



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(7): 791-793
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www.thepharmajournal.com

Received: 12-04-2022
Accepted: 15-05-2022

RC Sundararajan
Department of Veterinary
Medicine, Veterinary College and
Research Institute, TANUVAS,
Tirunelveli, Tamil Nadu, India

K Preethi
Department of Veterinary
Medicine, Veterinary College and
Research Institute, TANUVAS,
Tirunelveli, Tamil Nadu, India

V Vijayanand
Department of Veterinary
Medicine, Veterinary College and
Research Institute, TANUVAS,
Tirunelveli, Tamil Nadu, India

S Kokila
Department of Veterinary
Medicine, Veterinary College and
Research Institute, TANUVAS,
Tirunelveli, Tamil Nadu, India

K Gopal
Department of Veterinary
Medicine, Veterinary College and
Research Institute, TANUVAS,
Tirunelveli, Tamil Nadu, India

M Balangatharathilagar
Department of Veterinary
Medicine, Veterinary College and
Research Institute, TANUVAS,
Tirunelveli, Tamil Nadu, India

E Madhesh
Department of Veterinary
Medicine, Veterinary College and
Research Institute, TANUVAS,
Tirunelveli, Tamil Nadu, India

Corresponding Author
RC Sundararajan
Department of Veterinary
Medicine, Veterinary College and
Research Institute, TANUVAS,
Tirunelveli, Tamil Nadu, India

Nephro-cysto urolithiasis induced kidney disease in two dogs: A case report

RC Sundararajan, K Preethi, V Vijayanand, S Kokila, K Gopal, M Balangatharathilagar and E Madhesh

Abstract

Two dogs viz. Spitz and Doberman was presented to Veterinary Clinical Complex with a history of anorexia, vomiting and difficulty in urination for past one week. Clinical examination revealed severely congested conjunctival mucous membrane, enlarged popliteal lymph node and pain on palpation of the abdomen. Hematological analysis revealed leukocytosis and neutrophilia. Serum biochemical analysis revealed increased blood urea nitrogen, creatinine, ALP, sodium and decreased glucose levels. Radiographical examination revealed distended bladder with various uroliths. Ultrasonography of two dogs revealed the presence of calculi also in both the kidneys and penile urethra of Spitz. Urinalysis revealed presence of numerous WBCs, RBCs and few phosphate crystals in the urine with acidic pH. The cases were diagnosed as urolithiasis induced kidney disease. The animals were managed with retrograde urohydropropulsion, fluid therapy, antibiotics, diuretics, anti-inflammatory drugs and anti-histamines along with oral urine alkalizing agents and anti-lithiatic tablets. The details of the cases will be discussed.

Keywords: Anti-lithiatics, urolithiasis and retrograde urohydropropulsion

Introduction

The sediment formation anywhere within the urinary tract is called as urolithiasis [3]. Urolith is also defined as the accumulation of crystalline and matrix minerals in one or more locations of the urinary tract due to the oversaturation of urine with crystallogenic substances. Multiple physiological and pathological processes are involved in the formation of urolithiasis [1]. It is more common in the lower urinary tract than the upper urinary tract [1, 3]. There are four main types of uroliths, namely urate & uric acid, cystine, magnesium ammonium phosphate and calcium. Magnesium and calcium containing uroliths are the most prevalent types of uroliths [1]. The diagnosis of cystic and urethral calculi is to be done by clinical history, physical examination, radiography and ultrasonography [3]. The minimum analysis required to diagnose renal affections includes, blood urea nitrogen, creatinine, urinalysis, haemoglobin, total protein, albumin and electrolyte assays [5]. The most accurate method to count and diagnose calculi is double contrast radiography [1]. Both the radiopaque and non-radiopaque calculi can be diagnosed in ultrasonography [1].

The crystals formed can cause a different kidney injuries induced by minerals, metabolites, proteins or dietary components and drug metabolites [2]. The mechanism involved in the formation of crystal induced injuries are varied [2, 5]. There are three types of crystal nephropathies depending on their location. They are, Type 1 Crystalline nephropathy: Renal cholesterol embolism, Type 2 Crystalline nephropathy: Intratubular crystal formation and Type 3 Crystalline nephropathy: Urolithiasis [2]. Uroliths can also causes certain uncommon conditions like pancreatitis, vomiting and inappetence of undetermined etiology, and persistent signs of lower urinary disease [4].

Case history and observation

Twelve years old male Spitz and seven years old female Doberman were presented to Veterinary Clinical Complex of Veterinary College & Research Institute, Tirunelveli with the history of anorexia, vomiting and dysuria for past one week. Clinical examination revealed severely congested conjunctival mucous membrane and enlarged popliteal lymph node with the temperature of 39.2 °C & 38.5 °C in Spitz and Doberman respectively. Hematological analysis revealed leukocytosis and neutrophilia. Serum biochemical analysis revealed increased blood urea nitrogen, creatinine, ALP, sodium and decreased glucose levels. The hematological, serum biochemical and urine analysis of Spitz and Doberman were mentioned

in table 1. Radiological examination revealed distended bladder with radiopaque calculi (Fig.1 & 2). Ultrasonography of the abdomen of the Spitz revealed calculi in both the kidneys (Fig.4), bladder (Fig.3) and penile urethra (Fig.5). Ultrasonography of the abdomen of Doberman revealed calculi in both the kidneys (Fig.7) and bladder (Fig.6). Based on the above findings, the case was diagnosed as urolithiasis induced kidney disease (Type: 3 Crystalline nephropathy) and the cases were managed with retrograde urohydropropulsion (Fig.8), anti-lithiatic therapy and management of chronic kidney disease.

