

U - Nephrology & Urology

FELINE LOWER URINARY TRACT DISEASE

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ETIOLOGY

Feline lower urinary tract disease (FLUTD) includes inflammatory diseases of the lower urinary tract and non-inflammatory conditions that cause urination in inappropriate places. Both male and female cats are affected but mostly only male cats develop urethral obstruction. Typical signs in non-obstructed cats include

pollakiuria, stranguria, hematuria and urination in inappropriate places. FLUTD is one of most common reasons for cats to be presented to veterinary hospitals. In various surveys, the incidence of the syndrome has usually been about 0.6% in the cat population and 3-13 % of cats presented for veterinary care.

Table 1: Diagnoses in cats with FLUTD

(Number of cases)	1981-1985 ¹		1993-1995 ²	
	(47) Male	(43) Female	(47) Male	(62) Female
No urethral obstruction	%	%	%	%
Idiopathic	79	58	64	65
Urolith	17	40	9	19
Anatomical defect	-	-	11	10
Behavioral problem	-	-	13	6.5
Urolith and UTI	0	2	0	0
UTI	0.04	0	0.02	0
Neoplasia	0	0	4	0

Data from:

- Osborne CA et al. Feline lower urinary tract disorders. Definition of terms and concepts. *Vet Clin North Am Small Anim Pract.* 1996 Mar; 26(2): 169-79.
- Buffington CA et al. Clinical evaluation of cats with nonobstructive urinary tract diseases. *J Am Vet Med Assoc.* 1997 Jan 1; 210(1): 46-50.

The etiology of FLUTD was investigated prospectively in two studies a decade apart (Table 1). These data suggest that non-obstructive FLUTD is most likely to be idiopathic. Identifiable causes of non-obstructive FLUTD included urolithiasis, anatomical defects and behavioral problems. Urinary tract infection and neoplasia were rare. Urolithiasis is one of the major identifiable causes of FLUTD. The composition of bladder uroliths submitted for analysis has recently changed from predominantly struvite to mostly calcium oxalate. The reason for this change appears to be related to reformulation of commercial diets to prevent struvite crystalluria. Reduced magnesium and

phosphorus content and urine acidification caused by these diets may predispose to formation of calcium oxalate uroliths.

Cats with FLUTD tend to urinate in inappropriate places. However, this sign could be an indication of a behavioral abnormality. Marking or spraying is a normal territorial behavior response in cats, so urination outside the litter box can be confused with FLUTD.

Vesicourachal diverticula visible on contrast cystography have been reported in 25 % of cats with signs of hematuria, dysuria and urethral

obstruction. Clinical evidence suggests that diseases that induce increased intravesicular pressure can cause potential diverticula to open up. Once the underlying condition causing increased pressure is resolved, the diverticula disappear. As such, vesicourachal diverticula appear to be a consequence rather than a cause of FLUTD.

In most surveys of cats with FLUTD, the incidence of urinary tract infection is very low, around 3-4 %. This low incidence may be related to very effective host defense mechanisms and the high concentration of urea in cat urine may be a major contributing factor to resistance. The incidence of urinary tract infection increases with age above 10 years. This may be due to loss of urine concentrating capacity but other factors may be involved. Also, cats with a perineal urethrostomy are prone to urinary tract infection.

Bladder cancer is relatively rare in the cat. Almost all affected animals are older than 5 years, about 80% are malignant and about 30% are transitional cell carcinomas.

Many possible etiologies have been proposed for idiopathic FLUTD including viral infection, *Mycoplasma* spp. infection, food allergy, the presence of toxic metabolites in urine, and a defect in the protective glycosaminoglycan (GAG) layer which covers the uroepithelium of the bladder, mast cell abnormalities, and visceral pain syndrome.

The discovery of viral particles in the mucus of urethral plugs is intriguing but the significance is not yet clear. Several attempts have been made to implicate mycoplasmas in FLUTD but the evidence is strongly against their involvement as a causative agent.

Food allergy has been proposed as a cause of FLUTD on the basis that elimination diets appeared to reduce signs in some clinical situations. Unfortunately, no controlled studies have been performed to support or deny this possibility.

There has been no work performed to confirm or deny the contention that a toxic metabolite in urine causes uroepithelial irritation and inflammation.

Idiopathic FLUTD bears some similarity to the syndrome in humans called interstitial cystitis. Both humans and cats demonstrate chronic ongoing sterile inflammation of the lower urinary tract, submucosal hemorrhages visible on cystoscopy after mild bladder distention, reduced excretion of glycosaminoglycans, increased bladder mucosal permeability, and infiltration of mast cells.

Unfortunately the causes of interstitial cystitis in humans are not known and there is suspicion

that the abnormalities observed in both species may be non-specific stereotypic responses of the lower urinary tract to a variety of insults. Proposed causes of interstitial cystitis in humans have been as fanciful as proposed causes of FLUTD. Suggestions have included viruses, fastidious bacteria, deficient protective GAG layer and psychosomatic. Some veterinarians have associated episodes of idiopathic FLUTD with stress. Interesting comparative research continues on this line of investigation.

CLINICAL SIGNS

Cats with nonobstructive FLUTD have periodic episodes of urgency, dysuria, urination outside the litter box, pollakiuria and hematuria. Urination may be sufficiently painful for cats to vocalize during urination. The episodes can last for one to ten days separated by days to weeks of apparent normalcy.

