



วารสารโรงพยาบาลสัตว์ มหาวิทยาลัยเกษตรศาสตร์ หนองโพ

โครงการจัดการความรู้ เพื่อพัฒนาระบบงานบริการ วิชาการและสร้างวัฒนธรรมองค์กร
ในกิจกรรม “โรคทางเดินปัสสาวะส่วนล่างในแมว”

ครั้งที่ 5 วันที่ 14 กันยายน 2557

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โรคทางเดินปัสสาวะส่วนล่างในแมว

Feline Lower Urinary Tract Disease management



WHITE WINE

- Indoor-only
- He had been adopted 2 years earlier.
- Visiting the litter box frequently but only producing a small amount of urine.
- He had been grooming and licking his perineal region excessively.
- His vaccinations were up-to-date.
- Two dogs also lived in the household.



PHYSICAL EXAM

- BAR
- BCS 4/5
- T 102 °F, heart rate 200 beats/min with strong pulses, and respiratory rate 60 breaths/min
- Thoracic auscultation disclosed no abnormalities.
- Abdominal palpation revealed a small, painful urinary bladder.
- Swelling and erythema were noted on the prepuce and penis.
- Digital rectal examination was unremarkable.

URINALYSIS

Color	Brown
Turbidity	Cloudy
pH	7
USG	1.038
Blood	3+
Protein	3+
Sediment	
RBC	>200/hpf
WBC	5-10/hpf
Epithelial cells	Few/lpf
Cocci	Few/hpf

THONG: 3.5 YEARS, NEUTERED MALE DSH

Client complaint:

- Stranguria
- Dysuria
- Vomit 1 time

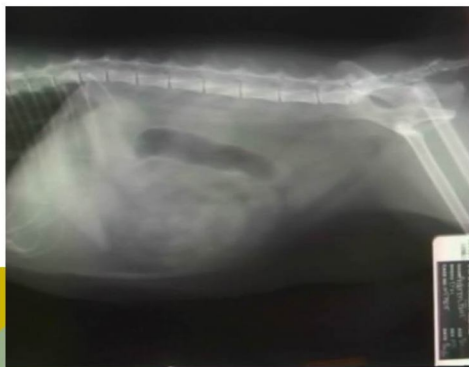


History:

- 2 years ago: CaOx stone
- Needed a second surgery to remove stones
- Perineal urethrostomy

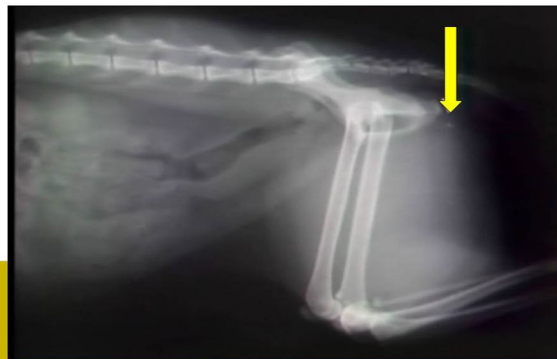
Physical examination

- 5 kg BW
- T 103.5 F
- HR 200, RR 36
- Perineal urethrostomy site normal

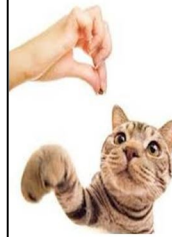


URINALYSIS

USG	1.050
pH	7.5
RBC	20-50/hpf
WBC	0-5/hpf
Crystals	Few MAP
Bacteria	None



WHAT IS FLUTD ?



- 1970s - Feline Urologic Syndrome (FUS)
- 1980s - Feline Lower Urinary Tract Disease (FLUTD)
- 2004 - Feline idiopathic cystitis (FIC)
- Idiopathic FLUTD (iFLUTD)

FLUTD is an heterogeneous group of disorders all characterized by similar clinical signs including hematuria, dysuria, stranguria, pollakiuria, periuria, and partial or complete urethral obstruction (*Kruger, 1991; Osborne, 1996a*).

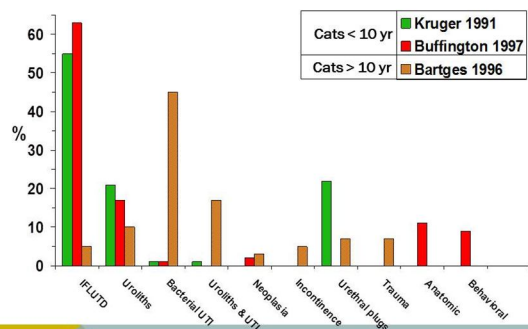
CLINICAL SIGNS

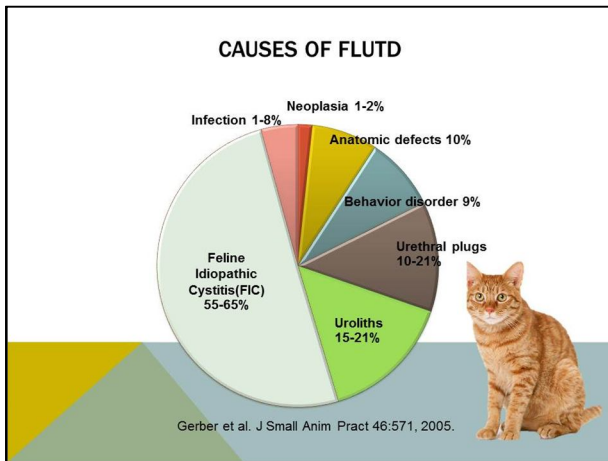
Stranguria: straining to urinate

Dysuria: inability to urinate

Haematuria: blood in the urine

Pollakiuria: increased frequency of urinating





MOST COMMON DIAGNOSES FOR FLUTD

Idiopathic	63%	55%	64%	57%
Obstruction	19%	21%	NA	58%
Uroliths	19%	23%	15%	22%
Behavioral	NR	NR	9%	NR
Incontinence	4%	0%	0%	0%
Bacterial UTI	3%	3%	1%	8%
Anomaly	0.3%	NR	11%	0%
Neoplasia	0.3%	0%	2%	0%

