UNIVERSITY OF CALGARY
FACULTY OF VETERINARY MEDICINE

This review accompanies the relevant episode of the Cutting Edge veterinary podcast. In each episode of this podcast, 3rd year students in the University of Calgary's veterinary medicine program fill you in on the most up-to-date literature and evidence-based practices on topics that matter to you, the practising veterinarian.

Up-To-Date Acute Management Protocols for Feline Urethral Obstructions

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What is FLUTD?

Feline Lower Urinary Tract Disease (FLUTD) is a significant topic in veterinary medicine, accounting for approximately 2-13% of the morbidity rate of cats presenting to veterinary hospitals across the United States and Canada[1]. FLUTD is a specific term that encompasses any condition in cats that present with a specific set of clinical signs and behaviors. These include pollakiuria, stranguria, periuria, dysuria, and hematuria[2,3]. FLUTD is not a diagnosis in cats, but rather denotes any dysfunction or dysregulation of the urinary bladder and urethra[3]. This dysregulation can lead to serious health consequences for the cat, including urethral obstructions (UO), which is arguably the most serious sequelae of FLUTD[4].

Causes of FLUTD

There are several accepted causes of FLUTD, and their occurrence rates are relatively disproportionate. The most prevalent disorder is Feline Idiopathic Cystitis (FIC), with 55-69% of the FLUTD population suffering from it. The second most common cause is urolithiasis, with a 12-22% prevalence rate. Uroliths are present in several types, including predominantly calcium oxalate and struvite in the feline population. Others, including urate, are much less common. It is important to note that crystalluria is not a confirmation of urolithiasis, as crystalluria has been found in a significant proportion of healthy middle-aged and older cats during regular health screenings[5]. The less common causes of FLUTD include urinary tract infections (UTIs), neoplasia, neurological disorders, and urethral plugs. Bacterial UTIs are a relatively uncommon diagnosis of FLUTD, with a variable prevalence rate of 1.5-20%. No matter the cause of FLUTD, male cats suffering from urethral obstructions can aggravate the signs and progress to a life-threatening emergency[2,6].

FIC: Definition + Pathophysiology

FIC is an idiopathic condition that affects the bladder and proximal urethra, among other organs[7]. It is proposed to be a pandora syndrome, which is a condition that presents with chronic clinical signs associated with multiple organ systems. The severity of clinical signs of this

syndrome wax and wane, speculated to be associated with events that activate the central stress response system (SRS)[3]. The clinical presentation of FIC corresponds with FLUTD, which includes dysuria, pollakiuria, stranguria, periuria, and hematuria. As discussed earlier, urinary tract obstructions can be a life-threatening sequelae of FIC[6].

There is ongoing speculation regarding the pathogenesis of FIC, however, two categories that are widely discussed in the literature are the inflammatory and central stress response. The inflammatory response involves an increase in inflammatory cells, altered ATP release from the urothelium[8], and an upregulation of COX-1 and COX-2 enzymes in the bladder mucosa and urethral mucosa, respectively[7]. The chronic wear and tear of the inflamed tissue in the proximal urethra and bladder mucosa leads to tissue remodeling in the lamina propria and urothelium[5]. This remodeling is speculated to alter the sensations and pain of the bladder and proximal urethra in cats by disrupting the mucosal signaling pathways[7,8]. Support for the critical role that the central stress response system plays in cats suffering from FIC has been growing significantly in the past few decades. Tony Buffington, a professional in the topic of FLUTD, defines the pandora syndrome/FIC as an "anxiopathy", rather than a cystitis. The chronic, persistent activation of the central stress response system in cats suffering from environmental stresses leads to increased activity of the autonomic nervous, endocrine, and immune systems, which can harm several organ systems in the body, including the urinary system[9]. The central SRS is overstimulated due to increased levels of local or systemic corticotropin-releasing factor (CRF), which increases the excitability to stress stimuli[10]. Evidence suggests that cats suffering from FIC have an inappropriate, exaggerated response to stress[11]. Several factors have been described to predispose cats to FIC, including indoor only cats, early adverse experiences, anxiety, multi-cat households, and environmental triggers, however, the most significant factor currently accepted is chronic, persistent central SRS activation[3,10,11].

