

Case Report: Traumatic Urethral Avulsion

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In this Feline Update,
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- Traumatic Urethral Avulsion
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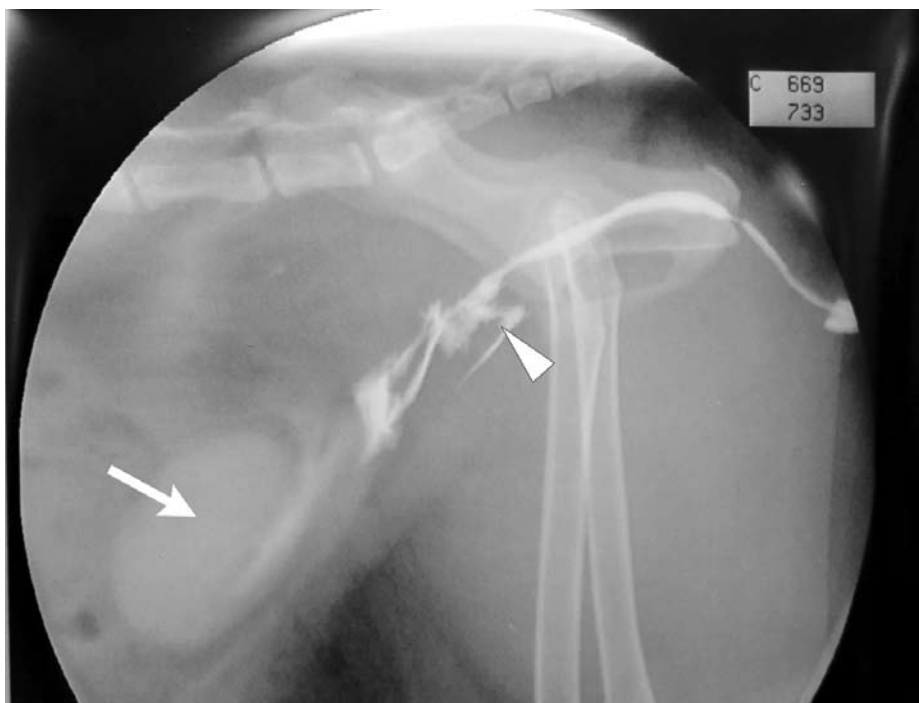


Figure 1 – Contrast urethrogram showing contrast leakage from the bladder neck/urethra – note the distance between bladder lumen (arrow) and the leakage site (arrowhead).

Murphy was presented to the referring veterinarian following a road traffic accident which had resulted in some superficial skin abrasions and some abdominal pain. Murphy had been treated initially by the referring veterinarian for shock and was discharged the following day with analgesia and antibiotics. He was presented for re-examination following a clinical deterioration and development of anuria. Ultrasound examination showed free abdominal fluid and serum biochemistry revealed a marked azotaemia with electrolyte disturbances. The referring vet suspected a urinary tract rupture and referral to Langford Veterinary Services (LVS) Feline Centre was arranged.

On presentation to the Feline Centre, Murphy was markedly obtunded and lethargic, with significant circulatory depression and marked azotemia (serum urea 37mmol/L [6.5-10.5mmol/L], creatinine 431umol/L [133-175umol/L]). Repeat ultrasound examination of the abdomen by the diagnostic imaging service showed free abdominal fluid, some retroperitoneal fluid and evidence of peritoneal inflammation. The bladder was not easily visible. Survey radiographs showed loss of serosal detail and some mild subcutaneous emphysema on the ventral and right lateral abdomen. Passage of a urethral catheter allowed removal of only small volumes of urine. Differential diagnoses of bladder or urethral rupture, or

urethral avulsion were considered possible for Murphy. Due to the initial marked azotemia and circulatory compromise, an abdominal drain was placed percutaneously (pigtail catheter) to facilitate removal of any free abdominal urine and reduce the reabsorption and post-renal origin of the azotemia. Due to lack of bladder filling, it was not possible to place a percutaneous cystostomy catheter to directly drain from the bladder. This would have been preferable if possible. Following 24 hour periods of stabilisation and documented improvement of the azotaemia and electrolyte abnormalities, a general anaesthesia was performed. Fluoroscopic intravenous urogram and retrograde contrast urethrogram (*Figure 1*) showed leakage of contrast from the bladder neck/urethra. Exploratory laparotomy was performed to explore the urinary tract and repair the injury. Surgery revealed a complete avulsion of the proximal urethra from the bladder neck and lumen.

The tissue appeared vital and well vascularised on both the bladder and urethral surfaces. After initial lavage and minimal dissection for exposure of the avulsed ends, a retrograde 4FG tomcat urinary catheter was passed so that the end of the catheter was visible intra-abdominally. An 8FG dog urinary catheter was also passed through a stab incision in the apex of the bladder to pass out the bladder neck. Approximately 1mm of the serosa/mucosa adjacent to the bladder and urethral avulsion sites was debrided to provide a fresh cut end to anchor the suture to. A stay suture was placed in the ventral bladder and urethral serosa to facilitate minimal tissue trauma. Preplaced sutures were then positioned

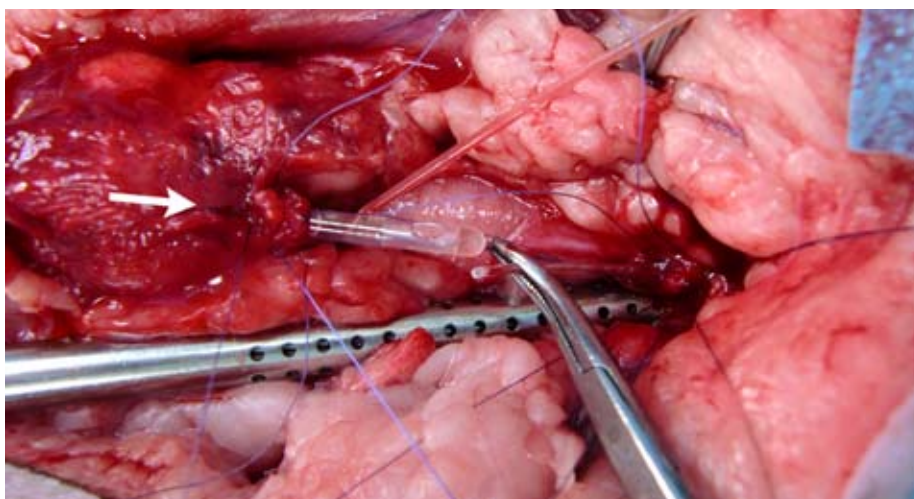


Figure 2 – The avulsed urethra to the right of the picture has the smaller urinary catheter held by forceps. The bladder lumen is delineated by the larger 8FG catheter seen to the left of the picture (arrow). The suture material seen is replaced at dorsal, ventral and lateral margins of the anastomosis site.

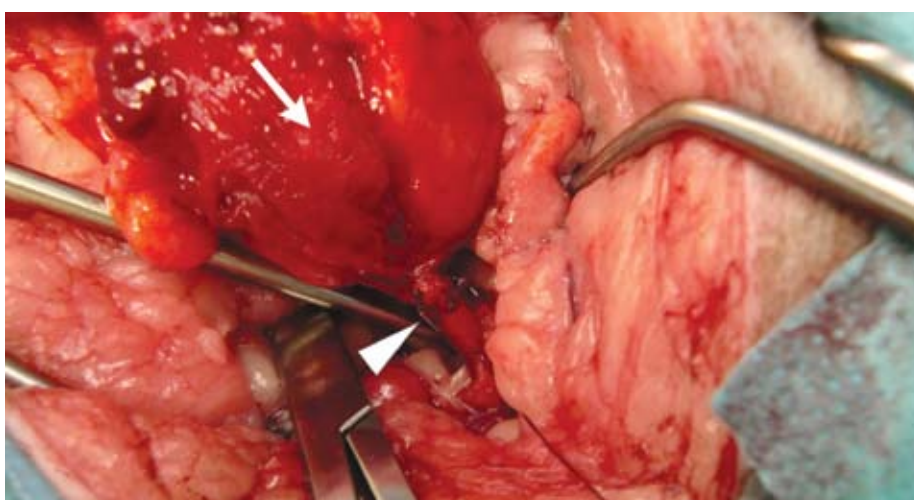


Figure 3 – Intraoperative view of urethrocystic anastomosis with sutures in situ. The bladder is denoted by the white arrow. The arrowhead shows the anastomosis site. Note the bladder is distended compared with the earlier picture. Cranial is to the top left of the picture.

