Surgery of the Urinary Bladder

Prof. Tibor NÉMETH, DVM, PhD, Diplomate ECVS, CertSACs
Professor and Head of Surgery

Surgical Anatomy

Surgical Anatomy of the Urinary Bladder
Cysturolithiasis

- **Incidence**
  - Frequent both in dogs and cats,
  - Struvite (based on bacterial infection)
  - Urate (Dalmatian, Russian black terrier, shi-tzu, yorkshire)
  - Oxalate (hyperparathyroidismus)
  - Cystine (hereditary, dachshound, basset hound, rottweiler)
  - Silicate (German shepherd, retrievers)

- **Diagnostics**
  - Dysuria, haematuria, pollakisuria
  - Irresponsible to antibiotics
  - Typical crystals in urine sediment
  - Palpable urolith (rare)
  - X-ray (plain, double contrast)
  - US
  - Cystoscopy
**Cysturolithiasis**

**Plain radiography**

**Cysturolithiasis**

- **Diagnostics**
  - dysuria, hematuria, pollakspuria
  - irresponsive to antibiotics
  - crystals in urine sediment
  - palpable urolith (rare)
  - X-ray (plain, double contrast)
  - US
  - cystoscopy

**Cysturolithiasis**

- **Therapy**
  - Lithotripsy
  - Cystotomy
  - Special diet (urin analysis!)
  - Antibiotic therapy (4-12 weeks)
  - Plentiful water provision, salting of food
  - Urine pH-optimisation
  - Urinalysis check-up regularly

**Cystolithiasis**

**US**

**Cystolithiasis**

- **Diagnostics**
  - dysuria, hematuria, pollakspuria
  - irresponsive to antibiotics
  - crystals in urine sediment
  - palpable urolith (rare)
  - X-ray (plain, double contrast)
  - US
  - Cystoscopy
Cystolithiasis

- Therapy
  - Lithotripsy (laser)

Cysturolithiasis

- Therapy
  - Lithotripsy
  - Cystotomy
  - Special diet (uroolith analysis!)
  - Antibiotic therapy (4-12 weeks)
  - Plentiful water provision, salting of food
  - Urine pH optimisation
  - Urinalysis check-up regularly

Cystotomy

- Surgery
  - Preoperative urethral catheterisation
    - Emptying of urinary bladder
    - Patency of urethra (urethrolithiasis!)
  - Lower ventral midline laparotomy
  - Dorsal or ventral cystotomy
  - Preservation of Lieuteau-trigone
  - Lavage and anterograde catheterisation
- Surgery
  - Preoperative urethral catheterisation
  - Emptying of urinary bladder
  - Patency of urethra (urethrolithiasis!)
  - Lower ventral midline laparotomy
  - Dorsal or ventral cystotomy
  - Preservation of Lieuteau-trigone
  - Lavage and anterograde catheterisation
Cystotomy

- Surgery (cont’d)
  - seromuscular technique (Lembert)
  - One or two layers
  - Inverting or „layer-to-layer”
  - monofilament absorbable synthetic material
    - PDS, polyglyconate, glycomer, (polyglycaprone)

**References**

Cystolithiasis

- Therapy (postop.)
  - special diet (urolith analysis!)
  - antibiotic therapy (4-12 weeks)
  - plentiful water provision, salting of food
  - urine pH optimalisation
  - urinanalysis check-up regularly
Surgical Diseases of the Urinary Bladder

- Cystolithiasis
- Urinary Bladder Neoplasia
- Urinary Bladder Injury

Urinary Bladder Neoplasia

- Incidence
  - frequent (mostly in dogs)
  - TCC (!!!), adenocarcinoma, SCC, leiomyosarcoma, hemangiosarcoma, rhabdomyosarcoma (!)
  - papilloma, fibroma
  - "polypoid cystitis"

Urinary Bladder Neoplasia ("Staging")

T: primary tumour
- T1a: Carcinoma in situ
- T1b: Non-tumour
- T2: Superficial papillary tumour
- T3: Deeper tumour/bladder wall
- T3: Tumour invading surrounding tissues

N: Lymphnode involvement
- N0: No RLN involvement
- N1: RLN involvement
- N2: RLN and surrounded LN involvement

M: Distant metastasis
- M0: +

Urinary Bladder Neoplasia

Diagnostics
- dysuria, hematuria
- irresponsive to antibiotics
- tumourous cells in the urine sediment
- X-ray: pos. contr. cystography, double contrast cystography
- Ultrasonography
- Cystoscopy

Positive contrast cystography

Double contrast cystography
Urinary Bladder Neoplasia

**Diagnostics**
- dysuria, hematuria
- irresponsive to antibiotics
- tumorous cells in the urine sediment
- X-ray: pos. contr. cystography, double contrast cystography
- Ultrasonography
- Cystoscopy

**Therapy**
- cystotomy → removal of tumour
- partial cystectomy
- (total cystectomy)
  → trigone-colonic anastomosis
  or
  → ureterocolonic anastomosis
- high recurrence rate !!!