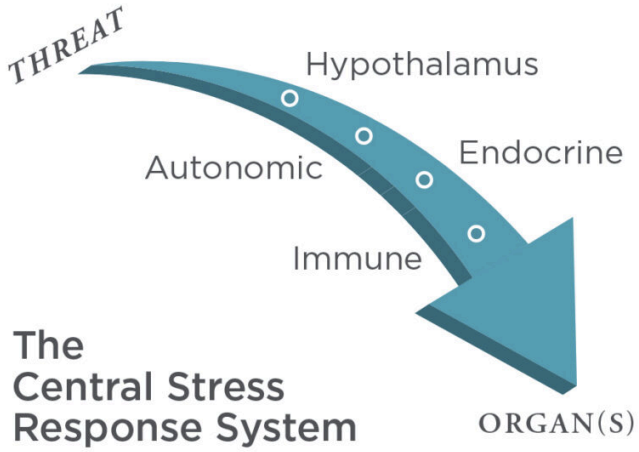

Figure 1. The Central Stress Response System[9]

FIC: Who's affected + why?

It is important to understand what the common clinical presentations of FIC are and why certain populations are predisposed. First of all, male cats are much more likely to present to the clinic with complications of FIC due to their long and narrow urethras[12]. Younger cats, averaging 2-7 years old, are at an increased risk of FIC[2,13]. In terms of diet, two components have been discussed in the literature that predispose cats to FIC, which are obesity and diets

with less water intake or moisture content, such as complete dry food diets[2,5]. The final category of risk factors for FIC cats are environmental and physiological stressors, as was previously described in the pathogenesis of FIC. Considering all the important risk factors of FIC, it is critical to emphasize that this disease is a multifactorial syndrome that is influenced by many factors, as is proven by the effectiveness of multimodal environmental modification (MEMO) treatment[9].

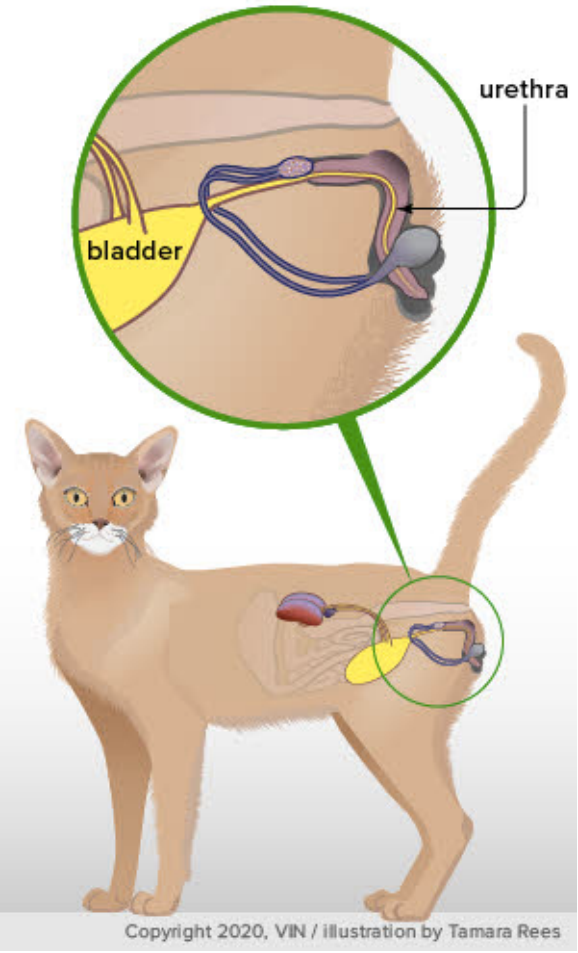

Figure 2. Feline male anatomy - predisposition to UO
https://veterinarypartner.vin.com/default.aspx?pid=19239&id=4951735