full thickness through the urethral and bladder walls at 90° intervals (dorsally, ventrally and bilaterally *See figure 2*). Once all four sutures were placed and orientation confirmed, the bladder urinary catheter was withdrawn, the stab incision closed and the anastomosis sutures were tied with the dorsal most suture tied first then the lateral sutures and then the ventral suture. 5-0 Vicryl was used. After securing the sutures, the urethral catheter was partially withdrawn and sterile saline was instilled retrograde to confirm water-tight seal of the anastomosis. Leakage was visualised at two points and further simple interrupted full thickness sutures were placed. Repeated pressure testing confirmed a seal of the completed anastomosis (*Figure 3*). A 4FG silicone urethral catheter was placed and its position within the urinary bladder confirmed with palpation. The abdomen was again copiously lavaged with warmed sterile saline and closure of the abdomen was routine. A closed urine collection system was attached to allow calculation of daily urine output and

maintain the urethral catheterisation to facilitate effective healing of the anastomosis by avoiding urinary irritation to the healing mucosa. On the third postoperative day, Murphy removed his own urinary catheter after getting his Elizabethan collar off. The decision was taken to place a percutaneous pig-tail cystostomy tube (*See Figure 4*) to keep the bladder empty for a further 5 days and to also avoid having to pass a urinary catheter past a potentially fragile surgical anastomosis. A repeated retrograde urethrogram 8 days following initial surgery showed minimal urethral leakage. The cystostomy tube was closed to see if voluntary attempts to urinate would be made. Some posturing attempts

were made, but minimal urine was produced. Dantrolene and prazosin were introduced to allow urethral sphincter relaxation and improved detrusor contraction.

This management resulted in improvement over the following days. Re-examination 30 days following trauma revealed Murphy to show evidence of straining to urinate. This had been managed by daily manual bladder expression by the referring vet. Ultrasound examination revealed some fat inflammation surrounding the bladder neck, but a normal sized bladder. Murphy was hospitalised to allow medical management of presumed inflammation and idiopathic FLUTD signs. Management included prazosin, dantrolene, and initiation of meloxicam and buprenorphine. Following treatment with these medications and efforts to keep stress to a minimum in hospital, Murphy improved; displaying minimal clinical signs with complete bladder emptying noted on palpation and ultrasound. Complete avulsion of the urethra predisposes to incomplete healing of the repair, and also post-operative stricture which can develop up to 6-10 weeks post injury. Trauma to the bladder neck may also cause permanent damage to the neurological supply to the bladder neck and urethra and cause incontinence. Although it is still relatively early in the post operative course, it appears that Murphy has made an excellent recovery from a serious injury. Management of the FLUTD symptoms will be important in his rehabilitation.

Vigilance and recognition of the clinical signs is also important.

Murphy will be monitored by his owner for dysuria over the next 4-6 weeks. Repeated retrograde urethrogram will be considered as an important future investigation should Murphy develop evidence of straining again.

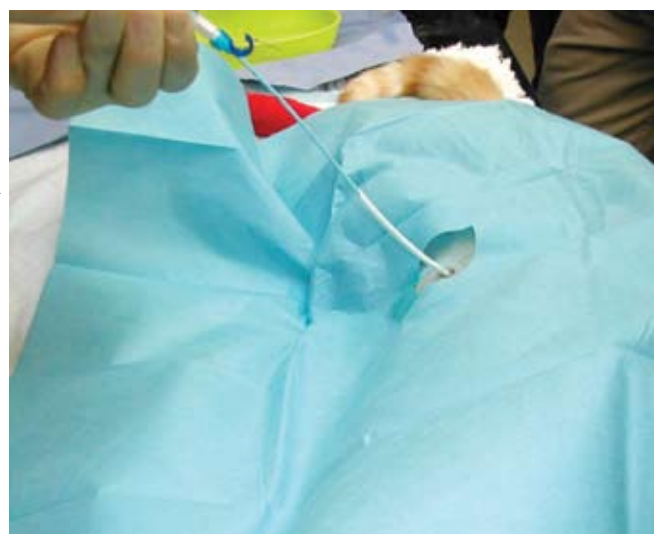


Figure 4 – Placement of a percutaneous pig-tail urinary catheter to allow bladder emptying without traumatising the urethra.

INTRODUCTION AND DEFINITION

Feline idiopathic cystitis (FIC), also sometimes called feline interstitial cystitis or feline urological syndrome, is a chronic condition characterised by lower urinary tract clinical signs. It is very similar to interstitial cystitis, a human disease causing severe bladder pain and discomfort on urination.

CLINICAL SIGNS

Most cats affected with FIC are young adults. Male and female cats are equally affected, although of course urethral obstruction is more common in male cats. The clinical signs usually indicate a lower urinary tract disease and can include dysuria, haematuria, stranguria, pollakiuria, periuria (urination in inappropriate location), vocalisation during urination, and excessive grooming of the perineum or genitals. Urethral obstruction is usually considered as a result of urethral spasm or formation of a urethral plug. Most of the time, the episodes of clinical signs are acute, self-limiting in the absence of urethral obstruction, and typically resolve within 5-7 days, regardless of treatment. In a small subset of affected cats (<15%), the clinical signs can be more chronic, lasting for weeks to months.

While the episodes are usually short and self-limiting, relapse is frequent; 39-65% of cats will have recurrence of clinical signs within 1-2 years. It is important to discuss this with owners of affected cats and to explain that relapse is common despite treatment. Anecdotally it appears that the severity and frequency of FIC decreases with age.

PATHOPHYSIOLOGY

FIC usually presents mainly as a sterile cystitis, with no apparent cause to be found on investigation. However many body systems and organs are in fact involved in the syndrome. Despite much research, the cause and physiopathology of FIC (and of interstitial cystitis in humans) is incompletely understood. Predisposing factors include an indoor environment, multi-cat households, an overweight body condition, use of an indoor litter tray, and a dry diet. Acute stressful events, such as a sudden change in environment, are anecdotally known to trigger flare-ups of clinical signs in cats with FIC.

Various abnormalities have been identified in cats affected by FIC, both in the urinary tract and other organs or systems.

1. URINARY TRACT ABNORMALITIES

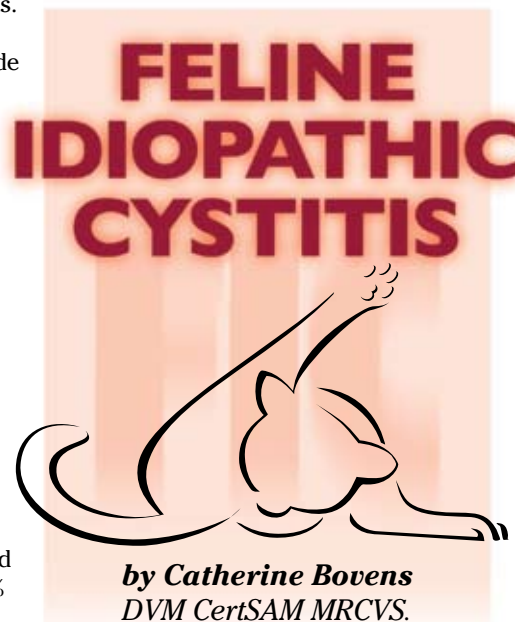
Microbial agents

A potential link between several viruses, such as feline calicivirus, and FIC has

been evaluated, but a viral cause for FIC was not demonstrated. Bacterial infections of the urinary tract have also been investigated, but are rare in cats affected by FIC and appear unlikely to cause the condition. Cats with FIC may however be predisposed to secondary urinary tract infections, due to compromised urinary tract defence mechanisms, or secondary to urethral catheterisation.

Glycosaminoglycan (GAG) layer

The internal surface of the lower urinary tract is coated in a protective GAG layer that might be abnormal in amount or in



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composition in cats with FIC. Affected cats have been reported to have decreased total urinary GAG, and decrease in a specific GAG known as GP-51. It is unclear whether this is part of the aetiology of the disease, or whether it is a secondary change to lower urinary tract disease. A defective GAG layer may increase the exposure of the underlying urothelium to noxious substances present in the urine.

