CALCIUM OXALATE CRYSTALS ASSOCIATED CYSTITIS IN PERSIAN CATS WITH HYPERCALCEMIA

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ABSTRACT

Present communication report on the cystitis due to calcium oxalate crystals in association with hypercalcaemia in Persian breed cats. During the study period of six months, four adult male cats (20 to 48 months of age) were identified as suffering from inappetence, haematuria, pollakiuria and dysuria. Clinical examination revealed elevated rectal temperature, heart rate, respiratory rate and pain while palpation at the caudal abdominal region. Ultrasonographic examination revealed a distended bladder with hyperechogenic contents and increased bladder wall thickness which is indicative of cystitis. Urinary analysis revealed urinary pH from 5.5 to 6.5, specific gravity from 1.045 to 1.050, calcium oxalate crystals on microscopic examination of urine sediment and it is free from parasitic ova. Serum analysis revealed hypercalcaemia. Cats were treated with oral amoxicillin and clavulanic acid twice daily for two weeks along with potassium citrate and capsule which contain prebiotics and probiotics. Dietary modifications were carried out with high fibre, low calcium and oxalates, the addition of B complex vitamins along with potassium citrate to prevent the recurrence.

***Key words*:** Cystitis, cats, potassium citrate, calcium oxalates, hypercalcaemia

Introduction

Feline lower urinary tract disease results from inflammation of the bladder and/or urethra. Lower urinary tract diseases are due to idiopathic aetiology, bacterial origin, urolithiasis or neoplasia. Urolithiasis is the formation of calculi within the urinary tract and common types of uroliths found in cats are struvite and calcium oxalate (Ferrester *et al.,* 2010). Calcium oxalate crystals are more common in old-age cats, male cats, pure-breed cats and cats with chronic kidney diseases (Lekcharoensuk *et al.,* 2001). Cats with idiopathic hypercalcaemia are more prone and urinary pH tends to be lower if they have renal insufficiency (Houston and Moore, 2009). The present communication describes the cystitis due to calcium oxalate crystals in male adult Persian breed cats with it's successful management.

Materials and Methods

Four adult Persian breed male cats (20 to 48 months of age) were diagnosed as suffering from cystitis during the study period of six months at Departmnet of Veterinary Medicine, College of Veterinary Science, Proddatur. All the four cats were presented to the clinic with a history of loss of body weight, inappetence, haematuria, pollakiuria, dysuria and dark colour urine (Fig.1A). Clinical examination revealed a rise in rectal temperature, heart rate, respiratory rate and pain while palpation at caudal abdominal region. Abdominal ultrasonography was carried out. Urine and serum were collected for laboratory analysis. Urinary sediment was collected by centrifugation of urine at 2000 rpm for 10 minutes for microscopic examination.

Results and Discussion

Ultrasonographic examination revealed a distended bladder with hyperechogenic contents and increased bladder wall thickness which is indicative of cystitis (Fig. 2A). The collected urine was dark colour, turbid, pH 5.5-6.5, with specific gravity 1.045 to 1.051 and microscopic examination of the sediment revealed calcium oxalate crystals and negative for parasitic ova (Fig. 3A and 3B). Results of the serum biochemical parameters are presented in Table 1. Confirmation of the cystitis was carried out by the ultrasonographic examination of the abdomen and urine analysis. Cats were diagnosed with cystitis due to calcium oxalate crystals. Cats were administered with amoxicillin and clavulanic acid (@ 20 mg/kg body weight) orally twice daily, oral potassium citrate (75 mg/kg PO q12h) and capsules renodyl (prebiotic and probiotc capsules one capsule once daily) for two weeks of duration. Clinical improvement was noticed after the completion of two weeks of therapy. Improvement was noticed after the changes in the colour of urine (Fig. 1B), ultrasonographic appearence of urine (Fig. 2B), frequency of urination, urgency to urinate and activity of cats. Dietary modifications were carried out with high fibre, low calcium and oxalates, the addition of B complex vitamins along with potassium citrate to prevent a recurrence.

Factors responsible for the development of the calcium oxalate crystals were not well documented but involved urine supersaturation with calcium and oxalate. Cats which were fed with low sodium and potassium; diets formulated for urinary acidification were more prone to calcium oxalate crystals (Lulich *et al.,* 2004). During metabolic acidosis, calcium mobilization from the bones, causes development of the hyper calciuria and reduction in urinary citrate excretion. Decreased water intake, increased urine salt concentration and mineral

Table1: Table showing the serum biochemical changes in cats with cystitis

Parameter	Mean±SE	Reference range
Total protein (g/dL)	7.61±0.28	6.6-8.4
Albumin (g/dL)	2.31±0.19	3.2-4.3
ALT (IU/L)	108.62±1.98	28-109
Creatinine (mg/dL)	1.93±0.08	0.8-2.1
Calcium (mg/dL)	11.08±0.19	8-11

