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Nutritional strategies in the management of lower urinary tract disease – How much scientific evidence exists?

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Abstract

All cats with feline lower urinary tract disorders (FLUTD) benefit from a nutritional consultation to determine the most appropriate diet for their diagnosis. Increasing water intake is typically beneficial in management of FLUTD and dietary interventions can be of assistance in supporting this.

Additional nutritional considerations vary according to the precise diagnosis and include urolith dissolution and urolith/crystal prevention strategies. Depending on the precise diagnosis, feeding an appropriate diet may reduce recurrence of lower urinary tract disease and improve long-term outlook.

Key words

Urinary, bladder, urethra, cat, feline, diet

Background

Feline lower urinary tract disease (FLUTD) is a term used to encompass a number of conditions which affect the bladder and urethra. FLUTD typically affects around 1% of cats and is characterised by clinical signs of cystitis. FLUTD is most common in young and middle aged cats. There are several important medical causes of FLUTD (Table 1).

(Fig 1)

The best outcome is achieved by making a definitive diagnosis and this typically involves a combination of history, physical examination, urinalysis including bacterial culture, imaging and sometimes additional tests. Nutritional strategies are relevant in the management of cats affected by the most frequently diagnosed causes of FLUTD and this article will present the evidence in support of considering nutritional strategies in these cases. Where possible, the author prefers wet food to dry since increasing fluid intake is often beneficial in the management of FLUTD, whatever the diagnosis (Fig 1).

A more detailed article discussing how water and water supplements can help cats with FLUTD is available separately.

Struvite urolithiasis

Nutritional dissolution is well established as a successful strategy for struvite urolithiasis. Clinical studies have shown that specially designed therapeutic diets can be highly effective in struvite dissolution (Houston et al 2011, Lulich et al 2013, Torres-Henderson et al 2017). Characteristics of a standard struvite dissolution diet include low magnesium content and urinary acidification. A strict dissolution diet should not be fed long-term (for more than 3 months) or to older cats, especially those known to have pre-existing kidney disease since the highly acidified diet may increase the risk of metabolic acidosis, hypokalaemia, loss of bone density and renal complications. Feeding a highly acidifying diet long term also increases the risk of oxalate stone formation and is another reason why a strict dissolution diet should not be fed long-term.

Fortunately, it is now known that many 'so-called' maintenance urinary diets are also effective in struvite dissolution, although typically at a slightly slower rate than a strict dissolution diet. For example a Hill's study indicated that whilst a dissolution diet (Hill's s/d) took on average 13 days to result in stone dissolution, their maintenance urinary diet (Hill's c/d) took a mean of 27 days (Lulich et al 2013). A more recent study involving a different maintenance urinary diet (Purina® Pro Plan® Veterinary Diets UR St/Ox URINARY™) for cats with urolithiasis resulted in dissolution of struvite stones within two weeks (Torres-Henderson et al 2017). Advantages of feeding a maintenance urinary diet include owner reassurance that the food is also safe for other cats in the household to eat. Unlike the situation in dogs, most struvite uroliths in cats are sterile and therefore antibiotic therapy is not usually required. Nonetheless bacterial urinary culture is recommended in all patients with struvite stones, where possible, and is especially important in older cats where bacterial urinary tract infections are more common.

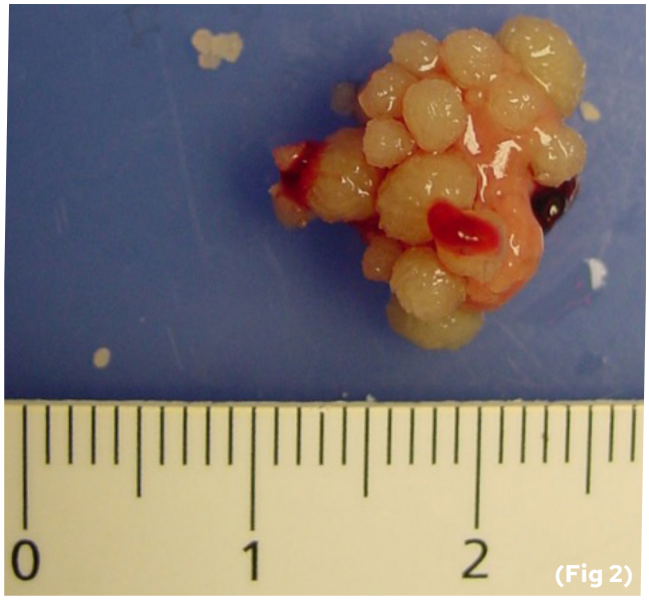
Clinical tip: Assess % dissolution at two weeks – if not completely 'dissolved', the stone should have decreased in size by at least 35% (Lulich et al 2013): Minimal or no stone reduction at two weeks, in a cat compliant to the diet, likely suggests that the urolith is not struvite. Calcium oxalate would be the most likely possibility and management of this requires a different approach.