Bladder wall

Cats with FIC have a higher urothelium permeability, which means that potentially irritant or inflammatory substances present in the urine may be able to cross the urothelium. The urothelium was also found to be damaged on electronic microscopy, with denuded underlying cells. Interestingly, such damage of the urothelium can also be found in healthy mice exposed to an environmental stressor (constant illumination).

Alterations were also found in cats with FIC in various receptors, channels, and transmitters allowing the urothelial cells to sense the environment and to

communicate with neighbouring urothelial and nerve cells. In the submucosa of the bladder wall of cats with FIC, vasodilatation and vascular leakage are common findings. These usually occur in the absence of significant inflammatory cell infiltrate, which suggests a neurogenic inflammation (triggered by activation of the nervous system in the area). Increased numbers of mast cells are present in about 20% of cats; this may be a result of a stress response.

2. NERVOUS SYSTEM

Both the storage of urine and micturition require complex neuroendocrine integration. Cats with FIC have several abnormalities in the urinary nervous system, both afferent and efferent, but also in the general nervous system.

Afferent input

For the afferent system, in charge of transmitting sensory inputs from the bladder, affected cats have an increased sensitivity to bladder distension, increase in substance P (a neurotransmitter) and increased substance P receptor expression (a pain receptor), as well as increased numbers of C-fibres (a type of sensory fibres activated by pain). Cats with FIC also have larger dorsal root ganglion cells in the lumbosacral spinal cord (including neurons going to the bladder) with altered neuropeptide profiles. However treatment trials targeting bladder sensory neurons, such as substance P antagonists, have been unsuccessful so far.

Cats with FIC have increased enzyme activity in the locus coeruleus, a nucleus in the brainstem which produces norepinephrine and activates the sympathetic nervous system. Increased activation of the locus coeruleus may be due to increased sensory input from the bladder; however chronic external stress can also activate the locus coeruleus and would lead to the same response.

Cats with FIC have a greater and different acoustic startle response (a reflex to an unexpected loud stimulus) than healthy cats.



Figure 2: Bladder ultrasound showing a diffusely thickened bladder wall secondary to feline idiopathic cystitis.

Efferent output

Cats with FIC have increased plasma catecholamine concentrations, both at rest and during stress. They also have altered responses to adrenergic receptor agonists and antagonists. This indicates abnormalities in their autonomous nervous system function, including an abnormal response of the autonomous nervous system to stress. An exaggerated, chronic sympathetic nervous system activation due to stress may lead to neurogenic bladder inflammation, via stimulation of the C-fibres in the bladder wall, release of substance P and other neuropeptides, increase in local mast cells and their degranulation. Increased sympathetic nervous system activation may also increase urothelium permeability, increasing the exposure of underlying cells to urinary substances, including potential irritants or inflammatory substances.

3. HORMONAL SYSTEM

The normal “stress response system” integrates responses from the sympathetic nervous system and the hypothalamic-pituitary-adrenal gland axis. A stressful event triggers the production of corticotrophin releasing factor (CRF) from the hypothalamus. CRF stimulates release of ACTH from the anterior pituitary gland, which then stimulates the adrenal glands to release cortisol. CRF also stimulates the locus coeruleus, which activates the sympathetic nervous system and the release of catecholamines. Outflow from the sympathetic nervous system is normally restrained by adrenocortical output. Cats with FIC have a decreased response from the adrenal glands to ACTH, leading to a reduced cortisol production during stress, and have smaller adrenal glands. This may lead to an abnormally high sympathetic response to stress. It is unclear whether this is a primary relative adrenal insufficiency in cats affected by FIC, or whether this could be an adaptation following chronic stress or an innate inability of the cat to cope with stress.

4. IMMUNE SYSTEM

Stress leads to a variety of behaviours, such as withdrawal and decreased interest in finding food.

These behaviours are called sickness behaviours, and have been linked to immune activation and proinflammatory cytokine release. Cats with FIC were recently found to have an increase in total sickness behaviours when exposed to unusual environmental events.

Summary

As a summary, although significant abnormalities are present in the urinary tract of cats affected with FIC, abnormalities are also present in many other systems and organs, including the nervous and hormonal systems. It is however unclear which abnormalities are causes and which are consequences of the condition at this stage. Chronic stress may lead to bladder changes via neurogenic inflammation and increased urothelium permeability; increased sensory input from the bladder due to primary urinary tract damage may also stimulate the autonomous nervous system. It is important to explain to owners of affected cats that FIC is not only a “bladder disease” but is a complex, incompletely understood syndrome where neurological and hormonal abnormalities are also present, making treatment challenging. Stress appears to have a large implication in the disease and both chronic, long-term stress and acute stressful events need to be addressed in treatment of the condition.

DIAGNOSIS

The clinical signs of FIC are not specific and simply reflect lower urinary tract disease. While a majority of cats (60-70% of cases without urethral obstruction) are ultimately diagnosed with FIC, other possible causes of similar clinical signs include urolithiasis, primary urinary

tract infections (rare in young adult cats but more common in cats older than 10 years), urinary tract neoplasia, anatomical defects or abnormalities such as urethral strictures, and behavioural abnormalities. Idiopathic cystitis is a diagnosis of exclusion. Investigation should include urinalysis and culture, and imaging of the urinary tract. Ultrasound is usually the imaging modality of choice and allows assessment of bladder wall thickness and appearance, and assessment for uroliths. However the urethra should also be assessed for the presence of a stricture or uroliths in all cats with current or previous urethral obstruction, via a retrograde contrast urethrogram; the bladder can also be assessed at the same time via a positive and double contrast pneumocystogram. Assessment of the renal function is prudent in these cases, and measurement of serum urea and creatinine is recommended.



Figure 3: Normal retrograde contrast urethrogram in a male cat, performed to exclude other causes of lower urinary tract clinical signs such as urethral stricture or uroliths.

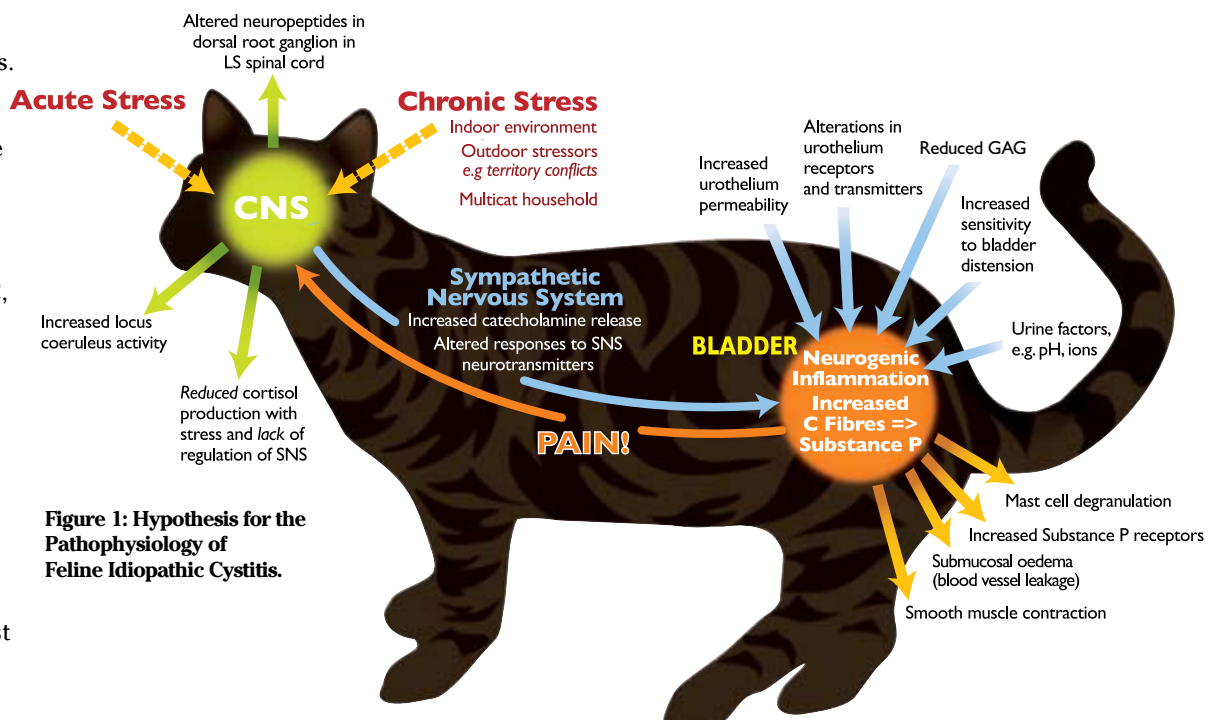


Figure 1: Hypothesis for the Pathophysiology of Feline Idiopathic Cystitis.

