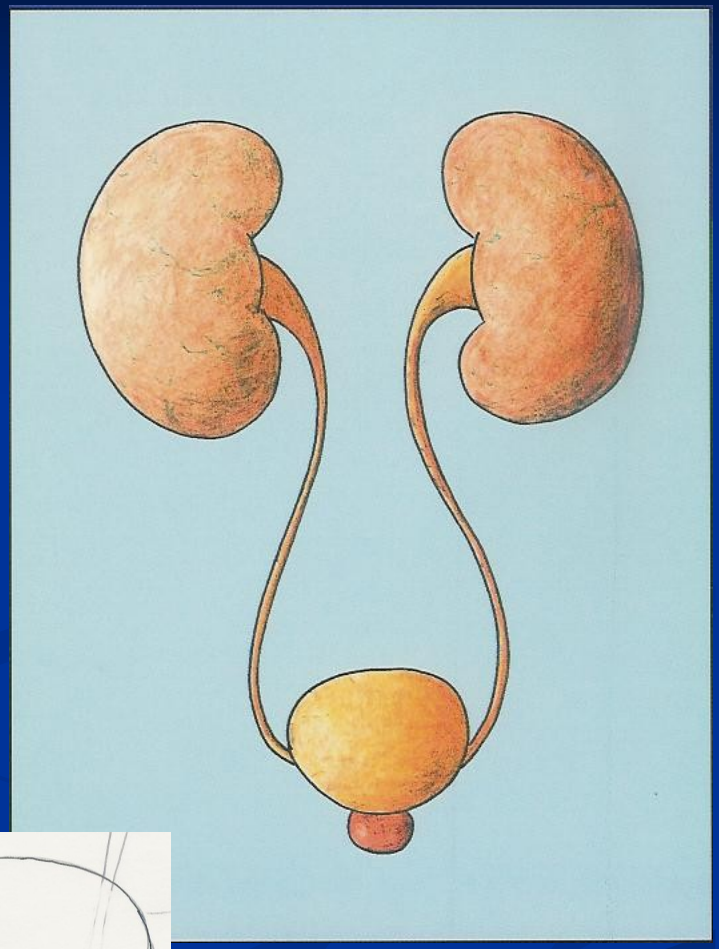
- Urology – medical discipline treating urinary system disorders, retroperitoneal disorders, male genital
- + male andrology, children urology

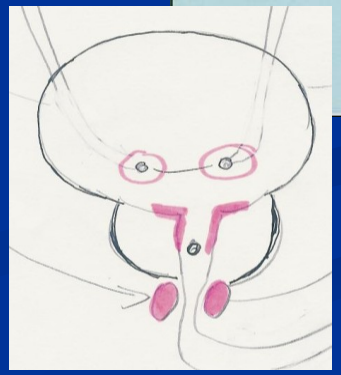
- Inflammatory diseases
- Oncology
- Injuries

- UUT
  kidneys and ureters
  low-pressure and low capacity system
  (10cm H_2O, max. 7 ml)

- LUT
  urinary bladder and urethra
  high pressure and high capacity
  system (40 cm H_2O a 400ml)

- genitals
  40km/hour
  communication with LUS





History:

- FH: oncological disorders, urolithiasis, polycystic kidneys
- PH: injuries, infections, DM, neurological disorders, …
- PH: character of complaints – character of urination, pain, fever

- The entire urogenital system should always be examined for every symptom of urological disease

- urine examination chemically, microscopically and biochemically, measuring micturition frequency and volume

Appearance of urine

- macroscopic hematuria (due to color- intensity and age of hematuria)
- uretrorrhagia (blood flow out of urethra meatus),
- pyuria (pus in urine, odor),

- hemoglobinuria (free hemoglobin in urine, no RBC)
- pneumaturia (air in the urine when fistula between intestine and urinary),
- Cholurie - bilirubinuria


THE NEPHROLOGIST'S FLIGHT
LAGER
AMBER ALE
IPA
COFFEE STOUT
NORMAL
CHOLURIA
HEMATURIA
RHABDO
@Md_comics

Pathology of the volume of urine

- Polyuria - diuresis > 2,5l
- Anuria – stop of urine production, diuresis 50-0 ml/24h
- Oliguria – decreased urination, 500-50 ml/24 hour
- Kidney failure, acute tubular necrosis, shock condition severe dehydration,

Urological symptomatology

- **Dysuria** – unpleasant difficult urination – postponed start, discontinued urination, prolonged, sensation of incomplete evacuation
- Urothelial irritation– subvesical obstruction , urethritis, cystitis, vesico-lithiais, chemical irritation

- **Polakisuria** – frequent urination with small amount of urine volume, in short intervals
- Emotional instability, cystitis, urethritis, lithiasis

- **Stranguria** – painful cutting sensation during urination

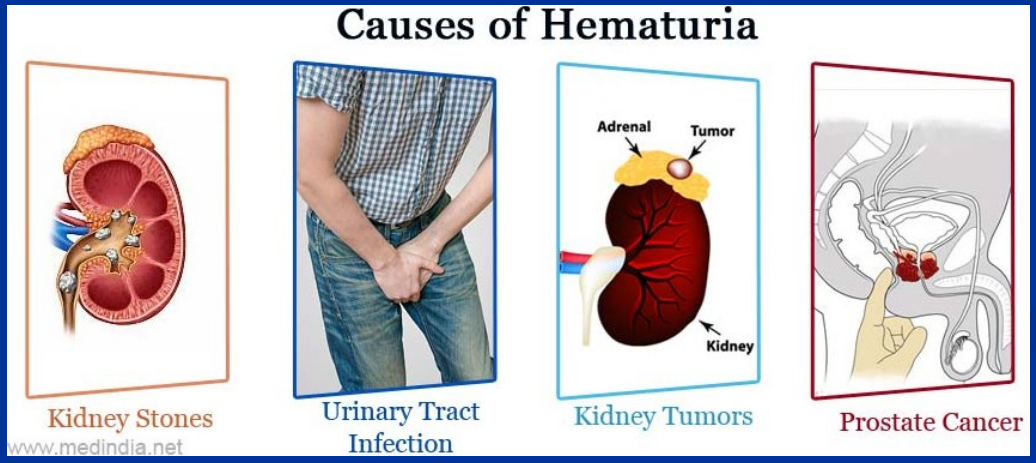
- **Nycturia** – frequent awakening in night due to repeated need to urinate
- Polyuria, CHHF, secretion disorder of ADH, disorder of capacity of bladder

- **Retention** – urinary retention in the bladder
- **Incontinence** - failure to retain urine
- **Residue** - urine residue after urination

- **Hematuria** – RBC in urine (>10/ml, 2-3 in visual field)

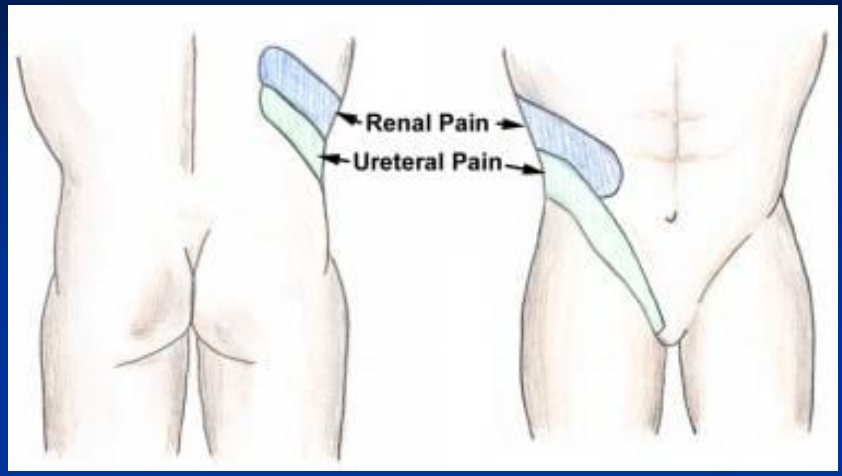
- Macroscopic
- Microscopic

- Renal
- Post-renal



Pain of urinary tract

- **Kidney –**
  - nephralgia
  - Colic pain



- **Bladder –** retro pubic, associated with urination
- **Urethra –** cutting sensation

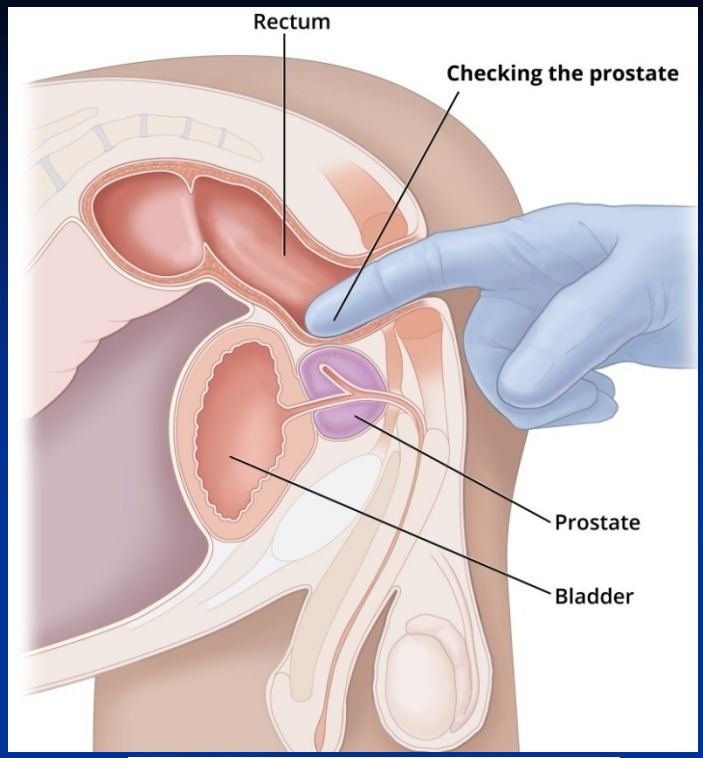
- **Prostate and seminal vesicles** – dull pain of perineum , around rectum
- **Testicles and epididymis -** testalgia

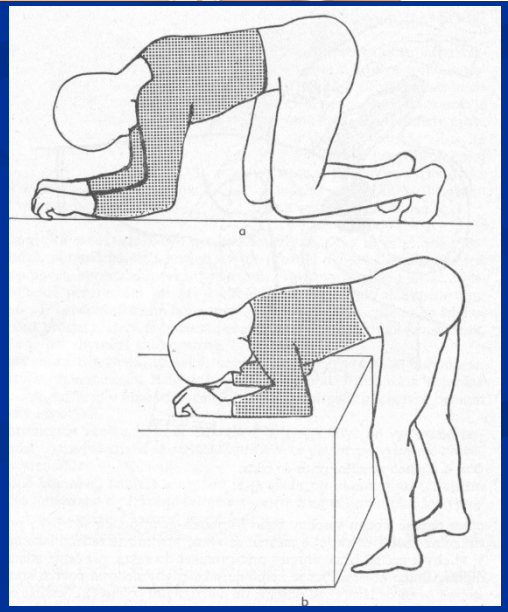
Examination in urology

- History
- Physical exam
- Lab exam
- Imaging methods – SONO, X-ray/CT, radioisotopes
- Endoscopic exam
- Functional exam

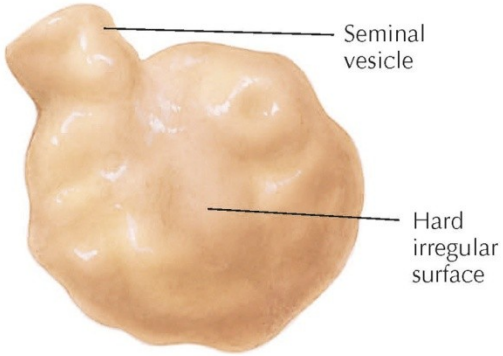
Physical examination in urology

- Aspects - View – antalgic posture
  - tumors, cysts, contraction of abdominal wall
- Palpation – kidney exam – bimanual palpation
  - larger tumors
  - movement of kidney when kidney ptosis,
  - filled bladder,
- Examination of outer genitals, digital rectal exam
- Percussion – tapottement,
- (auscultation – aneurysm)

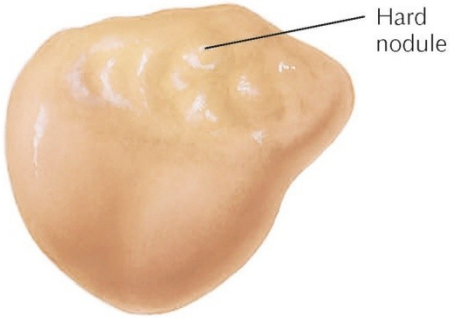

Rectum
Checking the prostate
Prostate
Bladder



PROSTATE



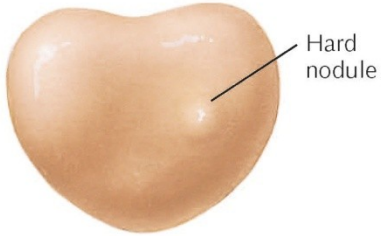
Prostate is enlarged with hard, irregular surface and seminal vesicle involvement. There is also massive neoplastic involvement indicating cancer.
5.5cm x 5.01cm x 0.5h cm, 50 cc



Prostate is enlarged with hard nodule below right of base, extending across midline and asymmetry at right base, indicating possible cancer.
5.5cm x 4.71cm x 1.3h cm, 50 cc

Prostate is enlarged with symmetrical surface and has soft, slight median furrow, indicating BPH.
5.5cm x 5.01cm x 1.0h cm, 65 cc

Prostate in normal condition.
4.2cm x 3.51cm, 20 cc



Prostate is normal size with hard nodule below surface of right lobe, indicating possible cancer.
4.2cm x 3.51cm, 20 cc

Prostate is enlarged with soft, smooth surface. Right lobe is larger. Indicates BPH and/or possible cancer.
4.7cm x 4.21cm, 30cc

Models are examples of size and/or presence of nodules within the prostate. Not representative of texture or consistency.

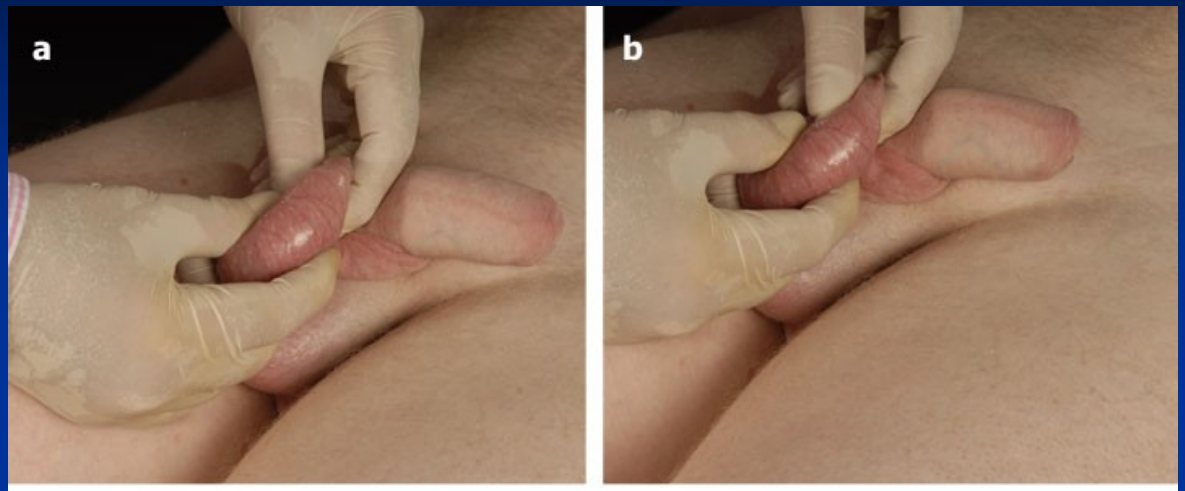
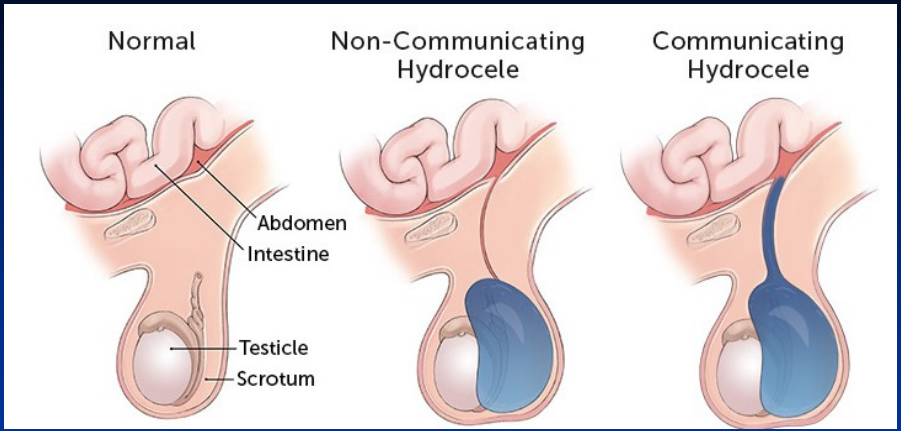


Figure 60 a,b. Examination of testis.

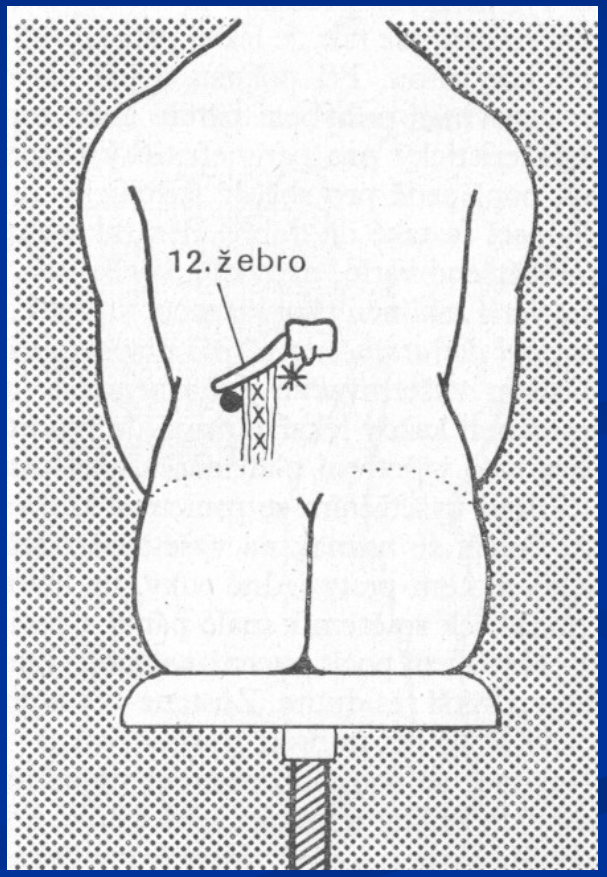
Figure 57 Severe phimosis with pinpoint opening.

