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Ureterolithiasis in Feline Patients

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Abstract

Ureterolithiasis is common in felines and, in part, it is due to the reduced lumen when compared to that of canine patients. In most cases, the occurrence is unilateral and can lead to hydronephrosis. Cats with chronic kidney disease may be affected by calcium oxalate uroliths due to hypercalciuria. The diagnosis includes imaging exams and the initial treatment can be conservative with primary use of analgesics. As surgical options, subcutaneous ureteral bypass is the first option, and there are other ones like ureterotomy, ureterocystotomy, and placement of a ureteral stent.

Keywords: Cat; Ureter; Calcium Oxalate; Kidney; Obstruction

Ureteroliths are important causes of upper urinary tract obstruction in cats [1]. Stones from the kidneys move through peristalsis and passive flow of urine until they lodge in one or both ureters. In the feline species, the increase in the occurrence of ureterolithiasis in the last 20 years has accompanied the increase in the incidence of calcium oxalate [2]. Still, the anatomical particularity of feline ureters explains the greater occurrence of ureterolithiasis in cats when compared to dogs, since the feline ureteral lumen is approximately 0.4 mm in diameter [3], much less than the canine ureter, which is 1.3 to 2.7 mm [4].

About 2 to 3% of the calculi sent to analysis centers are from the upper urinary tract in cats [5]. Regarding the presence of ureterolithiasis in domestic cats, most have uroliths unilaterally, corresponding to 76% of the patients, while only 19% of the uroliths were bilaterally [6,2]. Over 90% of nephroliths and ureteroliths in cats are composed primarily of calcium oxalate and they are not amenable to medical dissolution [7].

In chronic kidney disease (CKD), there is a significant loss of the number of nephrons due to persistent kidney damage, which are unable to maintain adequate homeostasis in the body [8,9]. A single or repeated acute kidney injury caused by urinary obstruction, nephrotoxins or pyelonephritis can lead to CKD [10].

The relationship between ureterolithiasis and CKD is not well understood, but ureteroliths may be both a cause and a consequence of CKD and there are an increasing number of domestic cats presenting with them concurrently [5].

In cats with pre-existing CKD, partial or complete ureteral obstruction usually results in "acute-on-chronic" decompensation, and hyperkalaemia and/or acidemia may occur. In addition, many cats with CKD also have calcium oxalate nephroliths [11] possibly associated with hypercalciuria. Hypercalciuria likely represents a risk factor for the formation of calcium oxalate stones in cats and may be associated with treatment with loop diuretics, corticosteroids, excess vitamin C or D, in addition to diets low in protein, phosphorus, magnesium, sodium, potassium and moisture [12] although further work is needed to confirm these findings in cats. Because the stones containing calcium oxalate (CaOx) are radiopaque, they are often observed on simple abdominal radiography [1].

The analysis of the stone after its removal is of great importance for the clinical management of the patient, since this type of mineral is not dissolved through conservative medical treatment [6]. Macroscopically, CaOx uroliths are hard, brown to black in color, can be smooth or rough, and have blackberry or rosette protrusions [13].

The diagnosis of ureteral stones can be obtained by means of radiography or ultrasound, but currently there is a great challenge in these diagnostic modalities due to the moderate precision, resulting in false negatives and false positives. As a result, antegrade pyelography may be considered as an adjunct method to confirm the presence of a complete ureteral obstruction [14]. It is also possible to associate other diagnostic methods, such as computed tomography or magnetic resonance imaging [15].

The initial clinical treatment in cases of ureterolithiasis consists of analgesics, parenteral administration of fluids plus or minus alpha-1 adrenergic antagonists, with frequent reevaluation. The goal of treatment is to promote the displacement of the stone into the urinary bladder and provide support for post-obstructive CKD, when present [6].

Surgical options include ureterotomy, ureterocystotomy, and placement of a ureteral stent or even the use of subcutaneous ureteral bypass [16], and this last therapeutic option is the one of choice, according to the latest consensus on treatment and prevention of uroliths in dogs and cats [7]. Other traditional methods include ureteral resection and anastomosis, ureteral replantation and ureteronephrectomy. In addition, intestinal graft and the use of ureteroscopy have recently been described as options [17].

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