Cats found to have a bacterial urinary tract infection should be assessed for possible underlying conditions, such as diabetes mellitus, hyperthyroidism, renal disease or uroliths.

Assessment and emergency treatment of cats with a urethral obstruction is beyond the scope of this article; in these cases the electrolytes should be assessed as part of an emergency database, as well as the acid-base status if available.

Possible abnormalities that can be detected on investigation of cats with FIC include haematuria and urinary inflammation, a diffusely thickened bladder wall, or the presence of blood clots in the bladder.

TREATMENT

The treatment of FIC can be divided in two phases: treatment of the acute episodes of clinical signs, and long-term management between episodes.

1. TREATMENT OF ACUTE EPISODES OF CLINICAL SIGNS

Analgesia

Acute episodes of FIC are painful. A large part of the medical treatment is to provide adequate analgesia; this will allow faster resolution of the acute episode and will decrease the likelihood of urethral obstruction. Analgesia is usually provided via a combination of opioids and non-steroidal anti-inflammatories.

- A non-steroidal anti-inflammatory licensed for use in cats should be used, such as meloxicam or robenacoxib, assuming no contra-indications are present (such as renal or gastrointestinal disease). In cats with dehydration or pre- or post-renal azotaemia, administration of a non-steroidal anti-inflammatory should be delayed until these are corrected.
- Buprenorphine (dose 0.01-0.03 mg/kg every 6-8 hours intravenously, subcutaneously or sublingually) is the most commonly used opioid in these cases, and has the advantage of being absorbed sublingually, which allows to avoid the stress of an intravenous catheter in hospitalised cats who don't require intravenous fluids, and allows home administration in cats who don't require hospitalisation. A high dose can be used initially, then tapered gradually. Sedation and behaviour changes may occur and this should be discussed with owners if the buprenorphine is administered at home. Pre-filled syringes with a needle-free bung can be dispensed to owners for home administration; the syringes should be labelled individually and should be kept in the fridge. Alternatively, oral tramadol can be considered for analgesia (dose 2-

4 mg/kg every 8 hours orally), but needs to be reformulated for cats. In rare cases with severe pain, hospitalisation and the use of stronger opioids such as methadone or fentanyl may be required.

Urethral spasmolytics

Urethral spasmolytics are recommended in all male cats, to treat or prevent urethral obstruction, as urethral spasm is probably common secondary to the pain and inflammation. It is unclear if female cats may also benefit from urethral spasmolytics, but as they generally don't suffer from urethral obstructions, the use of such medication in female cats is not routinely recommended.

The urethra is composed of both smooth and striated muscle. A combination of smooth and striated muscle relaxants is thus recommended in moderate or severe cases. In mild cases, a smooth muscle relaxant alone can be used.

- The most commonly used smooth muscle relaxant is prazosin (*Hypovase*®) dose 0.25-1mg total dose every 8-12h orally). Hypotension is a potential side effect as relaxation of the arterial smooth muscle can also occur, so monitoring of the blood pressure is recommended during treatment.

- Phenoxybenzamine (*Dibenylene*®) is an alternative smooth muscle relaxant to prazosin, but is considered less potent (dose 0.5-1 mg/kg every 12-24h orally).

- Dantrolene (*Dantrium*®) is a skeletal muscle relaxant (dose 0.5-2 mg/kg every 12h orally) and can be associated with prazosin or phenoxybenzamine. It needs to be reformulated for cats as it is commercialised in 25mg capsules. Possible side effects include weakness and rarely hepatopathy; monitoring of hepatic enzymes is recommended.

- Diazepam is not recommended in cats as a skeletal muscle relaxant due to the risk of idiosyncratic hepatic necrosis, which can be fatal.

Other treatments

Stress should be avoided as much as possible. Hospitalisation should be avoided if possible, but is required in cats suffering from dehydration or urethral obstruction, or requiring strong opioid treatments; hospitalised cats should be kept in a quiet, dog-free environment, and should be provided with hiding places ("igloo" beds, cut cardboard boxes with bedding) and handled gently to minimise stress.

Antibiotics are generally not required, as bacterial urinary tract infection is rare in cats with FIC, and should be reserved for cases with a proven infection (positive urine culture from a sterile urine sample, collected by cystocentesis or sterile urethral catheterisation); cases with a documented infection also

require further investigation for possible underlying causes.

Corticosteroids have been reported not to improve the clinical signs of cats with FIC and are not recommended.

Glycosaminoglycan supplementation is controversial (see long-term management below). It is probably best initiated as a chronic long-term treatment; use during acute episodes of clinical signs may increase stress and increases the number of medications that owners have to administer.

Treatment duration

All treatments should be continued at least until all clinical signs have resolved, and for at least 7-14 days post-urethral obstruction if present. Treatments can then be tapered gradually; the author recommends discontinuation of one treatment weekly, starting by the urethral muscle relaxants and finishing by analgesia agents, with tapering of the buprenorphine dose over 7-10 days. Once the acute episode has resolved, long-term management is required, but does not usually involve medication, apart in rare severe cases or cases with chronic clinical signs.

2. LONG-TERM MANAGEMENT

Long-term management is required in all cases with recurrent clinical signs. It should be discussed with the owners that cats with FIC have a chronic condition, for which the cat may be asymptomatic between "flare-up" acute episodes, but which remains present. The aim of long-term management is not a cure, but is to decrease the frequency and severity of acute episodes of clinical signs. Such episodes may still occur despite the owner's best efforts. The fact that the severity and frequency of FIC episodes has been anecdotally reported to decrease with age can be mentioned to owners of affected cats.

Increasing water intake

Increasing the cat's water intake leads to dilution of the noxious substances present in urine and more frequent urination, and has been shown to reduce the frequency of FIC episodes. The most efficient way of increasing a cat's water intake is to feed a wet diet only, and this should be recommended in all cats with FIC, following a gradual transition with the usual diet. A specific veterinary diet is not required in the absence of urolithiasis. Water can be added to the food to further increase its water content. If the cat will not eat a wet diet, addition of water to dry food can be considered.

Water should always be fresh and easily accessible, in quiet places that the cat can access without stress.



Figure 4: Some of the medications used in the treatment of FIC.

Several waterbowls should be placed in the house, in a location different to the food bowls. Using shallow, ceramic dishes is recommended as cats appear to favour these over metallic or plastic bowls, or deeper bowls that would press on their whiskers when drinking.

Other useful tricks to increase the water intake include placing a pet water fountain in the house; flavouring the water with tuna spring water (which can be frozen in ice-cubes for convenience) or cat milk; and encouraging the cat to drink from a running tap, if this is something that he/she enjoys. Each individual cat will have his or her preferences that the owner can determine.

The aim of water intake increase is to obtain a urine specific gravity <1.040.

Encouraging more frequent urination; litter tray management

Several litter trays should be available in different places in the house; the trays should always be clean and should be placed in quiet places where the cat can go without being disturbed or without fearing an attack by another cat in the household. The general rule of thumb is to have one litter tray per cat in the house plus one, in different locations. Again the personal preferences of the individual cat can be followed regarding the type of tray and litter; most cats appear to prefer open trays and clumping, unscented litter.

Decreasing stress

Considering the very important role of stress in the physiopathology of FIC, an individual specialist behaviour and consultation should be highly recommended to owners of affected cats; sources of stress may be subtle and difficult to identify. If such a specialist

behaviour consultation is not possible, some general recommendations can be provided. The cat should always be able to access his/her core resources with minimal stress, including food, water, a litter tray and a quiet resting place. Places for hiding or quiet resting should be provided; cats usually prefer an elevated place, and often like "igloo" beds



Figure 5: Encourage increased water intake by providing large, low water bowls situated away from food.

or cardboard boxes with bedding inside. In multi-cat households, the cat should be able to access the core resources without conflict with other cats, which means plenty of resources should be provided in various locations. Changes to the environment should be avoided, including new pets in the household. A visiting catsitter should be preferred over cattery stays in the owner's absence. Environmental enrichment is recommended and was demonstrated to significantly benefit cats with FIC. Various resting places, climbing structures, viewing and resting perches, and plenty of toys and scratch posts should be provided. Indoor cats may be stressed due to

limited activity; allowing access to outdoors or at least access to an outdoor pen if the cat wishes may be beneficial. An increased amount of time spent playing/interacting with the owner may also be beneficial. Audio (music, radio) and video (DVD for cats) sensory stimulation can be provided when the owners are absent from the home.