- hydrocele


Normal
Non-Communicating Hydrocele
Communicating Hydrocele
Abdomen
Intestine
Testicle
Scrotum

Differential diagnosis of pain

- Sciatic syndrome
  Herpes
  Biliary colic
  Abdominal colic
  Perinephric abscess
  Appendicitis
  Pancreatitis
  Gynecological diseases



Lab examination

- Blood – BCH, WBC, Coagulation
- Urea, creatinine, urine acid, ABL, ion's, osmolality, CRP

- Urine examination- necessary at all urological examinations Biochemical exam, microscopy exam

- First current– in urethra
- Medium current– significant (bladder, kidney)
- Final current

- /glu, ketone, proteins, pH, Hbg/
- Centrifuge, microscopy

- Microscopy: normal - 0-2 ery/field, 0-5 leu/field, rarely - crystals, epithelia's, 0 bacteria

- Microscopic exam

Urine sample:

- Medium current
- Single catheterizing
- Suprapubic aspiration

- Positive cultures- > 10*5 bacteria's in 1ml, sterile fashion > 10*3

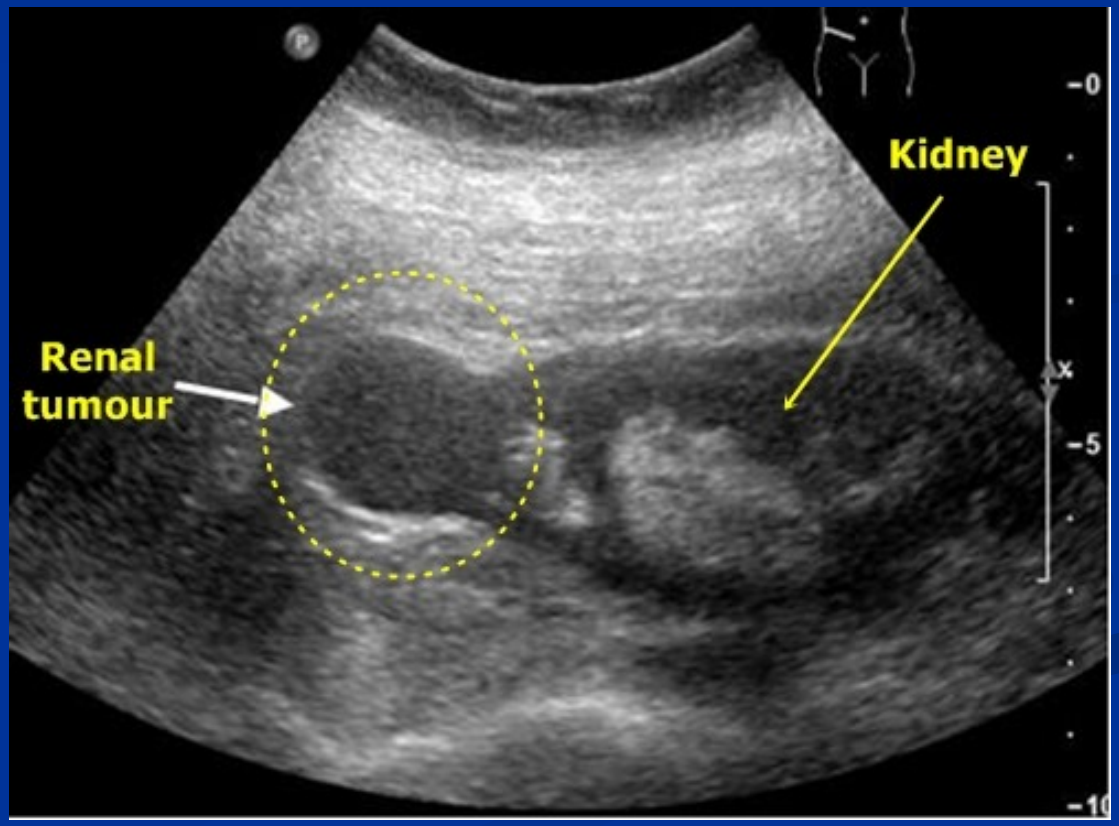
Imaging methods

- SONO – echo of high frequency (MHz) sound waves from different tissues

- B-mode

- 3D SONO

- Doppler



- X-ray

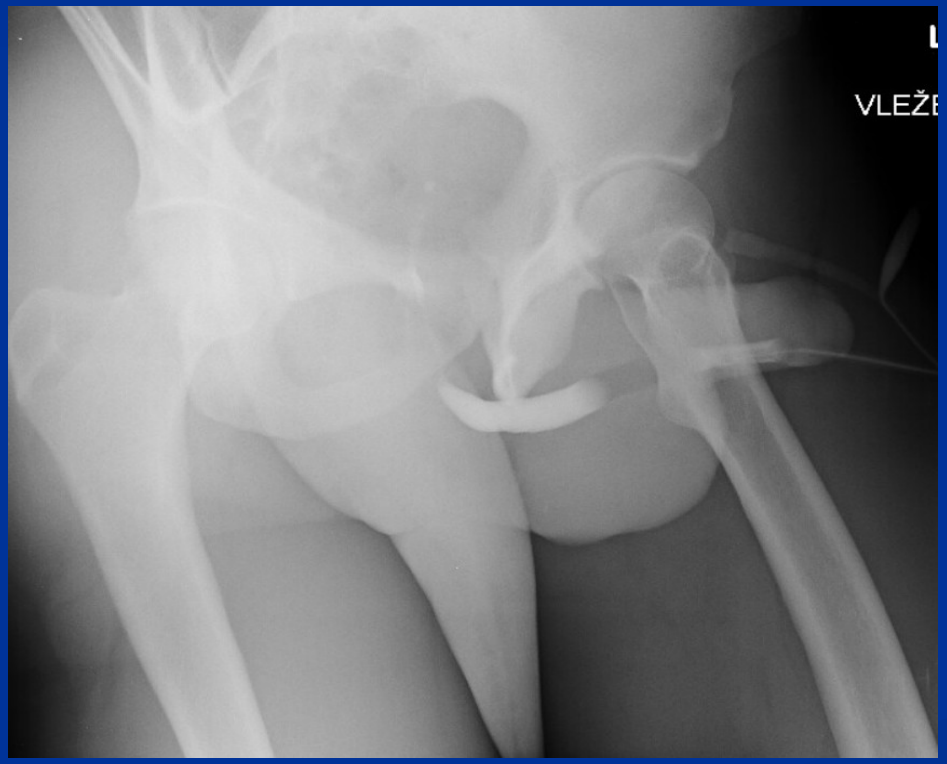
- Intravenous urography
  scans qh 5 min

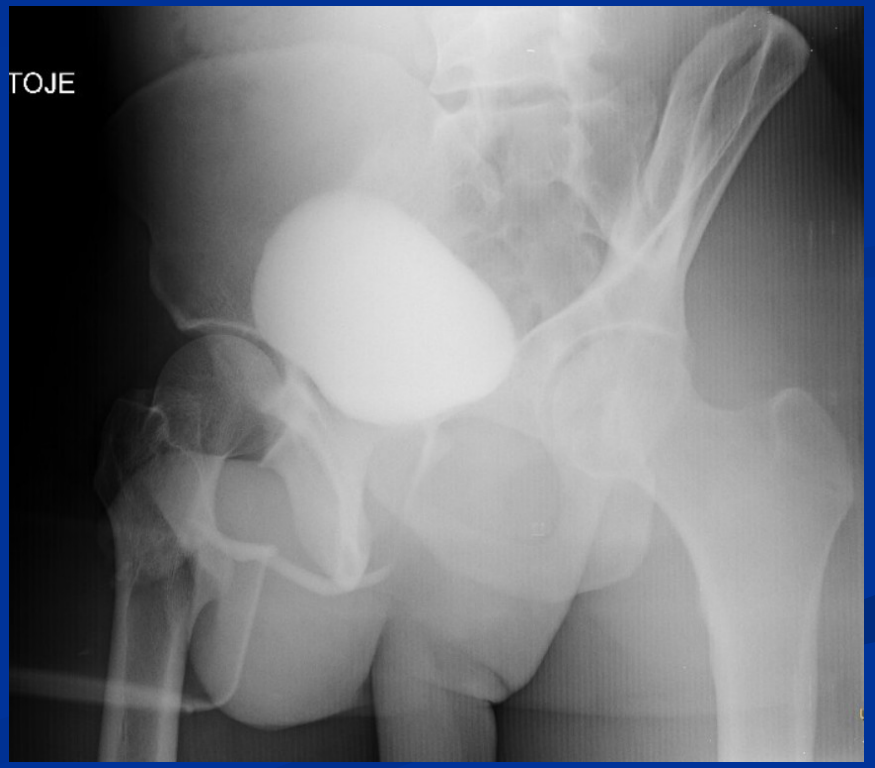
CAVE – creatinine > 175 umol/l

- cystography

- Ascendant pyelogram (retrograde pyelogram)
- Contrast via catheter to the ureters

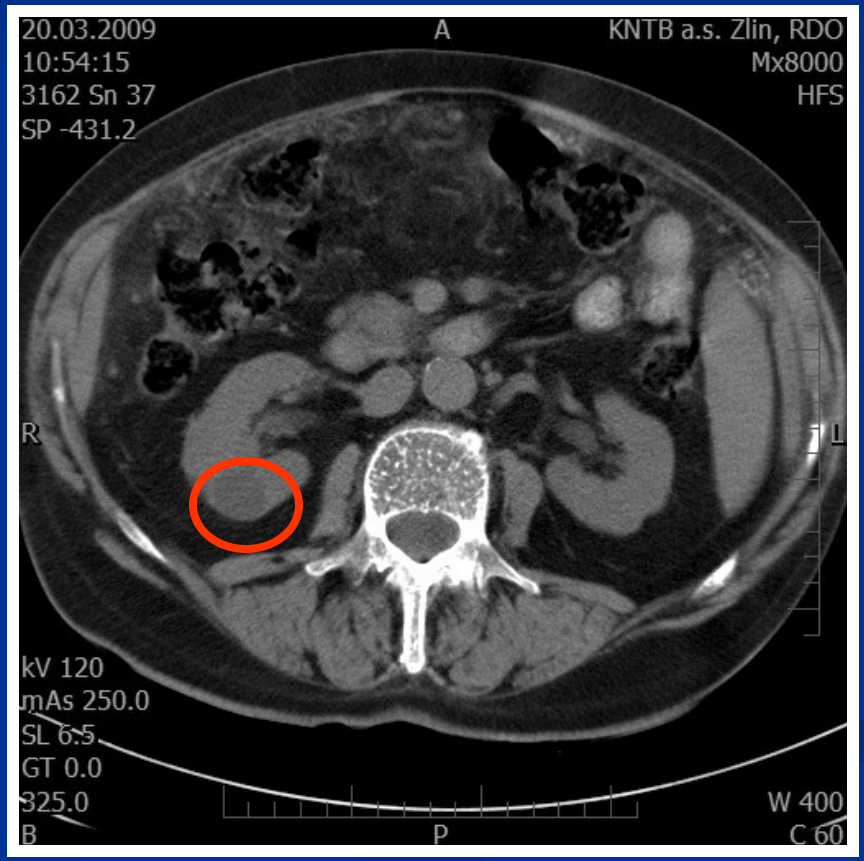
- Retrograde urethrocystography – assessment of urethra and bladder, quality of urination
- Voiding cystourethrography (VCUG) – during urination



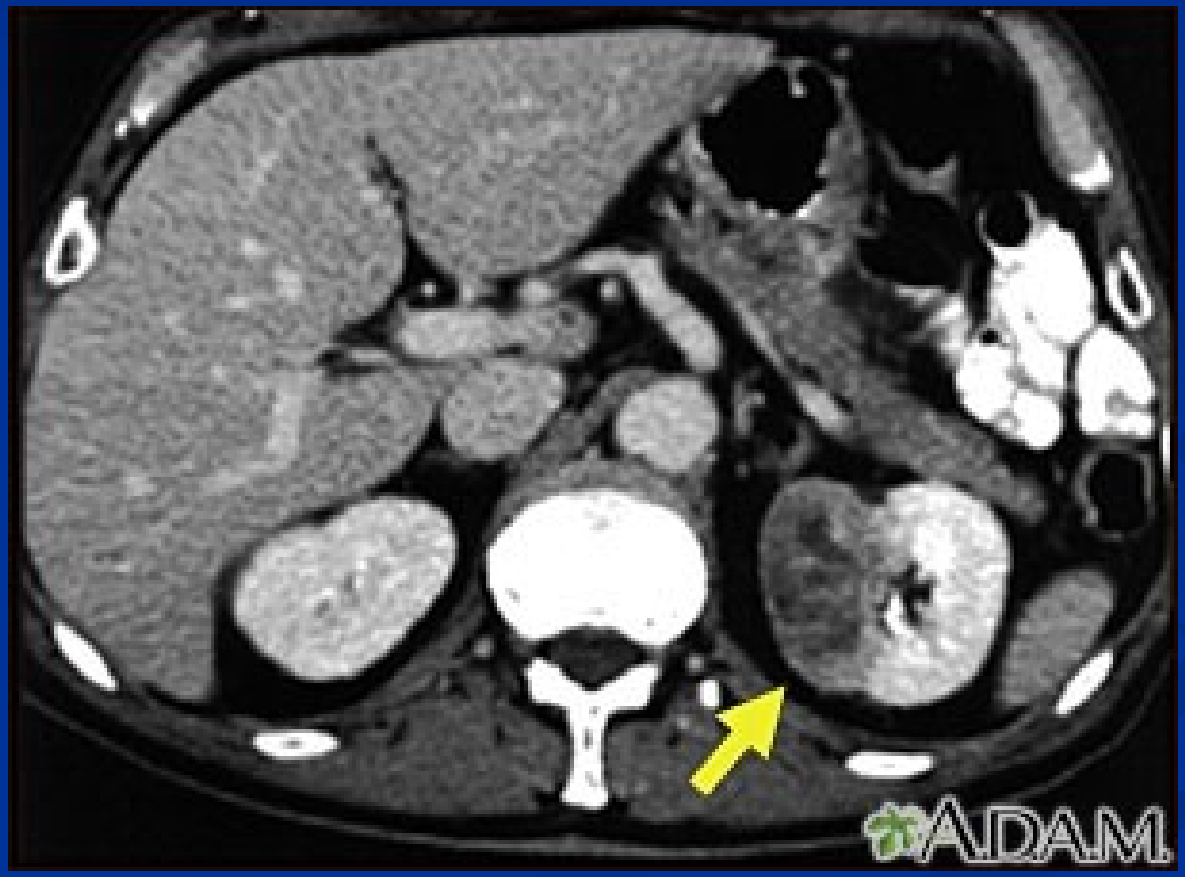


- Native CT

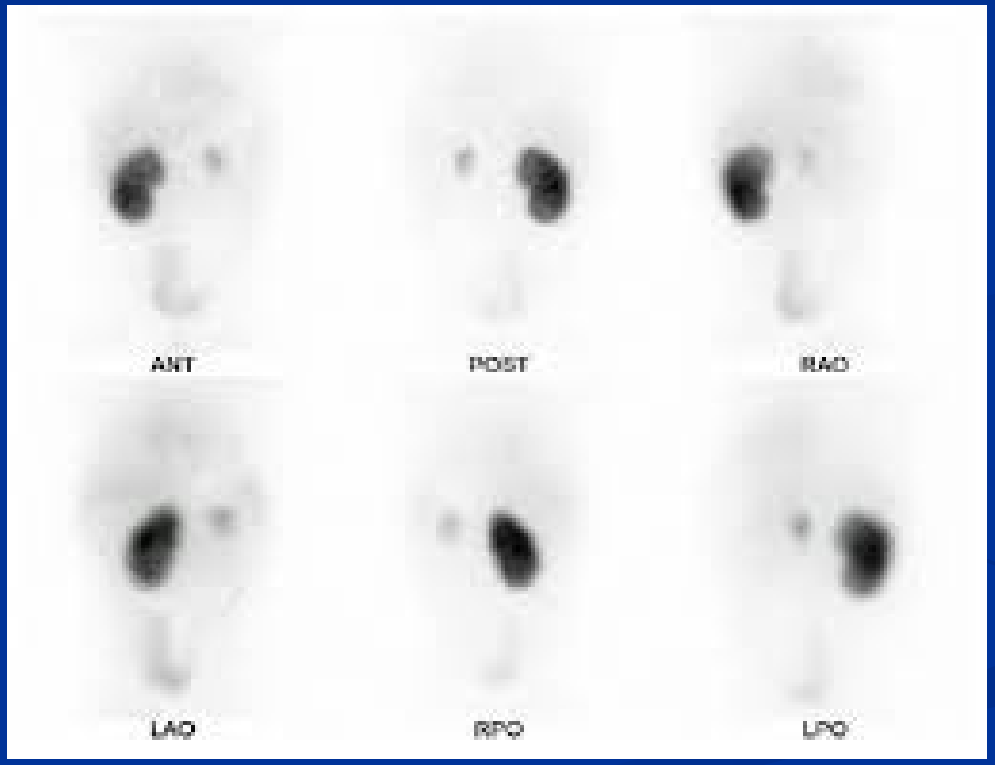

Se: 8866
Im: 143
DFOV 323.0 mm
20020622
512
R
L
kV 120.0
mA: 367
3.2 mm
Tilt: 0.0 degrees
ms
145935.513000
W=400,L=50
10mm/div
P


20.03.2009
10:54:15
3162 Sn 37
SP -431.2
A
KNTB a.s. Zlin, RDO
Mx8000
HFS
R
L
kV 120
mAs 250.0
SL 6.5
GT 0.0
325.0
B
P
W 400
C 60

- CT - i.v. contrast



- Kidney scintigraphy



Functional examination

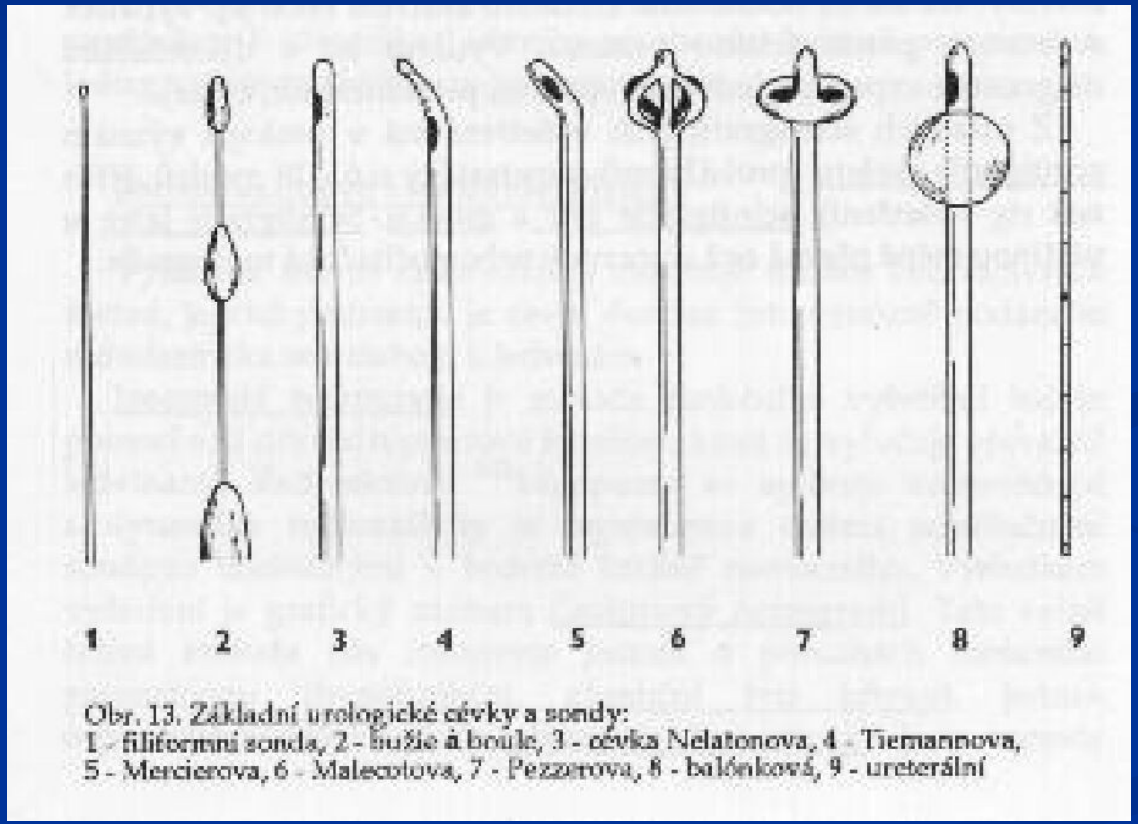
- **Uroflowmetry (UFM)**
- Measurement of amount of urine in time unit, depends on quality of detrusor muscle

- **Cystometry**
- Measurement of intravesical pressure doe to the volume of filling.