n=22,908 1980-97 Lekcharoensuk,2001 n=141 1982-85 Kruger, 1991 n=109 1993-95 Buffington,1997 n=77 2000-02 Gerber,2005

FELINE IDIOPATHIC CYSTITIS (FIC)

FIC IS A CHRONIC, STERILE, INFLAMMATORY PROCESS CAUSING SIGNS OF LOWER URINARY TRACT DISEASE. THE ETIOLOGY IS INCOMPLETELY UNDERSTOOD, AND TREATMENT IS OFTEN FRUSTRATING FOR BOTH CLINICIAN AND OWNER.

FELINE IDIOPATHIC CYSTITIS (FIC)

- Middle aged
- Male
- Overweight
- Pedigreed breed
- Stress factors
- A dry-food diet
- No access to outdoors for elimination

“Interstitial cystitis”
chronic or frequent signs and cystoscopic findings consistent with criteria for humans (Hanno, 2002).

THEORIES OF AETIOGENESIS

- Alteration between bladder neurons, protective glycosaminoglycan (GAG) layer lining bladder and compounds within urine.

Hostutler et al, 2005

IMPACT OF ENVIRONMENTAL STRESS

Brain Stress:

- Environmental changes
- Litter box stress, etc.

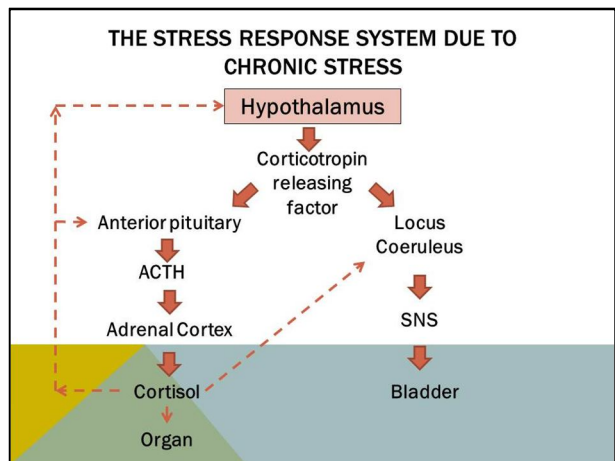
Sympathetic nervous system ↔ Pain ↔ Urine
Substances within urine can exacerbate the inflammation

- **Bladder lining**
Release of substances from nerve endings may cause:
 - Pain
 - Swelling
 - Leakage for blood vessels
 - Contraction of bladder muscle
 - Increased inflammation
 - Decreased or alter GAG layer

Gunn-Moore DA, 2001

THEORIES OF AETIOGENESIS

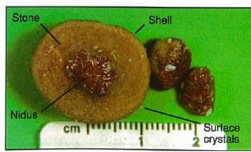
- Uncoupling of hypothalamic-pituitary-adrenal axis resulting in inappropriate response to stress.
- FIC cats have increased tyrosine hydroxylase in locus coeruleus and hypothalamic nuclei.
- Chronic stress can increase tyrosine hydroxylase activity, increasing autonomic outflow – increased catecholamine concentration.
- FIC cats have reduced cortisol response and reduced adrenal volume so dissociation of SNS from HPA.



Small adrenal glands in cats with feline interstitial cystitis.

Westropp JL¹, Welk KA, Buffington CA.

UROLITHS AND URETHRAL PLUGS



Elliott,2007



Barges,2011

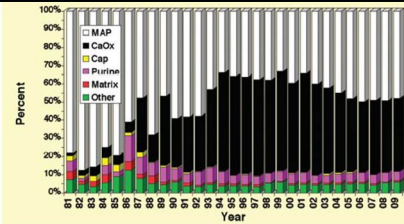
Urolith

Organized concretions containing primarily crystalloids with a small amount of organic matrix.

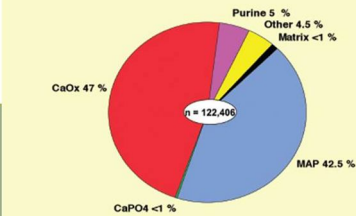
Urethral plug

Large quantities of matrix (mucoprotein and inflammatory debris) mixed with minerals.

