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Case Report
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Diagnosis and treatment of urolithiasis in a Toy Poodle dog

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Abstract

Background: Urolithiasis in dogs is a disorder of the urinary tract caused by the development of crystals. These crystals are composed of minerals such as phosphates, oxalates, urates, cystine, carbonates, and silica. It can be fatal if the diagnosis and treatment are inaccurate. This report aims to report a case of urolithiasis in a Toy Poodle dog.

Case Description: A 2-year-old male Toy Poodle dog weighing 4.2 kg with black hair, and having trouble urinating was presented to Prof. Soeparwi Animal Hospital, Universitas Gadjah Mada, Indonesia. The dog is examined physically and, in the laboratory, diagnosed and continued with operative therapy. The history and physical examination revealed that the dog had been experiencing hematuria, stranguria, and oliguria for 2 months, with the last few days accompanied by decreased appetite. The dog exhibited decreased skin turgor, a capillary refill time (CRT) of less than 2 seconds, signs of pain and distress during urination, and palpation of distended urinary vesicles. Ultrasound scans revealed uroliths in the urinary vesica, which were identified by an acoustic shadow. Blood tests indicated a decrease in hematocrit and erythrocytes along with an increase in leukocytes. Urolithiasis was diagnosed in the case dog based on anamnesis, physical examination, hematological examination, and ultrasonography. Subsequently, a cystotomy was performed, and uroliths located in urinary vesicles were removed. The dog received ceftriaxone injections at 15 mg/kg body weight and vitamin B-complex injections at a concentration of 10 mg/kg body weight for 5 days. Four days post-surgery, the case dog was able to successfully urinate and pass clean urine.

Conclusion: The Toy Poodle dog was diagnosed with silica urolithiasis in the urinary vesicles and the urolith is quite large. Cystotomy was performed to remove the urolith. Postoperative care were included the administration of antibiotics and vitamins to facilitate the healing process. The condition of the Poodle toy dog improved.

Keywords: Cystotomy, Male dog, Silica urolith, Toy Poodle, Urolithiasis.

Introduction

Urolithiasis is a condition that occurs when crystals develop in the urinary tract, causing stones to form. These stones are composed of minerals such as phosphates, oxalates, urates, cystine, carbonates, and silica. Classification of uroliths into four types of minerals, such as urate, cystine, magnesium ammonium phosphate, and calcium. Clinical signs of urolithiasis include haematuria, pollakiuria, stranguria, and dysuria, although these symptoms can also be indicative of other lower urinary tract diseases (Foster, 2021). Large uroliths have the potential to cause bladder obstruction, while smaller stones can travel into the urethra and become lodged, resulting in obstruction. Dogs with urinary tract obstruction typically exhibit attempts to urinate without passing urine or only releasing a minimal amount of urine (Permatasari and Sholihin, 2021; Hunter and Ward, 2023). In this case, a 2-year-old male Toy Poodle dog weighing 4.2 kg, was reported to have experienced haematuria, stranguria, and oliguria for a duration of 2 months. The purpose of this report is to report a case of urolithiasis in a male Toy Poodle dog.

Case Details

A 2-year-old male Toy Poodle dog weighing 4.2 kg with black hair was brought to RSH Prof. Soeparwi FKH UGM Yogyakarta with complaints of urinating only slightly or oliguria. Over the last 2 months, the dogs exhibited symptoms such as bloody urine (hematuria), whooping during urination (stranguria), and decreased appetite and water intake. Previous treatment included amoxicillin, nephrolith, and tranexamic acid, but a relapse occurred after completing the treatment. The dog is fed a homemade diet consisting of beef and vegetables, resides indoors, and is occasionally taken for walks with the owner despite minimal water intake.

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Similar experiences have occurred in the dog's medical history.

During urination, the dog displays signs of pain and whooping, and abdominal palpation indicates distention in the urinary vesicles. Blood tests revealed a decrease in hematology values of hematocrit (36%), erythrocytes (5.4 × 10^6/l), and eosinophils (0.85 × 10^3/l). The number of lymphocytes (5.89 × 10^3/l) has increased. Blood chemistry results revealed an increase in GOT/AST (60 IU/l), total plasma protein (9.0 mg/dl), globulin (6.4 g/dl), urea (50.91 mg/dl), and BUN/creatinine (273,661), while glucose values decreased (38.57 mg/dl). Ultrasound examination identified uroliths, as acoustic shadows in the urinary vesicles, accompanied by urinary vesicle distention. According to this ultrasound, the urolith is quite large (Fig. 1).

Cystotomy was determined, and the dog received pre-anesthesia with a subcutaneous injection of atropine sulfate at a concentration of 0.04 mg/kg body weight, along with intramuscular injections of xylazine HCl at 1.2 mg/kg body weight and ketamine HCl at 10 mg/kg body weight. Ringer lactate at a rate of 20 ml/kg/hour intravenously was administered during a surgical procedure. An incision was made 2 cm distal to the umbilical scar in the ventral midline. After grasping the bladder with Babcock forceps, a longitudinal incision was made on the ventral surface of the organ. The calculi were extracted using Kelly or grasping forceps, and the bladder was cleansed with a sterile solution to minimize the risk of infection. The incision on the bladder wall was carefully closed using a continuous suture technique with resorbable thread. A simple continuous pattern was used in the first layer, and the suture in the second layer was made with interrupted Lembert.