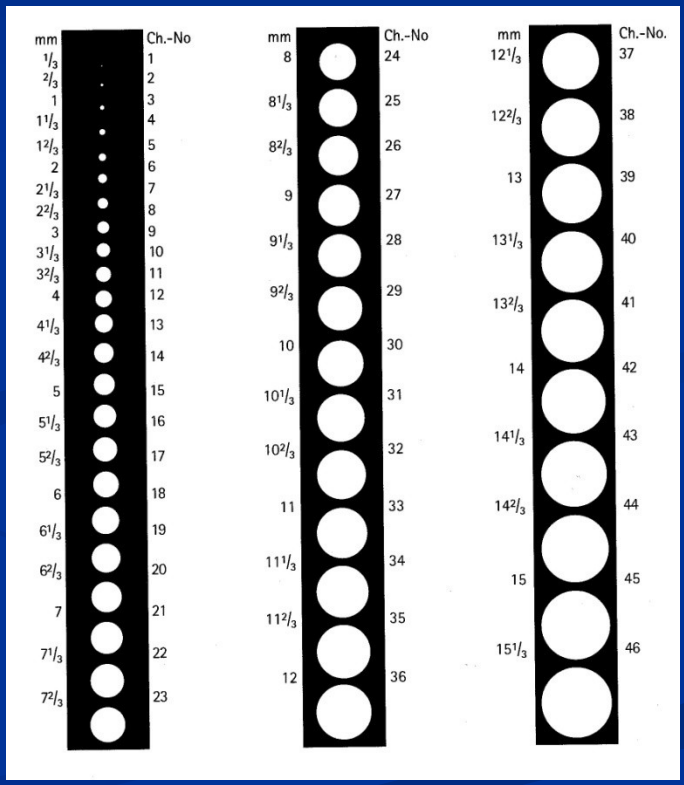
- **Measurement of urethral pressure**
- Measurement of intraurethral pressure with special probe catheter

Types of catheters

- size – Chariere/ French – circumference

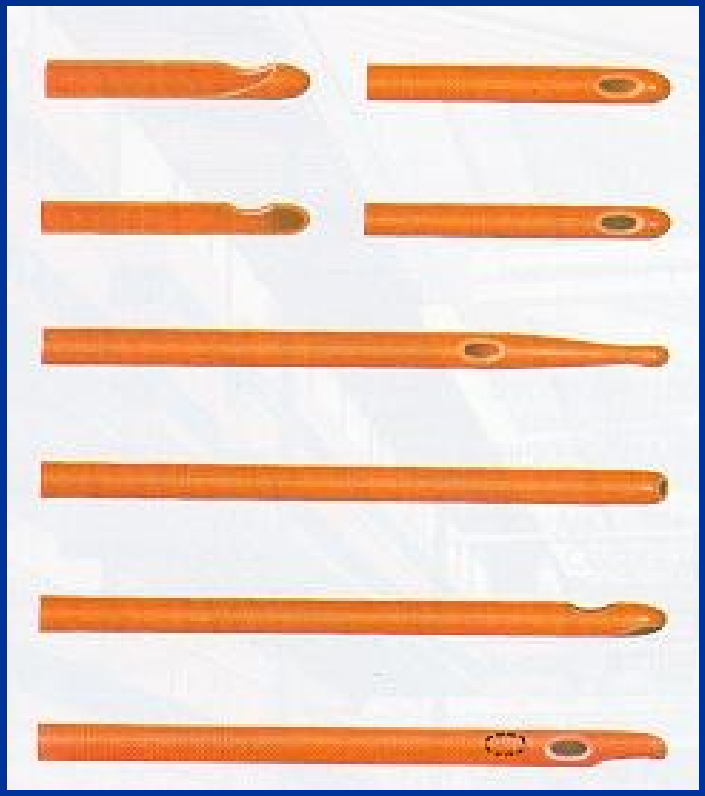


Obr. 13. Základní urologické cévky a sondy:
1 - filiformní sonda, 2 - bužie a boule, 3 - cévka Nelatonova, 4 - Tiemannova,
5 - Mercierova, 6 - Malecotova, 7 - Pezzerova, 8 - balónková, 9 - ureterální



Single use catheters

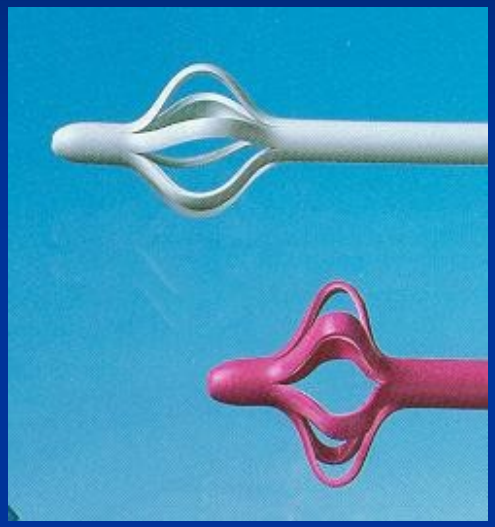
- Nelaton

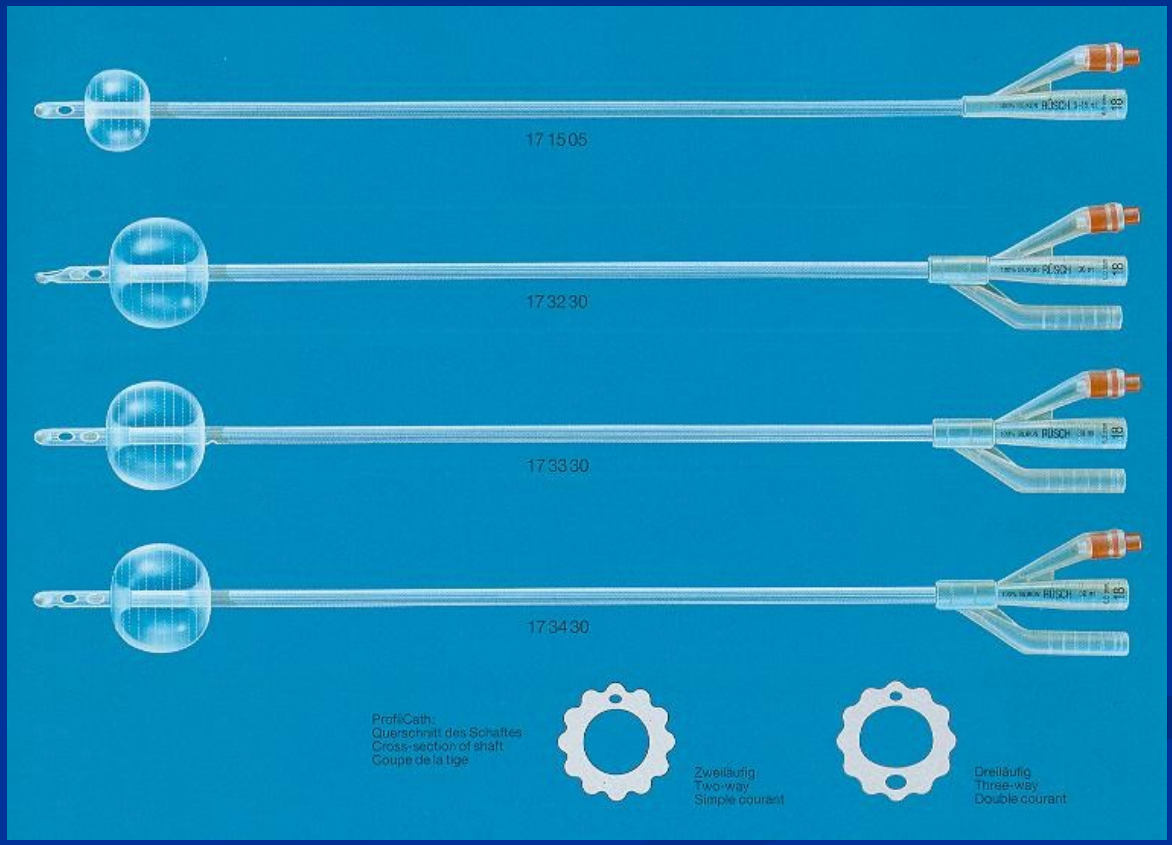


Thiemann

Long term catheters - Foley

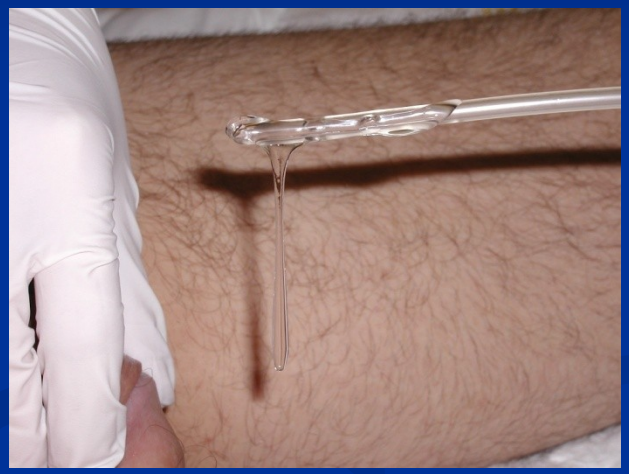
- fixation



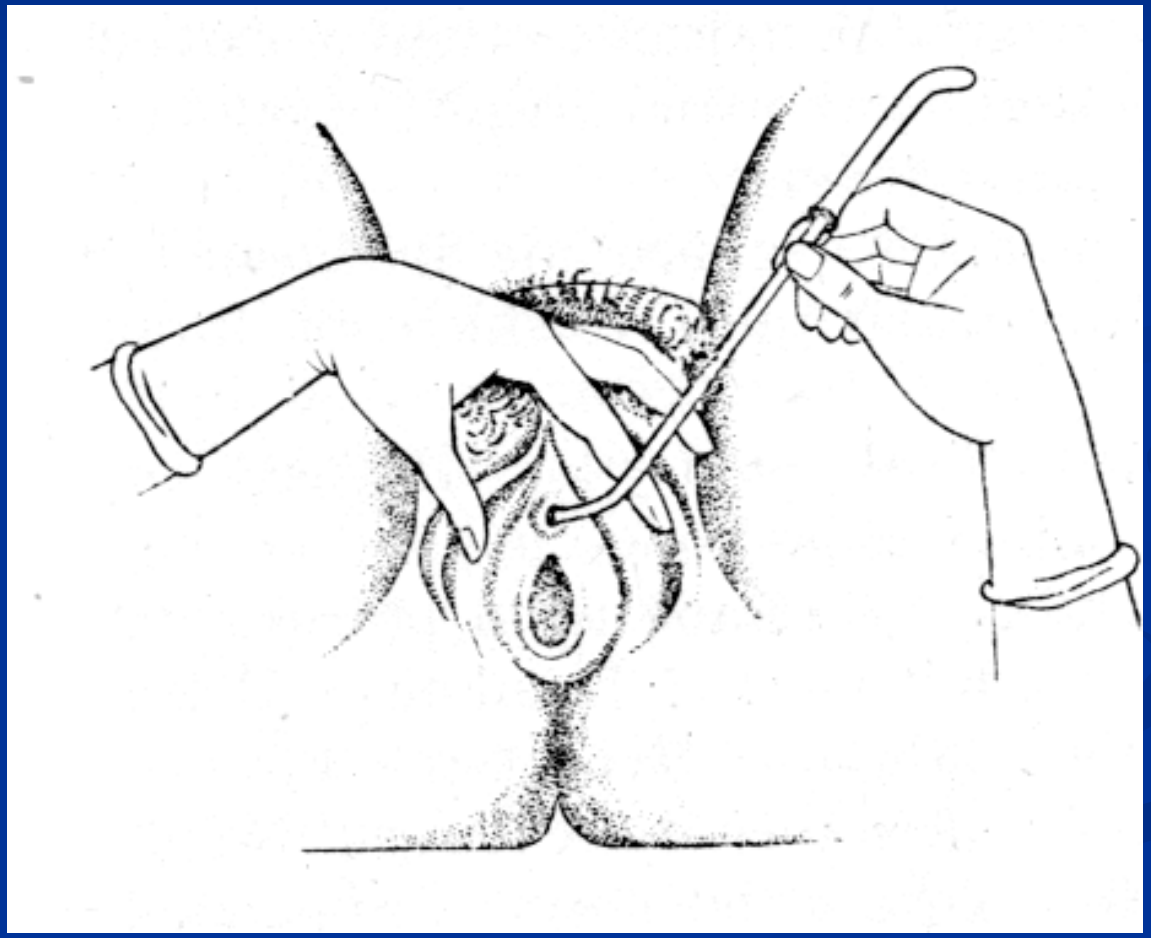


Urinary tract catheterizing

- Disinfection of outer orifice
- Apply lubrication agent/wait 2min/
- Instilagel, Mesocain
  - disinfection, lubrication, anesthesia
- Insert catheter
- Sterile fashion of connection of bag

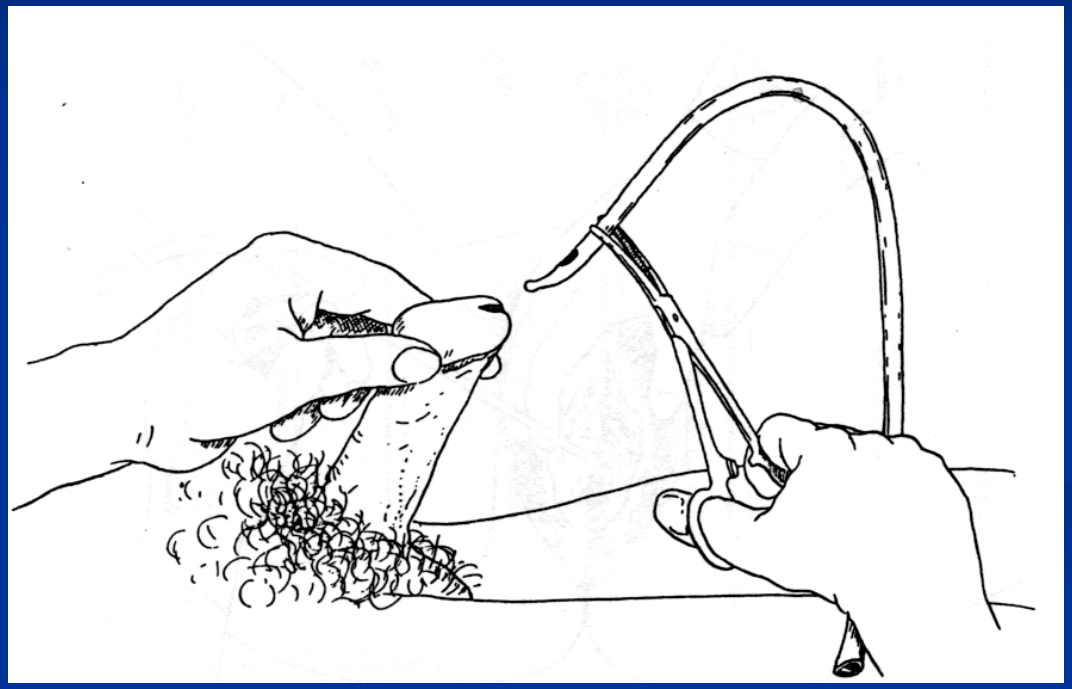


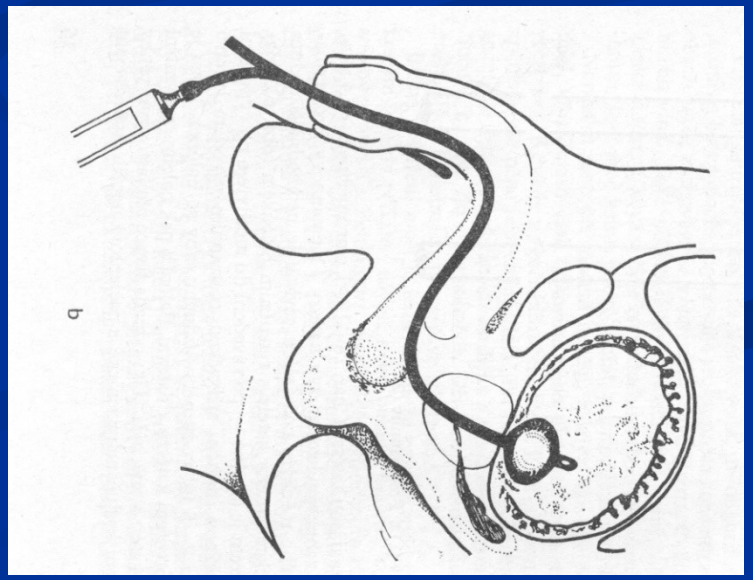
Female catheterizing



Male catheterizing

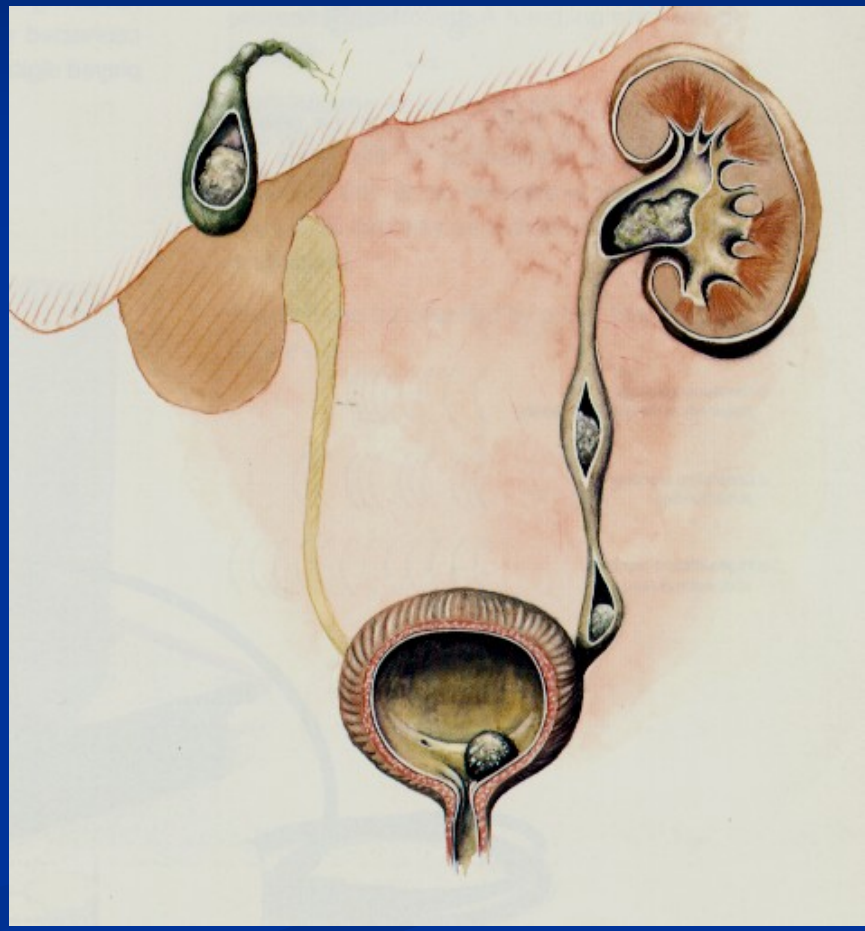
- two angles of male urethra





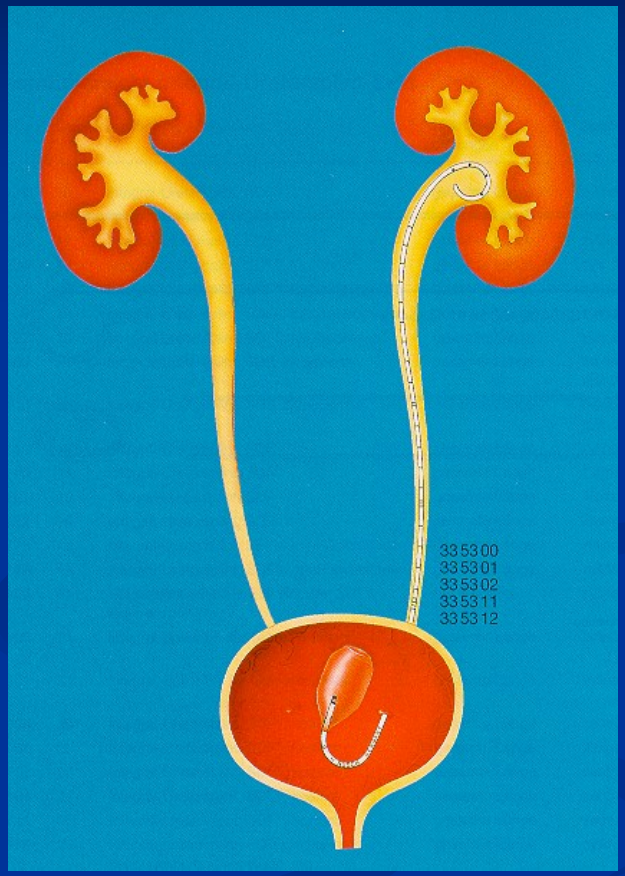
The main problem of urology – drainage od urinary tract