On physical examination the bladder may be thickened and sensitive to direct palpation. Uroliths can be difficult to detect in the bladder of cats particularly if they are solitary because crepitus will not be present.

DIAGNOSIS

The history should be carefully assessed to determine the possibility of behavioral abnormalities. Careful bladder palpation should be performed to detect the presence of crepitus and masses, which may indicate stones or tumors. The thickness of the bladder wall can also be assessed.

A problem specific database includes urinalysis, urine culture, radiographs, ultrasound, cystoscopy, biopsy, and urolith and crystal analysis.

Urinalysis and culture and sensitivity should be performed on urine obtained by cystocentesis. Urine can be collected by caging the cat without a litter for 2-3 hours, then sedation with ketamine given at 1-3 mg intravenously. Once the cat is sedated, an assistant can grasp the urethra while a cystocentesis is performed. Attempts at cystocentesis in the fully conscious cat usually result in reflex micturition as soon as the bladder is manipulated and collection by cystocentesis becomes impossible.

Radiographs including double contrast cystography should be performed to investigate the possibility of uroliths, tumors and diverticula. Ultrasound examination can be used instead.

Although not available in many practice settings, cystoscopy can allow visualization of submucosal hemorrhages, uroliths, tumors and diverticula. Biopsy can also be performed through the cystoscope. Histologic examination of bladder biopsies can reveal inflammation and mast cell infiltration.

Mineral analysis of crystals and uroliths should be performed as appropriate.

MANAGEMENT

The management of urolithiasis and urinary tract infection is discussed in other sections. Little is known about treatment of bladder tumors in cats because they are so rare. Management of behavioral abnormalities is beyond the scope of his chapter.

The development of effective management strategies for idiopathic FLUTD has been confounded by not knowing the etiology (or etiologies) and a paucity of controlled studies. Unfortunately, the waxing and waning nature of clinical signs leads investigators to conclude that certain treatments are successful when, in fact, a placebo would have been just as effective.

Feeding canned food instead of dry food seems to reduce recurrence of idiopathic FLUTD. Investigators postulated that this effect could be due increased urine volume associated with a canned food diet that would dilute toxic metabolites in urine.

Anticholinergic agents have been suggested to reduce bladder spasticity and increase the time between urination in cats with FLUTD. Propantheline given at 0.2-0.4 mg/kg po sid or bid has been suggested but controlled studies to determine efficacy are lacking.

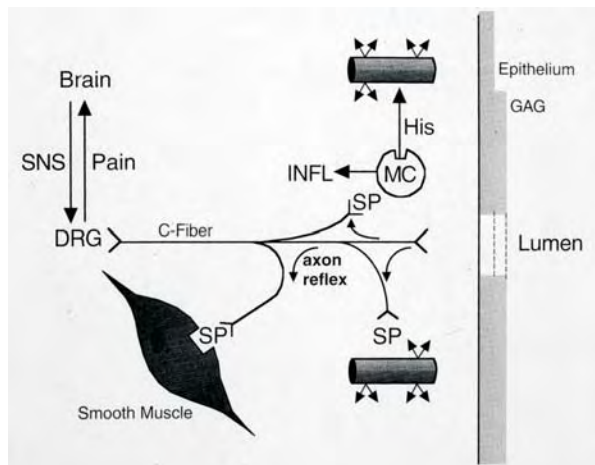
Antiinflammatory agents such as corticosteroids

have been proposed to reduce inflammation associated with idiopathic FLUTD. A short-term study indicated that prednisolone given at 1 mg/kg po bid failed to reduce the magnitude and duration of clinical signs faster than in control cats. However, long-term studies have not been performed to see if glucocorticoids have a preventive effect.

Intravesicular dimethyl sulfoxide (DMSO) is established as a treatment of interstitial cystitis in humans. Although intravesicular instillation of 10-20 mL of 10 % DMSO has been reported to reduce clinical signs in cats with FLUTD, no controlled studies have been performed.

In humans with interstitial cystitis, GAGs have been reported to alleviate clinical signs. The proposed mechanism of action is to set up a barrier between potentially irritating urine and the uroepithelium. There is evidence that the normal GAG layer is deficient in humans with interstitial cystitis and similar evidence exists in cats. Pentosan polysulfate is used in humans. Safety and efficacy need to be established in cats.

The tricyclic antidepressant, amitriptyline, acts as an anticholinergic, anxiolytic and analgesic. In a study of cats severely affected with idiopathic FLUTD, amitriptyline seemed to reduce clinical signs for up to a year when given at 5-10 mg po sid at night. The drug is in popular use at present and further studies are needed.



Distension of the bladder associated with cystoscopy is thought to give humans affected with interstitial cystitis a prolonged symptom-free period. The proposed mechanisms of action include dissipation of inflammatory mediators from nerve fibers in the submucosa of the bladder and die back of sensory nerves. Whether this procedure has a beneficial effect in FLUTD has not been established.

PREVENTION

Feeding canned food rather than dry food may prevent recurrence in some forms of idiopathic FLUTD. Reduction of stress is thought by many to reduce clinical signs in many affected cats.

REFERENCES

Available on request.