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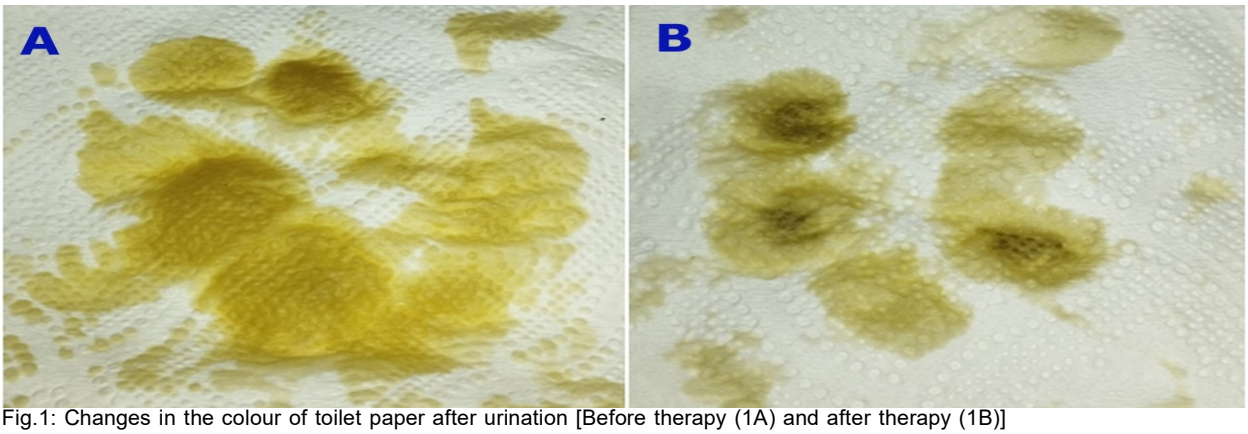

Fig.1: Changes in the colour of toilet paper after urination [Before therapy (1A) and after therapy (1B)]

Fig. 2: Ultrasonographic assessment of bladder for cystitis [Before therapy (2A) and after therapy (2B)]

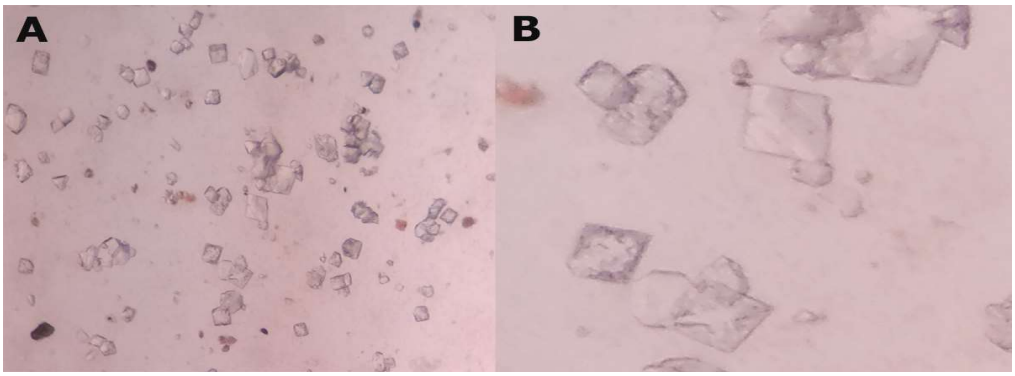

Fig. 3: Microscopic view of calcium oxalate crystals in urinary sediment [100X (3A) and 400X magnification (3B)]

excretion, inflammatory changes in the urinary tract and changes in urine pH are the common etiological factors for the development of the calculi in cats (Dijcker *et al.,* 2011). Males are more prone than females because of their urethral anatomical confirmation. In the present study, elevated levels of creatinine noticed might be due to renal insult by elevation of hydrostatic pressure and increased reabsorption of creatinine from the bladder due to prolonged stasis of urine in the urinary bladder (Reddy *et al.,* 2018). Lower than 0.3 mm crystals are not visible in radiography studies. In the present study, none of the cats showed the radio-opaque material in radiography which is indicative of crystals below the size of 0.3 mm. Supplementation of oral citrate is essential to prevent calcium oxalate crystals because citrate can combine with calcium to form soluble complexes which reduce the ionized calcium concentration (Bartges, 2016). Renodyl contains synbiotics including probiotics and prebiotics and these will help in natural enteric dialysis, beneficiary bacteria that support kidney function and helps to slow down uremic toxin build-up in cats with renal insufficiency. Lactobacillus species could decrease levels of IL6, IL8 and Lactic acid dehydrogenase significantly which could exert anti-inflammatory and immunomodulatory effects in cats. Continuation of potassium citrate orally because it acts as a urinary alkalizer and helps in the solubility of calcium oxalates in urine.

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