- UUT
  - stones
  - Outer pressure
  - stenosis
  - Rarely tumor
- LUT
  - Benign hypertrophy of prostate
  - tumors
  - stones
  - stenosis

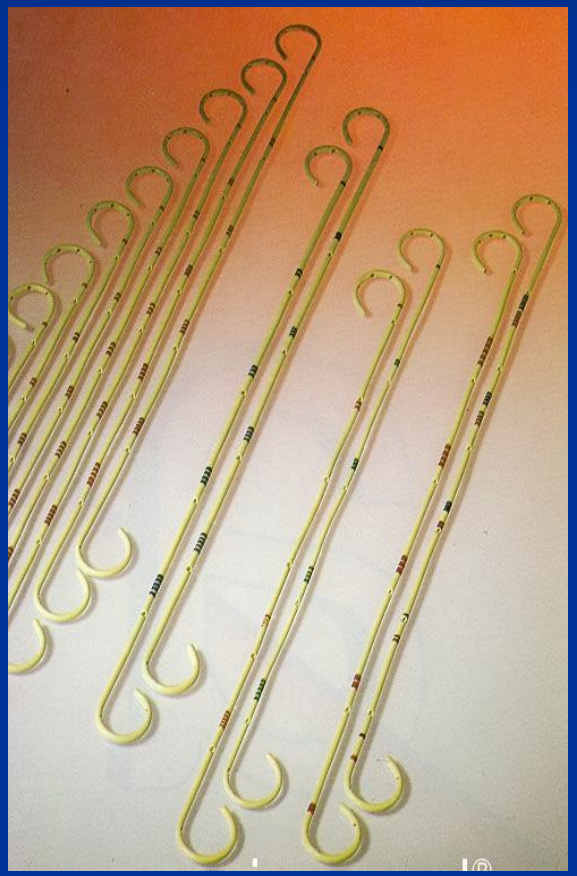


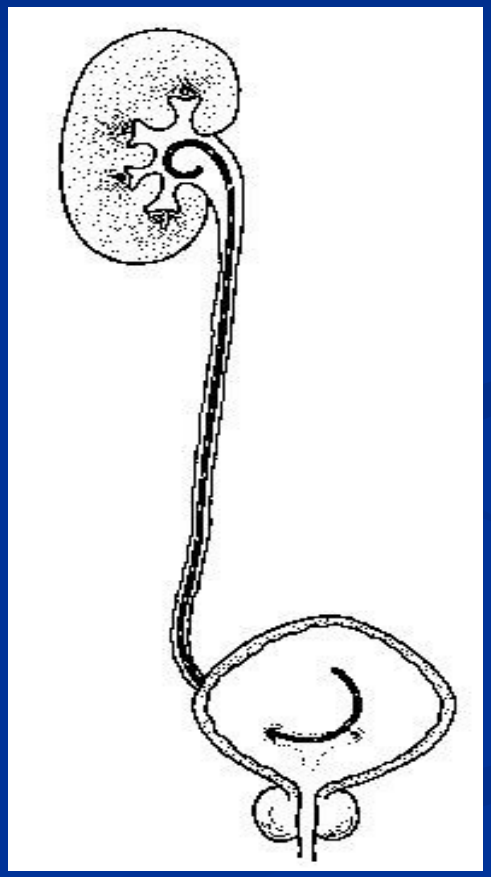
Drainage of ureter

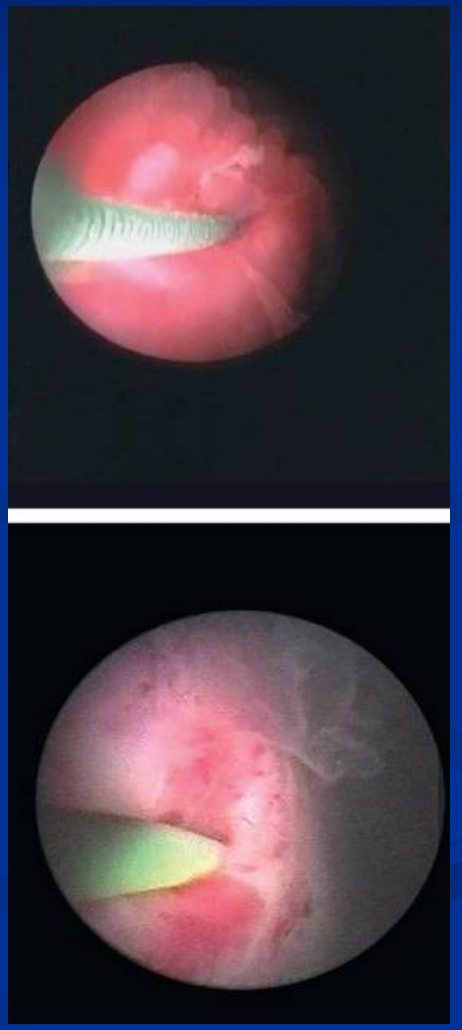
- ureteral catheter
- ureteral double (pigtail)
- Nephrostomy
- Stent



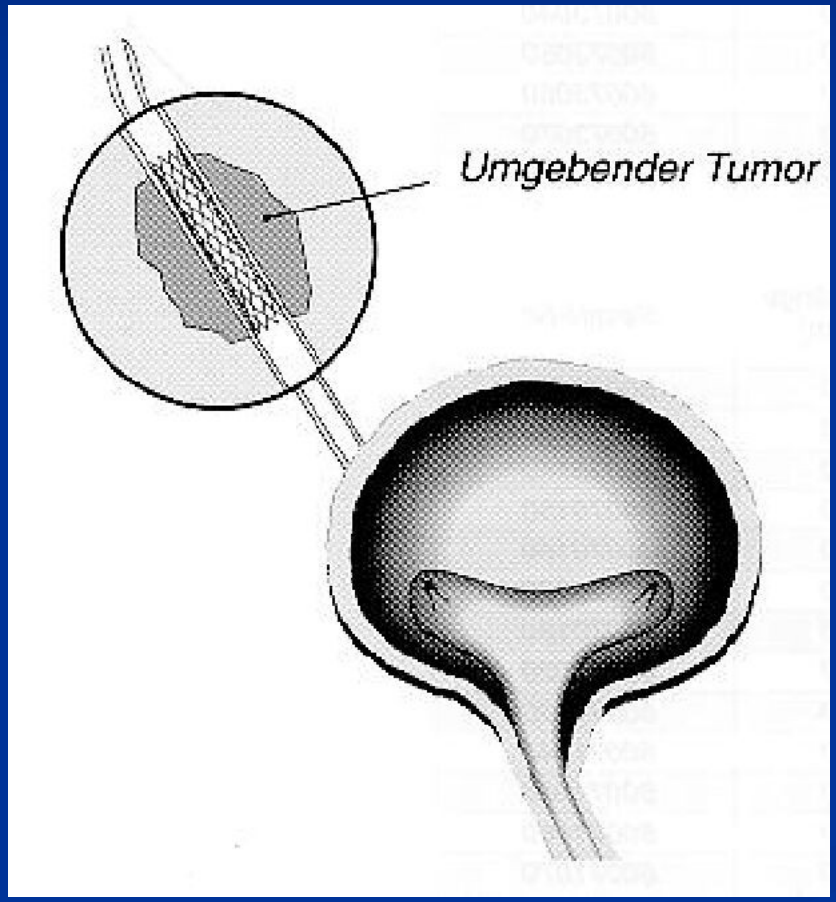
JJ stent - „Double pigtail“

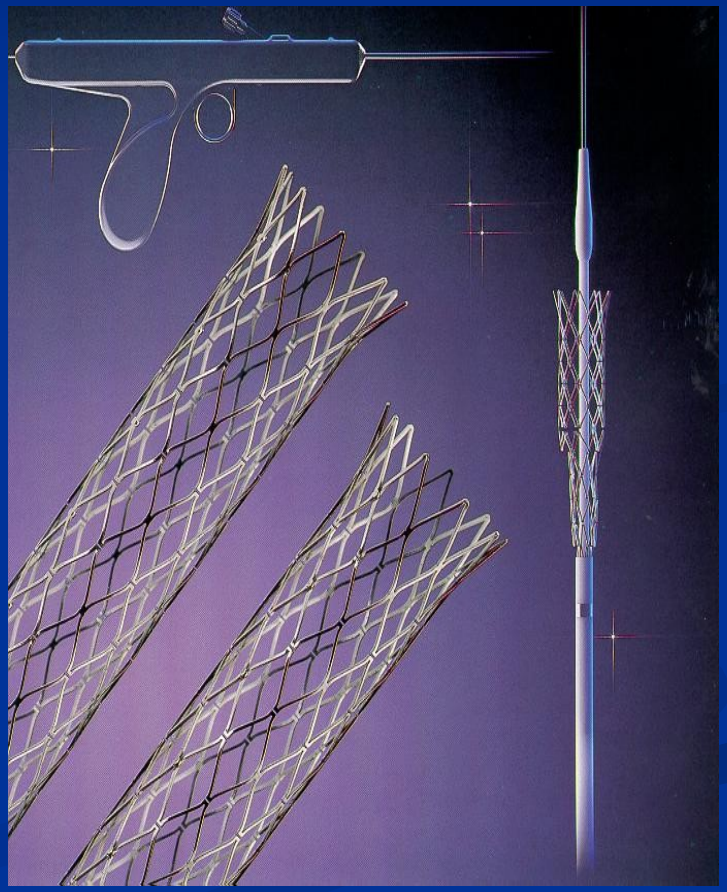






Wall stent

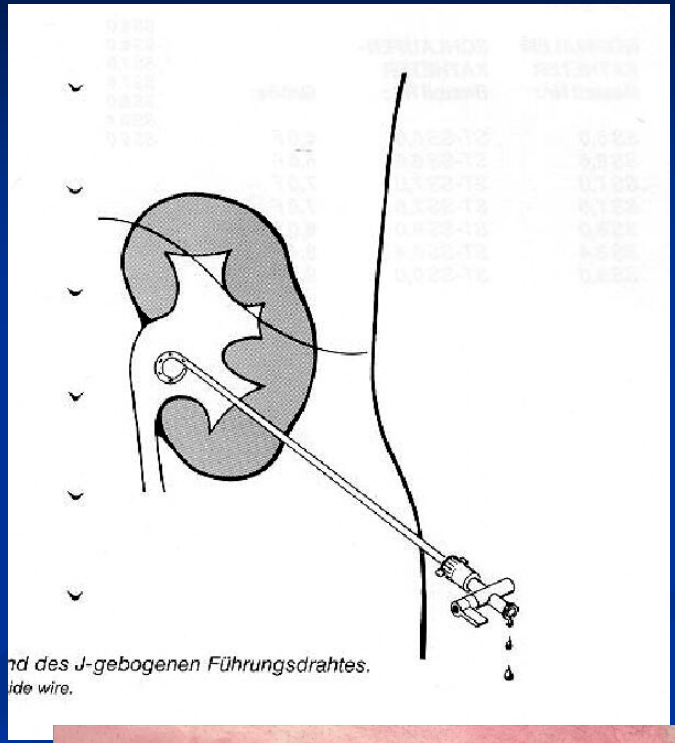


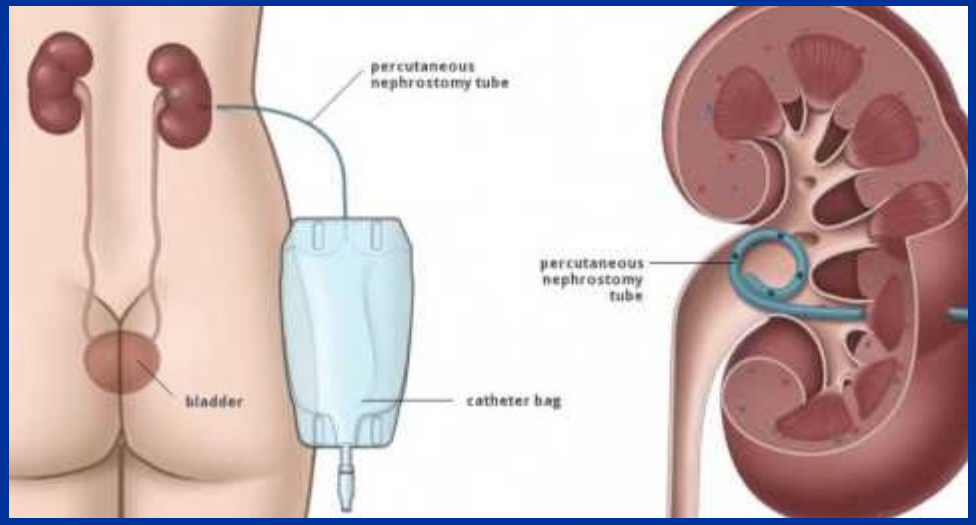


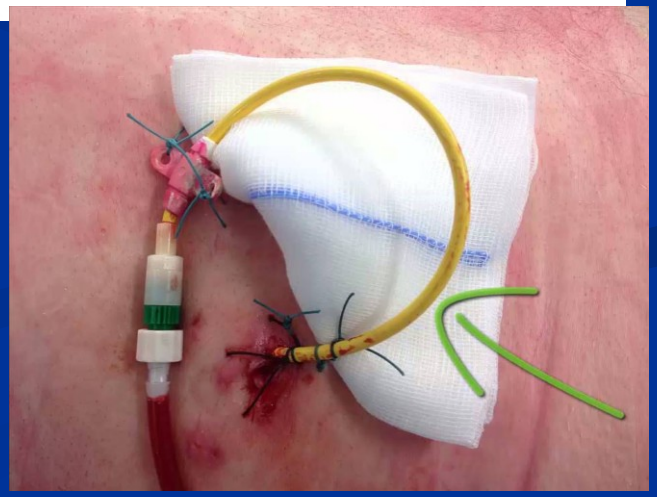
Percutaneous nephrostomy

- Acute and long term drainage
- Minimally invasive procedure
- Open pathway to kidney
- Good control of function