Oxalate urolithiasis

Oxalate stones cannot be treated medically – therefore oxalate stones need to be removed surgically. Small urethral oxalate stones can be flushed back to the bladder (retrograde hydropulsion) for surgical removal from here or they can be expelled from the body using voiding hydropulsion.

Prevention of future urolithiasis

Whenever stones are removed surgically or via voiding hydropulsion, typing the stone is recommended such that appropriate preventative strategies are employed in the future (Fig 2).



(Fig 2)

The most common uroliths diagnosed are calcium oxalate and struvite. Struvite stones are most common in cats less than 10 years old with oxalate stones more common in older cats.

Certain breed predispositions for calcium oxalate stones have been reported with this stone especially common in long-haired pure breeds such as Ragdoll, Himalayan and Persian cats. In these cats, stone formation can be seen in very young cats and should be considered a possibility whenever signs of FLUTD are reported in cats of these breeds (Fig 3).

Struvite stones tend to form in more alkaline urine than oxalate stones which are favoured by more acidic conditions.

Assessment of serum total, and where possible ionised, calcium levels are recommended whenever calcium oxalate stones are found as hypercalcaemia is a risk factor for stone formation. Management of hypercalcaemia, where diagnosed, is important in reducing the risk

of oxalate stone recurrence. Where urate stones are identified, investigations for the possibility of liver disease (and especially portosystemic shunts) are recommended.


(Fig 3)

Nutritional management of cats diagnosed with urethral plugs

Urethral plugs account for about 20% of FLUTD cases in cats less than 10 years of age and are a potential cause of life-threatening urethral obstruction. The plugs are made up of a protein matrix with some crystals (usually struvite). The matrix is formed from protein which has leaked through the bladder wall as a result of inflammation of the bladder lining. Urethral plugs are often associated with feline idiopathic cystitis (FIC) and most clinicians believe that this is a subset of FIC. Rarely urethral plugs can occur as a result of bladder stones, tumours or infections. The protein matrix can also cause a urethral obstruction even when no crystals are present. However, when crystals are present, these can become trapped in the matrix and make it more likely to cause an obstruction. Urethral obstruction can be caused by the plug itself but also can be caused by urethral spasm associated with the pain caused by the presence of FIC and/or a plug.

Successful long-term treatment of cats that have suffered from urethral plugs involves utilisation of nutritional strategies aimed at reducing the numbers of crystals in the urine. Although it is normal to identify microscopic crystalluria, especially in cats fed a standard dry diet since their urine is so concentrated, reduction of crystal numbers can help to reduce the formation of plugs. Specially formulated therapeutics diets such as maintenance diets designed for cats with FLUTD are recommended.

Additional measures which may be helpful include encouraging water intake such that more dilute urine is produced and other strategies aimed at supporting cats with FIC such as environmental modification to reduce the cat's stress levels. During an episode of urethral obstruction, antispasmodics and flushing the urethra may be require to remove a plug.

Nutritional management of cats with FIC

Encouraging fluid intake is a recommendation in cats diagnosed with FIC. This recommendation stems from quite an old paper where cats with FIC were managed either with a dry or a wet therapeutic diet where other dietary constituents were very similar (Markwell et al 1999). The researchers found a significant reduction in recurrence of clinical signs in those cats fed a wet diet.