The use of synthetic feline facial pheromones (*Feliway*®) and/or alpha-casozepine (*Zylkene*®) may decrease stress in cats and thus may be beneficial in the management of cats with FIC. These treatments have no reported side effects and are considered safe; however their efficacy has not been proven in FIC and they remain thus controversial.

Addressing obesity

As obesity is a predisposing factor to FIC, overweight cats should be started on a weight loss programme, using a wet diet designated for weight loss. The target weight loss is 1-2% body weight per week, and owners should be encouraged to keep a weekly weight diary. The amount of daily food can then be adjusted to obtain the target weight loss until reaching the cat's ideal body weight. Increased exercise should be

recommended (access to outdoors, playing with toys and the owner).

Glycosaminoglycan (GAG) supplementation

As the GAG layer in the bladder of cats with FIC appears to be abnormal, supplementation with GAG such as glucosamine may be beneficial in these cases. However it is unclear how much of the orally administered GAG reaches the bladder of affected cats. Also two published clinical studies did not demonstrate a significant benefit in GAG supplementation in FIC cases. However in one of the studies, a small subset of cats had relapse of clinical signs when GAG supplementation was discontinued.

Therefore it appears that GAG supplementation may benefit a small subset of cats with FIC, and is safe with no reported side effects. Discontinuation of supplementation can be attempted in stable cats who have not experienced a relapse of clinical signs for 4-6 months; alternatively long-term supplementation is unlikely to be harmful. Stress should be avoided in FIC cases, hence daily pilling of an affected cat may be counter-productive; it is best to give GAG supplements in food or treats.

Medication for severe cases

In rare cases with chronic clinical signs or with frequent recurrence of signs despite all other measures, chronic administration of medication may be required.

• Gabapentin is an analogue of the neurotransmitter GABA. Its precise mechanism of action is unknown. It is frequently used in cases of neurogenic pain, and may be helpful for analgesia in cats with chronic bladder pain from FIC, as the pain may be neurogenic in origin, at least partially. There are however no clinical studies currently published assessing the benefits of gabapentin treatment in FIC cases.

• Amitriptyline is a tricyclic antidepressant. It also has anti-histamine, analgesic and anti-inflammatory properties. Short-term treatment (<7 days) did not appear useful in a study. Amitriptyline treatment is only recommended in chronic cases, and should be prescribed for a minimum of several weeks. The dose should be tapered gradually prior to discontinuation. The tablets taste bitter and administration may be challenging or stressful.

3. SURGERY

Perineal urethrostomy is reserved for cases with recurrent urethral obstruction despite all management measures. The only aim of surgery is to reduce the likelihood of a life-threatening urethral

obstruction; it does not address the underlying FIC condition. This means that cats are likely to continue to have clinical signs of FIC post-operatively, especially if long-term management measures are not taken.

In our experience, most cats with FIC can be managed successfully medically, and surgery is rarely required for these cases. Perineal urethrostomy is most often required for cats with FIC who develop a urethral stricture as a complication of traumatic or repeated urethral catheterisation.

PROGNOSIS

The prognosis for cats with FIC largely depends on the commitment of the owner, the possibility to modify the environment, and the severity of the disorder in the cat. Euthanasia is most frequently requested if owners cannot cope with the cat's clinical episodes or are unable or unwilling to apply the required long-term management measures. Rehoming affected cats from a multi-cat household and/or with an indoor lifestyle in a single-cat household with outdoor access may improve dramatically their clinical signs if



Figure 6: The use of "igloo" beds where cats can hide may help to reduce stress, both in the hospital and at home.

management is otherwise impossible and if a specialist behaviour consultation and subsequent environment modification does not allow to decrease sufficiently the stress due to inter-cat conflicts.

On occasion, reference may be made to drugs which are not licensed for use in animals. The Editor does not take any responsibility for the safety and efficacy of such products. Any persons using these products do so entirely at their own risk.

University of Bristol

THE EFFICACY OF A DIETARY SUPPLEMENT IN FELINE IDIOPATHIC CYSTITIS

Clinical trial at the Feline Centre



Free CPD for each cat with suspected idiopathic cystitis referred!

Feline idiopathic cystitis is a common cause of lower urinary tract disease in cats. The pathogenesis of this condition is not fully understood. Current long-term treatment recommendations include measures to increase water intake and environmental modification, in particular decreasing stress within the household.

The condition however may be chronic and long-term management is aimed at minimising trigger factors along with reducing the frequency and severity of symptomatic episodes, rather than providing a cure.

The Feline Centre at Langford Veterinary Services (University of Bristol) has now started a clinical trial to evaluate the clinical efficacy of a dietary supplement in conjunction to standard medical and behavioural management in cases of feline idiopathic cystitis.

The study will be prospective, double-blinded and placebo-controlled, with a follow-up period of one year.

The Feline Centre is recruiting cats with a history of two or more episodes of lower urinary tract disease over a six-month period. An initial investigation to confirm the diagnosis of idiopathic cystitis (and thus confirm suitability for enrolment in the study) will be performed at a reduced cost.

The package cost will include a full medical and behavioural assessment (by the feline medicine team and behavioural specialists), blood and urine analysis, and diagnostic imaging as appropriate. Owners will receive a detailed medical and behavioural treatment plan. The dietary supplement or placebo will be provided free of charge for a period of one year. We would be grateful to hear from any vets with suitable cases, and hope this study can advance our understanding of this challenging condition further.

For each case of suspected feline idiopathic cystitis that is referred for assessment for the trial, you will receive a free CPD evening at Langford, worth 2 hours of CPD. If you refer three cases for assessment over a one year period, you will receive a free CPD day at Langford, worth 7 hours of CPD.

CONTACT DETAILS

For further information or queries about the suitability of a case, please see

<http://www.langfordvets.co.uk>

or do not hesitate to contact us:

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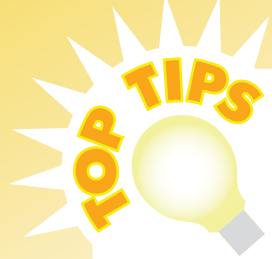
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The Blocked Cat

by Paul Higgs MA VetMB CertSAM MRCVS. Senior Clinical Training Scholar in Small Animal Medicine at Bristol University School of Veterinary Sciences

Urethral obstruction is a common problem in general practice and is one of the true life-threatening feline emergencies. There is a temptation to resolve the obstruction as soon as possible in order to help resolve the post-renal azotaemia and hyperkalaemia. However, in critically ill cases, survival depends upon the use of emergency measures to reduce the life-threatening effects of the hyperkalaemia prior to relieving the obstruction. Diligent triage, even in the absence of in-house blood machines and ECGs, can identify these cases and guide



treatment accordingly. Resisting the temptation to proceed immediately to urethral catheterisation may save another otherwise hopeless case. However, despite all of these procedures, the safest window for performing the anaesthetic may be small and monitoring of the patient is essential to identify this. Although it would appear that there is a lot of work involved in the initial triage and stabilisation, most cats should be ready for an anaesthetic within 10 minutes to 1 hour. Those that need an hour are likely to die if medical management is bypassed for a quick fix.



TRIAGE

It is essential to record all the findings of the triage examination to allow monitoring for improvements during stabilisation. An anaesthetic monitoring sheet can be used as a critical care record.

THE BASICS

- Body weight and condition score - record this early (before you need it urgently).
- Current medications, previous history.
- Place an intravenous catheter as early in the process as possible to provide emergency iv access if the cat deteriorates during triage.

ASSESS HYDRATION STATUS

- Assess mucous membranes, skin tenting and mentation to estimate percentage dehydration (dry membranes - >5%, extended skin tent - >8%, depression - >10%).
- It is impossible to identify a level of dehydration <5% so it should be assumed that all blocked cats will have at least mild dehydration.

