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# Urinary obstruction in a feline patient: a reflective case study

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ABSTRACT: A four-year-old neutered male domestic short hair presented with dysuria, stranguria and abdominal pain. Clinical examination revealed a large bladder, but all other organ systems functioning within normal limits. Initial treatment involved cystocentesis, biochemistry and haematology profiles, inducing anaesthesia to alleviate pressure on the bladder and place an indwelling urinary catheter. Urinalysis was performed in the form of microscopy to establish any biological cause for the blockage. The indwelling catheter remained in place for 24 hours post recovery, to ensure normal urine output could be sustained. Client education about feline stress and diet changes were utilised post-operatively.

Keywords: cystocentesis; urinalysis; catheterisation; dysuria; obstruction; emergency

## Introduction

Urethral obstruction is a common sign of feline lower urinary tract disease (FLUTD). Feline idiopathic cystitis (FIC) is thought to play an important part in the development of urethral obstruction. Cats with FIC appear to have alterations within the glycosaminoglycan (GAG) layer of the bladder, making them more susceptible to FLUTD (Simpson, 2014). The GAG layer is usually responsible for protecting the urothelium and bladder wall; when damaged, it may increase permeability into deeper tissue layers, causing pain and immune-mediated or neurogenic inflammation (Bradley & Lappin, 2013; Klingler, 2016). FLUTD is a term used to describe several disorders of the feline urinary tract (Black, 2018). Urethral obstruction can be caused by a physical obstruction, such as a mucus plug or urinary calculi, or a functional obstruction such as urethral spasm leading to an inability to urinate, abdominal pain, renal failure, electrolyte derangements and, if untreated, death (Cooper, 2015). Urethral obstruction is almost always an emergency. While managing the emergency itself can be challenging, it is post-operative management and client education that are paramount to the care of these patients. Figure 1 details the risk factors associated with FLUTD (Black, 2018).

## Initial presentation and intervention

A four-year-old neutered male domestic short hair presented to the practice with dysuria, stranguria, abdominal pain and vocalisation; the owner had noted these clinical signs had been present for 24 hours prior.

Clinical exam showed the patient to be approximately 5% dehydrated and suffering from abdominal discomfort but otherwise in good health. Auscultation of the heart and lungs showed no abnormalities, and his mentation and demeanour were normal for him. The patient's bladder was estimated to be 75% full and not firm, as they often are in extreme cases. All other organ systems were found to be functioning normally and the patient was normothermic at 38.1°C.

Analgesia was provided initially, in the form of 0.1 mg buprenorphine (Buprenodale, Dechra). In-house haematology and biochemistry tests were carried out following venepuncture of the jugular vein. A 20 G intravenous (IV) catheter was placed in the patient's right cephalic vein and an isotonic crystalloid was administered at a rate of 4 ml/kg/h; guidelines on fluid replacement are varied, but should always be based on the patient's losses, and hydration status added to their