Possible reasons why increasing fluid intake might be helpful include dilution of noxious/potentially irritant urine components, encouraging more frequent voiding and possibly as a route for environmental enrichment, especially in indoor-only cats. Strategies for encouraging increased fluid intake are presented in a separate article.

Although a wet diet is still considered a sensible recommendation, some studies have reported good results feeding dry therapeutic diets to cats with recurrent FIC (Kruger et al 2015, Naarden and Corbee 2019). In one prospective, randomised, double-blinded study the owners were able to choose whether to feed wet or dry food (Kruger et al 2015). The test food comprised Hill's® Prescription Diet® c/d® Multicare Feline and the control food was a custom-formulated food designed to mimic typical supermarket brands. In this study, both dry and wet formulations of the test diet reduced the rate of recurrent episodes of FIC signs by 89%. Addition of 'stress-alleviating' compounds such as alpha casozepine and L-tryptophan to therapeutic urinary diets has been reported to benefit some cats with FIC (Meyer and Becvarova 2016, Naarden and Corbee 2020). One study involving 31 cats with acute non-obstructive FIC reported that feeding a therapeutic urinary stress diet was associated with a significantly lower recurrence rate compared to cats fed a variety of commercial diets. Again, in this study there was no significant difference between cats receiving wet versus dry formulations of food although the numbers of cats involved was low (Naarden and Corbee 2020).

Some dry formulations of therapeutic urinary diets contain increased salt (sodium chloride) levels which have been shown to encourage thirst and production of more dilute urine (Hawthorne and Markwell 2004), thus potentially benefitting many cats with FLUTD – especially those resistant to transitioning to a wet food. Safety data for older cats and those with renal disease have been contradictory with one study revealing that renal parameters worsened in cats with CKD receiving a salt supplemented diet (Kirk et al 2006) whilst more recent prospective studies have indicated no adverse renal or cardiovascular consequences in cats receiving the food for prolonged periods (Reynolds et al 2013, Chetboul et al 2014). Manufacturers of salt-supplemented therapeutic diets currently list CKD and cardiovascular disease as contraindications to feeding this food.

Additional modifications of therapeutic urinary diets include addition of glycosaminoglycans (GAG). GAG supplementation is provided with the aim of supporting/replenishing the GAG layer on the inner lining of the bladder and thus reducing mucosal inflammation and bladder wall permeability. GAG supplements are also hypothesised to have potential anti-inflammatory and analgesic effects. Unfortunately, published data does not generally support efficacy of GAG supplements although individual patients may experience better results (Gunn-Moore and Shenoy 2004). A recent abstract indicated that Purina® Pro Plan® Veterinary Diets UR St/Ox URINARY™ was a helpful diet for cats in a rescue shelter with haematuria associated with suspected FIV. The haematuria resolved within 28 days in 8 of the 13 cats (Lappin et al 2019).

Management of concurrent relevant co-morbities

Obesity management is indicated, where appropriate. Encouraging play and activity levels may be of benefit in reducing further instances of FLUTD.

Summary

Diet plays an important role in the management of FLUTD and can significantly reduce the likelihood of recurrence of clinical disease. As always, the best outcome is achieved following an accurate diagnosis such that the most appropriate diet can be chosen for that individual.

Table 1. Major causes of feline lower urinary tract disease

Cause	*Approximate frequency in cats < 10 years old*	*Approximate frequency in cats ≥ 10 years old*
Feline idiopathic cystitis (FIC)	55%	5%
Bacterial urinary tract infection	5%	50%
Urolithiaisis	20%	10%
Urethral plugs	20%	10%
Bladder neoplasia	< 1%	5%
Urolithiasis + infection	< 1%	15%
Incontinence	< 1%	5%

Figures and legends

1. Tactics to encourage water and fluid intake are recommended in all cats with FLUTD.
2. Optimum management of patients with urolithiasis includes urolith analysis of any stones removed surgically or passed through the urethra. Stone type cannot reliably be predicted from the crystals present in the urine.
3. Gross haematuria, small calcium oxalate uroliths and heavy crystalluria in the urine of 10 month old Ragdoll.

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