ASSESS FOR HYPOVOLAEMIA

It is essential to differentiate between dehydration and hypovolaemia. Unless it is the result of dehydration, hypovolaemia does not result in extended skin tenting or dry mucous membranes but, in fact,

requires more urgent attention than dehydration alone

- Poor peripheral pulse quality - pedal pulses will be the most accurate for this.
- Prolonged capillary refill time (> 2 seconds).
- Pale mucous membranes.
- Unlike dogs, hypovolaemic cats may be bradycardic (especially if septic).

THORACIC AUSCULTATION

- Heart
 - Rate* - inappropriate bradycardia may indicate marked hyperkalaemia. A heart rate of 160 bpm in a stressed, collapsed cat should be considered inappropriate.
 - Rhythm* - a gallop rhythm suggests underlying cardiac disease; fluid resuscitation should be used more cautiously (see later).
 - Murmurs* - underlying cardiac disease may affect fluid use.
- Lungfields - Assess respiration rate and pattern. Severely acidotic cats may be tachypnoeic, however, if any respiratory

abnormalities are identified, careful monitoring for volume overload during fluid resuscitation is essential.

Depending upon available equipment and tolerance of the cat:

BLOOD PRESSURE MEASUREMENT

- Will confirm hypotension and identify the severity.
- Continued monitoring will enable more accurate adjustments of ongoing fluid therapy.
- Blood pressure should only be measured if it is not causing undue distress to the cat as a severely bradycardic patient will be at greater risk of succumbing to sudden deterioration when stressed.

ELECTROCARDIOGRAPHY

- Any ECG changes consistent with hyperkalaemia suggest a high risk for general anaesthesia this should initially be managed medically where possible (see below).

Serum Potassium conc (mmol/l)	Bradycardia	Peaked T-wave	Short Q-T interval	P-wave	Wide QRS complex	Sine-wave appearance to QRST	Irregular rhythm
<5.5	If hypovolaemic	No	No	Normal	No	No	No
5.5 - 6.5	Yes	Mild	Mild	Normal	No	No	No
6.5 - 8.0	Yes	Moderate	Yes	Flattened	mild	No	No
8.0 - 10.0	Marked	Marked	Yes	Absent	Severe	progressively	No
>10.0	Marked	QRST sections poorly identifiable: sin-wave appearance					Yes
>12.0	Cardiac arrest - ventricular fibrillation/asystole						Yes

Adapted from Textbook of Veterinary Internal Medicine, 7th ed. Ettinger, S.J. and Feldman, E.C. (eds). Elsevier Saunders 2010.



BASIC BLOODS

ELECTROLYTES

- Potassium levels would be considered the most essential parameter to measure as it will have the greatest influence on the approach to stabilisation prior to general anaesthesia
- Hypernatraemia and hyperchloraemia would add weight to a suspicion of dehydration

Other useful parameters which should be recorded as part of baseline measurement to be used to assess response to treatment would include PCV, phosphate, calcium and urea and creatinine. It should be noted however that there is no prognostic significance associated with the degree of azotaemia at presentation!

If available an acid-base measurement would be ideal but is not essential as a metabolic acidosis can usually be assumed with respiratory compensation. Any accompanying respiratory compromise may prevent an increase in ventilation, the essential compensatory mechanism to help reverse the acidosis, and may contribute to deterioration.



STABILISATION

ANALGESIA

Analgesia is one of the first considerations in the management of urethral obstruction:

OPIOIDS

The most appropriate choice

- Buprenorphine - this drug is well tolerated at doses higher than the licence. A dose of 0.03mg/kg can be used if pain is poorly controlled at lower doses.
- Methadone or morphine can be used if available although they carry a higher risk of respiratory depression and dysphoria making further assessment difficult.

NON-STEROIDAL ANTI-INFLAMMATORY DRUGS

Should be avoided until hypovolaemia is resolved and urine production achieved. However, the use of NSAIDs should be considered once the urethral obstruction has been relieved and renal perfusion has resolved. The use of these medications in the post-obstruction phase will help to reduce inflammation and the incidence of urethral spasm.

FLUID THERAPY

The mainstay of stabilisation is fluid therapy. Given that there is post-renal obstruction to urine production the provision of further fluid seems an unusual proposition, however; restoration of urine production is unlikely to resolve a severe hyperkalaemia rapidly enough to prevent life-threatening complications whereas resolution of hypotension and dehydration are more important priorities in the management of electrolyte disturbances. The basic findings during triage will allow decisions to be made regarding fluid therapy whilst blood tests are pending. Hypovolaemic cats will need much more aggressive fluid therapy than those with just mild dehydration.

FLUID CHOICE

Isotonic solutions:

- *Hartmann's/Lactated Ringer's Solution* - is this author's personal preference. Although a potassium containing fluid, it is at a lower concentration than normal serum and will, therefore, reduce potassium concentration in a hyperkalaemic patient. It also provides a bicarbonate precursor in the form of sodium lactate resulting in an alkalinising effect, helping to normalise serum pH with resultant translocation of potassium into the intracellular space.
- *Saline 0.9%* - the traditional choice in hyperkalaemic patients and can still be used although care should be taken to monitor sodium levels in hypernatraemic patients.
- *Commercially available Dextrose Saline* - This fluid should be avoided as it is electrolyte deficient and will result in worsening electrolyte disturbance.

FLUID RATES

- **Hypovolaemia**
Shock rate fluid rates are no longer considered advisable for cats with hypovolaemia due to the potential for volume overload; repeat boluses of fluids (with reassessment of hypovolaemia after each bolus) are preferred.
- If hypovolaemia is severe, and there is no history of cardiac or

respiratory disease, a bolus of 20ml/kg can be administered over 15 minutes and repeated until hypovolaemia is resolved.

- In patients at high risk of over-perfusion, smaller boluses of 5-10ml/kg can be used over 10 minutes but repeated frequently, as long as regular reassessment is made.

DEHYDRATION

If dehydration is present without hypovolaemia, less aggressive fluid therapy is required but will be needed for longer to replace the severe deficits.

- Using the estimation of the percentage dehydration aim to replace this deficit plus maintenance over 24 hours.

$$\text{Deficit (ml)} = \% \text{ dehydration} \times \text{body weight (kg)} \times 10$$

$$\text{Maintenance} = 2\text{ml/kg/hr}$$

Losses - once the obstruction is resolved diuresis will occur. This is unpredictable and urine production should be estimated and adequately replaced (either by weighing the litter tray or, if using a closed collection device, recording the volume). Normal urine production is considered to be between 0.5 and 2ml/kg/hr but can be as high as 8ml/kg/hr in post-obstructive diuresis.

- Beware of ongoing electrolyte disturbances. Expect a post-obstructive hypokalaemia. Many cats will require supplementation in the intravenous fluids after unblocking.

MANAGEMENT OF HYPERKALAEMIA

Appropriate fluid therapy is the safest treatment for this problem. In cases presenting with clinical signs associated with severe hyperkalaemia other treatment options should be considered after initial fluid therapy or, in the most severe cases, alongside fluid therapy:

- **Calcium gluconate** (0.5-1.0ml/kg 10% solution, diluted 1:1 in 0.9% NaCl, iv over 20 minutes).
Cardioprotective, stabilising myocardocyte membrane potentials to reduce rhythm disturbance due to hyperkalaemia.
No direct effect on potassium concentration. Calcium gluconate is an emergency stop-gap, allowing rapid management of the effects of hyperkalaemia and improving the chances of the patient to survive whilst other treatments take effect to reduce potassium concentrations. This drug can be arrhythmogenic if given too rapidly and it is advisable to monitor an ECG during administration.
Effects last for 20 - 30 minutes.
- **Glucose** - a bolus of glucose results in the release of insulin promoting facilitated transport of potassium into the intracellular space. Glucose solutions of up to 10% can be given via a peripheral vein.
- **Neutral insulin** (0.25 IU/kg) - Rapidly reduces extracellular potassium concentration but may result in hypoglycaemia which will require close monitoring. If insulin is used it must always be accompanied by glucose administration (2g dextrose per unit of insulin, give as 5% glucose in 0.9% NaCl).
- **Sodium bicarbonate** - reverses the acidosis, resulting in translocation of potassium. However, unless blood pH analysis and base excess measurement can be obtained there is a high risk of overcompensation resulting in an iatrogenic metabolic alkalosis and hypocalcaemia. A dose of 0.5 - 1 mEq/kg can be given iv over 30 minutes if acid-base status is unknown.