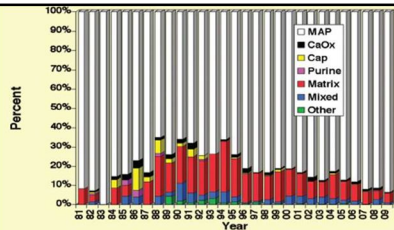
Feline urolith distribution 1981-2009



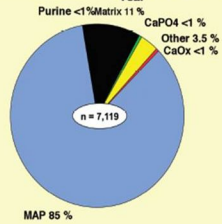
Mineral Composition of Feline Urolith 1981-2009



Feline plug distribution 1981-2009



Mineral Composition of Feline plug 1981-2009

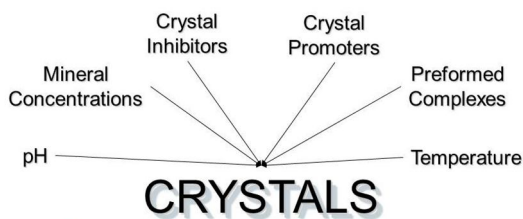


RISK FACTORS OF UROLITHIASIS

- Neutered
- Breeds
- Indoor living
- Obesity
- Food: quality of protein (Zentec, 2004)
- Urine supersaturation (Houston, 2011)
- UTI? (young, elderly, DM, iatrogenic: catheter, compromised immune system)
- FB (suture material)
- Hypercalcemia
- Upper urinary tract



HOW DO UROLITHS FORM ?



INCREASING CONCENTRATION OF CRYSTALS IN URINE



STRUVITE

Radiodense
Fairly large size
Variable shapes
Smooth contour
Often many stones



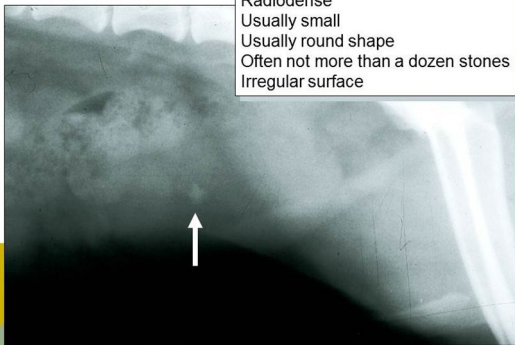
PREDICTING MINERAL COMPOSITION BASED ON RADIOGRAPHIC APPEARANCE

Mineral	Radiographic opacity	Surface contour	Shape	Usual number	Approximate size
CaOx monohydrate	+++to++++	Smooth, but occasionally bosselated	Commonly round, but also rosette	>5	1-5 mm
CaOx dihydrate	+++to++++	Rough to smooth	Rosettes	>3	1-7 mm
Sterile MAP	++to+++	Slightly rough	Round or discoid	1-3 to many	3-10 mm
Infection MAP	+to+++	Smooth to slightly rough	Round to faceted	Few to many	2 to >7 mm
Urate	-to++	Smooth	Round to ovoid	1, but up to 5	2-10 mm
CaP	+++to++++	Rough			1-4 mm
Cystine	-to+++	Rough	Round	Few to many	1-4 mm
Silica	+++to++++				1-4 mm
Xanthine	-to+	Smooth	Round to ovoid	1-3	1-5 mm

Lulich et al., 2011

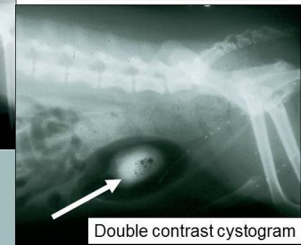
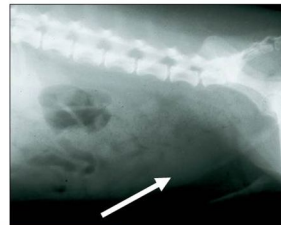
CALCIUM OXALATE

Radiodense
Usually small
Usually round shape
Often not more than a dozen stones
Irregular surface



URATE

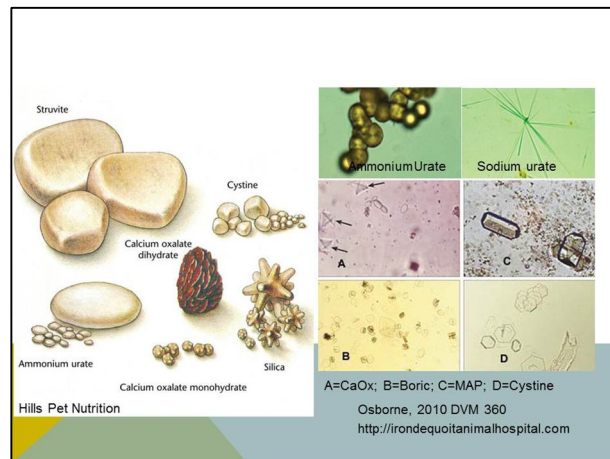
Radiolucent
Small
Smooth
Multiple stones
Round



Double contrast cystogram

	Mineral type		Predictors	
	Urine pH	Crystal	Urine culture	Serum abnormalities
MAP	Neutral to alkali	4-6 sided colorless prism	Urease-producing bacteria	none
CaOx	Acid to neutral	Dihydrate salt, colorless envelope, or octahedral shape Monohydrate salt-spindles or dumbbell shape	Negative	Occasional hypercalcemia
Urate	Acid to neutral	Yellow brown amorphous shape or spherical	Negative	Low urea nitrogen and serum albumin
CaP	Neutral to alkali	Amorphous or long thin prism	Negative	Occasional hypercalcemia
Cystine	Acid to neutral	Flat colorless, hexagonal plates	Negative	None
Silica	Acid to neutral	None observed	Negative	None