Urinary Bladder Neoplasia

**Diagnostics**
- dysuria, hematuria
- irresponsive to antibiotics
- tumorous cells in the urine sediment
- X-ray: pos. contr. cystography, double contrast cystography
- Ultrasonography
- Cystoscopy

Urinary Bladder Neoplasia

**Diagnostics**
- dysuria, hematuria
- irresponsive to antibiotics
- tumorous cells in the urine sediment
- X-ray: pos. contr. cystography, double contrast cystography
- Ultrasonography
- Cystoscopy

Polypoid cystitis

TCC - cystoscopic finding
Polypoid cystitis

Urinary Bladder Neoplasia

- Therapy
  - cystotomy → removal of tumour
  - partial cystectomy
  - (total cystectomy)
    - trigone-colonic anastomosis
    or
    ureterocolonic anastomosis
  - high recurrence rate !!!

Urinary Bladder Neoplasia
Partial cystectomy

Urinary Bladder Neoplasia
Partial cystectomy

Urinary Bladder Neoplasia
Partial cystectomy

Bladder - carcinoma
**Urinary Bladder Neoplasia**

- **Therapy**
  - cystotomy → removal of tumour
  - partial cystectomy
  - (total cystectomy + urine diversion)
    - trigone-colonic anastomosis
    - or
    - ureterocolonic anastomosis
  - high recurrence rate !!!
Urinary Bladder Neoplasia

- **Therapy**
  - cystotomy → removal of tumour
  - partial cystectomy
  - (total cystectomy + urine diversion)
    → trigone-colonic anastomosis
    or
    ureterocolonic anastomosis
  - high recurrence rate !!!

Urinary Bladder Neoplasia

- **Chemotherapy** (adjunctive)
  - Piroxicam (!)
  - 5-fluorouracil
  - Doxorubicin
  - Cyclophosphamide
Surgical Diseases of the Urinary Bladder

- Cystolithiasis
- Urinary Bladder Neoplasia
- Urinary Bladder Injury

Urinary Bladder Injury

- Incidence
  - car accident
  - fallen down

Urinary Bladder Injury

- Diagnostics
  - lack of urination
  - non-palpable (empty) urinary bladder
  - free urine in the abdominal cavity (abdominocentesis)
  - uremia, acidosis, hyperkalemia
  - pos. contr. cystography

Urinary Bladder Injury

Positive contrast cystography

Positive contrast cystography
Urinary Bladder Injury

**Therapy**
- reconstruction of the urinary bladder
- removal of the injured parts
- suturing
- lavage

Surgery of the Urethra

Prof. Tibor NÉMETH, DVM, PhD, Diplomate ECVS, CertSACVS
Professor and Head of Surgery
Surgical Diseases of the Urethra

- Urethrolithiasis in dogs
- Feline Lower Urinary Tract Disease
- Injury of the Urethra
- Neoplasia of the Urethra

Incidence
- usually occurs in the framework of urethral obstruction (partial or complete)
- associated with cystolithiasis
- mostly in males
- in females the obturation of the neck of the urinary bladder
Urethrolithiasis in dogs

**Incidence**
- Usually occurs in the framework of urethral obstruction (partial or complete)
- Associated with cysturolithiasis
- Mostly in males
- In females, the obturation of the neck of the urinary bladder

**Diagnostics**
- Blockage of easy urination (urine dripping)
- Partial or complete incapability for urination
- Dysuria, hematuria
- Unsuccessful catheterisation ("scratching or clapping")
- X-ray: retrograde pos. contr. urethrography
Urethrolithiasis in dogs

- Therapy
  - "hydrourethropropulsion" => cystotomy
  - urethrotomy
  - urethrostomy
    - (prescrotal)
    - scrotal with castration
    - perineal
  - postop. therapy: see cystourolithiasis
**Therapy**
- "Hydrourethropropulsion" ⇒ cystotomy
- urethrotomy
- urethrostomy
  - (prescrotal)
  - scrotal with castration
  - perineal
- postop. therapy: see cystourethrolithiasis
Urethrolithiasis in dogs
Scrotal urethrostomy

Therapy
- “hydrourethropropulsion” ⇒ cystotomy
- (urethrotomy)
- urethrostomy
  - (prescrotal)
  - scrotal with castration
  - perineal
- postop. therapy: see cystourethrolithiasis