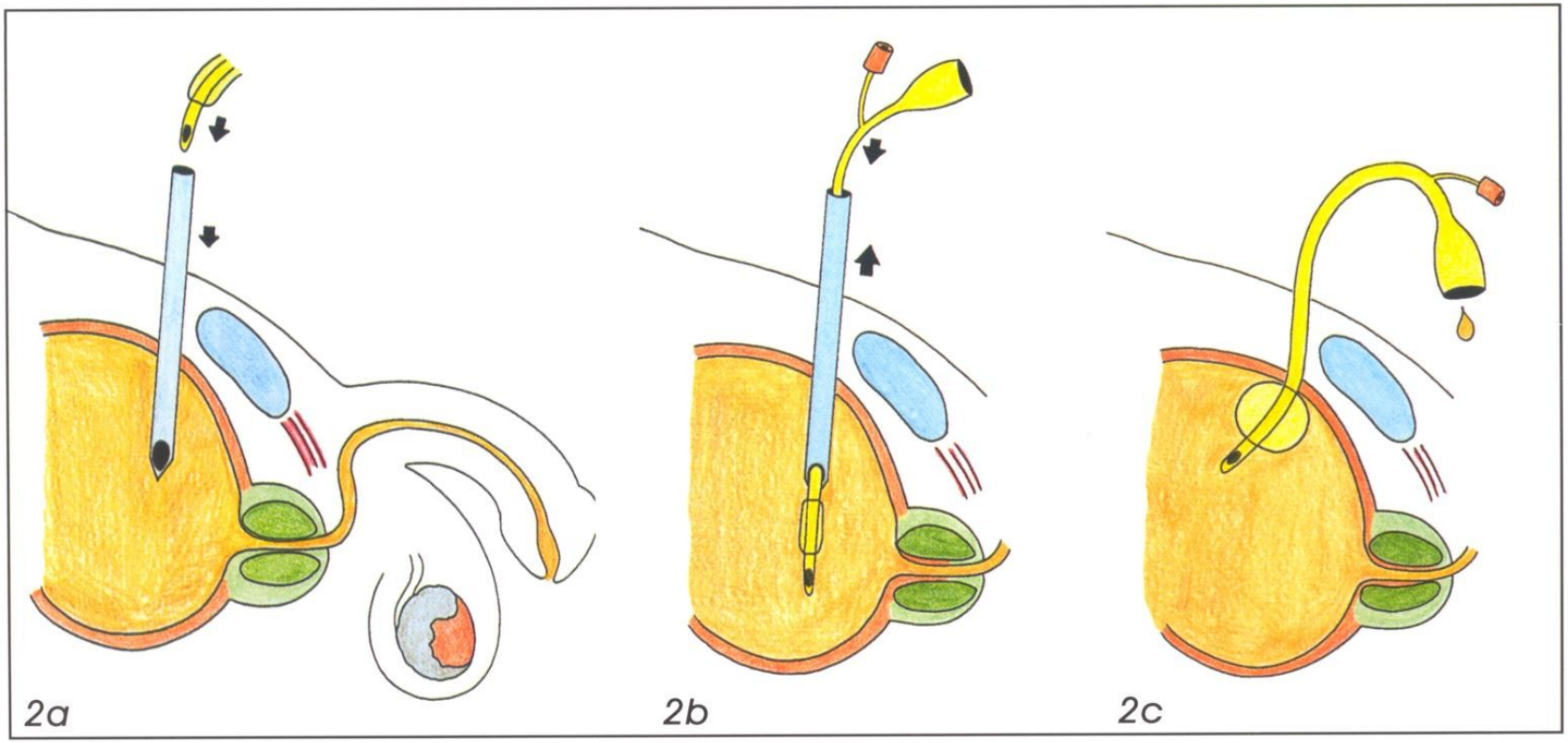
- Dilation of kidney pelvis







epicystostomy

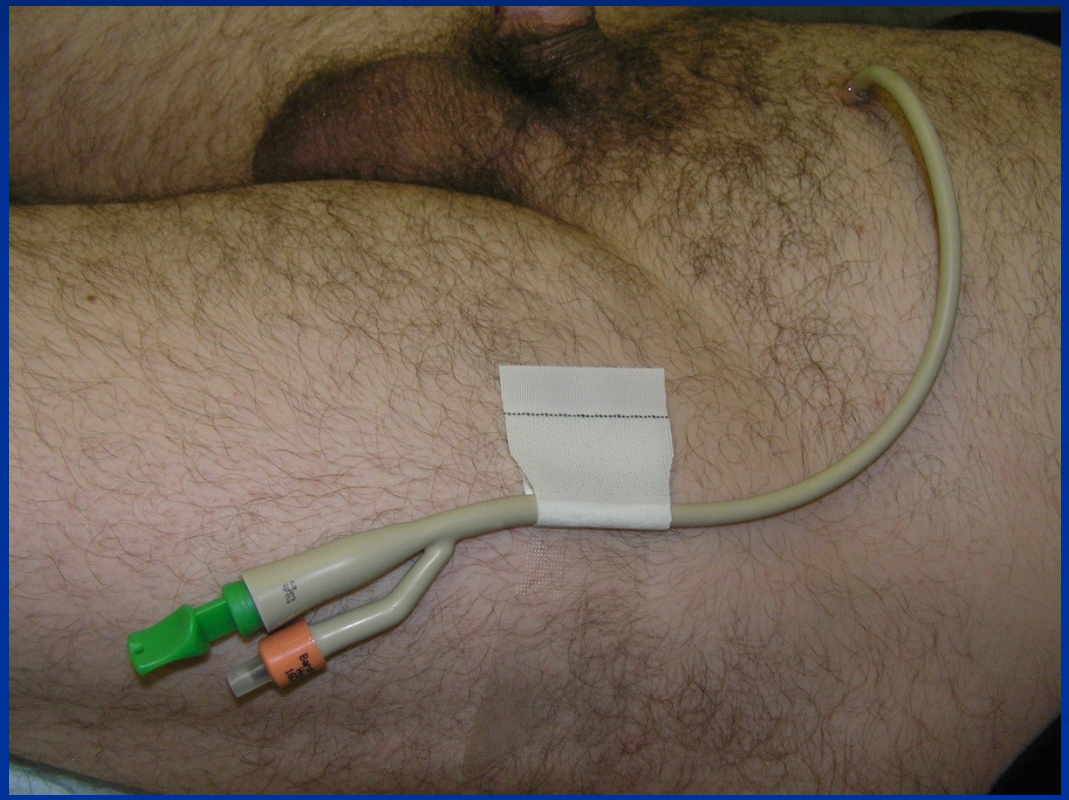


2. Punkční epicystostomie

2a Vpich punkční jehly

2b Zavedení katetru pláštěm jehly

2c Odstranění pláště jehly, fixace katetru

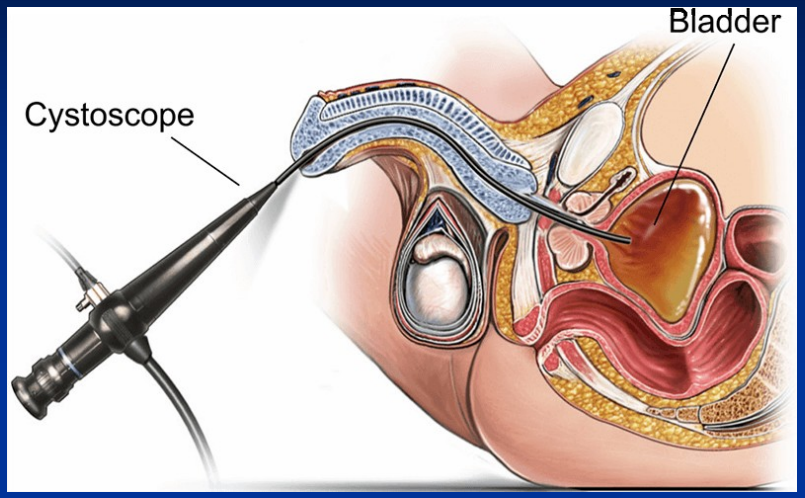


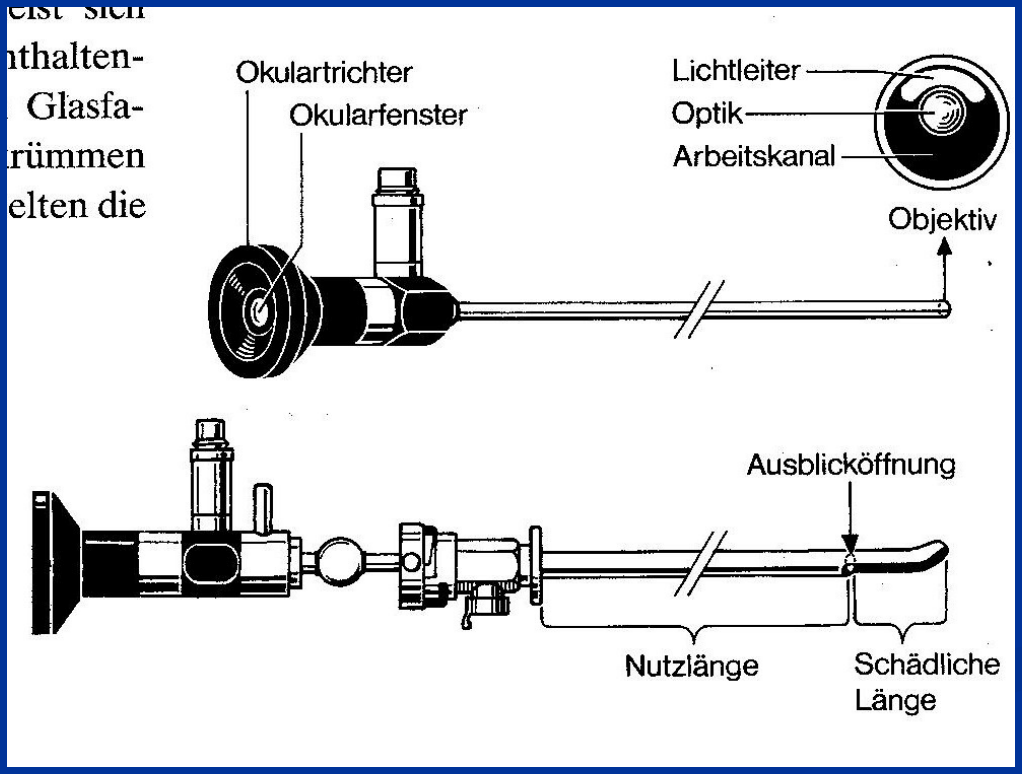
Endoscopy in urology

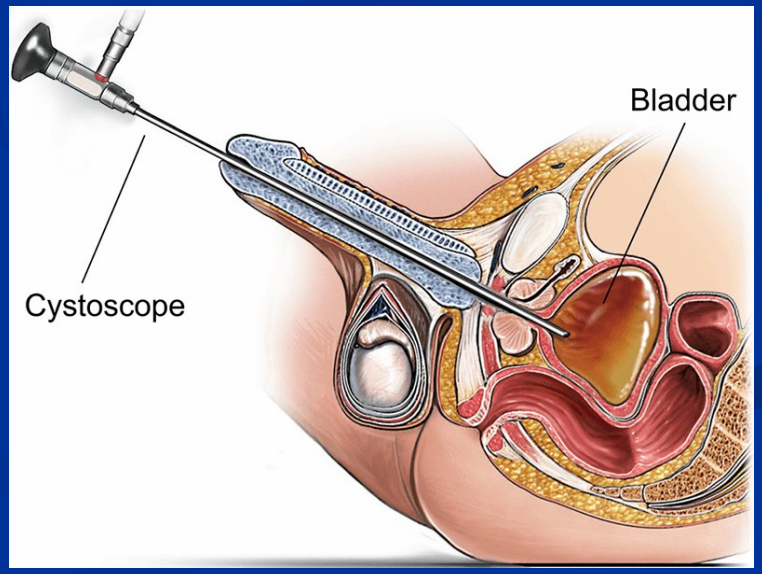
- Cystoscopy
- Ureteroscopy
- Pyeloscopy
- Retroperitoneoscopy (laparoscopy)

cystoscopy

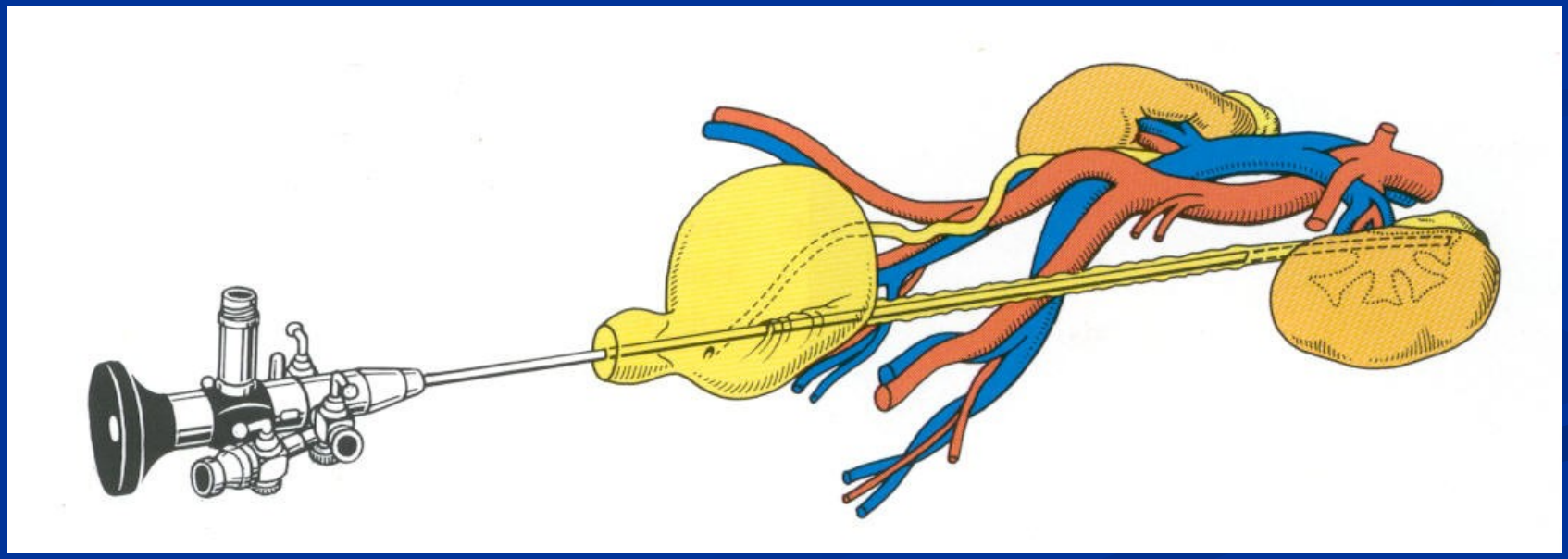
- Rigid
- Flexible



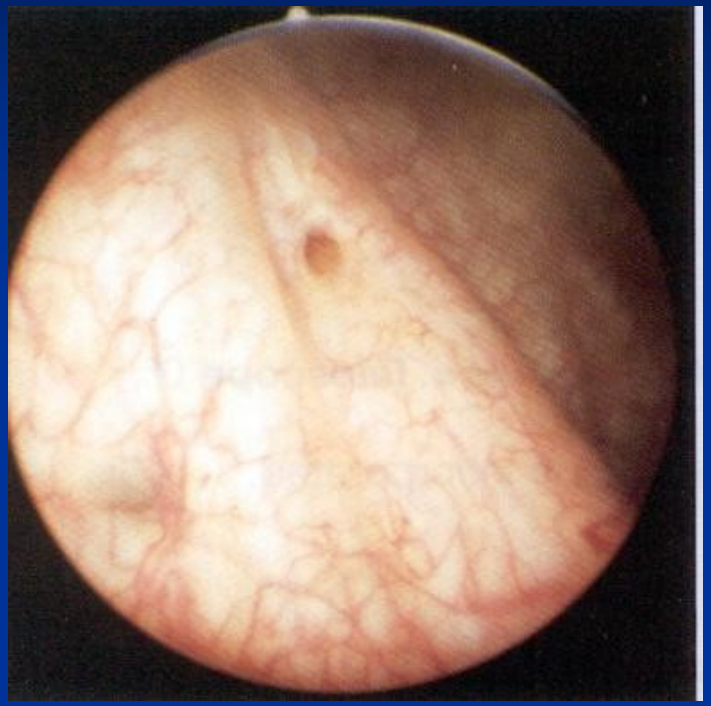




Urethrorenoscopy



cystoscopy



Infections of urinary tract

- simple

(simple acute pyelonephritis, cystitis)

- no disorder in anatomy and function

- complicated

- Deviation in anatomy and function, predisposing factors
- More severe, longer, recurrence rate

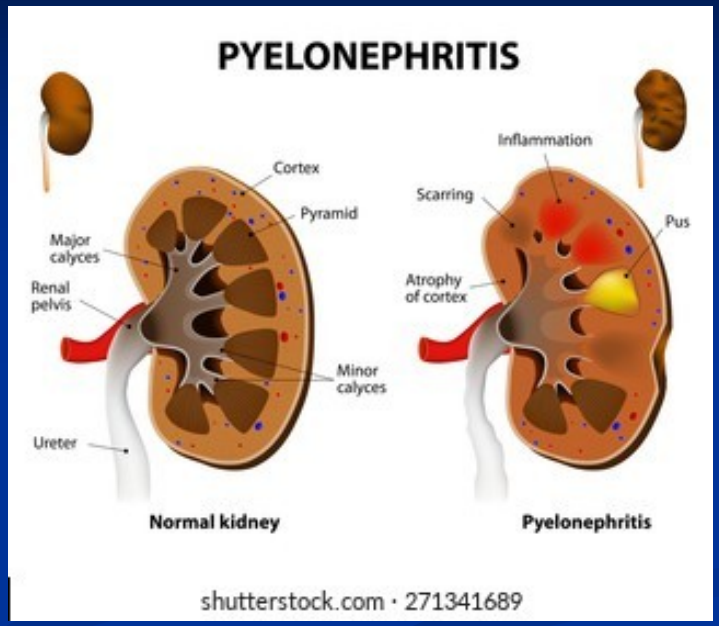
- community x nosocomial

- ILUT x IUUT

- 95 % of infection begins ascending – bacterial from perianal region - urethra, bladder, ureter, kidney
- More common female, - short, wide, urethra, male > 65 y/o
- Hematogenous – S. aureus – abscesses formation pyelonephritis
- Per continuitatem – vesico-intestinal / vesico-vaginal fistula, intraperitoneal abscess, necrotic tumor

Acute pyelonephritis

- IUUT
- Chills, fever, flank pain, lumbgia
- Hematogenous x ascending
- Pyuria, bacteriuria
- Kidney parenchama inflammation, abscess even scarring

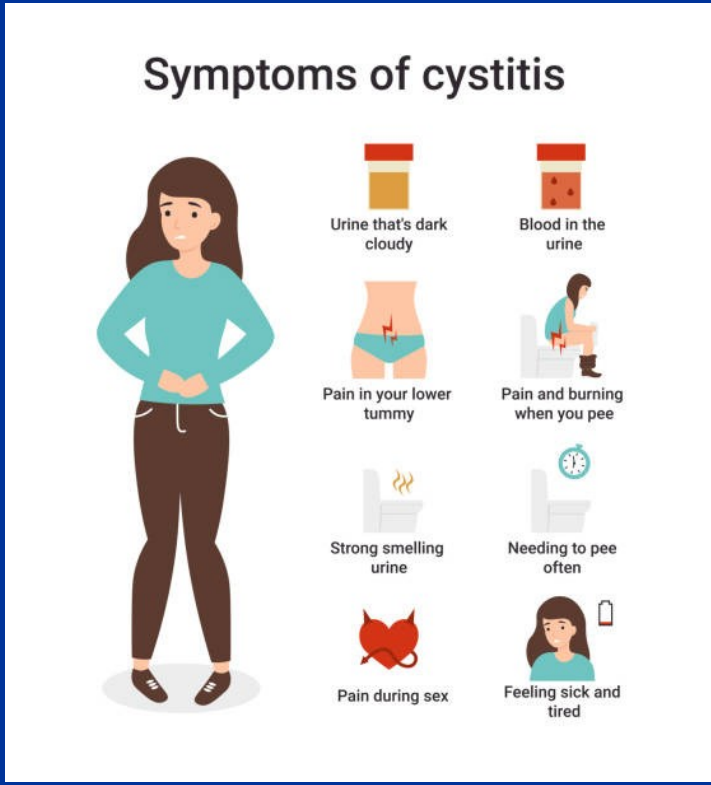


- Rule out obstruction – Sono

- Obstruction pyelonephritis – double pigtail, nephrostomy, ATB

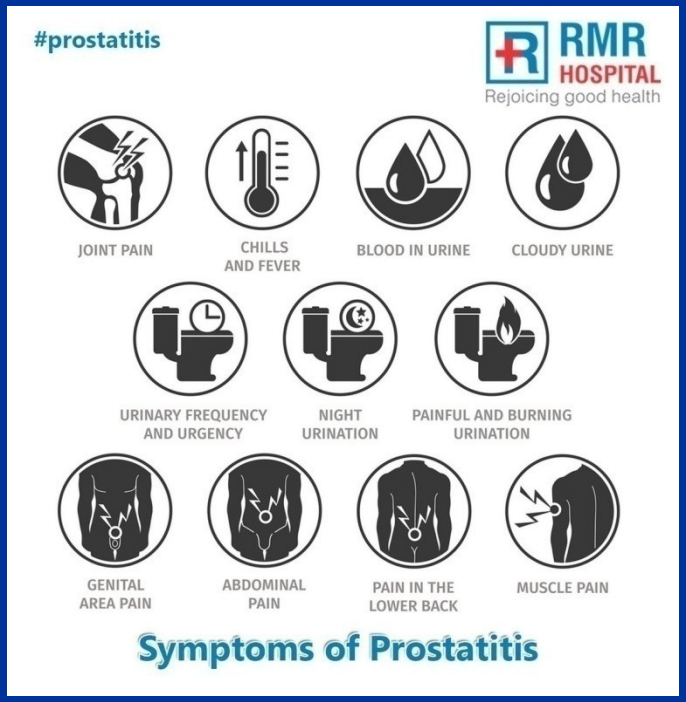
Acute cystitis

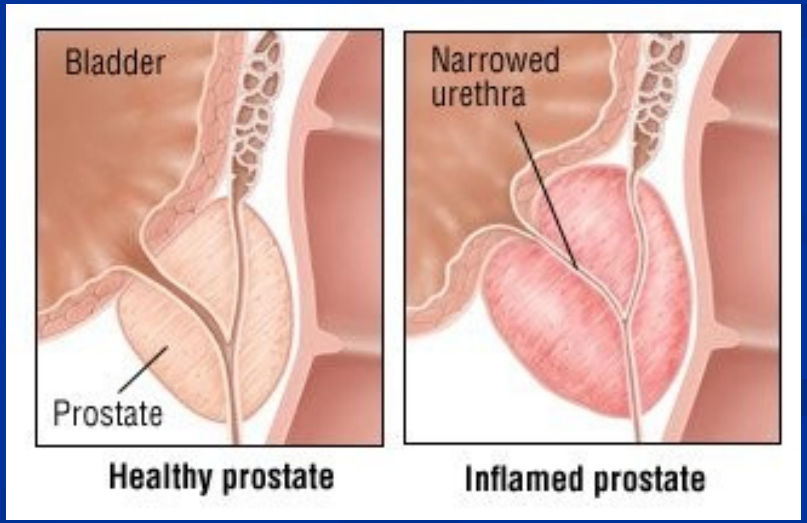
- More common females
- Cystalgia, dysuria, stranguria, polakisuria, hematuria
- ATB, symptomatic therapy – painkillers, fluid intake – wash out bacteria's, drainage when obstruction presented