Barges et al., 2011

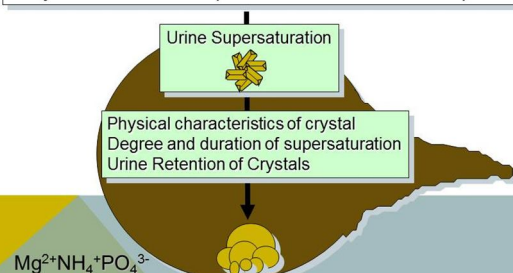


Struvite urolithiasis and matrix-crystalline urethral plugs

- 1) Sterile (95%)
- 2) Infection-induced
 - Peak age, 4 to 7 years
 - No clear sex predisposition
 - An indoor life style, obesity, low water intake, and alkaline urine
 - Persian, Himalayan, Ragdoll, Oriental Shorthair

UROLITH FORMATION

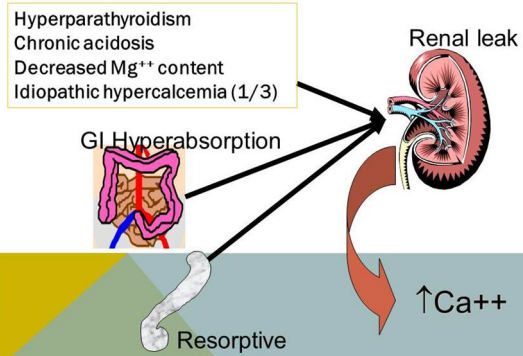
- Urine concentration of crystalloids
- Urine pH
- Crystal inhibitors and promoters
- Preformed complexes



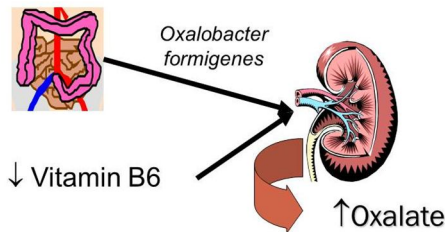
Calcium oxalate urolithiasis

- Age (mean age, 7 years)
- Breed (Persian, Himalayan, British Shorthair, Exotic Shorthair, Havana Brown, Foreign Shorthair, Ragdoll, Scottish fold)
- Male cats
- Diets low in sodium or potassium and those formulated to increase urine acidity increase the risk of CaOx urolith
- Stressful
- Obesity
- Most common urolith in kidney and ureter
- High recurrence (25-48%)

CALCIUM



OXALATE



- From fruit and vegetable
- Metabolism of ascorbic and glycine
- Human: increased dietary content, increased absorption, Vit B6 deficiency, inherited metabolic defect
- Cats: ???

OTHER UROLITHS

- Urate: uncommon in cats (Dear, 2011)
- Cystine: rare in cats
- Silicate: rare in cats
- Drug induced: Sulfadiazine, sulphonamides

DIAGNOSIS OF FLUTD



- A complete medical and dietary history
- Physical examination
- Urinalysis
- Urine culture and sensitivity testing
- Bladder imaging
- Cystoscopy
- Other laboratory investigations
- A behavioral approach

SIGNALMENT

Idiopathic cystitis and struvite urolithiasis

- cats less than 10 years of age
- no gender or breed predisposition

Matrix-crystalline urethral plugs typically occur

- male cats less than 10 years of age

Calcium oxalate urolithiasis typically occurs in

- cats older than 8 years of age
- longhaired cats
- no gender predisposition



HISTORY

- Diet?
- Change in drinking habits?
- Prior medical problems?
- Change in micturition?
- Any treatment?
- History of stones?



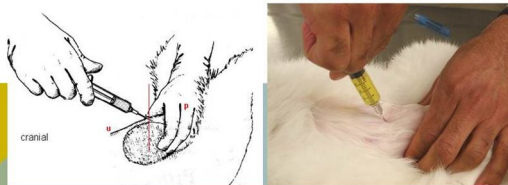
PHYSICAL EXAMINATION



- Bilateral ventral abdominal and inguinal alopecia is occasionally seen in cats with bladder pain
- Palpation: UB distension ?
- Urethra in male cats
 - Obstruction or not ?
 - Exact cause of obstruction ?
 - Catheter ?
- Other symptoms ?
 - Tachypnea: pain, excitement, metabolic acidosis
 - Bradycardia: hyperkalemia, circulatory shock
 - Hypothermia: circulatory shock and uremia

URINALYSIS

- Evaluated within 30 to 60 minutes.
- Storage for longer than 60 minutes, especially with refrigeration, may cause formation of struvite or CaOx crystals.
- A urine culture should be performed for any cat with recurrent FLUTD or an identified risk factor.