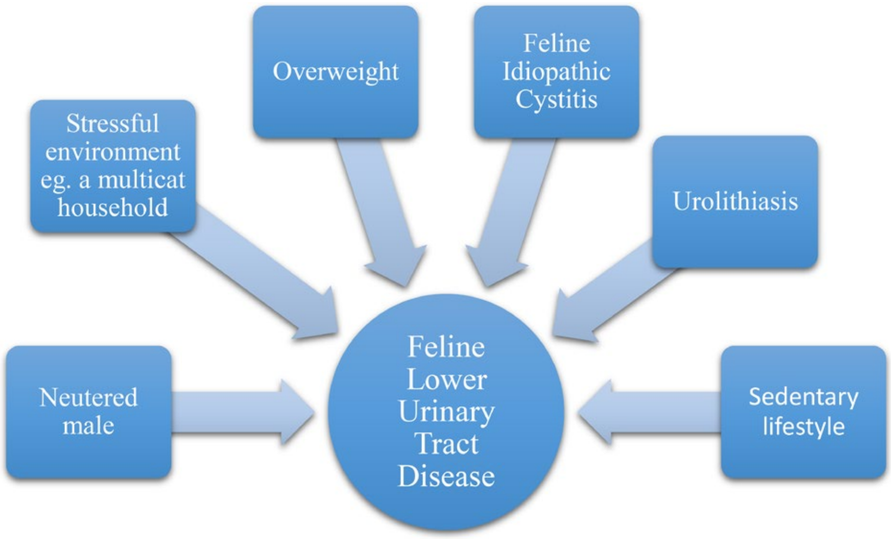


**Figure 1.** Factors of FLUTD (Black, 2018; Gunn-Moore, 2003; Welsh, 2016).

maintenance rate (Cooper, 2015). Muscle relaxation and anxiolysis was achieved by administering 2 mg diazepam (Hameln Pharmaceuticals Ltd) intramuscularly (IM) (BSAVA, 2017). However, the patient still did not pass urine naturally following this, despite his pain score improving from 9/20 to 5/20 (based on the University of Glasgow Composite Measure Pain Scale).

The patient was restrained in right lateral recumbency while cystocentesis was performed to alleviate pressure on the bladder and prevent backpressure on the kidneys, potentially impairing glomerular filtration rate and renal blood flow (Lee & Drobatz, 2003). Risk of bladder rupture during this procedure is minimal, but patients must be amenable to allow cystocentesis as, in rare cases, adverse vagal reactions have been documented (Hall, Hall, Powell & Lulich, 2015; Odunayo, Ng, & Holford, 2015). To minimise this risk, the patient was sedated using the previously mentioned combination of a benzodiazepine and opioid.

## Diagnostic tests

A summary of the patient's biochemistry and haematology results are shown in Table 1 and Table 2, respectively.

Haematology was repeated as it was suspected that sequestration of leucocytes to the urinary tract was causing leucopaenia, although it may be more likely that the patient's leucopaenia was stress-induced (see Table 3 for these repeated results) (Tvedten, 2012). The elevation in haemoglobin seen in the first results may be explained by dehydration and polycythaemia, as the second sample results show resolution of this following the administration of fluid therapy (Tvedten, 2012). The change in platelets may be due to poor sampling technique as the patient was hypotensive when the sample was taken and excessive backpressure on the syringe may have caused venous damage, initiating increased consumption through premature platelet activation (Stockham & Scott, 2008).

In-house microscopic urinalysis revealed a heavy burden of struvite crystals (crystalluria), cocci bacteria, erythrocytes and leucocytes. The specific gravity of the urine was 1.060 and the dipstick indicated the presence of protein; common findings on a urethral obstruction patient (Gunn-Moore, 2003).

## Anaesthesia

Anaesthesia was induced to place a urinary catheter. Due to the patient's age and otherwise good health, his American Society of Anaesthesiologists (ASA) Anaesthetic Risk Assessment score (Table 4) was evaluated to be a two (with an emergency classification).

Prior administration of a benzodiazepine and an opioid facilitated anaesthetic induction using 20 mg propofol (Propoflo, Zoetis) intravenously. Lignocaine (Intubeeze, Dechra) was sprayed on the patient's larynx to allow intubation with a 3 mm endotracheal tube; the tube's cuff was not inflated. This equipment can be seen in Figure 2.

The patient was connected to a Jackson-Rees Modified Ayres T-piece and maintained on oxygen and isoflurane (Vetflurane, Virbac Animal Health). A registered veterinary nurse monitored the patient's anaesthetic depth under the direction of the veterinary surgeon. Monitoring of the patient's respiratory, heart and pulse rate, blood pressure, temperature and oxygen saturation (via pulse oximetry) were recorded throughout the anaesthetic. The use of an electrocardiogram (ECG) was not available for this patient; however, the use of an ECG should always be considered in these patients as hyperkalaemia can cause cardiac arrhythmias and increase mortality rate (Garcia de Carellan Mateo, Brodbelt, Kulendra & Alibhai, 2015). An oesophageal stethoscope was used to auscultate the heart during the procedure and a size 3 blood pressure cuff was used on the distal forelimb to monitor blood pressure via an oscillometric multiparameter monitor. Blood pressure monitoring is essential in urinary obstruction patients to ensure adequate renal perfusion (Lee & Drobatz, 2003). Frequent checks of the patient's eye position, palpebral reflex, jawtone, mucous membrane colour and capillary refill time (CRT) were made, to ensure an adequate plane of anaesthesia was maintained. The patient showed signs of hypovolaemia during anaesthesia, hypotension and slowed CRT. This was corrected by increasing the patient's fluid therapy rate and decreasing the amount of volatile agent administered. The patient also developed tachycardia while under anaesthetic. This was considered a pain response and 2.5 mg ketamine (Anaestamine, Animalcare) was administered intravenously, with good effect.