Stabilization of Feline Urethral Obstructions

Quick and effective stabilization is key when it comes to patients with urethral obstruction. Once an IV catheter is in place, it is important to take a blood sample to run a minimum emergency database and get information on electrolyte values. Some values of importance from this lab work are potassium since hyperkalemia can be life threatening for these patients and checking for any azotemia that may already be present[14]. The next step is fluid therapy, at this time both a balanced electrolyte solution, such as normosol-R, or 0.9% saline are good options[15]. If there is a need to correct an acidemia, the use of a balanced electrolyte solution allows for a quicker correction within the first 12 hours. When it comes to

sedation, anesthesia, and analgesia there are many different protocols that would work well for obstructed cats but in general a combination of an opioid, sedative, and muscle relaxant should be administered[16]. On top of this, coccygeal epidurals are another method to provide excellent analgesia. When it comes to performing urinary catheterization and flushing to unblock the patient, the most important thing to remember is to keep it as atraumatic as possible. One technique that can be used before unblocking is a decompressive cystocentesis but at this time it is not indicated to be used on a routine basis[17]. A recent study showed that decompressive cystocentesis does not actually decrease the time to place a urinary catheter or add to the ease of placement so it is best to leave decompressive cystocentesis to urgent situations such as patients with severe hyperkalemia. Another intervention that is also lacking evidence on whether it is beneficial is performing a bladder lavage[18]. A study completed in 2019, showed that lavaging the bladder did not decrease urethral obstruction recurrence rates but additional studies are needed to confirm this finding.

Managing severe hyperkalemia + bradycardia

Hyperkalemia is a life-threatening electrolyte disturbance associated with UO in cats that is a medical emergency and requires immediate intervention[19]. The primary intervention is intravenous fluids, as it functions to lower the serum concentration of potassium by increasing GFR[19]. The recommended fluid type is an isotonic crystalloid[20]. The second most important intervention is IV calcium gluconate 10%. It is cardio-protective as it reduces the threshold potential in cardiac muscles to improve cardiac excitation, has a quick onset of action (~few minutes), and short duration of approximately 1 hour. The approved dose is 0.5-1mL/kg IV given slowly over 10-30 minutes. ECG monitoring is recommended during administration, as it can potentially worsen the arrhythmia[21]. The third and fourth suggested therapies are IV dextrose and regular insulin. IV dextrose 50% stimulates the release of endogenous insulin, which drives potassium into the intracellular space. It is recommended in cases of mild to moderate hyperkalemia, at a dose of 1-2mL/kg IV. In cases of severe hyperkalemia, regular insulin can be given at a dose of 0.25-0.5 units/kg IV in conjunction with an IV dextrose bolus. Appropriate monitoring must be implemented to ensure a life-threatening hypoglycemia does not develop in response to the exogenous insulin injections[20,21].

Catheter Size + Duration

When deciding on a urinary catheter size, the most appropriate choice is a 3.5 Fr[22]. When comparing a 3.5 Fr. to a 5 Fr., there is a lower recurrent obstruction rate in the first 24 hours after catheter removal which is thought to be due to the 3.5 Fr catheter causing less inflammation and trauma to the urethral mucosa. The duration an indwelling catheter should be left in for is somewhere in the 24-48 hour range. A study by Seitz et al. found waiting to remove the catheter until the urine has normalized may decrease the rate of recurrent obstruction but this could be quite hard to standardize and has not been studied further[23]. So it is still recommended to create individualized patient plans when it comes to urinary catheter duration[24].

Pain Management of Feline UO

Urethral obstruction, and FLUTD in general, is a very painful condition and we need to give adequate analgesia to these patients. In order to control pain, cats will need an opioid such as methadone, buprenorphine or fentanyl[22]. Although it may seem as though meloxicam could help alleviate some pain it does not decrease clinical signs in these patients and it does not impact recurrence rates[25]. So it is important to remember that even if the obstruction is due to FIC, it is not a true cystitis and meloxicam is not needed. As previously mentioned, another way to increase patient comfort is to perform a coccygeal epidural before unblocking as this provides local anesthesia to the area and can help with the ease of catheter placement[16]. Overall, there needs to be a multimodal approach to analgesia and all the various forms of pain need to be taken care of, especially when it comes to FIC.

Contentious Topic: Use of Prazosin

There have been 3 key studies in the past 6 years on the use of prazosin for urethral obstructions. In 2017, the study showed no significant difference between the incidence of recurrent urethral obstruction and the use of prazosin[26]. Although the study completed in 2017 was underpowered, a similar study completed in 2021 again showed no significant difference between cats who received placebo versus cats who received prazosin when looking at recurrent urethral obstruction 30 days following the initial unblocking[27]. Then in 2022, a larger study was published which stated cats who receive prazosin had an increased likelihood of a recurrent urethral obstruction[28]. This was a new and shocking finding but unfortunately their study design was a bit flawed with one issue being that the majority of cats received prazosin and the remaining 22% did not. So as of right now, we should hold off on prescribing prazosin until there is more concrete evidence that it is a useful drug for preventing recurrence in patients who present for urethral obstruction.