Acute prostatitis

- Perineal pain ana d suprepubic, pelvalgia, fever, urethra discharge, generalized fatigue
- Even septic condition
- ATB





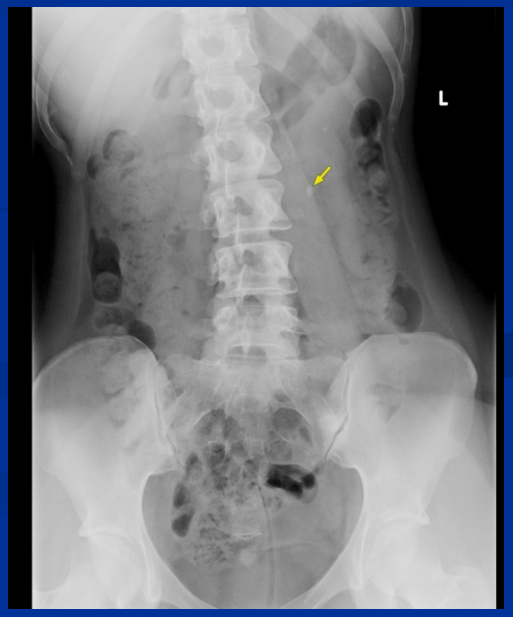
Urolithiasis – kidney stone disease

- 7% population
- Precipitation of salts in urinary tract– nefro/uretero/cystolithiasa
- Microscopic exam of crystals
- Water income, diet, genetic factors

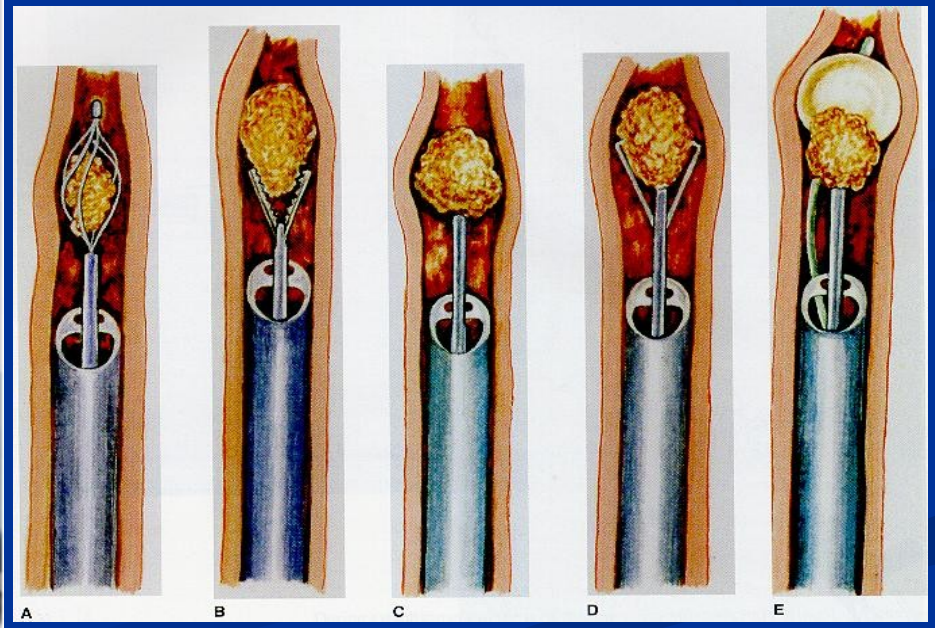
- Renal colic, nephralgia - in obstruction UUS
- Concernments can settle chronic infection

- SONO, X-ray/ CT

- Concernments up to 5mm – conservative therapy



- Extracorporal lithotrypsy
- Ureteroscopy, surgical extraction



Benign hyperplasia of prostate

- Non-malignant enlargement of prostate – increase in volume of stromal cells
- Incidence rises with age - effect of androgens - testosterone
- In periurethral area- hypertrophic nodes

beginning of obstruction:

- Mechanic - urethra compression
- Dynamic tone of prostatic and smooth muscles

frequency of urination

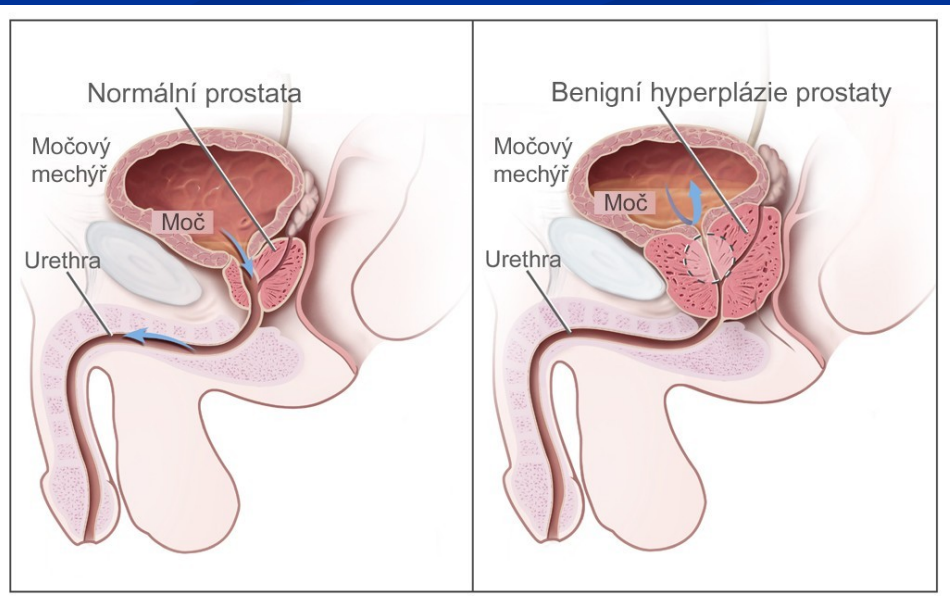
Nycturia

strength of urination current

delayed beginning of urination

discontinuation of urination

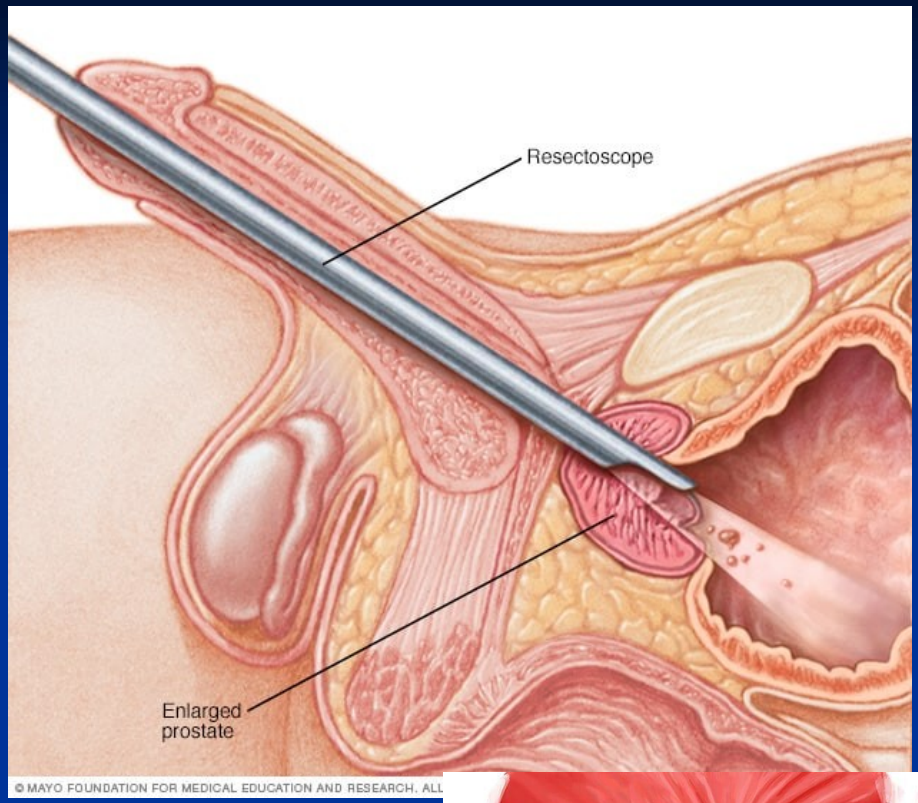
urgency

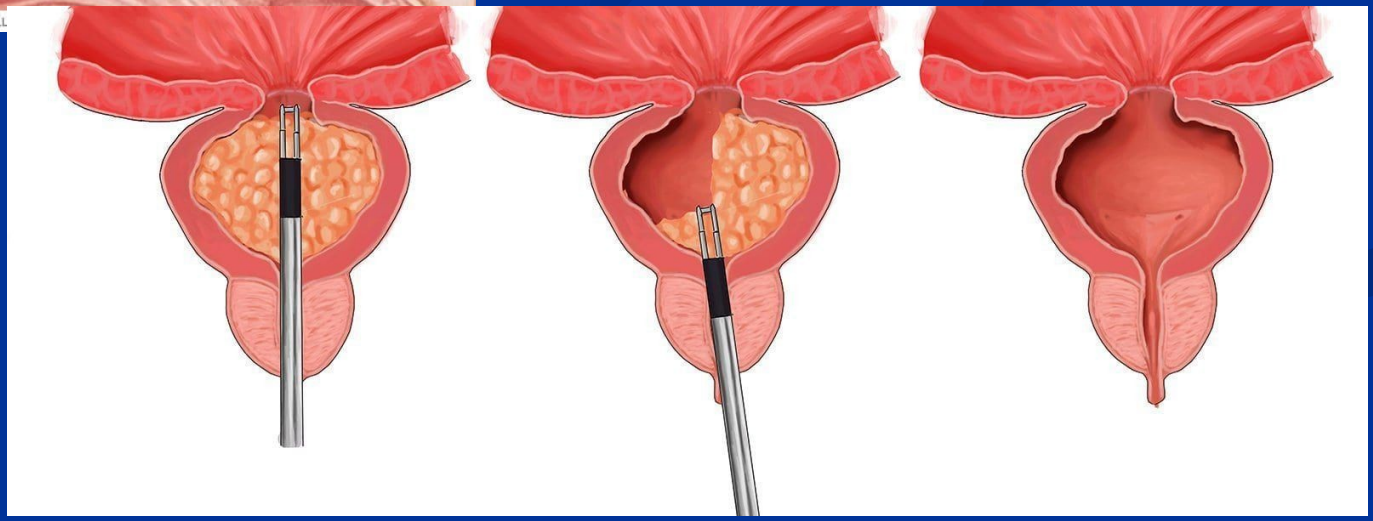


- DRE – prostate enlarged, smooth surface, elastic, well bordered, painless;
- Assessment of post-urination residuum
- USG – suprapubic or rectal tube prostate examination
- Urine exam - urinary tract infection –
- cystouretrography, IVU, uroflowmetry

Therapy:

- Medication : α-blockers , Inhibitors of 5-α reductase
- TURP – transurethral resection of prostate
- Partial prostatectomy – enucleation of periurethral prostatic tissue

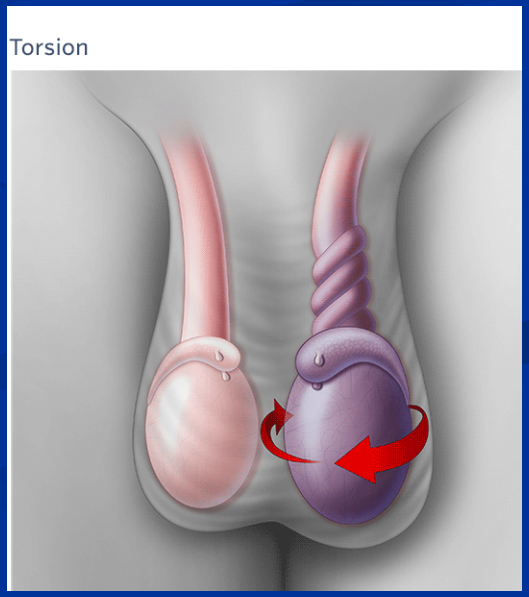

Resectoscope
Enlarged prostate
© MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH. ALL



Testicle torsion

- Torsion of spermatic cord vessels
- Sudden onset mainly children and adolescents
- Severe pain , nausea vomiting
- No signs of infection in urine
- Testicle in painful, enlarged, elevation doesn´t release pain
- Sonography of hydrocele, Doppler imaging of vascularization of testicle
- Hemorrhagic infarction , tissue necrosis

- Surgical therapy up to 6 hours
- Vital testicle derotation, orchiectomy necrotic testicle remove



Paraphimosis

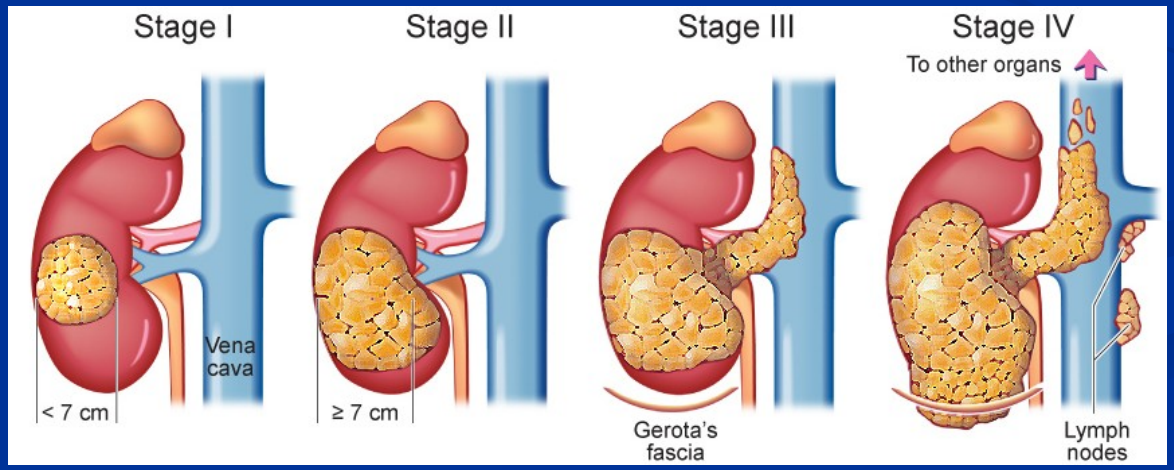
- Due to phimosis – tight foreskin
- Tight foreskin retracted over base of glans
- Glans induration and swelling due to lymphatic and venous stasis - ischemia

- Anesthesia of penis (field, emla)
- Manual compression of glans edema than reduction
- When unsuccessful - sharp discision of strangulation
- circumcision

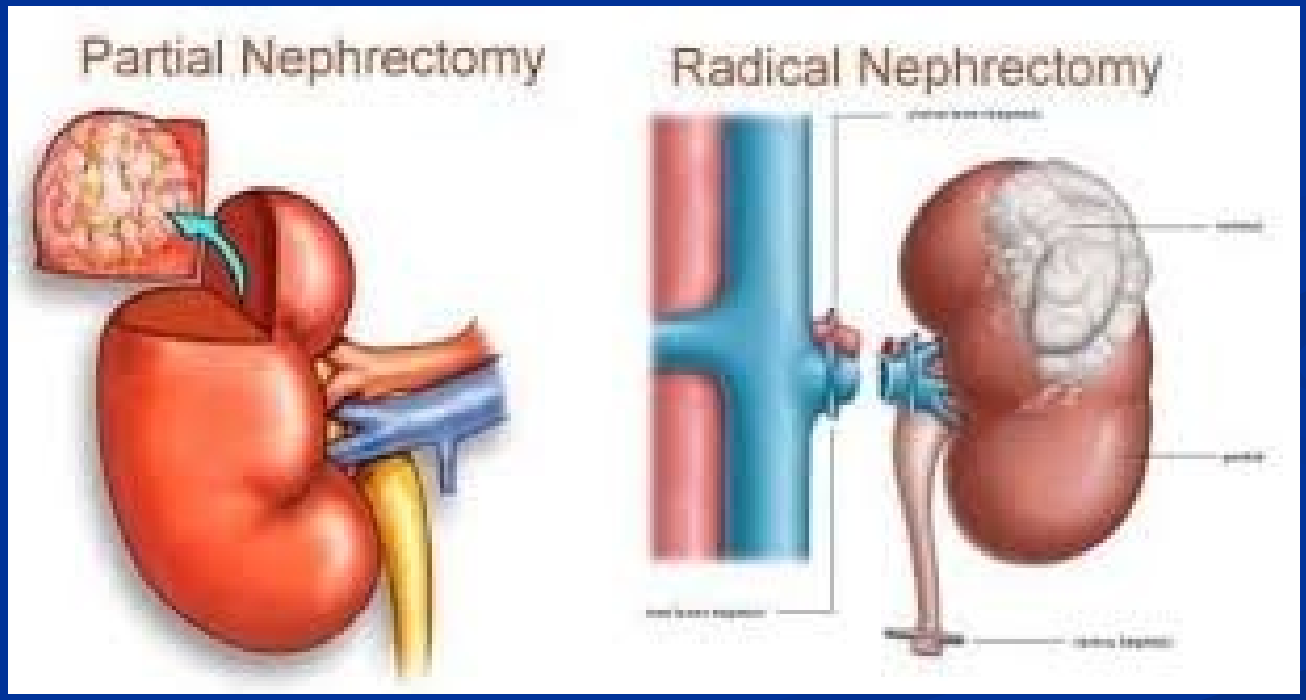
Kidney cancer

- Adenocarcinoma – Grawitz tumor
- Micro/macroscopic hematuria
- Nephralgie, lumbalgia, palpable resistance
- Bone pains, pathologic fr., anemia