The equipment used during the unblocking and placement of the urinary catheter can be seen in Figure 3. During the procedure, a urethral plug was removed and retropulsion used to aid catheter placement. The use of a local anaesthetic or sacrococcygeal block may have been valuable as the patient's urethra began to spasm during placement (Robertson et al. 2018; Thomas, 2015). The 3.5 Fr polyurethane catheter was sutured in place and attached to a closed collection system, taping the tubing to the patient's tail to avoid unnecessary drag. The use of polyurethane catheters for obstruction cases can be validated as they are firm at room temperature, aiding with the unblocking, but soften during their time in situ, making them a good, comfortable long-term catheter (Cooper, 2015). Closed collection systems have been recommended in recent literature as they prevent urine scalding and reduce nosocomial urinary tract infection

(UTI) risk (Brown, 2013; Oosthuizen, 2011). Due to the constraints of client finances, radiographs were not taken before or after catheter placement; they are usually recommended to ensure no urolithiasis (George & Grauer, 2016). To aid in reducing urethral inflammation and provide analgesia, 0.95 mg meloxicam (Loxicom, Norbrook) was administered subcutaneously; this was done once the patient was normotensive and following the second blood sampling, confirming renal function was not impaired (Black, 2018).

## Recovery and post-operative management

The patient's recovery was uneventful, his pulse, respiratory rate, temperature and CRT were monitored until he regained full consciousness. An Elizabethan collar was placed on the patient to avoid patient interference with the urinary catheter. Antibiotics were given in the form of 38 mg cefovecin (Convenia, Zoetis) subcutaneously, due to the presence of cocci bacteria found during urinalysis. Ideally, antibiotics would be prescribed based on the urine culture following catheter removal; however, the client's financial situation did not allow for this (Cooper, 2015). UTIs are relatively uncommon in FLUTD cases and routine antibiotic use in these cases is not to be encouraged as inappropriate antibiotics could predispose the patient to an antibiotic-resistant UTI (Black, 2018).

Considerations for the hospitalised obstruction patient are detailed in Figure 4. During hospitalisation, a non-urinary-specific food was offered, due to the link between stress and hospital-induced anorexia. The aim of this was to avoid the patient negatively associating the smell/taste of the urinary food with the hospital environment and subsequently refusing the food at home (Hawksworth, 2016; Thomas, 2015). The patient was hyporexic during his hospitalisation and so 1.87 mg of mirtazipine was prescribed (to be given once every third day); this greatly improved his appetite and so aided his recovery by allowing him to meet his basal energy requirements (BER).

The veterinary surgeon also prescribed 0.5 mg prazosin (Hypovase), an α-1 antagonist and smooth muscle relaxant designed to combat the urethral spasm associated with FLUTD and obstruction cases (Hetrick & Davidow, 2013). Supplementary therapy in the form of Cystophan was also prescribed to aid bladder health through increase of GAGs and urethral reparation, as FIC and FLUTD are thought to be linked to an increase in inflammatory mediators in the bladder, caused by a decrease in GAGs (Bradley & Lappin, 2014; Buffington, Blaisdell, Binns & Woodworth, 1996).

**Table 1.** Haematology results. Reference intervals quoted from the Idexx Lasercyte Dx Hematology Analyzer used in house.

| Parameter | Results | Reference interval |
|---|---|---|
| HGB (haemoglobin) | 17.9 g/dl | 9.0–15.1 high |
| MCH (mean cell haemoglobin) | 20.4 g/dl | 12.0–20.0 high |
| WBC (white blood cell count) | 0.30 × $10^9$/l | 5.50–19.50 low |
| NEU (neutrophils) | 0.02 × $10^9$/l | 2.50–12.50 low |
| LYM (lymphocytes) | 0.21 × $10^9$/l | 0.40–6.80 low |
| MONO (monocytes) | 0.05 × $10^9$/l | 0.15–1.70 low |
| EOS (eosinophils) | 0.02 × $10^9$/l | 0.10–0.79 low |
| PLT (platelet count) | 123 K/µl | 175–600 low |