Table 1: Hemato-biochemical and urine analysis

Parameters	Spitz	Doberman
Hematological analysis		
Haemoglobin (g/dl)	15.1	15.7
Packed cell volume (%)	39.9	47.2
Red blood cells (m/cmm)	7.49	9.8
White blood cells (/cmm)	19,600	25,000
Platelets (/cmm)	439,000	242,000
Neutrophils (%)	82	90
Lymphocytes (%)	18	7
Monocytes (%0	-	3
Eosinophils (%)	-	-
Basophils (%)	-	-
Serum biochemical analysis		
BUN (mg/dl)	201.23	211.74
Creatinine (mg/dL)	4.1	3.2
Total proteins (g/dL)	4.6	4.8
Albumin (g/dL)	2.1	2.3
ALT (IU/dL)	26	54
ALP (IU/dL)	108	183
Calcium (mmol/dL)	13.6	10.1
Phosphorus (mmol/dL)	9.1	6.2
Glucose (mg/dl)	43	44
Sodium (mmol/dL)	179.44	176.34
Potassium (mmol/dL)	4.23	3.39
Chloride (mmol/dL)	109.17	109.23
Urinalysis		
Colour	Reddish	Dark yellow (Fig.10)
pH	6.0	6.0
Specific gravity	1.020	1.020
Protein	+ve	+ve
Glucose	-ve	-ve
Bilirubin	-ve	-ve
Leukocyte	++	+++
Ketone bodies	-ve	-ve
RBC	+++	++
Bile salts	-ve	-ve
Bile pigments	-ve	-ve
Urobilinogen	-ve	-ve
Sediments	-ve	Few phosphate crystals



Fig 1: Radiograph showing the presence of calculi in the bladder of spitz

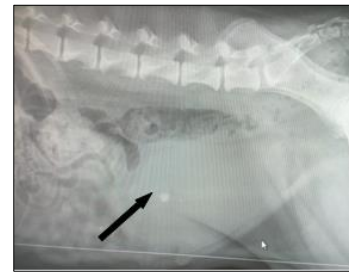


Fig 2: Radiograph showing the presence of calculi in bladder of Doberman



Fig 3: USG showing the thickened urinary bladder with calculi in Spitz



Fig 4: USG showing the calculi on both right and left kidney of Spitz

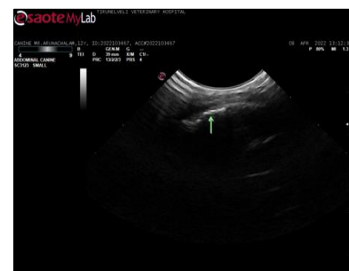


Fig 5: USG showing the calculi on penile urethra of Spitz

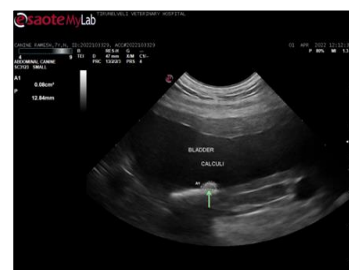


Fig 6: USG showing calculi on thickened urinary bladder of Doberman



Fig 7: USG showing calculi on right kidney of Doberman



Fig 8: Retrograde urohydropropulsion to relieve the obstruction by pushing the calculi back to the bladder



Fig 9: Calculi removed from Doberman



Fig 10: Dark yellow coloured urine from Doberman

Treatment and Discussion

Retrograde urohydropropulsion was performed as per the standard protocol to relieve the urethral obstruction. In Doberman, the uroliths present in the vaginal end of urethra were manually removed (Fig.9). Both the cases were managed with anti-lithiatic tablets (Tab. Cystone in Spitz & Tab. Tamsulin in Doberman) was advised b.i.d. P/O along with urinary alkalizer (Syrup. Neeri KFT in Spitz & Syrup. Noculi in Doberman). The chronic kidney disease was managed with Inj. Ringer's lactate @ 10ml/kg b.wt I/V, Inj. Amoxicillin & Cloxacillin @ 10mg/kg b.wt I/V, Inj. Pantoprazole @ 1mg/kg b.wt I/V, Inj. Frusemide @ 2mg/kg b.wt I/V and Inj. Chlorpheniramine maleate @ 0.5mg/kg b.wt I/M was administered. Suspension Sucralfate was administered at the dose of 0.5g/kg b.wt P/O as a phosphate binder. This treatment was continued for 10 days and the animals

succumbed to death several days after the treatment.

The reason for urolithiasis induced kidney disease in dogs might be due to the fact that persistence of supersaturated urine in the urinary tract for a long period of time, promotes crystal formation and results in tubular obstruction & tissue remodelling [2]. The spitz was suspected for calcium oxalate containing crystals. Hence, anti-lithiatic tablet Cystone (Herbal preparation) was given as it inhibits calculogenesis and causes disintegration and expulsion of crystals by binding with mucin. As phosphate crystals were found in Doberman, Tab. Tamsulin, an alpha blocker was given as it boosts the passage of crystals by relaxation of smooth muscles in the urinary tract. In majority of the dogs, a combination therapy of anti-lithiatics, antibiotics along with diet often caused dissolution of the urolith [4]. Urinary alkalizer, Syrup. Neeri was advised in Spitz, because maintaining the urinary pH between 5.5-6.0 helps in prevention and dissolution of uroliths [1]. Urinary acidifier, Syrup. was advised in Doberman, as the alkaline urine increases the chance of phosphate crystals in the urine [1].

Conclusion

Removal of uroliths will not alter the underlying condition responsible for its formation. Hence, additional therapies should be given to prevent its recurrence. The diagnosis of composition of urolith is highly helpful in providing proper medical and dietary treatment. A proper balanced diet with adequate water intake prevents crystal formation. A better understanding of the pathophysiology of crystalline nephropathy is essential to provide prognosis and treatment.

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