- Common incidental findings when SONO
- Metastasis – lungs, bones, brain, liver
- Non-sensitive to RT/CHT – only INF alfa, targeted terapy

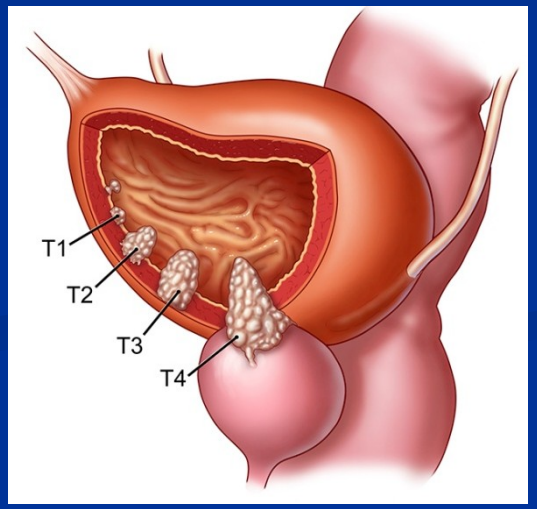


- Radical nephrectomy
- Parcial – tumor up to5 cm



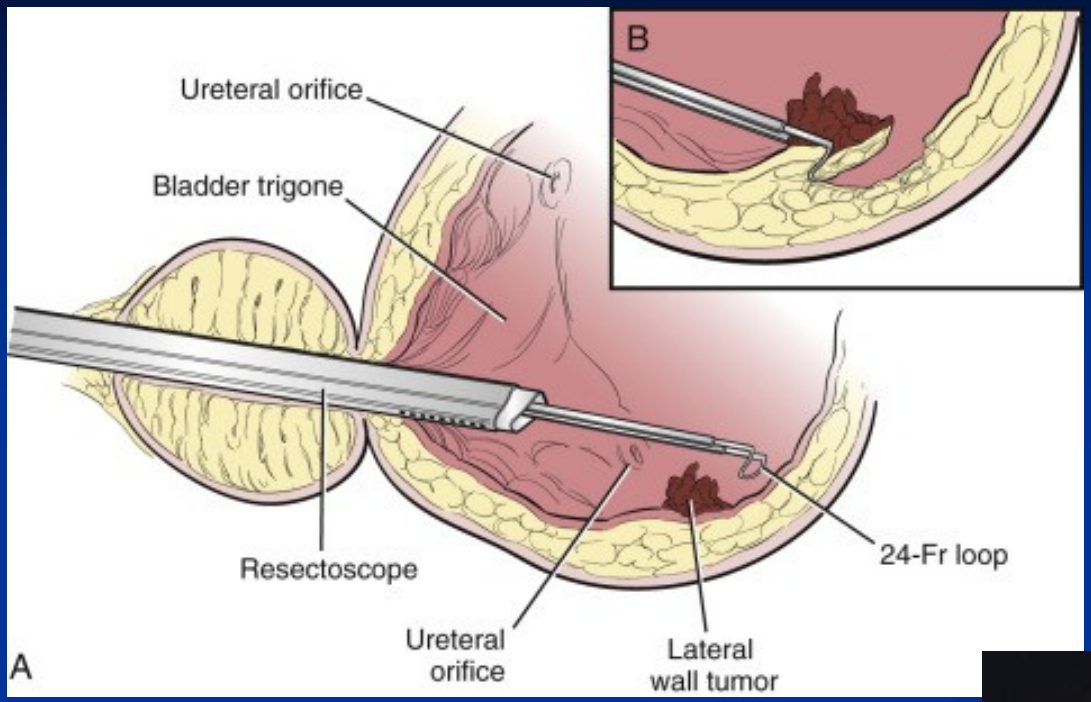
Urinary bladder carcinoma

- Increasing incidence
- 5. - 7. decennium, (2nd. Most common male malignancy)
- Risk factors – smoking, aromatic amines



- Urotelium of bladder
- Hematuria, polakisuria

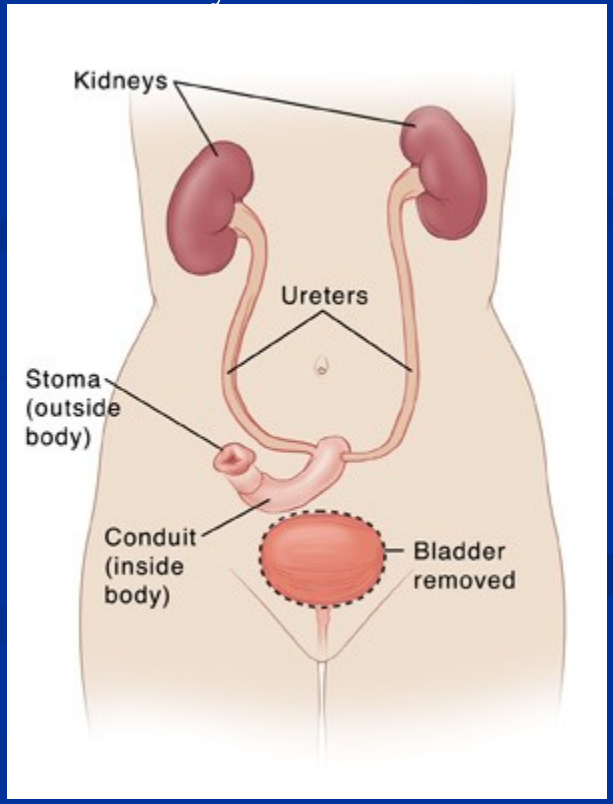
- Diagnostics: cystoscopy
- TUR transurethral resection - biopsy from base of tumor –
- TNM classification

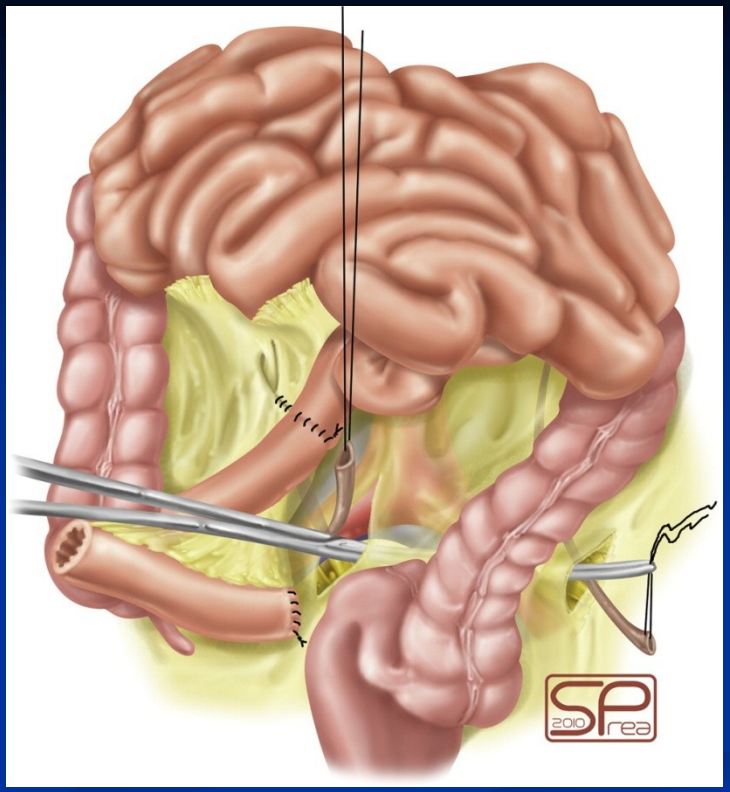

B
Ureteral orifice
Bladder trigone
Resectoscope
24-Fr loop
Ureteral orifice
Lateral wall tumor
A

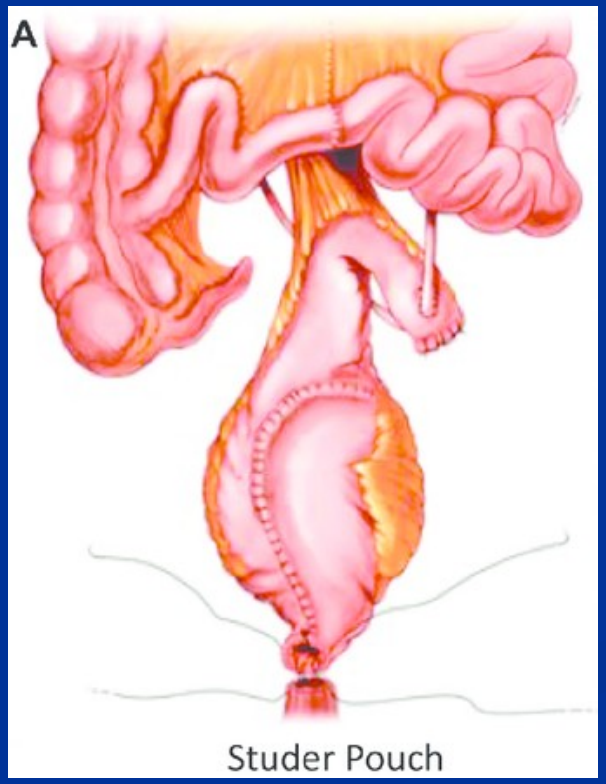
- Therapy:

- TUR + intravesical CHT, BCG vaccination
- Partial, radical cystectomy – affection of muscle layers
  - Ileal conduit - ostomy
  - Ileal neovesica – new bladder pouch

- Chemotherapy
- Local x systemic + RT

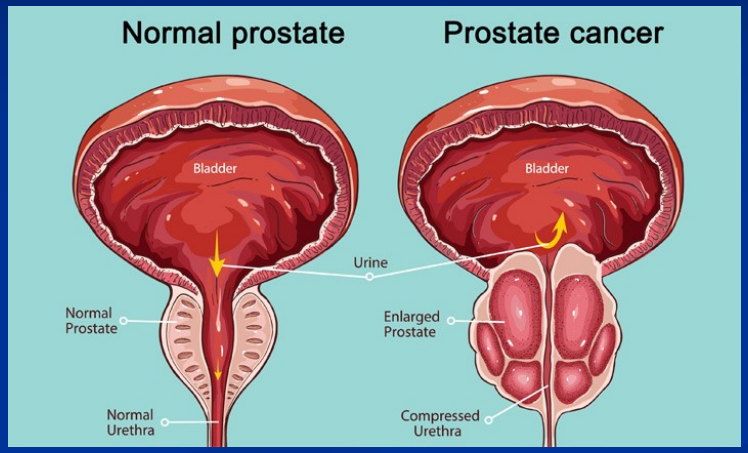





A
Studer Pouch

Carcinoma of prostate

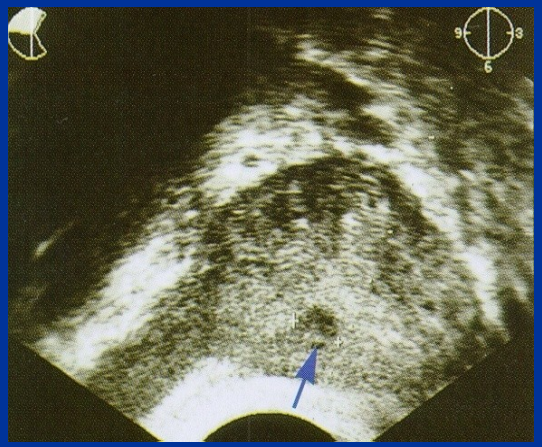
- The most common urological malignity of male, 3rd common cause of male cancer disease
- 7. – 8. decennium
- Bone metastasis, lung metastasis

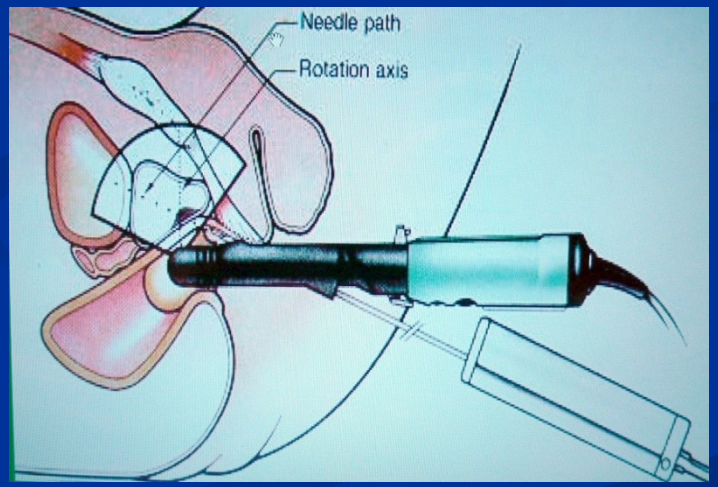


- Well bordered tumor– asymptomatic
- Locally advanced tumor – urination disorders, hematuria, hemosperma, ED
- generalized – skeletal pain, anemia, fatigue, DIC

- Diagnostics:

- DRE
- PSA
- TRUS biopsy

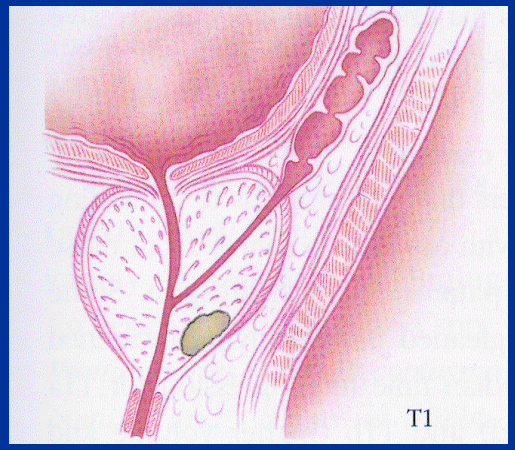


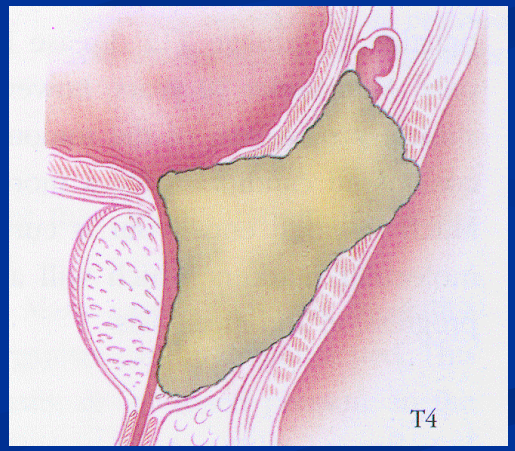


- Imaging – CT/ MRI of pelvis, scintigraphy of bones

- localized CaP
- locally advanced CaP
- Generalized with metastasis CaP

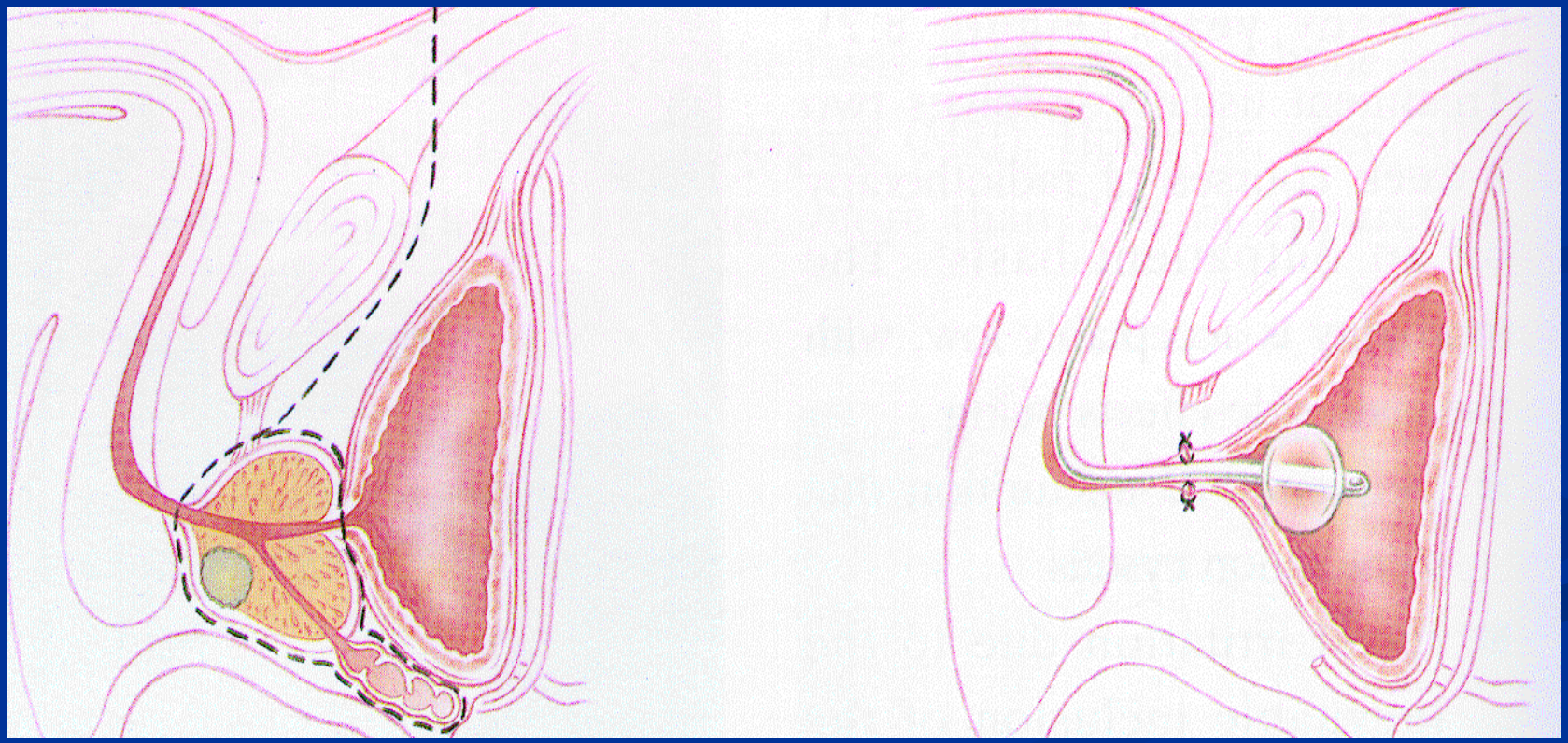
- TNM classification – T1-T4

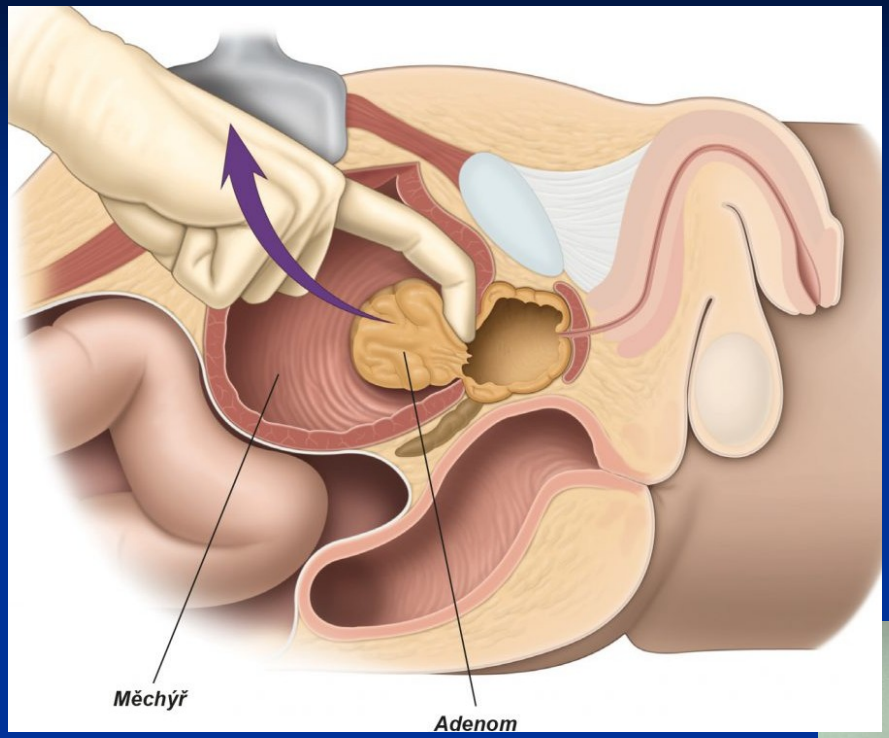




Radical prostatectomy

- Complete removal of tumor tissue while preserved continence of urine even in suitable condition erection functions
- Open, laparoscopic, robot



