

Case Study

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## Therapeutic Management of Cystic Calculi Induced Cystitis in a Dog

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### ABSTRACT

#### Keywords

Dalmatian, Suppurative cystitis, Urate crystals, Struvite crystals, Urohydropropulsion

#### Article Info

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A six year old male Dalmatian dog was presented with the history of not voiding urine and gradual distention of abdomen for three days. The dog showed fever and distended urinary bladder. Haematobiochemical findings were leukocytosis with neutrophilia and elevated BUN and creatinine. Radiography and ultrasonography showed distended urinary bladder with cystoliths. Cystocentesis followed by retrograde urohydropropulsion was performed and 350 ml of cloudy urine was collected by catheterization. The microscopic examination of urine revealed numerous urate and struvite crystals, granular casts, leukocytes, erythrocytes and bacterial rods and cocci. *Escherichia coli* and *Staphylococcus spp.* were isolated from urine culture. The animal was treated with enrofloxacin, allopurinol and oral haematinics for 15 days and showed uneventful recovery.

### Introduction

The cystitis in dogs is mainly due to inflammation and bacterial infections of urinary bladder either bacteria migrating up from the lower urinary tract or secondary to calculi knocking around in the urinary bladder, withholding the urine for longtime, or infections in prostate, kidney, uterus, etc. Dalmatian breed of dog is more likely to be affected with urate calculi due to inherited defect in uric acid metabolism like impaired transport of urate across hepatocyte cell membrane (Giesecke and Tiemeyer, 1984), delayed intestinal uptake of urate and hypoxanthine (Briggs and Harley, 1986) and reduced renal absorption of urate (Roch-

Ramel *et al.*, 1976). In the present case, both urate and struvite calculi with suppurative cystitis in a Dalmatian dog was documented.

### Case history and observations

A six year old male Dalmatian dog was presented to small animal medicine outpatient unit of Teaching Veterinary Clinical Complex, Veterinary College and Research Institute, Tirunelveli with the history of not voiding urine, anorexia and gradual distention of abdomen for the past 3 days. Elevated body temperature (39.8°C), congested mucus membrane, moderate dehydration, distended and tense urinary bladder on palpation of abdomen were recorded in general clinical

examination. Haematobiochemical examination revealed moderate anaemia (Hb - 8.0 g/dl, PCV - 26.4%, RBC -  $4.52 \times 10^6$ /cumm) leukocytosis (24,600/cumm) with neutrophilia (78 %), elevated blood urea nitrogen (103.5 mg/dl) and serum creatinine (4.1 mg/dl). Radiography showed distended urinary bladder with numerous cystoliths. Ultrasonography of the abdomen revealed distended urinary bladder with hyperechoic sediments and cystolith (plate 1). Cystocentesis was performed to relieve the pressure in the urinary bladder and to collect urine sample for cultural examination. After performing retrograde urohydropropulsion, urinary catheter was passed and remaining urine was collected from urinary bladder. Total volume of 350 ml of yellowish cloudy urine was collected (plate 2). Urinalysis revealed slightly alkaline urine (pH 7.4), presence of numerous urate and struvite crystals (plate 3), granular casts, leukocytes, erythrocytes and bacterial rods and cocci. Cultural examination of urine showed *Staphylococcus spp.* and *Escherichia coli* and sensitivity to enrofloxacin and amoxicillin + clavulanic acid. Based on the history, clinical findings and laboratory findings, the case was diagnosed as suppurative cystitis.

### **Treatment and Discussion**

The animal was treated with Inj. Dextrose normal saline @ 10 ml/kg iv and Inj. Ringer's lactate @ 10 ml/kg iv for five days along with Tab. Enrofloxacin @ 5 mg/kg bwt sid po, Tab. Allopurinol @ 10 mg/ kg bwt tid po and oral haematinics 15 days. Urolithiasis induced cystitis is common in dogs. Crystal solubility is mainly depending upon urine pH. Struvite urolith is most common uroliths of dogs formed in alkaline urine found in urinary tract infection due to urease producing bacteria like *Staphylococcus* and *Proteus*, calcium phosphate in alkaline to neutral urine, calcium oxalate and silica in neutral to acidic urine and

urate, xanthine and cystine in acidic urine (Adams and Syme, 2005). Urate crystals may also occur due to liver disorders and portosystemic shunts in dogs. In the present case, the Dalmatian dog was having normal liver function precluded the liver disorder in the formation of urate crystals. It might be due to enzyme defect specific for Dalmatian dog. The mechanical damage of urinary bladder by the urate calculi might predispose for cystitis or urinary tract infections with urease producing bacteria like *Staphylococcus*, *Proteus* and *E. coli* might have increased ammonium ions which predisposed to ammonium urate calculi formation. Seguin *et al.*, (2003) reported that *Escherichia coli*, *Proteus spp.*, *Staphylococcus spp.* were the major pathogens in the canine urinary tract infections.

In the present case, *Staphylococcus* and *Escherichia coli* were isolated in the urine culture. *Staphylococcus* contains urease and is capable of splitting urea into ammonia and carbon dioxide. Hydroxyl and ammonium ions are formed by the hydrolysis of ammonia, which decreases hydrogen ion concentrations in urine, resulting in an alkaline urine pH and decreased struvite solubility. The calcium oxalate and struvite are largely radiopaque and urate, cystine and calcium phosphate are variably radiopaque. Hence, for accurate diagnosis of the urolithiasis in dogs, combination of ultrasonography and survey radiography is needed (Kyles *et al.*, 2005). Urine sediment examination and urine culture are useful in identifying the type of calculi, pyuria or bacteriuria and identification of bacteria (Gatoria *et al.*, 2006). Bacterial urine culture and sensitivity testing are important in all animals with urolithiasis to identify and properly select the antibiotics in concurrent urinary tract infections (Olin and Bartges, 2015). In the present case, enrofloxacin was administered based upon urine culture and sensitivity test.

