Nursing a patient with feline urethral obstruction — a patient care report

Abstract

Feline urethral obstruction is a potentially life threatening emergency which requires immediate attention. A nursing care plan ensures that veterinary nurses are able to tailor care based on the patient's individual needs. Fluid therapy, pain assessments and catheter care are just three of the areas that require particular attention. This report aims to discuss the importance of these nursing interventions in an emergency situation.

Key words: feline urethral obstruction, pain assessments, fluid therapy, metabolic acidosis, emergency, critical care, electrolyte imbalances

The patient presented to the clinic with a 3day history of anuria, vomiting, lethargy, and pain. The patient had recently had cystitis which had been treated with meloxicam (Loxicom, Norbrook) for 14 days, presenting signs commenced on completion of the medication.

Signalment

Species: Feline
Breed: Domestic short hair
Age: 3 years 8 months
Sex: Neutered male
Weight: 5.68 kg

Veterinary investigations

The veterinary surgeon (VS) diagnosed a urethral obstruction requiring emergency treatment. The patient was hospitalised and a blood sample was taken which revealed severe hyperkalaemia of 8.6 mmol/litre, hyperglycaemia of 16.55 mmol/litre and severe post renal azotaemia of 65.3 mmol/litre. The patient was placed on intravenous fluid therapy 0.9% saline (NaCl) and administered an injection of buprenorphine 20 μg/kg (Vetergesic, Ceva).

The bladder was decompressed via cystocentesis using a 23 g butterfly needle. The urine obtained was blood tinged; a sample was stained for microscopic examination in which no crystals were observed. Despite fluid therapy 1 hour following decompression the potassium levels were checked and remained at 8.6 mmol/litre. Heart and respiratory rates marginally improved but the patient remained painful.

The VS made the decision to sedate the patient to enable urinary catheterisation. Sedation in a patient with severe hyperkalaemia increases the risk of catastrophic events; however complete stabilisation of these patients is not always achievable. The following must be present before considering sedation or anaesthesia: normal mentation, sinus rhythm, normal heart rate and a potassium reading below 5.5 mmol/litre (Hibbert, 2013). A combination of 5 mg/kg ketamine (Narketan, Vetoquinol) and 0.3 mg/kg midazolam (Hypnovel, Roche), was selected because they were the practice's 'safe anaesthetic' protocol for cats, and also because midazolam acts as a muscle relaxant, potentially reducing muscle spasm in the urethra in order to facilitate easier catheterisation, relieve the obstruction and promote diuresis. A right lateral abdominal radiograph revealed no uroliths. A 3fg urinary catheter (tom cat catheter, Henry Schein) was placed after flushing an obstruction in the penile urethra and urethral flexure area. The potassium was checked and had increased to 8.7 mmol/litre.

At this point the VS administered a bolus of glucose and then a constant rate infusion of 2.5% glucose in 500 ml bag of 0.9% sodium chloride (NaCl). Nine hours following the initial blood test the patient's potassium levels had decreased to 4.7 mmol/litre, heart rate had decreased, respiratory rate increased, mucous membranes were pink and urine was flowing well into the collection bag. The urinary catheter was left in situ post anaesthesia and left in overnight, a drip line and bag were attached for urine collection. The patient was bright and less painful at the end of the day.