For postoperative care, the animal was prescribed intramuscular injection ceftriaxone sodium at a dosage of 25 mg/kg body weight (Inj. Monocef®, Aristo Pharmaceuticals Pvt. Ltd., India) twice daily for a duration of 5 days. In addition, an intravenous infusion of 5% dextroses sodium chlorin (DNS) (250 ml b.i.d) was administered, and an intramuscular injection of meloxicam at a dose of 0.2 mg/kg body weight (Inj. Melonex®, Intas Pharmaceuticals Ltd., India) was given once daily for a period of 3 days. Furthermore, an injection of vitamin B-complex at a dose of 0.25 ml once a day was given intramuscularly (Inj. Vit B Complex®, PT. Medion Farma Jaya). As shown in Figure 2, the silicate urolith was successfully removed as a result of this procedure.

Discussion

Urolithiasis is a general term that describes the presence of stones in the urinary tract. Stones can form in the kidney, ureter, bladder, or urethra, among other places in the urinary tract. This urolithiasis case is not the result of a single disease, but rather the result of or secondary to one or more conditions (Tiruneh and Abdisa, 2017). The presence of the urolith can lead to inflammation, urine bleeding or haematuria, difficulty urinating, and in some cases, urethral obstruction (Permatasari and Sholihin, 2021; Hunter and Ward, 2023). In this case, a male Toy Poodle dog exhibited symptoms of stranguria, experiencing silica urolithiasis caused by obstruction of the urinary tract by silica uroliths. The development of these uroliths in the urinary tract is attributed to insufficient water intake and pet food rich in silica content. A high percentage of plant-derived components in food is a likely risk factor for the production of silica-containing urolith. Silicic acid is easily absorbed from the gastrointestinal system and eliminated through the kidneys (Tasaki *et al.*, 2013).

Several factors can affect the development of silica urolithiasis in dogs, such as age, sex, race, feed/diet, urinary tract infections, anatomical and metabolic abnormalities, and urine pH. Male dogs have a higher risk with a ratio of 2:1 compared to female dogs, primarily because male dogs have longer and narrower urethras (Brown, 2013). Dogs aged over 7 years and those that have been castrated also face a higher risk (Kopecny *et al.*, 2021). The two prevalent categories of bladder stones include those made of calcium oxalate and those made of struvite. In dogs, silica urolithiasis is rare. In international epidemiology research, 0.69%–0.74% of the samples examined in the reference laboratory had silica urolithiasis (Lulich *et al.*, 2013). Cases of uroliths containing silica are increasing in line with the pet food industry's increased use of plant-derived ingredients. Silicate uroliths are radiopaque, making crystallographic techniques for urolith analysis highly useful for diagnosis (Tiruneh and Abdisa,

Fig. 1. The ultrasound examination of the dog case revealed uroliths in the urinary vesicles, as indicated by the arrow marked with an acoustic shadow.

Fig. 2. The type uroliths after removal is silicate.

2017). The formation of silica uroliths is believed to be a result of consuming low-quality animal food that incorporates plant material with elevated levels of silica as a protein source (Osborne *et al.*, 1999). On the other hand, the consumption of water rich in silica, such as groundwater, might play a role in the development of silica uroliths (Del Angel-Caraza *et al.*, 2010). Mendoza-López *et al.* (2021) also demonstrated that high silica concentrations in Mexican water increase the risk of silica urolith formation in dogs.

The treatment of urolithiasis involves various approaches, such as voiding urohydropropulsion, surgical intervention, dietary modifications, and strategies to increase urine volume and alkalization. Surgical treatment emerges as one of the most commonly used methods for eliminating uroliths. When the size of the stone renders urohydropropulsion impractical, surgical removal of silica uroliths becomes a prevalent and effective course of action (Osborne *et al.*, 1999). Cystotomy, a specific surgical technique used for this purpose, has been demonstrated in studies focused on the removal of silica uroliths in dogs (Pinel *et al.*, 2013). This procedure involves making an incision in the bladder to facilitate the extraction of stones (Osborne *et al.*, 1999; Brown, 2013). In this case, the dog underwent a cystotomy to remove the silica urolith located in the urinary bladder. For postoperative care, the dog was prescribed antibiotic, anti-inflammatory, and vitamin B-complex. The dog showed smooth, clear urine without blood on day 4 after surgery.

Following the initial treatment, it is essential to conduct regular follow-up visits and urinalysis to monitor the treatment's effectiveness and prevent the recurrence of silica urolithiasis (Grauer, 2015). Effective feed diet management is crucial to prevent the recurrence of urolithiasis in dogs. Attention should be given to avoiding diets rich in vegetable protein. Dietary adjustments are recommended if a dog's diet contains a high of silica or if there is a recurrence of silica urolithiasis. Adding salt and water to the diet is necessary to induce diuresis and reduce the concentration of urine solutes, while a plant-based diet should be avoided (Brown, 2013).

Conclusion

Based on the results of physical examination and ultrasound, the Toy Poodle dog was diagnosed with silica urolithiasis in the urinary vesicles and the urolith is quite large. Silica urolithiasis is rare in dogs. Cystotomy surgery was performed to remove the urolith and reveal a silica urolith measuring approximately 1 cm. For postoperative care for 5 days, the animal was prescribed intramuscular injection of the antibiotic Monocef®, intravenous infusion of DNS, and an intramuscularly injection of vitamin B-complex. In addition, intramuscular injection antiinflammation of meloxicam was administered for a period of 3 days. Throughout the postoperative care process, the condition of the Toy Poodle dog improved and on day 4 the dog exhibited good urination without any signs of blood. On day 5, the patient was allowed to go home. To prevent a recurrence of urolithiasis in Toy Poodle dogs, it is necessary to have proper feed management to meet the nutrition of the dog's body.

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Conflict of interest

The authors declare that no commercial or financial relationships existed that could be construed as a potential conflict of interest when conducting the research.

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Authors' contributions

GTM was involved in the case analysis and took responsibility wrote the script. ABP is involved in case management and documentation. TWP was involved in coordinating the case and is responsible for

publication. All the authors have read and approved the final version of the script.

Data availability

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

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