**Table 2.** Biochemistry results. Reference intervals quoted from the Idexx Catalyst One Chemistry Analyser used in house.

| Parameter | Results | Reference interval |
|---|---|---|
| CREA | 118 µmol/l | 71–212 |
| UREA | 10.5 mmol/l | 5.7–12.9 |
| PHOS | 1.31 mmol/l | 1.00–2.42 |
| CA | 2.36 mmol/l | 1.95–2.83 |

**Table 3.** Repeated haematology results. Reference intervals quoted from the Idexx Lasercyte Dx Hematology Analyzer used in house.

| Parameter | Results | Reference interval |
|---|---|---|
| HGB (haemoglobin) | 12.7 g/dl | 9.0–15.1 |
| MCH (mean cell haemoglobin) | 20.7 g/dl | 12.0–20.0 |
| WBC (white blood cell count) | 3.81 × $10^9$/l | 5.50–19.50 |
| NEU (neutrophils) | 1.6 × $10^9$/l | 2.50–12.50 |
| LYM (lymphocytes) | 1.83 × $10^9$/l | 0.40–6.80 |
| MONO (monocytes) | 0.17 × $10^9$/l | 0.15–1.70 |
| EOS (eosinophils) | 0.20 × $10^9$/l | 0.10–0.79 |
| PLT (platelet count) | 333 K/µl | 175–600 |

**Table 4.** ASA physical status classification (American Society of Anesthesiologists, 2014).

| ASA Physical Status Classification | Definition of classification | Example |
|---|---|---|
| ASA I | A normal healthy patient | A young patient presented for an elective procedure |
| ASA II | A patient with mild systemic disease | A patient with a low-grade heart murmur and no clinical signs of cardiac disease |
| ASA III | A patient with severe systemic disease | A patient with a heart murmur that has resulted in reduced exercise intolerance |
| ASA IV | A patient with severe systemic disease that is a constant threat to life | A patient with a cardiac arrhythmia that has resulted in severe circulatory compromise |
| ASA V | A moribund patient who is not expected to survive without the operation | A patient with gastric dilation volvulus |
| ASA VI | A declared brain-dead patient whose organs are being removed for donor purposes | Not usually applicable in veterinary patients |
| E | Denotes that the procedure is an emergency. (An emergency is defined as existing when delay in treatment of the patient would lead to a significant increase in the threat to life or body part) | |

Urine output was measured every 6 hours during hospitalisation to monitor for signs of post-obstruction diuresis; the patient's urine output remained within the normal 1–2 ml/kg/h expected (Francis, Wells, Rao & Hackett, 2010; Goddard & Phillips, 2011). After 24 hours, the patient had his catheter removed and within 6 hours he had urinated in his litter tray. He was discharged from the hospital to be started on Royal Canin (2017) Urinary High Dilution diet to dissolve any potentially remaining uroliths.

**Figure 2.** Anaesthesia induction equipment.

**Figure 3.** Catheterisation equipment. The basic 'kit' for unblocking a urethral obstruction patient and placing a urinary catheter.

## Discussion

FLUTD is more common in young, overweight, neutered male cats, making the presentation of our patient less surprising (Hills Pet Nutrition, 2011; Thomas, 2015). Stress also plays a pivotal role in FLUTD as it is more common in cats living in a multi-cat household. This patient was a lone cat, although it transpired that a local tom cat had taken to sitting at the kitchen window, in full view of our patient; this stress may have contributed to his condition (Gunn-Moore, 2003; Hargrave, 2017).

The use of meloxicam in the urinary patient could be disputed, as despite its excellent anti-inflammatory properties, it can have a detrimental effect on the renally impaired due to how it is metabolised and so should be used with caution in these patients (George & Grauer, 2016). While extensive blood tests were carried out in this patient, plasma urea and creatinine levels only increase when renal damage is very severe; therefore, repeated sampling over several weeks is recommended in order to achieve an accurate representation of renal function (Heiene & Lefebvre, 2007).

Many urethral obstruction patients present at a much later stage; fortunately, this patient's owner was at home and able to notice his stranguria. This meant that when the patient presented, he was in the early stages of the disease process and so biochemistry evaluation did not indicate other clinical signs associated with a urethral blockage such as hyperkalaemia, metabolic acidosis or hypocalcaemia (Thomas, 2015; Welsh, 2016). The lack of systemic complications improved the prognosis of this particular patient; however, this does not prove the same for all cases; each patient should be assessed on a case-by-case basis.