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Table 1: Nursing Care Plan

Patients Name:				**Date:**		
Age:	**Time:**		**VS:**	**VN:**	**I.D No:**	
To be completed once daily or more often following dramatic changes in patient's health or following surgery.						
Ability	**Normal routine**	**Grade**	**Problem list**	**Nursing interventions (detail on hospital form with times)**	**Review time/ frequency**	**Evaluation**
Eat	Go cat dry in the morning. Felix wet food in the evening in a plastic bowl.	3	Anorexic — last ate Saturday but vomited.	NIL PER OS until further notice, as having sedation for catheterisation. Reassess after anaesthetic.	Check with vet at 1 pm.	1 pm — continue to hold off food. 3 pm — offered food not interested.
Drink	Water available all day in a metal bowl.	3	Vomiting since Saturday -— dehydration.	Place on IVFT on maintenance rate 50 mls/kg until surgery. Check electrolytes 1 hour following catheterisation.	Reassess rate at the beginning of surgery. Then check 1 hourly.	10:30 — fluids running well, no problems. 11:30 — no problems. 12:05 — fluids turned up to x2 maintenance (M) 1:30 — turned fluids up to x3 M for 1 hour. 2:30 — VS advise keep on x3 4:30 — place another IV line on 250 ml bag saline with 2.5 ml glucose infusion on x1 M, turned other bag down to x2 M. 5:50 — stopped glucose bag and put back on x3 M on initial bag.
Urinate	Usually urinates approx. x2 daily — litter is non clumping stones.	3	Anuria due to blocked bladder.	Monitor for sings of pain — cystocentesis performed at 9:15 am. Once unblocked monitor urine output from bag - Ensure not over infused or dehydrated.	Hourly following catheterisation.	2:00 — no urine in collection bag. 3:00 — no urine in collection bag. 4:00 — urine in bag. 5:00 — urine flowing into bag. 6:00 — urine flowing into bag.
Defecate	Usually defecates approx. x2 daily — non clumping litter.	2	Currently no problems.	Ensure if defecates in kennel soiled litter removed hourly to avoid contamination of catheter and collection line.	Hourly.	10:00 — no f+ 11:00 — no f+ 12:00 — no f+ 1:00 — sedated. 2:00 — no f+ 3:00 — no f+ 4:00 — no f+ 5:00 — no f+
Breathe	No problems.	3	Tacypnoea	Check respiration and heart rate hourly until sedation and hourly following sedation.	Hourly.	10:00 — elevated.
Maintain body temperature	Sleeps on a soft bed — doesn't mind noise.	2	Currently normal temperature.	Check 2 hourly prior to sedation, check hourly following sedation until normal. Ensure placed on a comfy thick bed.	Hourly.	8:30 am — temp was 38.5 9:45 — 38.5 10:45 — 38.5 2:00 recovery from sedation Temp — 37.5 3:00 — 39.1 4:00 — 38.5 5:00 — 38.5 6:00 — 38.6

Groom	Grooms himself frequently.	1	Currently no problem grooming.	Ensure following catheterisation that he is kept clean to avoid scalding. Will be wearing buster collar following catheterisation so ensure he is kept clean around his head and neck area.	Check every 2 hours.	Kept clean throughout the day.
Mobilise	Active cat, no problems jumping or climbing.	1	No problems.	Very painful on abdomen, might reduce his mobility. Following sedation ensure he is able to move around and does not lay on one side for more than 1 hour.	Hourly.	No problems reported able to mobilise.
Sleep/rest	Sleeps on big soft bed, will sleep when noisy at home.	1	No problems currently reported.	Please ensure adequate time for rest. If vital signs are normal leave checking until 2 hourly.	Check every 2 hours.	No problems — able to rest, hosp quiet on pain relief.
Express behaviour (including pain assessment)	Used to dogs, but not cats, not keen on strangers.	3	Extremely painful abdomen.	Pain score every 4 hours to monitor changes/ improvements. May require analgesic regime amended.	Check every 4 hours.	9:30 — very painful. 12:00 — still painful. 5:30 — pain score of 3. 6:00 — much brighter and more comfortable.

Discussion of nursing interventions

Feline urethral obstruction (FUO) is a common but treatable medical emergency (Hetrick and Davidow, 2013). Male neutered cats tend to make up the majority of the cases, due to their long and narrow urethras (Brace et al, 2014). The most common predisposing cause of FUO is idiopathic cystitis (IC) (Balakrishnan and Drobatz, 2013).