URINALYSIS

- **Dipstick**
 - Leucocyte, nitrite: not valid
 - Blood: not reliable, small amount if cystocentesis is normal
 - Bilirubin: always abnormal in cats
 - Protein: mainly albumin
 - pH: variations: hyperventilation, post prandial, storage, bacteria
 - Glucosuria: stress, tubular damage

URINALYSIS

Crystals

- Crystalluria ≠ urolith
- Commonly supersaturated
- Crystalluria itself is
 - not a disease
 - not need to be treated unless it is associated with clinical signs
- Crystalluria in cats with signs of FLUTD does not guarantee that the crystals are actually the cause of the clinical signs.
- Absence of crystalluria doesn't exclude presence of stone

Collection Method

Purpose of Sample Collection	Collection Method			
	Cystocentesis	Voided Midstream	Catheterization	Manual Expression
Screening test	P	A	N	N
Diagnostic urine culture	P	A	N	N
FLUTD	P	A	N	N
Urolithiasis	P	A	N	N
Bladder neoplasia	N	P	N	N
Disease distal to the bladder	N	P	N	N

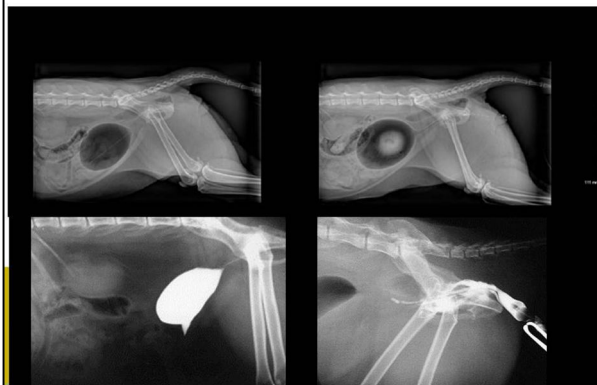
P Preferred; A, acceptable; N, not advised; FLUTD, feline lower urinary tract disease.
Adapted from: Lulich J, Osborne C. Cystocentesis: lessons from thirty years of clinical experience. *Clin Brief* 2:11, 2004.



IMAGING

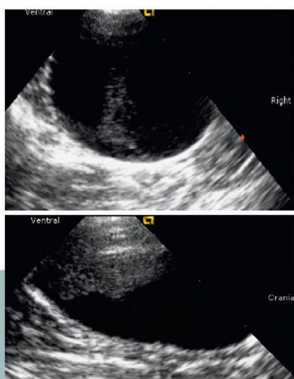
- Recurrent or persistent FLUTD signs
- Palpation of a bladder mass
- History of urolithiasis
- Survey radiographs are most useful for detection of radiodense uroliths at least 3 mm.
- The entire urinary tract, including the urethra, should be radiographed.
- After surgery or urohydropropulsion

CONTRAST CYSTOGRAPHY

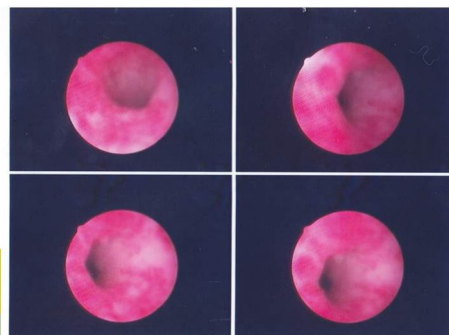


ULTRASOUND EXAMINATION

- Bladder wall thickness
- Mass lesions
- Calculi
- Blood clots
- Echogenic debris
- Diverticula
- Ectopic ureters

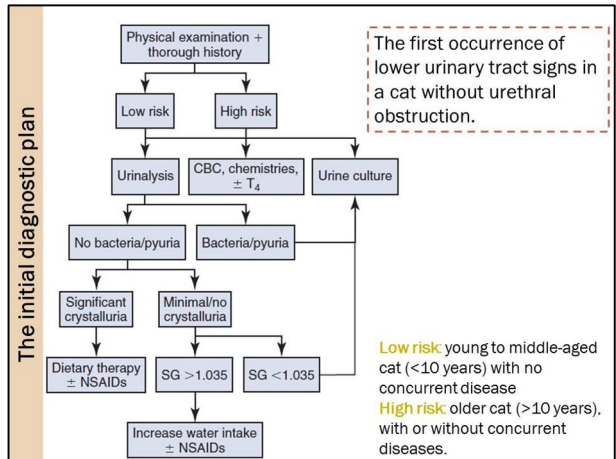


CYSTOSCOPY

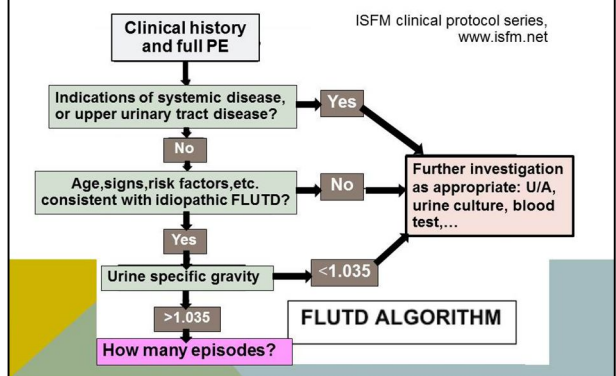


STONE ANALYSIS

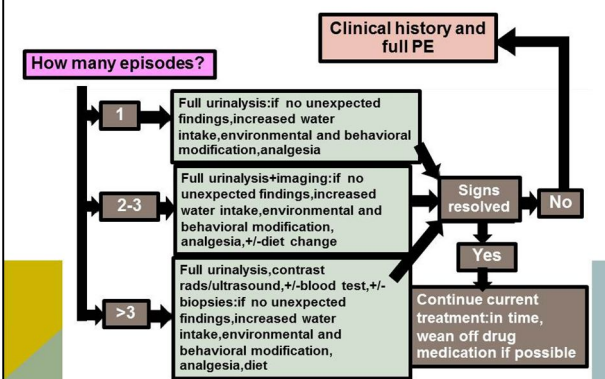
- NOT optional
- Prevention of recurrence
- Qualitative stone analysis does not provide enough for patient management
- Quantitative = gold standard