CATHETERISATION

ANAESTHESIA

As with any anaesthetic, the safest anaesthetic will be the one in which the anaesthetist has the most experience.

- Premedication will usually be provided by the opioid analgesia.
- A ketamine/midazolam combination can be used to provide a short period of deep sedation; however, this is not appropriate in cases with ECG changes.
- Propofol or alfaxalone is suitable for general anaesthetic but blood pressure or at least peripheral pulse quality should be closely monitored, especially in those that cats that were originally hypovolaemic.
- Sevoflurane induction is a great option in calm cats; however, the induction process may cause distress and acute deterioration in some.

CYSTOCENTESIS

This has been a contentious issue in the past. Cystocentesis does not allow sufficient urine production to solve the hyperkalaemia and is definitely not indicated for this. Cystocentesis is performed in urethral obstruction cases to reduce the intravesicular pressure to enable catheterisation. There is an increased risk of bladder rupture in urethral obstruction cases; however, if performed with minimal trauma the risk is low, especially if the bladder is emptied. For these reasons cystocentesis need only be performed in urethral obstruction cases once the cat is anaesthetised; this will avoid unnecessary stress and reduce the risk of bladder laceration.

CATHETER SELECTION

This is often partly down to personal preference and experience but unfortunately each catheter type has its shortcomings and a combination of catheters may be required. A rectal examination should be performed prior to catheterisation to assess for any physical cause of urethral obstruction.

- *Jackson cat catheter* - is a very sturdy, stiff catheter with a stylet provided. This can mean that they are able to shift hard obstructions but it also means that the potential for severe urethral trauma is high. Jackson catheters usually come with side holes and therefore may be less effective when attempting a retrograde flush and can be traumatic to the urethral wall. In most cases this author would avoid this catheter type and would certainly never place this catheter with the stylet in place.
- *Slippery Sam* - are more flexible and soft but are often quite short (14cm versions are now available). In big cats the catheter may not reach into the bladder neck. Although they are provided with a soft rubber neck for stitching to the prepuce and fit "Little Herbert" adaptors for continued drainage there are reports of the catheter detaching from the stitching plate resulting in bladder foreign bodies. They may not, for these reasons, be suitable as indwelling catheters as they should not be left unattended but they are excellent for unblocking.
- *Mila cat catheter* - very soft, made of the same material as Mila chest drains. Unfortunately this makes them excessively flexible and they are unlikely to be able to dislodge all but the loosest of obstructions. Leaving these catheters in the freezer can make them temporarily more rigid but it is not known what effect this may have on the longevity of the catheter material or what the cold shock might do to the urethral mucosa. These catheters are most useful as indwelling catheters placed after the urethra has been unblocked and the bladder flushed using a Slippery Sam. Suturing these catheters in place is difficult and many techniques have been tried. A Chinese finger trap suture can be used if there are concerns regarding kinking.
- *Other catheters* - intravenous catheters (without the stylet) and lacrimal catheters can be used if there is a very distal obstruction requiring retro-pulsion.
- *Ultrasonic disruptors* - some dental machines will allow a special ultrasonic head fitting to the scaler attachment. This can cause severe trauma and can introduce infection and are not considered suitable for this purpose.

CATHETERISATION TECHNIQUE

There are many approaches to catheterisation of the urethra.



Some points to consider are detailed below

1. Sterile preparation of the perineum is required including adequate clipping and the used of surgical scrub (avoid surgical spirit).
2. Select a suitable gauge catheter. A second, larger catheter can always be passed after the obstruction is relieved, urethral strictures on the other hand cannot be reversed if the catheter was too large.
3. Use adequate amounts of **sterile** lubricant (this can be purchased as small individual sachets for this purpose).
4. Catheterisation of the bladder should be attempted prior to cystocentesis decompression. If catheterisation is not possible cystocentesis should be performed to remove as much urine as possible. This author is right handed and finds it easiest to perform urethral catheterisation in right lateral. However, some practitioners prefer to place the cat in dorsal recumbency with the hind limbs pulled cranially.
5. A rectal examination should be performed to feel for uroliths, masses or trauma.
6. The penis should be fully extruded to allow examination for evidence of small uroliths or other urine sediment such as mucous plugs. Some obstructions in the tip of the penis can be dislodged by gentle massage.
7. The urethra must be straightened out by extruding the penis in a caudo-dorsal direction, to ease passage of the catheter.
8. Whilst gently advancing the catheter, low pressure sterile saline (2ml syringe) can be flushed through it to distend the urethra and flush obstructive material back into the bladder or out of the penis. Per rectum urethral massage can help to relieve obstructions during flushing.
9. Once the catheter is fully inserted the bladder should be emptied. Sterile saline should then be flushed into the bladder and drained multiple times until the saline runs clear.
10. In most cases the urinary catheter should then be removed to reduce the risk of iatrogenic trauma by the catheter tip. Indwelling catheters may be required if the urine does not run clear after flushing or if there are marked concerns regarding re-obstruction.
11. If the catheter is to be left indwelling a closed drainage collection system should always be used. The catheter should not be left open.



AFTERCARE

ANTIBIOTICS?

The use of antibiotics is tempting after urethral catheterisation. However, the use of antibiotics should be avoided until there is clear proof of urinary tract infection. The inappropriate use of antibiotics (particularly long acting versions) can result in the creation of a resistant population of bacteria. There is some debate over the most sensitive way to identify a urinary tract infection; until recently the advice would have been to have cultured the tip of the urinary catheter after removal but recent research suggests that a cystocentesis sample is more sensitive and specific. Sterile placement of the urinary catheter

and the use of a sterily managed closed drainage system can dramatically reduce the need for antibiotics.

TO LEAVE OR NOT TO LEAVE?

A cat that is easily unblocked after a short period of obstruction may cope well without the need for an indwelling catheter. However, placement of an indwelling catheter (usually for a maximum of 48 hours) may be required for more difficult cases and if there are particular concerns about suspected urethral spasm or discoloured urine. Owners should be warned of the possible need for re-catheterisation. Stranguria is likely to continue for a variable period of time. Long term advice on management of FLUTD to minimise the risk of recurrence is important (useful information for owners can be found at www.fabcats.org.uk and www.catprofessional.com)



Bristol Cats Kitten owners required for THE BRISTOL CATS STUDY

The BRISTOL CATS STUDY was launched in the Bristol area in June 2010, and since 2011 the catchment area has expanded to include kitten owners across the UK. We hope that you will help us by encouraging kitten owners to enrol onto our 'first of its kind' study investigating cat health, welfare and behaviour.

What's it all about?

We are collecting information from kitten owners to help find causes of common behaviour patterns and diseases of cats (e.g. obesity & hyperthyroidism). Kitten owners complete four online questionnaires, initially when their kittens are approximately 8-16 weeks, then again at 6, 12, and 18 months of age. (If further funding becomes available we plan to extend the study to a lifetime study of the kittens). We will then analyse the data to see what extent certain characteristics (e.g. obesity) are associated with management (e.g. diet, lifestyle) and other factors (e.g. breed).



What are the benefits?

We aim to improve the health and welfare of cats and provide guidance for practitioners and owners. The study is the cat equivalent of the 'Children of the 90's study' which collects information relating to children in the Bristol region. This helped identify ways to prevent many important conditions, such as cot death (<http://www.bristol.ac.uk/alspac>).

Many lives have been saved by those who gave their time and took part during the 90's and we hope you can spare a little time to help our study make a difference. Therefore, we should be grateful if you could spread the word, and contact us, using the details below, for a supply of posters and fliers to display and pass on to kitten owners who visit your premises.

Further details can be found on our website (www.vetschool.bris.ac.uk/cats), together with a link to the first questionnaire. If you have any questions or would like to discuss any aspect of the study, then please do not hesitate to get in touch. Thank you in anticipation of your help and support with this study.

Welcome to Philippa Welsh BSc (hons) MRCVS - Pfizer Feline Scholar

Philippa joined the Feline Centre at Langford, Bristol as Pfizer sponsored Feline Scholar in November 2011. After graduation from the University of Bristol in 2005, Philippa spent a short time in mixed practice, followed by 5 years in small animal practice. She continued to develop a strong interest in Feline Medicine during this time, and gained her ESVPs GP Certificate in Feline Practice. She is thoroughly enjoying her time back at Langford, continuing to learn about all things 'cat'! Among other projects, she is involved in the Bristol Cats Study with Dr Jane Murray. The results from this study will provide essential information to help improve the health and welfare of cats in the UK. Philippa is owned by two beautiful moggies called Basil and Sybil.