Severely affected patients often present with hyperkalaemia, post renal azotaemia, metabolic acidosis, hypocalcaemia, dehydration and hypovolaemia, which if left untreated can progress to cardiovascular compromise (Drobatz and Cole, 2008). As a result treatment consists of correcting electrolyte imbalances, appropriate analgesic regimens, removing or relieving the obstruction and post catheterisation management (Balakrishnan and Drobatz, 2013).

Three important areas were identified following the nursing care of this patient as being vital in successful case management; these were fluid therapy, pain management, and urine collection with catheter care. The patient received individualised care with the use of a patient questionnaire and a nursing care plan (*Table 1*). Other areas such as stress management, behavioural interventions and nutritional management were important, but will not be discussed in this report to allow a focus on the chosen areas.

Fluid therapy — correcting abnormalities

Fluid therapy plays a vital role in FUO, it is used to improve initial hypovolaemia, correct metabolic acidosis and electrolyte imbalances (Brown, 2013). The most significant electrolyte imbalance in these patients is hyperkalaemia due to its effects on the resting membrane potential of the myocardium, potentially resulting in fatal conduction abnormalities (Malouin et al, 2006). Hyperkalaemia occurs when the kidneys are unable to excrete potassium and hydrogen ions as a result of a drop in glomerular filtration due to impaired kidney function as a result of the obstruction (Breton, 2013; Lee and Drobatz, 2003).

Historically it was thought that 0.9% saline was the most beneficial fluid type in the treatment of FUO. The use of isotonic balanced fluids such as Hartmann's which contains a small amount of potassium, were thought to worsen a patient's hyperkalaemic state. However more recently it has been demonstrated

that this has minimal effects on hyperkalaemia, especially as the post obstruction diuresis excretes excess potassium in the urine (Drobatz and Cole, 2008).

The benefits of utilising isotonic balanced fluids have been investigated by both Drobatz and Cole (2008) and Cunha et al (2010). Their studies demonstrated that the administration of balanced fluids resulted in more rapid correction of metabolic acidosis compared with 0.9% saline in cases of urethral obstruction. This is due to the presence of buffers in balanced fluids which are metabolised to bicarbonate resulting in an alkalising effect. Furthermore balanced fluids contain less NaCl than saline; NaCl has acidifying effects when in excess, through limiting the amount of bicarbonate reabsorption in the proximal tubule, worsening the acidosis. Therefore the administration of a balanced isotonic fluid in this case may have resulted in a more rapid restoration of acid–base balance.

Fluid therapy — selection of rate

The patient was placed on 0.9% NaCl on maintenance rate of 2 ml/kg/hour in order to improve the hyperkalaemia; the VS decided to start on this rate as they were concerned that a higher rate may result in bladder rupture. The fluid rate was only turned up to twice maintenance following the start of anaesthesia.

Drobatz and Cole (2008) advised that aggressive fluid therapy improves potassium and acid–base imbalances more rapidly, and in 2013 Balakrishnan and Drobatz concluded that a bolus of between 10 and 30 ml/kg of an isotonic crystalloid should be given for emergency stabilisation. Cunha et al (2010) stated that inadequate replacement of fluids can delay resolution of imbalances. It could therefore be argued that this patient would have benefited from a higher initial fluid rate or an initial bolus in order to correct the hypovolaemia and hyperkalaemia more promptly.

The patient's vital signs were monitored closely during fluid therapy and recorded in order to recognise and respond to any improvements or potential deteriorations. Research indicates that initial emergency treatment should include an electrocardiogram (ECG) to monitor the effects of hyperkalaemia on the heart, and regular blood pressure monitoring for hypovolaemic patients (Cuhna et al, 2010). Neither monitoring device was implemented during this patient's treatment. On refection it may have been beneficial to utilise these monitoring aids alongside fluid therapy to assist in the decision-making process regarding fluid rate and administration of additional medications such as administration of calcium to stabilise the resting membrane potential of the heart.

