



## Diagnosis and Surgical Management of Struvite Urolith in a Yorkshire Terrier - A Case Report

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### Abstract

A 4-Year-old, female Yorkshire Terrier was presented with a history of dysuria, hematuria for past 2 months and passing of calculi in the urine. Physical examination revealed hard and distended urinary bladder. Physiological and hematological parameters were within normal range. Multiple cystic calculi and a large urethral calculus were diagnosed with radiography. Analysis of the voided stone disclosed it as struvite calculi. Midventral laparotomy and cystotomy was performed to retrieve all the cystoliths. Post-operatively, antibiotics and analgesics were followed along with medical management to prevent recurrence. Animal recovered uneventfully without recurrence with follow up for 6 months postoperatively.

**Keywords:** Cystotomy; Dysuria; Struvite Calculi; Urolithiasis

### Introduction

Urolithiasis refers to aggregate of crystalline and occasionally non crystalline solid substances that form in one or more locations within the urinary tract [10]. It is a common condition encountered in small animal practice and caused by precipitation and crystal formation of a variety of minerals which may be due to various reasons like high concentration of salts in urine, optimal pH that favours salt crystallization or decrease in body's natural inhibitors of crystal formation. The most common component in canine uroliths is struvite (magnesium ammonium phosphate) [7]. and is primarily linked to urinary tract infections. Struvite uroliths form when the urine becomes supersaturated with magnesium, ammonium, and phosphorus and when the urine pH is >6.5. Breeds frequently identified with struvite urolithiasis were the miniature schnauzer, bichon frise, shih tzu, Lhasa apso, and Yorkshire terrier with females outnumbering males by 16:1 [5], this increased occurrence in female dogs is due to the host factor which enhances the possibility of urinary tract infection [2].

The animals are presented with dysuria, hematuria, and stranguria, in some cases the animal may be anorectic with vomiting, lethargy, flank and renal pain. In some animals calculi can be no-

ticed in urine. Urinary calculi can develop within a few weeks or they may take months to form. Speed of formation will usually depend on the quantity of crystalline material present and the degree of infection present.

Surgical removal is the most prudent method of stone removal when all aspects of the specific case were reviewed was cystotomy [5].

### Materials and Method

A 4-Year-old, female Yorkshire Terrier was presented with a history of dysuria, hematuria for past 2 months and passing of calculi in the urine. Upon physical examination, bladder was hard and distended on palpation with severe pain. The physiological and hematological parameters were within normal range, whereas biochemical parameters revealed slight hyperproteinemia (7.5g/dl) and hyperalbuminemia (3.5g/dl). Upon urinary catheterization, resistance noticed near the cranial urethra and was unsuccessful. On survey radiography, multiple medium to large sized, radiopaque structures were observed in the urinary bladder with one large calculus obstructing the urethral passage. Ultrasonographic examination revealed hyperechoic structures with acoustic shadowing in

the urinary bladder which was suggestive of cystoliths. Analysis of the excreted calculi disclosed it as Magnesium Ammonium Phosphate (Struvite) calculi. Struvite stones are amenable to medical dissolution but takes an average of 3 months and is not always successful [9]. It was decided to perform cystotomy for surgical removal of the uroliths as the present case posed a risk of urethral obstruction.

The animal was premedicated with diazepam (0.5mg/kg BW) followed by tramadol (4mg/kg BW) intravenously. General anaesthesia was induced using propofol (4mg/kg BW) and maintained with propofol (1mg/kg BW) intravenously. Under aseptic preparation, animal was placed on dorsal recumbency and laparotomy was performed with caudal mid-ventral approach to exteriorize the bladder. The urinary bladder wall was moderately thickened, edematous and the blood vessels on the serosal surface were severely engorged. Cystotomy was performed and around fifty cystoliths of varying sizes were removed. The large calculus obstructing the urethra was pushed into the bladder in retrograde manner and was removed through the cystotomy site. The urinary bladder was flushed with metronidazole solution and catheterized using infant feeding tube size 7. The bladder was closed by Cushing suture pattern followed by Lembert pattern using polyglactin 910 (size 2-0). The muscle layer was apposed by interlocking suture pattern, subcutaneous tissue by walking suture pattern and skin by intradermal pattern using polyglactin 910 (size 2-0). Postoperatively, intravenous administration of Amoxicillin and Cloxacillin (20mg/kg) and Tramadol (2mg/kg) were advised for 5 days. Wound dressing was followed every 2 days. Suture site healing was evident on 12<sup>th</sup> post-operative day.

## Results and Discussion

Lower urinary tract stones are relatively more common in dogs where bladder is the most common site of urolith [3]. urethral obstruction caused by urethral plugs has life threatening consequences of post-renal azotaemia, severe hyperkalaemia and death occurs rapidly if the obstruction is not relieved.

Urolith in the present case was diagnosed as struvite calculi with the help of radiography and microscopical analysis. Radiography is an effective diagnostic modality in case of radiodense calculi like Magnesium ammonium phosphate, calcium oxalate, calcium phosphate, silica and cystine crystals [3]. Analysis of the urolith provides essential information in the management and pre-

vention of further urolith formation. Most struvite stones in dogs are infection-induced, and female dogs are at the greatest risk for this [5]. Most large radiodense stones in dogs are infection induced struvite uroliths which are round to faceted or pyramidal in shape and usually 4 or more in number measuring more than 4- 20 mm in size [10] which was analogous to the present observation [10]. The average time taken to dissolve struvite stones using antimicrobial agents and diet is 3 months and treatment is not always successful [1]. Treatment can fail due to the presence of a calcium phosphate shell. Surgical removal of the uroliths was commanding in this case as it provided immediate relief to the animal and is considered the most prudent method of stone removal [5]. noninvasive techniques such as ESWL, ureteric stenting and laser lithotripsy are available with limited access and are cost-prohibitive for many pet owners [1].

Urinary tract infection with urease-producing microorganisms is essential for the formation of infection-induced struvite uroliths. Thus, eliminating these infections will prevent recurrence of infection-induced struvite uroliths [6]. The prompt usage of antimicrobial agents, urinary antiseptics and dietary changes prevented recurrence of urolithiasis in this case. Following surgical intervention, proper general and dietary management is required to prevent recurrence of cystoliths [10].



**Figure 1:** Abdominal radiograph shows radio opaque urolith in bladder and urethral passage.



**Figure 2:** Urolith excreted in urine.



**Figure 3:** Urinary bladder after removal of urolith.



**Figure 4:** Uroliths surgically removed from Yorkshire Terrier.

## Conclusion

Urolithiasis in canines can be primarily managed by nutritional and dietary changes in early stages; however, the condition can be treated successfully by surgical intervention as the calculi were bigger in size and numerous in numbers in the present case.

It can be concluded that appropriate dietary management can reduce the chances of calculi formation to a great extent. However, prompt diagnosis and surgical intervention improve the outcome of urolithiasis.

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