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SURGICAL MANAGEMENT OF CYSTOLITHS BY CYSTOTOMY IN A GOLDEN TERRIER DOG UNDER RESOURCE-LIMITED FIELD CONDITIONS: A CASE REPORT

KINZANG CHEDUP[1] AND TENZIN WANGCHUK[2]

[1] Regional Veterinary Hospital & Epidemiology Center, Dewathang, Samdrup Jongkhar
[2]National Veterinary Hospital, Thimphu

*Author for correspondence: kinzangchedup@gmail.com

ABSTRACT: *A four-year-old Golden Terrier (mixed breed) female dog was presented to the Regional Veterinary Hospital & Epidemiology Center with the complaint of urinary incontinence, severe hematuria, dysuria, and stranguria. Feeding habits were reported to be normal. Clinical examination was performed and all the vital physiological parameters like conjunctival mucous membrane, pulse rate, and rectal temperature were normal. The animal exhibited pain upon palpation of the lower abdominal region. The dog's condition was confirmed as Cystolith through radiographic imaging (X-ray), with technical assistance from the Human General Hospital. The dog remained clinically affected for over 15 months following initial presentation with pollakiuria and dysuria. Cystotomy was performed to remove the two Cystoliths detected in the urinary bladder lumen. Cystoliths were triangular and square prism-shaped, weighing 11g and 13 g, respectively. Post-operatively, the dog was treated with antibiotics: Enrofloxacin (5 mg per kg body weight, b.i.d orally for 5 days); Chlorpheniramine maleate (0.4mg/kg or 4mg total dose, b.i.d orally), and Prednisolone (1mg/kg or 10mg total dose, orally, o.d). The post-surgical follow-up on the 7th day showed the dog made an uneventful recovery except for a minor swelling over the incision line, which subsided after administration of Serratiopeptidase tablet (10mg, total dose, orally). This case illustrates the prolonged discomfort endured by the animal due to the delayed diagnosis of the condition in the limited veterinary setting especially due to lack of point-of-care diagnostic facilities. However, the uneventful recovery of the affected dog indicates that cystotomy is the choice of medical interventions to treat cystolithiasis, regardless of the degree of affection, in dogs.*

Keywords: Cystolith; Dysuria; Female dog; Hematuria; Incontinence; Serratiopeptidase

1. INTRODUCTION

Uroliths are aggregations of crystalline and noncrystalline solid particles seen in the urinary tract(Koehler et al. 2009). Urolith that develops in the bladder is called Cystolith. Struvite and oxalates are the most common canine Cystoliths (Fossum 2007), as cited in Sagar et al. (2024) Canine urolithiasis is a common cause of emergency urinary tract disease requiring a rapid definitive diagnosis for immediate surgical and/or medical therapy (Fromsa and Saini 2019).

There is no definitive mechanism of calculi formation in dogs (Njoku et al. 2021). However, increased urine concentration, decreased water intake, irreversible water losses, increased mineral excretion, urinary tract inflammation, and change in urine pH are the major predisposing factors that may lead to calculi formation in the urinary tract (Uma et al. 2018)

Female dogs are more susceptible to bladder infections and develop bladder stones much more frequently than males, probably because of their shorter urethra and higher urinary tract infection (UTI) incidence. The incidence of struvite bladder stones is higher- up to 85% in female dogs (Ryan 2025).

Microscopic crystals associated with urolithiasis rarely cause clinical signs. The formation of macroscopic uroliths in the lower urinary tract irritates the mucosal surface, manifesting typical clinical signs such as dysuria, hematuria, and stranguria (Njoku et al. 2021).

Surgical management is considered a more effective treatment of canine urolithiasis (Fossum 2007) as cited in (Sagar et al. 2024; Saharan et al. 2018) where the medical dissolution of calculus is not possible. This case report presents the delayed diagnosis of Cystolith condition in a four-year-old Golden Terrier mix pet dog and its surgical removal at the Regional Veterinary Hospital & Epidemiology Center, Dewathang.

2. CASE STUDY

2.1 History

A four-year-old Golden Terrier mix female pet dog, weighing 10 kg body weight, was presented to the Regional Veterinary Hospital & Epidemiology Center (RVH&EC) on 29th October 2024 with the owner complaining of the dog suffering from hematuria, stranguria, and dysuria, despite completing treatment regimen of suspected urinary tract infection and cystitis. The medical history revealed that the same dog had suffered from pollakiuria one year and three months earlier, and was treated for a suspected UTI Dzongkhag Veterinary Hospital (DVH), Samdrup Jongkhar with antibiotic: Enrofloxacin (5mg per kg body weight orally for 5 days), antihistamine: Chlorpheniramine maleate (4mg, Total dose). The condition persisted and it was further referred to RVH&EC, Dewathang on October 21st, 2024 with a severe form of hematuria, stranguria, and dysuria, and was treated for suspected Cystitis with the antibiotic: Doxycycline (10 mg/kg body weight orally for 5 days); antihistamine: Chlorpheniramine maleate (4mg total dose, PO, b.i.d); analgesic: Prednisolone (0.2 mg/kg body weight); liquid Alkasol (Disodium Hydrogen Citrate), and Vitamin-C supplement.

2.2 Case presentation

The demeanor of the particular dog, including the appetite was reported to be normal and all other vital physiological parameters (conjunctival mucous membrane (cmm), pulse rate, hydration, and rectal temperature) were within normal ranges.

2.3 Diagnosis

2.3.1 Blood parameter analysis

Complete blood count (CBC) and red blood cell parameters were examined in the center's laboratory using a blood analyzer. All blood parameters were within normal ranges, except for an elevated Mean Corpuscular Hemoglobin Concentration (MCHC) of 38.1 g/dl (32.0-36.3g/dL) and a decreased platelet count of 166 × 10^3/mm^3 (211-621 x 10^3/µL). The urine analysis was not performed.