Pain management — recognising the signs

Correct pain management is vital in ensuring patients' wellbeing in hospitalised circumstances (Cherry, 2014). Nurses play a pivotal role in identifying pain and distress in patients, to ensure adequate analgesia is provided. Pain is a complex process, consisting of both physiological pain in response to a disease process and emotional pain (Cherry, 2014).

Physiological consequences of pain are easier to recognise than emotional responses. These include increased cardiac output, anorexia, increased respiration, and hypertension, all of which can be efficiently monitored. Emotional responses to pain consist of depression, fear, anxiety, frustration and distress (Sparkes et al, 2010). Nurses must be experienced in recognising both forms. A study conducted by Robertson in 2005 stated that feline patients are analgised less effectively for pain in comparison to canine patients with similar conditions. This is in part due to the tendency of feline patients to conceal pain as part of a protective mechanism, however it is not acceptable to provide inadequate analgesia due to finding it difficult to assess pain. If the patient is in pain, it will be suffering and its welfare compromised (Robertson, 2008).

Pain is individual and patients are likely to react to pain in different ways, it is therefore appropriate to attain knowledge of a patient's normal behaviour, to allow prompt recognition of abnormal behaviours when experiencing a form of pain (Barratt, 2013). The patient's health questionnaire and nursing care plan helped to identify that the patient was experiencing a high degree of pain compared with his normal behaviour when healthy.

Pain assessments are based on evidence gained from physical examination and observations of behaviour. Pain scoring charts can be used to guide nurses to recognise signs of pain, but also to monitor trends in order to tailor individualised care for example the Colorado State University feline acute pain scale which has been validated in cats. The patient received a buprenorphine injection on arrival, however only received one pain score while hospitalised. His heart and respiration rate however remained elevated throughout the day; indicating the analgesia may not have been adequate in controlling pain in this patient. Common responses to pain include elevation of vital signs. Following the specific nursing interventions and conducting a regular pain score would have provided the VS with an identifiable trend which could have indicated that this patient's analgesia regimen was inappropriate and facilitated earlier intervention.

Catheter care and urine collection

A urinary catheter was placed in order to relieve the obstruction and promote diuresis. An empty fluid bag and sterile fluid line were attached to the catheter to facilitate monitoring of urine output. The collection bag was placed below the level of the patient to ensure urine flowed freely into the bag under gravity, but was kept off the floor to reduce the chance of bacterial contamination (Aldridge and O'Dwyer, 2013). Typically urine output is 1–2 ml/kg/hour, however output can be much higher following relief of the obstruction, and as a result dehydration may occur. Monitoring of urine output is an important indicator of kidney function and hydration status, ensuring the patient is neither dehydrated nor over perfused (Freitas et al, 2012).

Orpet and Welsh (2011) recommend that urine output should be monitored every 4 hours and the bag emptied. The patient's urine output was not specifically monitored however it was noted that the catheter remained patent due to the observed urine flow into the bag. In 2013 Mazzaferro and Powell highlighted that the volume of fluid consumed should match the volume of fluids excreted. In hindsight it would have been beneficial to record the exact fluid input and output in order to have a specific indicator of the patient's fluid status.

Both the catheter and collection line require careful management for successful use. Oosthuizen (2011) identified that a number of complications can occur due to the presence of an indwelling urinary catheter (IUC) including patient discomfort, urethral trauma and urinary tract infection (UTI), with the latter being the most common (Corgozinho et al, 2007). Oosthuizen (2011) stated that IUCs should always be kept closed, in order to minimise bacterial infection and decrease the likelihood of urine scalding. A closed system was employed in this case. Open urine systems are IUCs left open without the presence of a bung or collection line, allowing urine to drain freely into the environment, or where the bag is disconnected (Bloor, 2013).