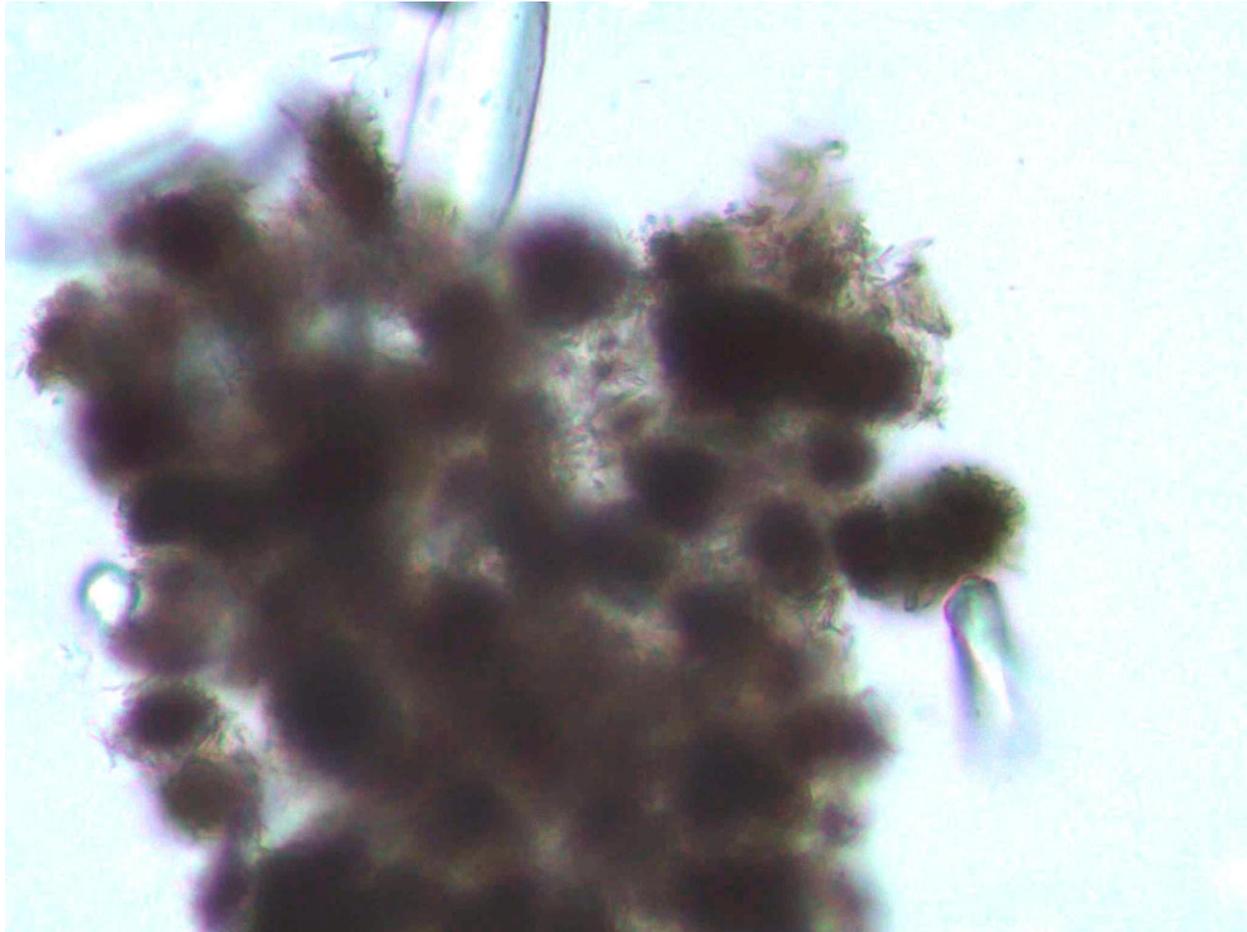
**Plate.1** Ultrasound examination of urinary bladder showed hyperechoic sediments and cystoliths



**Plate.2** Yellowish cloudy urine



**Plate.3** Urine sediment examination showed urate and struvite crystals



The long course of 7 to 14 days treatment was needed for the management of complicated case of cystitis in dogs. Enrofloxacin, Amoxicillin + clavulanic acid and Sulfamethoxazole + trimethoprim were having good activity against canine urinary tract infections (Weese *et al.*, 2011). Allopurinol is a competitive inhibitor of the enzyme xanthine oxidase, so it can be administered in dogs for the management of urate crystals in Dalmatian dogs (Bartges *et al.*, 1999). In the present study, there was post renal azotemia and it was managed by fluid therapy. Post treatment haematology and serum biochemistry were within normal. The dog had the normal urine flow. Post treatment urine sediment and cultural examination showed normal pH and absence of crystals

and bacteria. For the prevention of Struvite urolith, the commercially available diet with lower urinary phosphate and magnesium is to be fed and also to maintain an acidic urine by elimination of urease-producing bacterial infections. The low protein and purine diet and alkalinization of urine are to be followed for the prevention of urate uroliths.

**Summary**

Urate and struvite calculi induced suppurative cystitis in Dalmatian dog was diagnosed by clinical signs, haematobiochemical examination, radiography and ultrasonography. The animal was treated successfully by the administration of enrofloxacin, allopurinol and fluid therapy.

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