Surgical Diseases of the Urethra

- Urethrolithiasis in dogs
- Feline Lower Urinary Tract Disease
- Injury of the Urethra
- Neoplasia of the Urethra
F.L.U.T.D. (Feline Lower Urinary Tract Disease)

- Previously F.U.S. (Feline Urologic Syndrome)
- Cystourethrolithiasis
- Incidence:
  - breed predisposition (Persian > European > Siamese)
  - sex predisposition (castrated > male)
  - usually 3< years of age
  - home kept cats, dry food feeding
  - in heat season
  - struvite, oxalate

F.L.U.T.D. Urethral obstruction

- Previously F.U.S. (Feline Urologic Syndrome)
- Cystourethrolithiasis
- Incidence:
  - breed predisposition (Persian > European > Siamese)
  - sex predisposition (castrated > male)
  - usually 3< years of age
  - home kept cats, dry food feeding
  - in heat season
  - struvite, oxalate

F.L.U.T.D. Diagnostics

- 3 (triad):
  - dysuria
  - hematuria
  - obstruction

- crystalluria
- idiopathic (sterile) cystitis
- catheterisation (sedation, anesthesia)
- bloody, opaque urine, full of debris
- ultrasonography

F.L.U.T.D. Urethral catheterisation
F.L.U.T.D.
Urethral catheterisation

F.L.U.T.D.
Urethral catheterisation

F.L.U.T.D.
Urethral catheterisation

F.L.U.T.D.
Urethral catheterisation

F.L.U.T.D.
Urethral obstruction

- **Therapy**
  - Conservative (gen. combined with surgery)
    * fixation of catheter for 2-3 days
    * flushing the bladder with acidic solutions (Urofree)
    * Bicarbonate infusion iv.
    * special diet (pH control, Preser, diet feline c/d, S/O)
    * ad libitum potable water provision
    * acidifying (struvite) or alkalinisation (oxalate) of urine
    * (antibiotics: Amoxicillin, Sulfonamids, Fluorokinolons, Cephalosporins)
    * anti-stress arrangements
F.L.U.T.D.

- Therapy - Surgery
  - indications:
    - unsuccessful catheterisation
    - after temporary catheterisation
    - recidiva
    - extreme stricture of urethra
  - PU (perineal urethrostomy)
  - postoperative therapy = conservative suggestions
F.L.U.T.D.
Perineal urethrostomy

F.L.U.T.D.
• Therapy - Surgery
  - indications:
    • unsuccessful catheterisation
    • after temporary catheterisation
    • recidiva
    • extreme stricture of urethra
  - PU (perineal urethrostomy)
  - postoperative therapy = conservative suggestions

Surgical Diseases of the Urethra
• Urethrolithiasis in dogs
• Feline Lower Urinary Tract Disease
• Injury of the Urethra
• Neoplasia of the Urethra

Injury of the Urethra
• Incidence
  - car accidents, fallen down
  - associated with fractured pelvis, mostly in males (long, curved urethra)
  - rarely associated with penile bone fracture

Injury of the Urethra
• Diagnostics
  - traumatic history
  - uncapability for urination
  - pelvic urine phlegmone
  - unsuccessful catheterisation
  - X-ray: retrograde pos. contr. urethrography
Injury of the Urethra

**Therapy**
- urethral reconstruction (pelvic region)
- urethrostomy (penile bone fracture)
- PPU (prepubic urethrostomy)
- (euthanasia)
Injury of the Urethra II

- Therapy
  - urethra-reconstruction (pelvic region)
  - urethrostomy (penile bone fracture)
  - PPU (prepubic urethrostomy)
  - (euthanasia)

Castration + Scrotal urethrostomy
Injury of the Urethra

- Therapy
  - urethra-reconstruction (pelvic region)
  - urethrostomy (penile bone fracture)
  - PPU (prepubic urethrostomy)
  - (euthanasia)

Surgical Diseases of the Urethra

- Urethrolithiasis in dogs
- Feline Lower Urinary Tract Disease
- Injury of the Urethra
- Neoplasia of the Urethra

Neoplasia of the Urethra

- Incidence
  - Prostatic or independent urethral tumour
  - TCC
  - Urethral obstruction

Neoplasia of the Urethra

- Diagnosis
  - Dysuria, hematuria, obstruction
  - Catheterisation
  - Positive contrast retrograde urethrography
  - urethroscopy
**Neoplasia of the Urethra**

- Therapy
  - "En bloc" resection/urethrostomy
  - Surgery + Radiotherapy
  - Transurethral resection + laser ablation
  - Urine diversion (tube cystostomy)
  - Palliative "stenting"

**Neoplasia of the Urethra**

- Tube-cystostomy

**Neoplasia of the Urethra**

- Urethral stenting