Bloor (2013) and Brown (2013) concluded that closed collection systems were the most appropriate choice for urine collection. Brown (2013) did however identify a study in which there was no difference in bacterial contamination when using open or closed systems. Barrett and Campbell (2008) cultured 95 fluid bags for bacteria following urine collection and concluded that fluid bags are an appropriate method of urine collection since no bacterial growth was demonstrated. Bloor (2013) advised that in order to keep bags as sterile as possible, the existing giving set should be kept in place, the tube should be clamped below the chamber, and a knot should then be tied to the tubing and cut below. This is a practice currently utilised in the clinic.

Oosthuizen (2011) recommended that in order to further prevent bacterial contamination the preputial area should be kept clean by clipping the area prior to urethral catheter insertion and ensuring regular cleaning with diluted chlorhexidine solution (0.05%). The patient's preputial area was not clipped prior to insertion however the area was regularly checked for contamination. Brown (2013) stated that other methods such as regular hand washing using the World Health Organization (2009) method, and applying sterile gloves when handling the collection system could help increase asepsis. These were not employed in this case, and on reflection should have been considered to decrease the likelihood of a nosocomial infection. Furthermore, such additions should have been added on to the nursing care plan in order to increase the holistic care of this patient. The previously highlighted studies emphasise the significance of nursing interventions in ensuring catheters remain patent and uncontaminated to reduce further complications. On reflection additional techniques could have been introduced in this case to improve patient care and recovery.

Future considerations

Little evidence exists on the nursing care of FUO. What is apparent from the aforementioned research is that the most common predisposing factor to FUO is IC (Fordham, 2011). The patient presented in this study had previously been diagnosed with IC however there was no mention in clinical notes regarding management of this condition in order to prevent a subsequent obstruction. Management of IC not only consists of medical treatment but also consists of interventions to improve the patient's home environment to reduce stress (Cherry, 2014).

Stress is thought to be an important factor in the management of IC. Continued professional development based on stress management in cats would help nurses increase their knowledge of feline specific nursing. One recommendation would be for medically minded nurses to establish feline friendly stress clinics in order to educate owners in the important of modifying the home environment, reducing stress and the reoccurrence of IC and subsequent FUO. Environmental enrichment and stress reduction can be applied to hospitalised cases, increasing the success of treatment. Future studies comparing improvements made within the home

environment, with subsequent cases of FUO, would be a vital step forward in the management of these patients.

Patient outcome

Following stabilisation the patient was transferred to the branch clinic for 24 hour care at 8:00 pmthat evening. The patient remained in the hospital for a further 3 days. He started to become increasingly stressed in the hospital environment and was not tolerating the presence of the urinary catheter. The decision was made to discharge the patient, since his biochemistry blood parameters had returned to normal. One day following discharge the patient did however return to the emergency 24 out of hours clinic with stranguria.

Key Points

- Feline urethral obstruction is a emergency situation requiring immediate treatment.
- Hyperkalaemia is the most significant electrolyte imbalance which requires immediate correction.
- Fluid therapy is vital in the management of feline urethral obstruction, without it further deterioration can occur.
- Pain assessments in feline patients can be difficult, but veterinary nurses should be confident in using pain score charts in practice.
- Best practice indwelling catheter care is vital in ensuring bacterial infections do not occur.
- Nursing care plans help to tailor care to the individual patient.
- Stress reduction at home and in practice may help to reduce the occurrence of this condition.

Conclusion

Veterinary nurses play an extremely important role in the care of the FUO patient, understanding specifics of aetiology is vital in ensuring care given is well thought out and individually planned. Patients can present with obstruction due to a number of causes and it is for this reason that home environment and hospital stressors should be considered when treating these patients. What is evident from the study is that professionals must ensure they are up to date with current literature and best practice guidelines for treating emergency conditions. Building on nursing-based evidence on how best to reduce stress to feline patients both at home and in practice could help owners to understand how to reduce the possibility of emergency situations such as these. Once in practice veterinary nurses must be able to make suggestions in order to improve a patient's care and subsequently increase successful management of FUO. VN

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