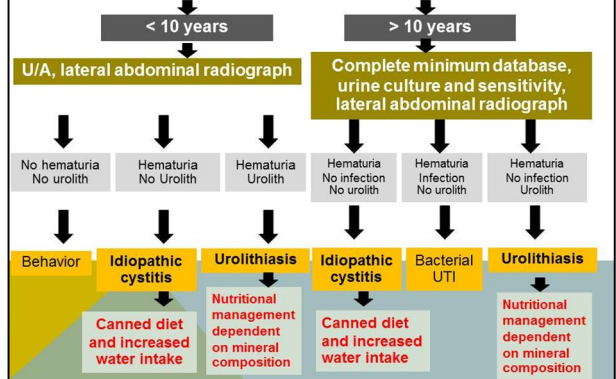
MANAGING CATS WITH NON-OBSTRUCTIVE FLUTD



MANAGING CATS WITH NON-OBSTRUCTIVE FLUTD



NUTRITIONAL MANAGEMENT OF NON-OBSTRUCTIVE FLUTD



NUTRITIONAL MANAGEMENT

- Struvite can be **dissolved** through nutritional
- No diet can **dissolve** CaOx.
- Medical and dietary manipulation can **prevent** both struvite and CaOx.

MANAGEMENT OF STRUVITE

- **Increasing water intake**
 - A canned diet should be selected or water can be added to the food
 - ~2 cups per 1 cup dry food
 - ~1/4 cup per 1 cup canned food
 - Increased dietary sodium can be used to promote increased water intake



- **Struvite dissolution diet:**
 - Protein restriction
 - Phosphorous and magnesium restriction
 - Moderate fat: increasing energy density results in decreased amount of food intake
 - **Cautioned**
 - Against feeding treats, table food, and milk
 - Not be used in growing cats, cats with acidemia, or pregnant cats
 - Should be fed only on a short-term basis, never as a preventive diet
 - Urethral obstruction is always a risk with this method
- **An appropriate antimicrobial agent**

Dietary Recommendations for Dissolution of Sterile Struvite Uroliths in Cats

1. Water: Canned foods induce polyuria and excretion of minerals
2. Magnesium: 0.04% to 0.09% on a dry matter basis
3. Phosphorus: 0.45% to 1.1% on a dry matter basis
4. Protein: 30% to 50% on a dry matter basis
5. Sodium: 0.3% to 0.6% on a dry matter basis
6. Urinary pH: 5.5 to 6.5

Dietary Recommendations for Prevention of Sterile Struvite Uroliths in Cats

1. Water: Canned diet may increase urine volume and dilute potential calculogenic compounds
2. Magnesium: 0.04% to 0.14% on a dry matter basis
3. Phosphorus: 0.5% to 0.9% on a dry matter basis
4. Protein: 30% to 50% on a dry matter basis
5. Urinary pH: 6 to 6.8

VETERINARY THERAPEUTIC DIETS - STRUVITE

FELINE	Dissolution	Prevention
Eukanuba Veterinary Formula Urinary Low pH/S		■
Hill's Prescription Diet s/d	■	
Hill's Prescription Diet c/d Multicare		■
Purina Veterinary Diets UR St/Ox		■
Royal Canin Veterinary Diet Dissolution	■	
Royal Canin Veterinary Diet SO	■	■



MONITOR

- **Urinalysis and lateral abdominal radiographs should be monitored **monthly** until urolith dissolution.**
- The expected time frame for dissolution is 3 - 4 weeks for a sterile struvite urolith, and up to 20 weeks for an infection-induced urolith.
- **After radiographic dissolution**
 - Antibiotic therapy should be continued for 1 month.
 - Diet should be fed for 2-4 weeks to ensure that the smallest uroliths that are not radiographically detectable have resolved.

MONITOR

- **Urinalysis and lateral abdominal radiography should be performed 1-2 months after medical dissolution or surgical removal.**
- **Urinalysis every 4-6 months and abdominal radiography if clinical signs of FLUTD occur.**

MANAGEMENT OF CALCIUM OXALATE

- Remove all stones
- X-ray prior to recovery
- Wet diet
- Limited in high oxalate
- Ca serum level?
 - Normal dietary calcium levels are recommended.
 - High dietary calcium may result in increased urinary calcium excretion.
 - Low dietary calcium may result in an increased absorption of oxalate from the gastrointestinal tract.

- **Magnesium**
 - Calcium oxalate urolith inhibitor by forming a soluble salt with oxalate.
 - Diets designed for managing both calcium oxalate and struvite urolithiasis use a moderate Mg.

- **Citrate**
 - a inhibitory role by binding with calcium to form a soluble salt.
 - Potassium citrate has also been used as an alkalinizing agent.

