SURGERY OF THE URINARY TRACT IN DOGS AND CATS

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Overview

- Anatomy review
- Cystotomy
- Urethrotomy
- Urethrostomy
- What’s New!
Anatomy
Cystotomy

- Indications
  - Cystic/urethral calculi
    - Urethral obstruction
    - Calcium oxalate calculi
    - Incidental or non-obstructive calculi
  - Neoplasia
  - Ureteral procedure
Cystotomy

- **Preoperative Management**
  - Radiographs/ultrasound
  - Urinalysis

- **Antibiotics**
  - Perioperative IV antibiotics do not appear to impact culture results from bladder/calculi

Cystotomy

- **Technique**
  - Ventral midline (paramedian in males)
  - Pack off
  - Stay sutures
  - Bladder spoon
  - Retro- and antegrade catheterization and flushing
  - **Single** or double layer continuous closure
  - **Appositional** vs. inverting
  - **Interrupted** vs. continuous
  - Leak test
Cystotomy
Cystotomy
Cystotomy

- Postoperative Care
  - Postoperative radiograph
  - Stone analysis
  - Analgesia
  - Mild hematuria and stranguria expected
  - +/- antibiotics
Cystotomy

- Complications
  - Remaining calculi (4-20%)
  - Uroabdomen (1-3%)
  - Urethra or ureteral trauma (2-3%)
  - Surgical site infection (3%)
Cystotomy

- **Tips**
  - Retrograde flushing of urethral calculi
  - Limited incision, exteriorize bladder
  - Males – ventral midline through body wall
  - Ventral cystotomy
  - Flush, flush, and flush again
Laparoscopic Assisted Cystotomy

- Minimally invasive alternative to open cystotomy
- One or two portals, each approximately 1-2cm
- Males and females
- Dogs and cats
  - Not practical in very small dogs/cats
Laparoscopic Assisted Cystotomy

๏ Advantages
  • Less painful
  • Smaller incisions
  • Thorough evaluation of bladder
  • Shorter hospital stays

๏ Disadvantages
  • More expensive
  • More time consuming initially

Calculi Prevention

- Calcium oxalate
  - Correct hypercalcemia if present
  - Aciduria prevention (pH 6.5-8.0)
    - Diet (Hill’s u/d, Royal Canine Urinary SO)
    - +/- potassium citrate if pH <6.5 after diet change
  - Increase water intake (USG <1.020)
  - Miniature Schnauzers
    - Higher recurrence rate
    - Consider Hill’s w/d, c/d or g/d if hypertriglyceridermic
  - UA every 3-6 months, image every 6-12 months

- Allen HS, et al. Associations of diet and breed with recurrence of calcium oxalate cystic calculi in dogs. JAVMA. 1015;246:1098-1103
Calculi Prevention

- **Struvite**
  - Treat, prevent and monitor for infections!
    - Culture and sensitivities
    - Weight loss, episiopasty
    - Increase water intake
    - UA and urine culture/sensitivity q3-6 months
  - **Diet**
    - Urine acidifier (pH <6.5)
      - May increase risk of CaOx calculi
    - Low in phosphorus and magnesium

https://www.vetmed.umn.edu/centers-programs/minnesota-urolith-center/recommendations
Urethrotomy

- **Indications**
  - Urethral calculi unable to be hydropulsed
  - Temporary bypass due to other
- **Location**
  - Pre-scrotal – ideal due to superficial location
  - Usually over calculi
Urethrotomy

- Procedure
  - 2cm skin and subcutaneous incision
  - Identify urethra
  - Longitudinal incision on midline
  - Remove calculi and advance catheter
  - Closure vs. second intention
  - 4-0 or 5-0 monofilament absorbable suture, simple continuous or simple interrupted in urethra. Routine SQ and skin closure
Urethrotomy

- **Risks**
  - Post-op bleeding – not life threatening
  - Stricture – uncommon

- **Post-op care**
  - E collar, cage rest, antibiotics, analgesics
  - Kept in an easy to clean area
  - Petroleum jelly around stoma until healed
  - Calculi prevention!
Urethrotomy

- **Tips**
  - Owner preparation pre op – before every cystotomy
  - Gentle tissue handling
  - Small gauge suture for closure
  - Owner preparation post op - bleeding
Urethrostomy - Dog

- Indications
  - Permanent injury/obstruction of distal urethra
  - Neoplasia
  - Decrease likelihood of obstruction from recurrent urinary calculi
  - Because of risks – try to avoid if possible
Urethrostomy - Dog