2.4 Ultrasound examination

Ultrasonography was the only diagnostic imaging facility available at the center's disposal. It was performed to detect the presence of urinary calculi. However, no inference could be drawn from the ultrasonography, and the patient was also uncooperative while it was being performed.

2.5 Radiographic imaging (X-ray)

The case was suspected of Cystolith and for confirmatory diagnosis, radiography of a lateral abdominal view was performed, with technical assistance from the human general hospital, Samdrup Jongkhar. Two Cystoliths, apparently of the same size, were discernible in the urinary bladder lumen (Figure1).

Figure 1: Lateral abdominal radiograph showing two large, radiopaque cystoliths completely occupying the urinary bladder lumen.

2.6 Surgical procedure

2.6.1 Cystotomy

The surgical site was prepared aseptically at the mid-lower ventral abdominal region. General anesthesia was induced using Ketamine and Xylazine combined, and it was maintained on Ketamine and Diazepam combination. A longitudinal skin incision approximately 5 cm long was made over the mid-ventral abdomen. The anatomical structures beneath the skin were carefully dissected using scissors and the urinary bladder was manually exposed and exteriorized gently (Figure 2). The urinary bladder was found impacted by the Cystoliths.

Figure 2: Exteriorization of the urinary bladder during cystotomy.

The urine was emptied by applying gentle pressure over the bladder. The surgical opening was packed with sterile gauze to prevent peritoneal contamination. An incision on the bladder was made over the area with limited blood vessels. The wall of the urinary bladder was significantly thickened. Two Cystoliths of considerable sizes were stacked in the bladder, completely occupying the bladder cavity. The Cystoliths were then carefully exteriorized with artery forceps. The cystoliths were found to be vaguely triangular and square-prism shaped (Figure 3), weighing about 11g and 13g, respectively.

Figure 3: The two large, vaguely triangular and square-prism shaped cystoliths after surgical removal, weighing 11g and 13g.

Urinary catheterization was performed using a canine urethral catheter (BUSTER dog catheter, 3.3mm x 50 cm) to examine the patency of the urethra. The bladder was sufficiently flushed with 0.9% Normal Saline solution, and the bladder opening was closed using Lambert and Cushing's suturing pattern, respectively. The peritoneum and muscle layers were apposed with interrupted cross-mattress suture pattern using absorbable suture (PGA, 1-0), and skin was apposed intradermally using the same suture material.

2.7 Post-operative care

The dog was treated with antibiotics: Enrofloxacin tablet (5 mg per kg body weight, b.i.d orally for 5 days); Chlorpheniramine maleate (0.4mg/kg or 4mg total dose, b.i.d orally), and

Prednisolone (1mg/kg or 10mg total dose, orally, o.d). Daily antiseptic dressing with povidone-iodine solution and external application of Gamma Benzene Hexachloride ointment over the surgical wound was advised.

3. RESULTS AND DISCUSSION

Initially, empirical treatment was initiated for a suspected UTI and cystitis, as the dog presented with clinical signs was consistent with both conditions. However, the signs persisted and progressively worsened. Subsequent radiographic examination revealed the presence of uroliths within the urinary bladder, confirming a diagnosis of cystoliths.

The clinical signs, including hematuria, urinary incontinence, and dysuria suggestive of cystolith condition, were exhibited by the particular dog. These clinical signs exhibited by the affected dog align with similar findings reported in earlier case studies (Njoku et al. 2021; Sharma et al. 2020; Uma et al. 2018). Hematuria and dysuria exhibited by dogs are presumed to have been caused by the irritation of the bladder mucosa caused by uroliths (Uma et al. 2018). The layers of the urinary bladder were also observed to be largely thickened, and the inner lining and mucosal layer were hemorrhagic in this particular case.

A urinary tract infection predisposes the urinary tract to the formation of a urolith. Struvite urolith in dogs is primarily linked to urinary tract infections (Weaver and Pillinger 1975). Certain breeds of dogs are predisposed to struvite, including Cocker Spaniel, Miniature Poodle, Miniature Schnauzer, Shih Tzu, Lhasa Apso, Pekingese, Dachshund, and Bichon Frise (Ryan 2025).

The type of Cystolith in this particular case could not be determined due to a lack of capacity/diagnostic laboratory facilities at the center. However, the most common canine uroliths/cystoliths are magnesium ammonium phosphate, calcium oxalate, or urate, and the most common urinary stones in dogs are struvite and calcium oxalate (Van Vertloo 2025). Struvite stones, or magnesium ammonium phosphate hexahydrate, are reported more commonly in female dogs and calcium oxalate uroliths in male dogs (Barnes et al. 2025), with more incidence in neutered male dogs (“From Stones to Straining; Managing Stranguria in Dogs and Cats,” 2021). Struvites are clearly discernible on the radiograph and appear radiopaque (Sagar et al. 2024).

The Cystoliths removed in this particular case were typically light yellowish and developed in two, with vaguely triangular and square prism-shaped in the bladder. This concurs with the finding of (Sagar et al. 2024).

The fact that the stones were radiopaque and discernible in a lateral abdominal radiographic view suggests they were likely Struvite or Calcium Oxalate, which are the most common canine uroliths.

4. CONCLUSION

Cystotomy was performed, and the Cystoliths were successfully removed. The dog underwent strict post-surgical care and management by the owner, resulting in an uneventful recovery. This case illustrates the prolonged discomfort endured by the animal due to the delayed diagnosis of the condition in the limited veterinary setting and lacking point-of-care diagnostic facilities. However, the uneventful recovery of the affected dog indicates that cystotomy is the procedure of choice for treating cystolithiasis, regardless of the degree of affection, in dogs.

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