Main Takeaways

The first main takeaway to remember is that although FIC stands for feline interstitial cystitis it is not a true cystitis but a multifactorial syndrome and needs to be treated as such[9]**.** The second takeaway is that catheter size and duration can play an important role but making sure the unblocking technique is atraumatic is the most crucial aspect[20]**.** Third, ensure the patients receive opioids, an epidural if possible and once again meloxicam is not indicated[16,22,25]. Lastly, for now hold off on prescribing prazosin as there is not enough evidence to show it is of any benefit [26,27,28].

Acknowledgements

We would like to thank Dr. Serge Chalhoub for all his assistance and guidance throughout this project. It would not have been possible without him.

References

1. Lekcharoensuk C, Osborne CA, Lulich JP. Epidemiologic study of risk factors for lower urinary tract diseases in cats. J Am Vet Med Assoc 2001; 218: 1429e35.
2. Kaul E, Hartmann K, Reese S, Dorsch R. Recurrence rate and long-term course of cats with feline lower urinary tract disease. Journal of Feline Medicine and Surgery. 2019;22(6):544–56.
3. Buffington, C. A. T. (2011). *Idiopathic cystitis in domestic cats—beyond the lower urinary tract*. J Vet Intern Med. Retrieved February 15, 2023, from https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1939-1676.2011.0732.x
4. Senior, D. (2006). *Lower urinary tract disease - feline - WSAVA2006*. VIN. Retrieved February 14, 2023, from https://www.vin.com/apputil/content/defaultadv1.aspx?pId=11223&id=3859297&print=1
5. Jones E, Palmieri C, Thompson M, Jackson K, Allavena R. Feline idiopathic cystitis: Pathogenesis, histopathology and comparative potential. Journal of Comparative Pathology. 2021;185:18–29.
6. Brooks W. Idiopathic cystitis in cats [Internet]. VIN. 2022 [cited 2023Feb23]. Available from: https://veterinarypartner.vin.com/default.aspx?pid=19239&catId=102903&Id=4951488
7. Kullmann FA, McDonnell BM, Wolf-Johnston AS, Lynn AM, Giglio D, Getchell SE, et al. Inflammation and tissue remodeling in the bladder and urethra in feline interstitial cystitis. Frontiers in Systems Neuroscience. 2018;12.
8. Birder LA, Barrick SR, Roppolo JR, Kanai AJ, de Groat WC, Kiss S, et al. Feline interstitial cystitis results in mechanical hypersensitivity and altered ATP release from Bladder Urothelium. American Journal of Physiology-Renal Physiology. 2003;285(3).
9. Buffington T. Feline medicine pandora syndrome in cats: Diagnosis and treatment [Internet]. Today's Veterinary Practice. 2023 [cited 2023Feb24]. Available from: https://todaysveterinarypractice.com/urology-renal-medicine/pandora-syndrome-in-cats/
10. Hanna-Mitchell AT, Wolf-Johnston A, Roppolo JR, Buffington TC, Birder LA. Corticotropin-releasing factor family peptide signaling in feline bladder urothelial cells. Journal of Endocrinology. 2014;222(1):113–21.
11. Care IC. [Internet]. International Cat Care. 2020 [cited 2023Feb24]. Available from: https://icatcare.org/advice/feline-idiopathic-cystitis-fic/
12. Segev G, Livne H, Ranen E, Lavy E. Urethral obstruction in cats: Predisposing factors, clinical, clinicopathological characteristics and Prognosis. Journal of Feline Medicine and Surgery. 2011;13(2):101–8.
13. Forrester SD, Towell TL. Feline idiopathic cystitis. Veterinary Clinics of North America: Small Animal Practice. 2015;45(4):783–806.