Dr Jane Murray Cats Protection Research Fellow

FREEPOST RSHR-AGRJ-UABZ Bristol Cats, University of Bristol, Dolberry Building, Langford BRISTOL, BS40 5DU Tel: 07827 981412. Email: cat-study@bristol.ac.uk

Applications are invited for the Pfizer Feline Fellowship based at the University of Bristol School of Veterinary Science

This post offers an opportunity for veterinary surgeons with a particular interest in feline medicine to gain specialist experience and expertise in this field. Funded by Pfizer Animal Health, it is based at the Bristol University Veterinary School at Langford.

The successful applicant will join a strong team working in the field of feline medicine involving both clinical and research activity. Current areas of particular interest are infectious diseases, feline immunology, endocrinology and gastroenterology. The major objectives of the Pfizer Fellowship are to provide a link between feline clinical and research work in the department, assist in the development of feline projects and to assist in supporting the busy specialist feline diagnostic service. The Pfizer Fellow works very closely with the Feline Advisory Bureau Residents who have responsibility for most of the feline referrals but there is some opportunity for clinical work and there is encouragement to develop a particular aspect of feline medicine. Previous Fellows have developed a particular interest in FIV, FIP, endocrine diseases (mainly diabetes mellitus) and allergic skin disease.

Newly qualified veterinary surgeons will be considered for this post but some experience is an advantage. The post is ideal for veterinary surgeons wishing to pursue an interest in feline medicine. It provides an insight into an academic/research career and is particularly suitable for the graduate who wishes to consider this without making a long term commitment. The Pfizer Feline Fellowship provides an excellent basis for a subsequent academic or research career and previous Fellows have subsequently undertaken PhD projects arising from their year. This position normally starts in October and is for one year although reappointment at the end of the first year may be considered.

Further details of the post are available from:

Prof. T.J. Gruffydd-Jones, The Feline Centre
Department of Clinical Veterinary Science
University of Bristol Langford House, Langford,
BRISTOL BS40 5DU

Tel: 0117 928 9558 or e-mail: lvs@langfordvets.co.uk
Prospective applicants are invited to visit Langford and to talk to the current Pfizer Feline Fellow.

USE OF PENTOSAN POLYSULPHATE IN CATS WITH IDIOPATHIC, NON-OBSTRUCTIVE LOWER URINARY TRACT DISEASE: A DOUBLE-BLIND, RANDOMISED, PLACEBO-CONTROLLED TRIAL

BM Wallius, AE Tidholm
JFMS 2009, 11: 409-412

In this paper the authors define idiopathic Feline Lower Urinary Tract Disease (iFLUTD) as haematuria, pollakiuria, stranguria, periuria and painful voiding of urine in the absence of a known cause. Feline Interstitial Cystitis (FIC) is defined by the authors when petechial haemorrhages in the bladder submucosa are identified at cystoscopy or vesicotomy. The mucosal surface of the bladder is lined with a thin layer of protective mucous containing a specific glycosaminoglycan (GAG) GP-51 which helps prevent bacteria and crystals adhering to the bladder wall. Some cats with FIC have been shown to have a reduced concentration of GAGs within this layer. GAG replacement therapy has been used with some success in human with interstitial cystitis. The assumption is that exogenous GAG will be excreted in the urine and attach to the defective urothelium. Pentosan polysulphate (PPS) is a semi-synthetic GAG that inhibits and modulates proinflammatory mediators. It also has antiarthritic chondroprotective properties and is used as a treatment for osteoarthritis in dogs. Oral GAG replacement with PPS has been used in humans with IC with unrewarding results.

The purpose of this study was to determine if PPS administered parenterally in cats with signs of iFLUTD may have beneficial short and long-term effects, compared to a placebo. The study was double-blinded, randomised and placebo-controlled.

Inclusion criteria were (1) clinical signs such as stranguria, haematuria, pollakiuria, painful voiding (2) absence of positive urinary culture (3) absence of concrement detected on ultrasonography (4) absence of urethral obstruction.

No statistical difference was found between the PPS treated group and the cats in the placebo group.

In the discussion the authors explain that iFLUTD is often self limiting and so many treatments appear effective. This study showed that in the majority of cats (89%) with signs of iFLUTD, clinical signs resolved spontaneously and the frequency of recurrence was low. However only 6 cats (33%) showed recurrence of clinical signs and the possible benefits of PPS in cats with continuous or frequently recurrent clinical signs could not be evaluated in this study.

CATS AND CALCIUM OXALATE: STRATEGIES FOR MANAGING LOWER AND UPPER TRACT STONE DISEASE

CA Palm, JL Westropp
JFMS 2011, 13: 651-660

This review article gives a thorough overview of Calcium Oxalate (CaOx) stones in cats. A summary of the article is given below.

Epidemiological Trends

The two most common feline urinary calculi submitted for analysis are calcium oxalate and struvite. Their relative frequencies of submission to stone analysis labs have changed over the years.

Struvite was the most common stone reported in cats until about 1993, when the incidence of CaOx began to increase. In 2007 it was reported that CaOx was the most common mineral type found in submissions to University of California, Davis Stone Analysis Laboratory.

The concern regarding struvite stone disease in cats lead pet food manufacturers to restrict magnesium content of feline diets and produce diets with urinary acidifying potential. Unfortunately, an increase in the frequency of CaOx stone disease appears to have occurred since these diet modifications began, due to the release of calcium carbonate from bone as a metabolic buffer, resulting in hypercalciuria.

Risk Factors

Several breeds have been reported to be at higher risk of CaOx stone disease, including domestic longhair cats, Persians, and Himalayans. Cats between 7 and 10 years of age are reportedly 67 times more likely to develop CaOx uroliths than cats between 1 and 2 years of age. CaOx uroliths are more commonly detected in male cats than females, and in neutered cats than sexually intact cats.

Lower Urinary Tract CaOx Stones

CaOx stones are radiodense and can usually be seen on plain radiographs; however ultrasound can be used to detect very small bladder stones as well as bladder sediment that can be missed on radiographs. The urine pH in cats with CaOx is variable and CaOx crystals are not always present in cats with CaOx stones. There is no dissolution protocol for CaOx stones, so removal and mineral analysis of stones should be performed if they are growing or causing clinical disease. If serum calcium concentration is elevated, a search should be initiated for underlying causes. Increasing water consumption is the cornerstone of therapy for stone disease, and can be achieved by feeding a wet diet. Urine specific gravity should be monitored, the author recommends aiming to keep it below 1.025.

Upper tract CaOx stones

Ureterolithiasis has emerged as an important cause of acute and chronic kidney disease in cats over the past 15 years, and in one study it was reported that 98% of these ureteroliths contained CaOx. Other causes of ureteral obstruction can include soft tissue plugs, inflammatory debris and dried solidified blood calculi.

Ureterolithiasis tends to develop in middle aged to older cats. Clinical signs are variable and relate to the rate at which ureteral obstruction develops. Acute obstructions are associated with rapid renal capsular distension and are more painful than patients with more insidious obstructions. Cats may not present with any lower urinary tract signs, and may have non-specific signs such as weight loss and lethargy. 'Big kidney, little kidney syndrome' can occur when cats have one non-functional or minimally functional kidney due to a previous ureteral obstruction, which then develop an acute ureteral obstruction in the other kidney.

It is recommended that imaging of the abdomen is performed on all cats with azotemia as CaOx stones are radio-opaque and are readily identified in the retroperitoneal area on a lateral radiograph. Abdominal ultrasound is recommended as it can help determine which ureter is obstructed and the severity of the hydronephrosis and hydroureter that may be present. Computed tomography (CT) may be necessary to identify calculi that are not present on radiography or ultrasonography.

Expulsive therapies may play a role in stable disease, with suggested therapies including fluid therapy, administration of a diuretic and anecdotal use of α -antagonists such as prazosin. Analgesics such as buprenorphine can prevent ureteral spasm. Surgical intervention should be considered when there is evidence of partial or complete ureteral obstruction, and may involve ureteral stenting.

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