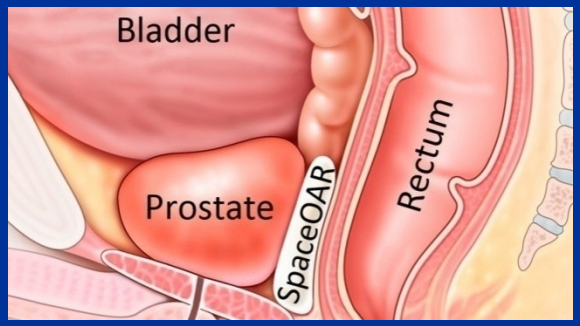

Měchýř
Adenom

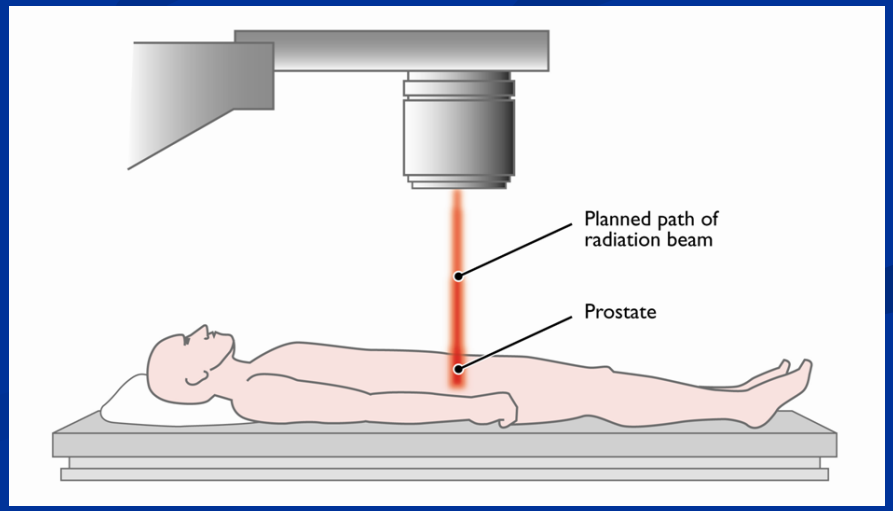
- generalized – metastasis formation

- Up to 50% of patients are generalized in time of diagnosing
- Hormonally dependent tumor - testosterone

- **Antiandrogens, castration** – apoptosis of tumor cells – temporary improvement

- **Radiotherapy**

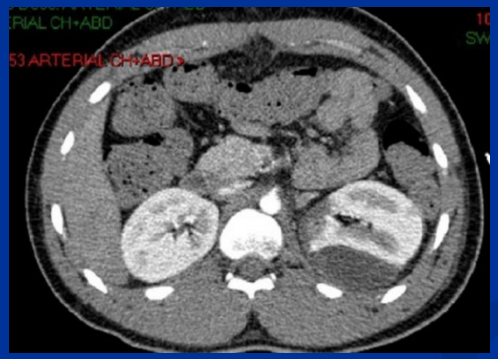


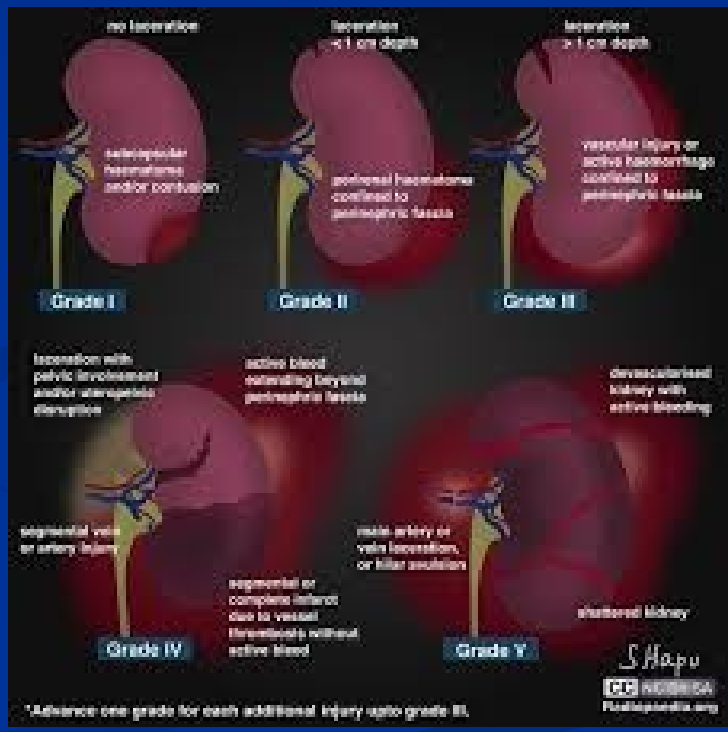


Kidney injuries

- High incidence at high energy injuries - 80%
- blunt x penetrating injury of abdomen, flank, back

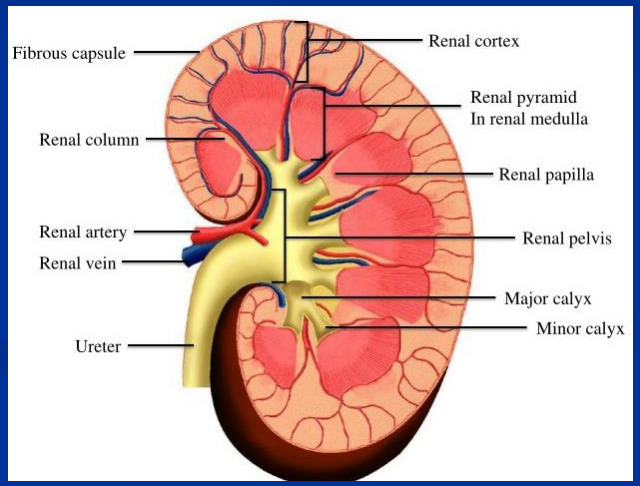
- Hematuria
- SONO + Doppler
- CT + iv. contrast





- 85% mild and moderate injuries– contusion - bruising, sub-capsular hematoma, superficial cortical lacerations

- Severe injuries15% - hilar injury - vessels, cortico-medullar injury – pyramid, hollow system – pelvis – urine extravasation



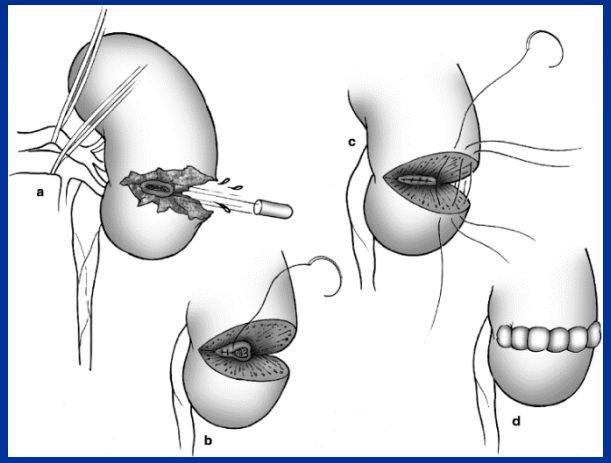
- Critical injuries – life threatening – surgery

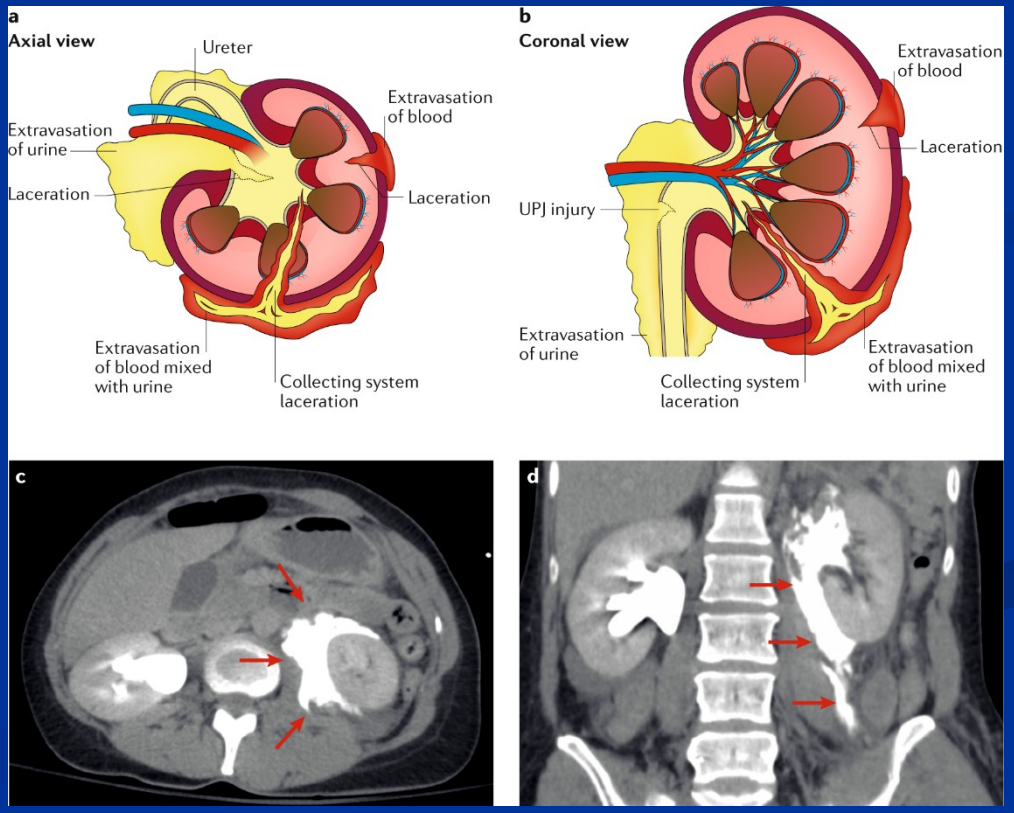
Shattering of kidney – partial resection, nephrectomy

Hilum avulsion / vascular thrombosis - nephrectomy revascularization

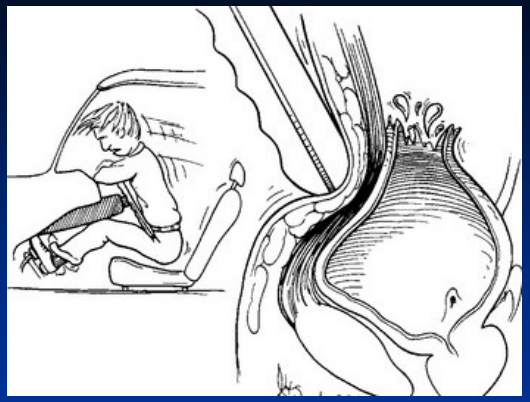
Rupture of pelviureteral junction – suture with stent

- Injury of calyx – renal pelvis (collecting) system with urine extravasation – ATB coverage
- Urine drainage with stent/catheter, nephrostomy – excessive urine extravasation – tissue scarring

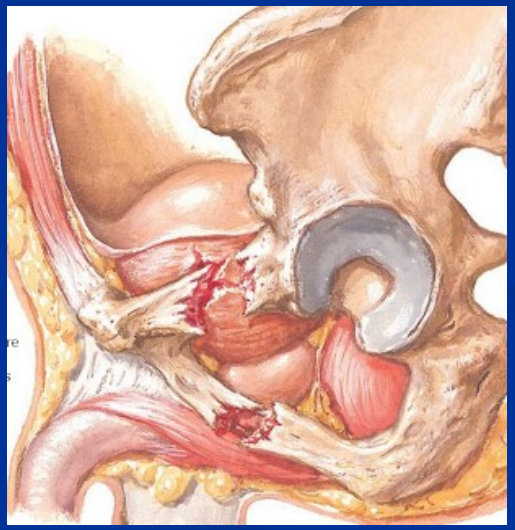




Urinary bladder injury

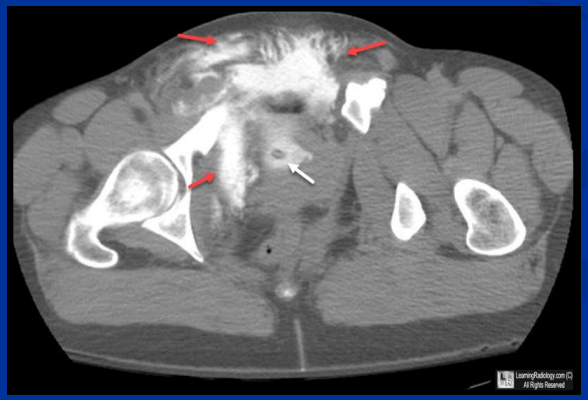


- Blunt impact on hypogastrium with full bladder
- Laceration by dislocated pelvic fracture

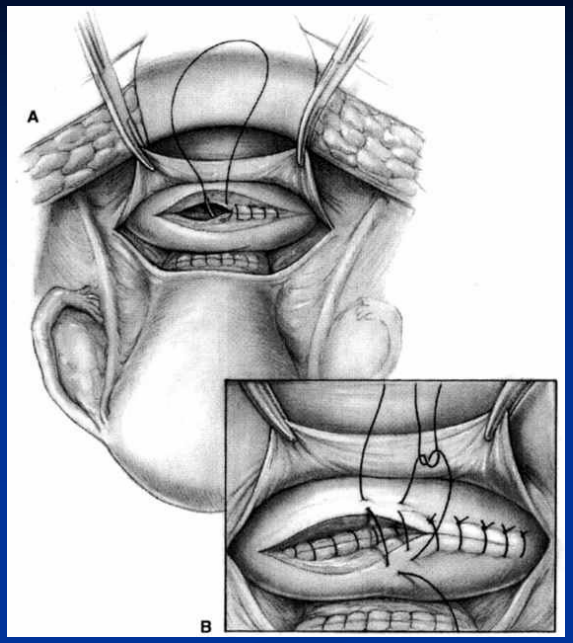


- Catheter – anuria / gross hematuria
- CT + iv contrast, retrograde cystography

- Intraperitoneal X extraperitoneal rupture

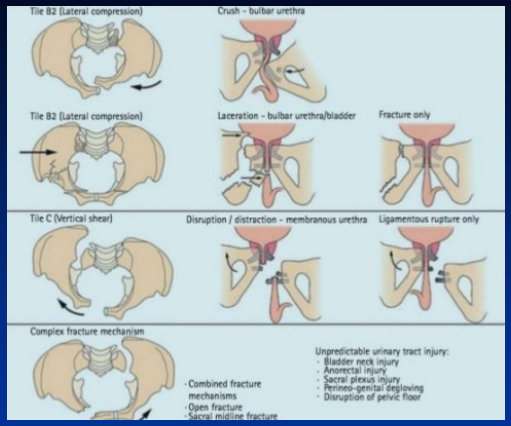


- Intraperitoneal rupt. – acute surgery
  two-layer suture
  temporary catheter / epicystostomy - week



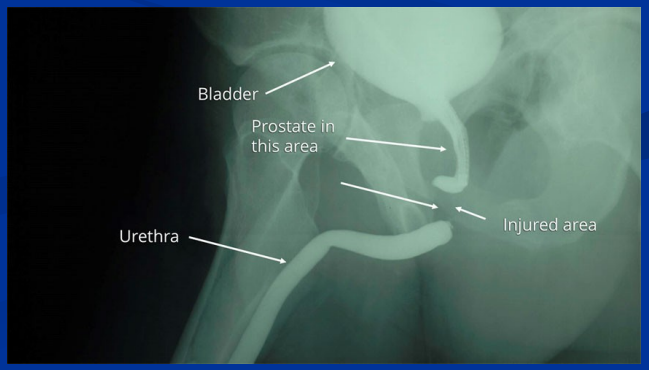
- Extraperitoneal rupt.
  non dislocated fx – conservative treatment. + catheter
  surgery – dislocated fx – ORIF –of pelvic fx + suture of bladder wall + bladder drainage

Injury of urethra



- Predominantly at male - longer, double angled
- anterior urethra -penile- direct hit to perineum
- posterior urethra - dislocated pelvic fx with fixed bladder distraction / rupture of posterior urethra

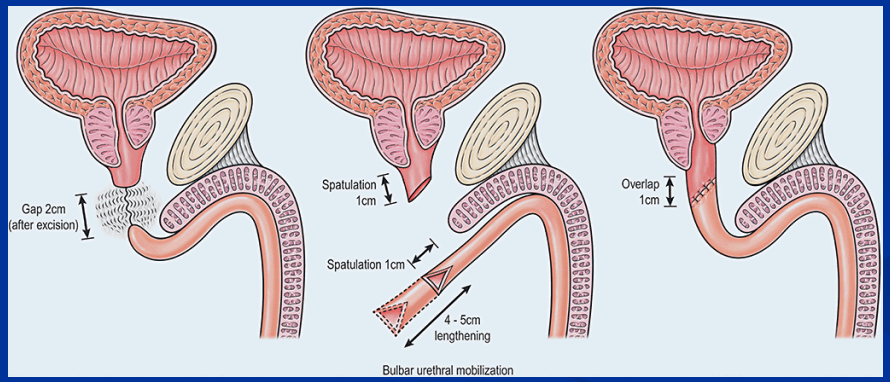
- perineal hematoma
- Pelvic fx, DRE – proximal dislocation of prostate „high riding“
- Urethrorrhagia – blood at outer orifice, unable of urination, unable catheterizing
- Retrograde urethrocystography
- epicystostomy

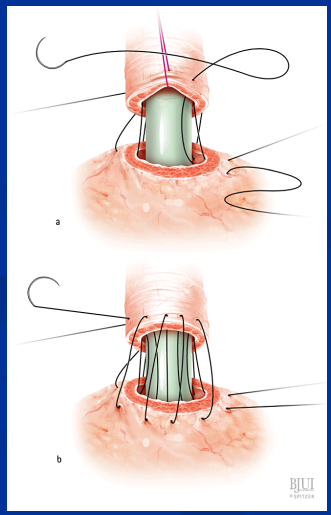


- Urethra: complete x incomplete rupture

- <u>Partial rupture</u> – conservative management 3-4weeks with catheter

  subsequently voiding urethrocystopraphy to rule out stenosis of urethra





- <u>Complete rupture</u>
- anterior urethra – suture on catheter
- posterior urethra – primary surgical repair only at monotrauma due to severe condition of multiple injured
- Mainly approximation on catheter + epicystostomy, postponed secondary urethroplasty after healing soft tissues