- Re-evaluate the patient (4-6 weeks)
- Recurrence ?
 - Hydrochlorodiazide
 - Potassium citrate

Dietary Recommendations for Prevention of Calcium Oxalate Uroliths in Cats

1. Water: Canned diets increase urine volume and dilute potential calculogenic compounds
2. Magnesium: 0.07% to 0.14% on a dry matter basis
3. Phosphorus: 0.5% to 1% on a dry matter basis
4. Calcium: 0.6% to 1% on a dry matter basis
5. Protein: 30% to 40% on a dry matter basis
6. Urinary pH: >7
7. Crude fiber: >7% on a dry matter basis if idiopathic hypercalcemia is present

VETERINARY THERAPEUTIC DIETS – CALCIUM OXALATE

FELINE

Eukanuba Veterinary Formula Urinary Moderate pH/O
Hill's Prescription Diet c/d Multicare
Hill's Prescription Diet x/d
Purina Veterinary Diets UR St/Ox
Royal Canin Veterinary Diet SO

DIET COMMENTS AND CAUTION

- Acidifying diets
 - Induce metabolic acidosis, which results in bone resorption, leading to increased calcium excretion in the urine.
 - Decreased citrate excretion, reducing the levels of a potential inhibitor in the urine.
 - Vitamin C supplementation should be avoided because excess vitamin C is metabolized within the liver to oxalate and excreted in the urine.
- Phosphorus restriction
 - Decreases in urinary pyrophosphate, which is an inhibitor of calcium oxalate.

DIET COMMENTS AND CAUTION

- Sodium
 - Safe!
 - No adverse effect (Lekcharoensuk, 2001; Luckschander, 2004; Cowgill, 2007; Xu, 2009; Reynolds, 2013)
 - The upper safe limit is greater than 15g/kg diet (40 g salt)
 - Smoked salmon, tuna in brine, shrimp, oyster sauce



MULTIMODAL ENVIRONMENTAL MODIFICATION AND ADDRESSING UNDERLYING STRESSOR

- Living with another conflict cat
- Moving house
- Change in owner routine
- Rainfall



ENVIRONMENTAL MODIFICATION



ENVIRONMENTAL MODIFICATION



ENVIRONMENTAL MODIFICATION



- A synthetic formulation of feline facial pheromone
- Decrease anxiety-related behavior in cats, including urine marking and destructive scratching.
- One report suggested different behavior in hospitalized cats exposed to Feliway compared with placebo-treated cats (Griffith et al, 2000)



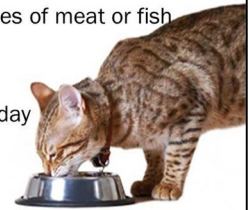
INCREASING WATER INTAKE

- Dilute noxious components in urine
- Irritate the bladder mucosa ↓
- Pain ↓
- Inflammation ↓
- USG ↓
- Canned foods containing at least 60% moisture (Chew et al., 2009)
- Total daily water intake volume canned food > dry food
- Feeding 2-3 meals has been shown to increase water intake (Kirschvink et., 2005)



METHODS FOR INCREASING WATER INTAKE

- Mix water with dry diets 1:1
- Flavor water with frozen cubes of meat or fish broth
- Try distilled or filtered water
- Ensure water is fresh every day
- Large water bowls



METHODS FOR INCREASING WATER INTAKE

- Ensure the water bowls are kept clean
- Keep food and water bowls away from the litter box
- Feed multiple smaller meals
- Provide a moving source of water



ANALGESIA AND ANTI-INFLAMMATORY DRUGS

Buprenorphine

0.01 to 0.03 mg/kg, every 6-12 h for 3 to 5 days

Fentanyl transdermal patch

Tramadol

NSAIDs (should be avoided if there is reduced renal function)

- Tolfenamic acid 4 mg/kg q24 h SC, PO
 - Has been suggested to treat acute flare-ups
- Meloxicam 0.1-0.2 mg/kg q24h PO

ANTISPASMODICS

Bladder relaxants

- Propantheline bromide

Urethral relaxants

- Phenoxybenzamine / prazosin
- Diazepam / dantrolene



AMITRIPTYLINE

Tricyclic antidepressant

(Anticholinergic, antihistaminic, sympatholytic, anti-inflammatory, analgesic and sedative properties)

2.5 - 12.5 mg PO every 24 hrs - give at night

2 treatment groups

- Amitriptyline 5 mg/day = 16
- Placebo = 15

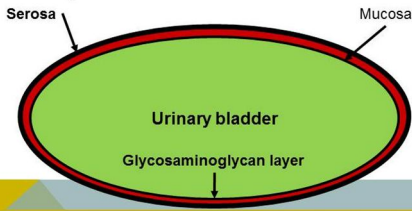
Follow up for 1, 6, 12, and 24 months

Amitriptyline was associated with:

- Quicker resolution of clinical signs
- Quicker resolution of hematuria

ARE MUCOSAL PROTECTANT ARE INDICATED ?

- To repair the defective urothelium to decrease permeability, as well as provide analgesic and anti-inflammatory effects.



N-acetyl D-Glucosamine

Cats with FIC have lower urinary GAG-to-creatinine ratios than did clinically normal cats (Panchapanpong et al., 2011).

