Struvite and Calcium Oxalate

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URINARY STONE THERAPY AND PREVENTION

Lith= stone

- Organized concretions
- Organic Matrix:
  - proteins, Gag's
  - DSB
- Inorganic Mineral (crystals) lattice
- Casts, epi cells, heterogenous, suture

Why Stones Count

- Recurrence
  - About 50%
  - Months to years
- Infection
  - Can lead to inability to clear infection
  - Kidney failure
  - Sepsis
- Result in kidney loss
- Obstruction
- Chronic Renal Insufficiency
- Acute Renal Failure
- Strictures

Identify the Stone

- Stones are not all equal
- Struvite
- Calcium Oxalate
- Cystine
- Urate
- Silica

After Identification

- Water
- Diet- emphasis
- Other
- Monitoring
- If you cannot remove the stones

The Key: Water

- Goal= Decrease concentration
  - Many reasons why
- Dry food vs canned
- Water dishes
  - Fountains
- Ice cubes
- Bottled vs. other

Medical dissolution

- Struvite, xanthine/urate, cystine
- Diet
  - Specific gravity
  - Low purines for Urates, also alkalinize
    - no fish or glands

Dietary

- Prescription formulas
  - Science Diet Hills
  - Purina
  - Waltham
- Must fit the stone

Diets, preventions

STRUVITE STONES

Struvite stones

- Culture
  - Complicated UTI schedule
  - Struvite will release new Bacteria
  - Treat for 1 month after radiographic resolution
- Treat long term
  - 4 total cultures
  - Antibiotics
    - 5-6 weeks
    - Or 2 weeks past x-ray changes

Struvite Diets

- Hill's Science Diet c/d, w/d, s/d
- Royal Canin
  - Urinary SO, SO13, Control Formula

Basics of Struvite diets

- Low magnesium
- Low phosphorous
  - Low protein
- Low sodium
  - Dilute urine
- pH goal
  - 6.2-6.4

Hill’s Science Diet c/d

Goal

- Monitor urine pH
  - Should be neutral

Concerns & contraindications

- Hyperlipidemia
- Pancreatitis
  - Current and history
- Non-struvite crystaluria
- Pregnant or nursing dog
- Puppies

- Obesity concerns
  - w/d similar, better long term

Hill's Science Diet w/d

Goal

- High fiber better for those with elevated lipids
- Has low magnesium and phosphorous
- Already urine acidifying
- Monitor urine pH and urinalysis
  - CaOx?
  - Alkaline= new infection

Contraindications

- Same life stages
- Concurrent use of urinary acidifiers
- Low weight
  - Debilitated
- Dehydration

Hill's Science Diet s/d

- Acute therapy for dissolution of struvite
- Not meant for long term
  - CaOx
- Lowest protein
  - Acidifying

Hill's Science Diet s/d

- Monthly Monitoring
  - PE
  - CBC
  - Serum chemistry
  - cPLI and triglycerides
  - Urinalysis
- Same life stages
- First 1-2 weeks after surgery
- Urinary acidifiers on board
- Use no longer than 6 mo
- Stones that are not struvite

Hill's Science Diet s/d

- Many more "No's"
  - Heart
  - Kidney
  - Hypertension
  - Liver
  - Hyperlipidemia
  - Pancreatitis
  - Obese
  - Older than 7 yrs
  - Other disease
  - Steroid administration

http://www.hillspet.com/products/prescription-diet/pd-canine-sd-canine-canned.html. 4.8.10

Diets, preventions

CALCIUM OXALATE STONES

Oxalate stones

- Low calcium
- Low protein
- pH target: 7.1- 7.7

- Hill's Science Diet u/d
- Royal Canin
  - Urinary SO, SO 13

Hill's Science Diet u/d

- Stone types
  - CaOx, urate, cystine
- Changes of note
  - Urine dilute
  - Decreased BUN
- Monitor 6 months
  - Serum chemistry
  - echocardiogram
- Struvite stones
- Low albumin
  - Protein depletion possible if used long term
- Added carnitine and taurine due to low protein

Royal Canin Urinary SO

- Moderate acidic urine
  - pH 5.5-6.0 ☹
- High volume urine
  - High moisture
  - Higher NaCl
  - Protein restricted
- Low
  - Magnesium
  - Calcium
  - oxalate
- Struvite
  - Dissolution or prevention
- Controversial diet for CaOx

Contraindications for Both

- Growing puppies
- Pregnant and nursing
- Hyperlipidemia
  - High triglycerides
- Pancreatitis
  - History or risk

Human Food to Avoid

Calcium

- Meats:
  - salmon, bologna, sardines
- Vegetables:
  - baked beans, broccoli, collards, lima beans, spinach, tofu
- Dairy

What to Avoid

Oxalate

- Meats: sardines
- Vegetables:
  - Asparagus, broccoli, celery, corn, cucumber, egg plant, green beans, green peppers, lettuce, spinach, summer squash, sweet potatoes, tomatoes
- Fruits
  - Apples, apricots, cherries, citrus peel, orange, peach, pear, pineapple, tangerine
- Various
  - Peanuts, cornbread, soybean, pecan, wheat germ, beer

Supportive care for all

OTHER SPECIFIC THERAPIES

Urine retention

- Access to Outside
- Back problems?

Why Glucosamine?

- Underlying defense for bladder surface
- Can help normal urine proteins work optimally
  - Proteins
  - Increased glucosamine = increase ability to trap bacteria

Antibiotics?

- When appropriate?
- When “blind” antibiotics not good

Antioxidants

- Renal protectant
- Omega 3's
  - Fish oil

The Acidifiers

- Acidifying diets
- Chronic metabolic acidosis
- Cranberry
- Vitamin C/Ascorbic acid

Changing urine to basic

- Potassium Citrate
  - Binds Ca
  - Changes pH
    - Less Ca in urine
- Science Diet ud
  - Supplemented already

Underlying Causes

- High calcium- idiopathic vs other
- Liver disease
- Causes of increase UTI risk
  - Diabetes mellitus
  - Hyperadrenocroticism/Cushing's
  - Kidney disease
  - Structural abnormalities
- Immune-suppression
- Low phosphorous
- Vitamin Deficiency?

Treatments Predisposing

- Furosemide
- Prednisone/prednisolone
  - Steroids
- Vitamin D

- Urine acidifiers

Increase calcium in urine

Vitamin B6

- Dogs with CaOx deficient
  - Miniature Schnauzers
  - Bichon Frise dogs
  - All others so far tested
    - current stones
    - Brussels Griffon
    - Welsh Corgi
    - Mixed breed
    - Maltese
    - Toy Poodle

Vitamin B6

- Other vitamin B's
  - A small number tested: B 12
- Supplement?
  - Not without documented deficiency
  - Not without ability to monitor
    - Too early to tell if effective

Life After Urinary Stones

MONITORING RECOMMENDATIONS

Assuming Removal has Occurred

- Recheck
- Urinalysis
  - Sp gr
  - 3-4 months
- Abdominal radiographs
  - 4-6 months
- Exceptions: whenever clinical signs occur

Options for difficult situations

WHAT TO DO IF THE STONE CANNOT BE REMOVED

Removal Not Possible

- Recheck schedule 4-6 months
  - Culture urine every 6 months
    - Treat appropriately
  - Renal panel
- Clinical signs= do sooner

Take homes for all

- Water intake
  - Increased intake= increased output
    - Less chance for formation
- pH of urine
  - 7.0
- Monitor for complications
  - Infections
  - Obstruction
  - Polyps

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