14. Jones JM, Burkitt-Creedon JM, Epstein SE. Treatment strategies for hyperkalemia secondary to urethral obstruction in 50 male cats: 2002-2017. J Feline Med Surg [Internet]. 2022;24(12):e580–7. Available from: http://dx.doi.org/10.1177/1098612X221127234
15. Drobatz KJ, Cole SG. The influence of crystalloid type on acid-base and electrolyte status of cats with urethral obstruction. J Vet Emerg Crit Care (San Antonio) [Internet]. 2008;18(4):355–61. Available from:
16. O'Hearn AK, Wright BD. Coccygeal epidural with local anesthetic for catheterization and pain management in the treatment of feline urethral obstruchttp://dx.doi.org/10.1111/j.1476-4431.2008.00328.xtion: Use of coccygeal epidural in urethral obstructions. J Vet Emerg Crit Care (San Antonio) [Internet]. 2011;21(1):50–2. Available from: http://dx.doi.org/10.1111/j.1476-4431.2010.00609.x
17. Reineke EL, Cooper ES, Takacs JD, Suran JN, Drobatz KJ. Multicenter evaluation of decompressive cystocentesis in the treatment of cats with urethral obstruction. J Am Vet Med Assoc [Internet]. 2021;258(5):483–92. Available from: http://dx.doi.org/10.2460/javma.258.5.483
18. Dorsey TI, Monaghan KN, Respess M, Labato MA, Babyak JM, Sharp CR, et al. Effect of urinary bladder lavage on in-hospital recurrence of urethral obstruction and durations of urinary catheter retention and hospitalization for male cats. J Am Vet Med Assoc [Internet]. 2019;254(4):483–6. Available from: http://dx.doi.org/10.2460/javma.254.4.483
19. Jones JM, Burkitt-Creedon JM, Epstein SE. Treatment strategies for hyperkalemia secondary to urethral obstruction in 50 male cats: 2002–2017. Journal of Feline Medicine and Surgery. 2022;24(12).
20. Chalhoub S. Acute Kidney Injury and Acute Azotemia: It's Not Always the Kidneys' Fault. Lecture presented at: UCVM VETM542; 2022 Oct 25.
21. Shell L, Rothrock K, Galles B. Hyperkalemia (Feline) [Internet]. Vin Login. 2022 [cited 2023Feb24]. Available from: https://www.vin.com/members/cms/project/defaultadv1.aspx?pid=607&id=4954107&f5=1
22. Hetrick PF, Davidow EB. Initial treatment factors associated with feline urethral obstruction recurrence rate: 192 cases (2004-2010). J Am Vet Med Assoc [Internet]. 2013;243(4):512–9. Available from: http://dx.doi.org/10.2460/javma.243.4.512
23. Seitz MA, Burkitt-Creedon JM, Drobatz KJ. Evaluation for association between indwelling urethral catheter placement and risk of recurrent urethral obstruction in cats. J Am Vet Med Assoc [Internet]. 2018;252(12):1509–20. Available from: http://dx.doi.org/10.2460/javma.252.12.1509
24. Cosford KL, Koo ST. In-hospital medical management of feline urethral obstruction: A review of recent clinical research. Can Vet J. 2020;61(6):595–604.

25. Dorsch R, Zellner F, Schulz B, Sauter-Louis C, Hartmann K. Evaluation of meloxicam for the treatment of obstructive feline idiopathic cystitis. J Feline Med Surg [Internet]. 2016;18(11):925–33. Available from: http://dx.doi.org/10.1177/1098612X15621603
26. Reineke EL, Thomas EK, Syring RS, Savini J, Drobatz KJ. The effect of prazosin on outcome in feline urethral obstruction. J Vet Emerg Crit Care (San Antonio) [Internet]. 2017;27(4):387–96. Available from: http://dx.doi.org/10.1111/vec.12611
27. Hanson KR, Rudloff E, Yuan L, Mochel JP, Linklater AK. Effect of prazosin on feline recurrent urethral obstruction. J Feline Med Surg [Internet]. 2021;23(12):1176–82. Available from: http://dx.doi.org/10.1177/1098612X211001283
28. Conway DS, Rozanski EA, Wayne AS. Prazosin administration increases the rate of recurrent urethral obstruction in cats: 388 cases. J Am Vet Med Assoc [Internet]. 2022;260(S2):S7–11. Available from: http://dx.doi.org/10.2460/javma.21.10.0469