MANAGEMENT OF URETHRAL OBSTRUCTION

- Relief of obstruction and reestablishment urine flow
 - Cystocentesis
 - Urethral catheterization
 - Emergency urethrotomy
 - Plan B
- Fluid administration
- Correction of biochemical and electrolyte abnormalities
 - Hyperkalemia
 - Hypocalcemia
 - Acidosis
 - Azotemia

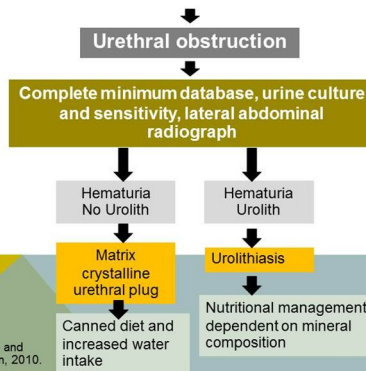


PLAN B (Cooper, JAVMA 2010)

- Reduced anxiety and provide analgesia
 - ACP 0.25 mg IM, buprenorphine 0.075 mg IM
- Wait 10 min
- Gently extrude and massage penis
- Single attempt to gently express bladder
- No urine ? Cystocentesis
- Blood test and SC saline
- No IV nor UB catheter
- Low stress environment
- ACP and buprenorphine repeated, bladder palpation, cysto if needed
- Medetomidine (0.1 mg IM) if necessary
- Up to 3 days
- Discharge if spontaneous urination

Journal of the American Veterinary Medical Association
 A protocol for managing urethral obstruction in male cats without urethral catheterization
 Journal of the American Veterinary Medical Association
 Volume 137, Number 11, November 2010
 doi: 10.2460/javma.137.11.1821
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 Authors: Cooper, JAVMA 2010
 Journal of the American Veterinary Medical Association
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NUTRITIONAL MANAGEMENT OF OBSTRUCTIVE FLUTD



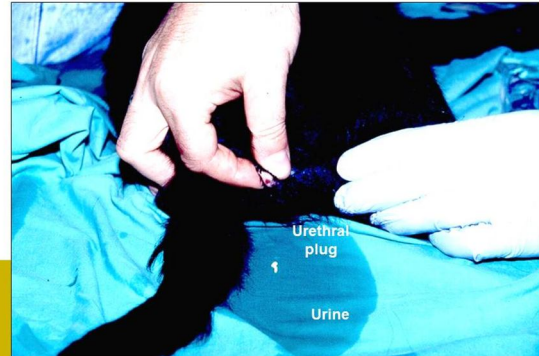
Handbook of Canine and feline clinical nutrition, 2010.

METHODS FOR UROLITH REMOVAL

Technique	Urolith Size/ Number	Urolith Type	Advantages	Disadvantages	Anesthesia Required?	Equipment Required
Voiding urohydropropulsion	<3.5 mm in females <1 mm in males Any number	All	No surgery	Urethral obstruction	Yes	Catheter
Cystoscopic retrieval	Small, any number	All	No surgery	Limited to small uroliths	Yes	Rigid cystoscope, stone basket
Laser lithotripsy	Small to medium, moderate number	All	No surgery	Limited availability, long procedure times, not well evaluated in cats, limited to females or males with perineal urethrostomy	Yes	Cystoscope, laser lithotripter
Cystostomy	Any	All	Rapid, readily available	Invasive, longer recovery time	Yes	Surgical instruments
Medical dissolution	Any size, number	Struvite only	Noninvasive	Limited to struvite stones, takes several weeks	No	Prescription diet

Adapted from Langston C, Gosselman K, Palma D et al. Methods of urolith removal, *Compend Contin Educ Vet* 32, 2010.

MASSAGE DISTAL URETHRAL



Short- and long-term outcome after perineal urethrostomy in 86 cats with feline lower urinary tract disease



- 52.3% not require subsequent treatment
- 25.6% one or two episodes of mild recurrent FLUTD and were treated medically
- 22.1% surgical complications or more frequent and/or severe recurrent episodes

Ruda et al., *Journal of Small Animal Practice*, 2012.

J Vet Intern Med 2012;26:526-531

Intravesical Application of Lidocaine and Sodium Bicarbonate in the Treatment of Obstructive Idiopathic Lower Urinary Tract Disease in Cats

L. Zezza, C.E. Reusch, and B. Gerber

- Randomized, blind, placebo controlled
 - 12 cats received lidocaine; 14 control
 - 3 consecutive days of intravesical lidocaine or placebo
 - No significant benefit
 - 58% vs. 57% re-obstruction

URETHRAL OBSTRUCTION OUTCOME

Journal of the American Veterinary Medical Association
August 15, 2013, Vol. 243, No. 4, Pages 512-519
doi: 10.2460/javma.243.4.512

Initial treatment factors associated with feline urethral obstruction recurrence rate: 192 cases (2004–2010)

Peter F. Hetrick, DVM; Elizabeth B. Davidow, DVM, DACVECC

Animal Critical Care and Emergency Services, 11536 Lake City Way NE, Seattle, WA 98125. (Hetrick, Davidow)

- 192 cats
- Retrospective case series.
- Overall recurrence
 - 10.9% at 24 h and 23% at 30 days
- Significantly recurrence with 3.5 F catheter
- Significant recurrence with prazosin vs. phenoxybenzamine

Short Communication



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DOI: 10.1177/1098919113505093
jfms.com
SAGE

Intravesical glycosaminoglycans for obstructive feline idiopathic cystitis: a pilot study

Allison M Bradley and Michael R Lappin

- Randomized, blind, placebo controlled
 - 0/9 reobstructed in GAG treated group for 7 days follow up
 - 3/7 reobstructed in placebo
 - P=0.06



"There are some patients whom we cannot help; there are none whom we cannot harm"

Arthur L. Bloomfield