It must be noted that financial constraints were a limiting factor in this case and so gold standard care was not always able to be achieved, but was always strived for.

Without financial constraints, the care of the patient would have included sending the urine samples away for culture and sensitivity before selecting antibiotic therapy, and taking radiographs to ensure there was no underlying urolithiasis warranting further action such as a cystotomy.

Allow the patient an area in which they can hide away, this can be a simple box or a purpose made hideaway. If neither of these are available, simply covering half of the kennel door is sufficient.

Housing the cat in a low-trafficked area of the practice, out of sight, sound and hearing of dogs will help to reduce the amount of stimulants likely to cause stress within the hospital environment.

The use of pheromones within the cattery can help to reduce stress. These can be sprayed onto the bedding (before the patient is in the kennel) or used as a plug in diffiuser within the cattery.

Allocating the same nurse/s to deal with this patient during their stay has been shown to reduce their stress levels.

In patients where Elizabethan collars must be worn during their hospitalistion, the use of a 'soft collar' should be considered as this will allow the patient to exhibit more normal behaviours than a standard collar.

**Figure 4.** Reducing feline stress in the hospital (Hewson, 2014).

## Conclusion

Thanks to the owner's swift actions, this patient received emergency care quickly, resulting in reduced patient morbidity and improving the overall outcome. However, financial limitations may have marginally hindered the team's ability to provide gold standard care; the veterinary team are no stranger to working within financial constraints and so the impact on the patient was minimal. Nursing of a urinary obstruction patient is intense yet rewarding due to their high survival rates (91.1–94.2%) (Segev, Livne, Ranen & Lavy, 2011). Client communication and education if often found to be at the crux of these cases as such a vast number of variables can affect a patient susceptible to urinary obstruction. Cooper (2015) reported that as many as 35% of cats reobstructed within 6 months of discharge, so it is imperative that clients are able to recognise the risk factors and signs of a patient struggling with FLUTD in order to improve the outcome of the case. At the time of writing, the author is aware that this particular patient is being happily maintained on Royal Canin Urinary Low Calorie diet and has not returned to the practice with a urethral blockage since his discharge one year ago.

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## Disclosure statement

The author holds no conflict of interest and has no financial interest or benefit to be gained from the information in this article.

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## Multiple Choice Questions

1. **What does the acronym FLUTD stand for?**
   - **(a)** Feline lower urinary tract damage
   - **(b)** Feline lower urinary tract dysplasia
   - **(c)** Feline lower urinary tract disorder
   - **(d)** Feline lower urinary tract disease
2. **FLUTD is more in common in:**
   - **(a)** Neutered male cats
   - **(b)** Unneutered male cats
   - **(c)** Neutered female cats
   - **(d)** Unneutered female cats
3. **Urethral obstruction is almost always an emergency:**
   - **(a)** True
   - **(b)** False
4. **One reason a closed urine collection system is recommended as part of the treatment plan is to:**
   - **(a)** Prevent dehydration
   - **(b)** Assist with urolith passage
   - **(c)** Prevent urine scalding
   - **(d)** Maintain blood pressure
5. **Stress plays a pivotal role in causing FLUTD:**
   - **(a)** True
   - **(b)** False
6. **Which of the following will NOT assist in reducing stress for feline patients in the hospital?**
   - **(a)** Providing a box or a hide away
   - **(b)** Using pheromone sprays or diffusers
   - **(c)** Allocating the same nurse consistently to the patient
   - **(d)** Housing the patient in a highly visible and high trafficked area
7. **Which one of the following is a recognised method of preventing patient interference with in-situ urinary catheters?**
   - **(a)** Bandaging the catheter site
   - **(b)** Fitting an Elizabethan collar
   - **(c)** Sedating the patient throughout the hospitalised period
   - **(d)** Avoiding placement of in-situ catheters
8. **Which one of the following drugs can have detrimental effects on patients exhibiting signs of renal impairment due to the way they are metabolised?**
   - **(a)** NSAIDs
   - **(b)** Antibiotics
   - **(c)** Antiemetics
   - **(d)** Anthelmintics

For the answers to the MCQs, please go to: **http://www.bvna.org.uk/publications/veterinary-nursing-journal**