Procedure

- Pre-scrotal, scrotal, perineal and prepubic
- Elliptical incision at base of scrotum/remnant
- Dissect to urethra and incise over catheter (3-4cm in length)
- Tacking sutures to pull urethra ventrally
- SC or SI small gauge non absorbable – mucosa to skin

Urethrostomy - Dog

- Risks
  - Bleeding – not life threatening
    - Continuous closure may reduce the duration
  - Hematuria
  - Stricture of stoma
  - Urine scald
  - Urinary tract infection
  - Recurrent calculi and obstruction
Urethrostomy - Dog

- Post op care
  - E collar, antibiotics, activity restriction, analgesics
  - Monitor for urine scald
  - Prepare owners for bleeding
  - Monitor for urinary tract infections
  - Calculi prevention
Urethrostomy - Dog

Tips
- Use a catheter
- Careful tissue handling
- Careful apposition of mucosa to skin
- Minimize tension
- Large stoma – it will shrink by a third to half
Perineal Urethrostomy in Cats

- Indications
  - Recurrent urinary obstruction
  - Non-catheterizable urinary obstruction
  - Urethral strictures or tears
Perineal Urethrostomy in Cats

- Preoperative management
  - Treat azotemia, dehydration and electrolyte derangements
  - Rule out other etiologies (calculi, infection)
  - Owner education
Perineal Urethrostomy in Cats

- Analgesia
  - Systemic
  - Regional – epidural

- Purse string in anus

- Positioning
  - Dorsal vs. sternal
Perineal Urethrostomy in Cats

- **Technique**
  - Elliptical incision around penis and prepuce
  - Ventral dissection, freeing ischiocarvernosis muscles from the pelvis
  - Limited dorsal dissection to the level of the bulbourethral glands
  - Transect retractor penis muscle
  - Catheterize urethra and make urethral incision
  - Suture urethral mucosa to skin
PU in Cats
Perineal Urethrostomy in Cats

- Postoperative Care
  - Prevent local trauma
    - E-collar
    - Do not clean area
    - Shredded paper/Yesterday’s News Litter
  - Analgesics (Fentanyl Patch or Buprenex, +/- NSAID)
  - Antibiotics
  - Activity Restriction
Perineal Urethrostomy in Cats

- Complications (50%)
  - Stricture and re-obstruction
  - Subcutaneous urine leakage
  - Dehiscence
  - Cystitis (10-25%)

- 86% long term success rate

Perineal Urethrostomy in Cats

- Tips
  - Ventral dissection
  - Large stoma size
  - Suture choice
  - Suture technique
  - Prevent self trauma
What New!

- Urethral stenting
- Ureteral obstructive treatment
  - Ureteral stenting
  - Subcutaneous ureteral bypass
Urethral Stenting

- Indications
  - Urethral obstruction
    - Neoplasia
      - TCC
      - Prostatic carcinoma
    - Strictures
    - Reflex dyssynergia
    - Extraluminal compression
Urethral Stenting

- Outcome – Malignant causes
  - Palliative procedure
  - Survival times (MST 78 days)
  - Improved clinical signs – resolved obstruction (85-97% success rate)
  - Incontinence common – 26-39%
  - Stranguria common – 45%
  - Risk of migration, infection, re-obstruction
  - Usually combined with an NSAID/Chemo

Blackburn A, et al. JAVMA 2013
McMillan S, et al. JAVMA 2012
Urethral Stenting

- Outcome – benign causes
  - Resolves obstruction
  - Incontinence – 37.5%
  - Good long term prognosis
Ureteral Obstruction

- **Causes**
  - Calculi – 98% calcium oxalate
  - Strictures
  - Neoplasia

- **Clinical Signs**
  - Vomiting, lethargy, inappetence
  - Abdominal pain
  - Azotemia, hyperkalemia
Ureteral Obstruction

- **Traditional treatments**
  - Length of obstruction directly correlated with permanent loss of GFR
  - Medical therapy – 33% mortality rate
    - Better with small, distal 1/3rd calculi
  - Surgery – 18-39% mortality rate

- **Minimally Invasive Techniques**
  - Stents – 7.5% mortality rate, MST 500 days
  - Subcutaneous ureteral bypass

Berent AC, et al. JAVMA 2014
Ureteral Stents
SUBs

Flow is from the kidney through the shunting port & into the bladder, bypassing the ureter.

Shunting Access Port with 2 catheter outlets

Kidney locking loop catheter with marker band

Bladder catheter fenestrated & cuffed
Questions
Resources