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Feline lower urinary tract disease diagnosis in an obese sterile male Persian mixed-breed cat

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ABSTRACT: Feline lower urinary tract disease (FLUTD) occurs because of dysfunction of the urinary bladder and urethra in cats. This study reported that FLUTD occurs in a castrated and obese male cat. The supporting diagnostics used to confirm the diagnosis are the dipstick test, urine microscopic observation, and ultrasound. The examination results showed pyuria, proteinuria, haematuria, struvite crystals, and cystitis. The pathophysiology of FLUTD in this case begins with the condition of castrated males, who tend to have little activity and become obese. Obesity increases the risk of ascending infections, which is one of the causes of crystal formation in the urinary tract.

Keywords:
feline lower urinary tract disease, castration, obese, pathophysiology, struvite

■ INTRODUCTION

Feline lower urinary tract disease (FLUTD), a common condition in cats, affects the reproductive tract, urinary bladder, and urethra (Piyarungsri *et al*. 2020). According to Hostutler *et al*. (2005), almost all cats with FLUTD develop idiopathic cystitis, urolithiasis, bacterial infections, and anatomical malformations of the urinary tract. The risk factors for FLUTD vary depending on factors such as geography, season, diet, lifestyle, and rearing patterns (Piyarungsri *et al*. 2020). A case report from a clinic in Surabaya suggested a relationship between sex, castration history, and feeding and the risk of FLUTD (Plumeriastuti *et al*. 2023). Similarly, a case report from Thailand identified dry food and obesity as risk factors of FLUTD (Pusoonthornthum *et al*. 2012). This study reports the diagnosis of FLUTD in sterilised obese male cats.

■ CASE

Signalement and anamnesis: Mixed Persian cat, 3 years old, sterile male, experienced stranguria and haematuria for four months. Normal appetite, complete vaccine history, and a special urinary diet since the initial symptoms. **Physical examination**: 6.6 kg weight, 38.6°C body temperature, BCS 8/9, no fleas, pink mucosa, pain score 1. Abdominal palpation revealed a small bladder in the medial hypogastricus with pain and no changes on kidney palpation. **Diagnosis**: Feline Lower Urinary Tract Disease (FLUTD). **Supporting diagnosis**: Dipstick test, B-mode ultrasonography, and microscopic observation. **Differential diagnosis**: Urolithiasis and Cystitis.

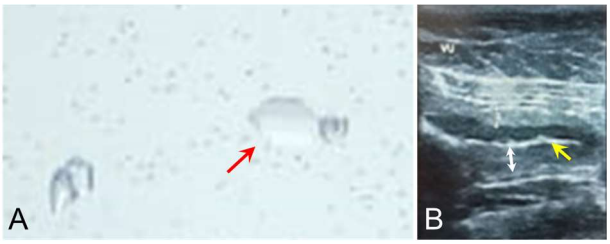

Figure 1. Urine crystal examination and ultrasonography of an obese sterile male Persian mixed-breed with severe feline lower urinary tract disease. (A) Struvite crystals (red arrow) and (B) sonogram of the bladder showing thickening (white arrow) and a hyperechoic layer in the lumen (yellow arrow).

■ RESULTS AND DISCUSSION

FLUTD, also known as FUS, is a condition in which crystals obstruct the lower urinary tract, including the bladder, bladder sphincter, and urethra, making urination difficult in cats. This condition is more prevalent in male cats, and often affects young cats of both sexes. The urethra of male cats, shaped like a tube with a narrow section, is prone to urinary blockage due to urethral disorders (Wael 2012).

Several supporting examinations, such as dipstick examination, microscopic examination, and ultrasonography, were performed to confirm the diagnosis. The dipstick test results showed the presence of leukocytes 125++ (pyuria), nitrite -, urobilinogen -, protein 2000++++ (proteinuria), pH 7.5,

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blood ++ (haematuria), specific gravity 1.015, ketones + (5), bilirubin + (17), and glucose -.

Pyuria. The presence of leukocytes in the urine indicates urogenital tract infection. Generally, leukocytes in urine are polymorphonuclear. In healthy cats, five leukocytes per large visual field were found. If it is greater than that, the condition can be called pyuria (Yadav *et al*. 2020). If pyuria occurs with proteinuria, it may originate from the glomerulus (Clarkson *et al*. (2011).

Proteinuria. Urine protein can indicate pathological conditions, such as prerenal, renal, or postrenal. In healthy cats, no protein was detected in urine. Pre-renal proteinuria causes haemolysis, rhabdomyolysis, and multiple myeloma or lymphoma. Renal proteinuria may be caused by strenuous activity, fever, kidney injury, or nephritis. Postrenal proteinuria can result from urinary tract infections, urolithiasis, or other conditions (Harley & Langston 2012). Dipstick protein examination may produce false-positive results, particularly in adult cats, because of alkaline pH (Rizzi 2014). In this case, the high proteinuria levels may have been influenced by alkaline urine and urolithiasis.

Hematuria. The presence of whole blood in urine indicates haematuria. Haematuria generally occurs due to mechanical pressure by the urolith on the bladder wall, thereby damaging the tissue and causing bleeding and inflammation of the bladder. Fragments of uroliths or calculi in the urethra also cause inflammation, so that the blood vessels in the walls of the urinary tract burst and trigger the release of blood which is carried in the urine (Men & Arjentina 2018).

Microscopic examination. Microscopic observation of urine revealed crystalluria in the form of struvite (Figure 1A), 2-3 struvite per field of view. The morphology of struvite is shaped like a prism, varies in size, is colourless, and has three to 3-8 sides (Apritya *et al*. 2017).

Struvite. Struvite is composed of magnesium, ammonium, and phosphate, and can form due to either food or bacterial infections. If a cat consistently receives dry food high in magnesium ions, it can absorb alkaline magnesium, which in turn increases ammonium levels and pH (Fauziah 2015). However, in this case, the cat was already on a special urinary diet; therefore, the food trigger was likely not the cause. Instead, we suspected that bacterial infection was the cause of the increased ammonium concentration and struvite formation, supported by an increase in leukocytes in the dipstick test. Bacterial infections that produce urease also contribute to the formation of struvite crystals in urine.

Ultrasonography. Sonography showed thickening of the bladder wall (3.34 mm), when compared with the normal reference (1.3-1.7 mm) (Thomas *et al*. 2015), and the presence of a hyperechoic layer on the mucosa (Figure 1B). Normally, the lumen of the bladder shows an anechoic image if it is filled with urine. The hyperechoic image is thought to be a part of the inflamed bladder mucosa and the presence of crystal deposits.

Castration and obesity can cause issues with the urinary tract, such as reduced elasticity and increased risk of dysfunction (Kovarikova *et al*. 2020). Obesity can also lead to fat accumulation around the urethra and penis, causing compression and dysfunction (Dorsch *et al*. 2019, Piyarungsri *et al*. 2020). In some cases, this can lead to infections and formation of struvite crystals, which can cause irritation, inflammation, and haematuria. These symptoms can progress to pyuria and stranguria due to impaired bladder emptying.

■ CONCLUSION

Based on anamnesis, physical examination, urinalysis, ultrasonography, and microscopic examination, the cat was diagnosed with feline lower urinary tract disease and the risk factors for male sterility and obesity.

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