

## Upper and Lower Urinary Tract Surgery

### Lower Urinary Tract Surgery

- Understand and identify the anatomical components of the lower urinary tract.**

#### Urinary Bladder

- Peritoneal location
- Ureters attach on dorsal surface in dogs
- Apex is cranial
- Trigone is junction with the urethra

#### Urethra

- Variable lengths/diameters
- Males vs females
  - Males have a more complicated urethra
- Species

- Understand the indications for performing lower urinary tract procedures.**

#### Cystopexy (attachment of the bladder to the body wall)

*\*Neck of the bladder returns to a zone of higher pressure, which adds occluding pressure to the outside of the neck of the bladder*

- Part of treatment for urinary incontinence
  - Sphincter incompetence
  - Bladder neck position within the pelvic canal
  - Short urethral lengths
- Bladder entrapment associated with perineal hernia
- Urinary obstruction secondary to urethral kinking

#### Cystostomy Tube Placement (tube placed into bladder to allow urine evacuation)

- Temporary drainage
  - Urethral surgery
  - Urethritis
- Permanent drainage
  - Benign urethral stricture
  - Malignant obstruction

#### Cystotomy (incision into bladder with closure)

- Cystic/urethral calculi

- Cystic neoplasia
- Urethral bypass
- Ruptured bladder

Partial Cystectomy (removal of a portion of the bladder)

- Trauma
  - Ruptured bladder
  - Neoplasia
  - Infarction/devascularization

Urethrotomy (Making an incision into the urethra)

- Urethral stones
- Urethral biopsy

Urethrostomy (permanent attachment of urethral mucosa to skin)

- Recurrent obstructive calculi
- Lodged calculi
- Urethral stricture
- Urethral or penile neoplasia
- Severe trauma
- Preputial neoplasia requiring penile amputation

**Understand the principles of cystotomy.**

Procedure

- Caudoventral celiotomy
- Exteriorize bladder
- Use stay sutures
- Incision on ventral aspect?
  - Ventral: Away from ureters
  - Dorsal: Better chance to prevent leakage?
- Suction urine carefully
- Flush towards bladder first

Closure

- 1 or 2 layer closure
- Submucosa is the holding layer
- Absorbable suture

## Overview of Lower Urinary Tract Surgery Indications

<b>Procedure</b>	<b>Indications</b>
Cystotomy	Cystic/urethral calculi, cystic neoplasia, urethral bypass, ruptured bladder
Cystotomy tube placement	Post-bladder obstruction, trigonal/urethra/prostate neoplasia, uroabdomen, to facilitate cystopexy
Cystopexy	Congenitally-displaced bladder, herniation, incontinence
Cystectomy	Neoplasia, bladder trauma, devascularization
Urethrotomy	Urethral stones, urethral biopsy
Urethrostomy	Recurrent obstructive stones, lodged calculi, urethral strictures, urethral/penile/preputial neoplasia, severe trauma

### Upper Urinary Tract Surgeries

- Understand and identify the anatomical components of the upper urinary tract.**
  - Kidney: Paired organ
    - Located in the retroperitoneal space
  - Ureter: paired organ, attaches on the dorsal surface of the bladder
    - Located partially in retroperitoneal space and partially in the peritoneal space

### **Ureteral Surgery: Difficulties**

- Size and location!!
  - Canine ureter: 0.5 to 2 mm diameter
  - Feline ureter: 0.4 mm diameter
  - Located in retroperitoneal space
    - Often encased in fat and difficult to find
  - Feline ureters terminate in urethra
- Know the techniques for obtaining renal biopsies and the complications that can be encountered.**

Sample must be obtained from the **CORTEX**

- Safety – crossing the corticomedullary junction may damage larger vessels
- Renal cortex tissue is the tissue of interest since it contains the glomeruli
- Want to avoid puncturing the renal pelvis

## Techniques

- Wedge
  - #11 or #15 blade
  - Close with interrupted suture (mattress, cruciate, simple)
- Punch
  - 2, 4, 6 mm punch
  - Close with interrupted suture (mattress, cruciate, simple)
- Needle-core (ultrasound-guided vs open vs laparoscopic)

## Major complications

- Bleeding
- Renal pelvic puncture with subsequent urine leakage

## Understand the basic principles of kidney and ureter surgery.

### Kidney Surgery: Principles and Procedures

- Renal biopsy
- Nephrectomy (and ureterectomy)
  - Preferred technique is to remove as much as the ureter as possible!
  - Neoplasia, hydronephrosis, renal abscess, cystic disease, trauma, renal hematuria
- Nephrotomy
- Nephrostomy tube

### Ureter Surgery: Principles and Procedures

- Ureterostomy
- Ureteral resection and anastomosis
- Ureteral reimplantation (neoureterocystostomy)
  - Obstructive disease
  - Trauma
  - Ureteral ectopia
- Ureteral stenting and ureteral bypass
  - Obstructive disease
  - Trauma
  - Ureteral ectopia
  - Goal is to get urine from kidney (renal pelvis) to the bladder