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Surgical management of a large cystolith in a spitz

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Abstract
A three years old female spitz was brought to the Veterinary Clinical Complex with a history of dysuria, intermittent fever and anorexia since four days and recent episodes of haematuria. Based on history, physical examination, hemato-biochemical and urinalysis, it was suspected for urolithiasis. large cystolith was diagnosed by radiography and ultrasonography. Cystotomy was performed to retrieve that cystolith and further medicinal management was done as per nature of the cystoliths. Animal recovered uneventfully. No recurrence was observed up to 5 months postoperatively.

Keywords: Cystolith, cystotomy, spitz and urinary bladder

Introduction
Uroliths are aggregates of crystalline and occasionally non crystalline solid substances that form in one or more location within the urinary tract (Koehler *et al.*, 2009) [6]. Uroliths that develop in the bladder are called as cystoliths. 95% of calculi in dogs are found either in the bladder or urethra and bladder together (Uma *et al.*, 2018) [10]. The common uroliths in canines include the struvite, calcium oxalate, urate, cystine, calcium phosphate, and silicate among which struvite and calcium oxalate stones are of common occurrence. When urine becomes oversaturated with lithogenic substances, uroliths may be formed and these can interfere with the complete and frequent voiding of urine (Dehmiwal *et al.*, 2016) [3]. Obstruction induced by uroliths causes urine retention that leads to bladder distention causing abdominal pain and eventual urethral perforation or bladder rupture leading to death from uraemia or septicaemia. Increased urine salt concentration, decreased water intake, increased irreversible water losses, increased mineral excretion, urinary tract infections, change in urine pH are the major predisposing causes that may lead to the formation of calculi in the urinary tract. (Uma *et al.*, 2018) [10]. Often a single large cystolith in the bladder or multiple uroliths in bladder and urethra may be observed. Imaging techniques like radiography and ultrasonography are considered best for the diagnostic evaluation of the urinary system. The present article reports the successful surgical management of urine retention in a female pug due to a single large cystolith weighing 75 grams.

Case History and Observations
A three-year-old female spitz was brought to the Veterinary Clinical Complex with a history of dysuria, intermittent fever and anorexia since four days and recent episodes of haematuria. The animal was active and alert and on abdominal palpation a hard, big lemon sized mass was felt at caudal abdomen. Rectal temperature, heart rate and pulse rate were within the normal clinical range. Haematological analysis showed mild neutrophilia with elevated serum creatinine and blood urea nitrogen levels, whereas the rest of the other parameters were within the normal limits. On survey radiography of abdomen, a single large cystolith was observed in the bladder (Fig. 1). On Ultrasonogram the hyperechoic calculi were present within the anechoic lumen of the urinary bladder (Fig. 2). Thus it was decided to perform cystotomy for surgical removal of the calculus.

Surgical Treatment
The animal was fasted for 12 hours prior to surgery and the ventral abdomen was prepared for aseptic surgery as per standard protocol.

Atropine sulphate was used as pre-medicant 0.04 mg/kg body weight subcutaneously followed by xylazine hydrochloride @ 1.0 mg/ kg body weight intramuscular. Anaesthesia was induced with ketamine hydrochloride @ 5 mg/kg body weight intravenous and maintained on inhalant anaesthetic for the rest of the procedure. The animal was restrained in dorsal recumbency and laparotomy was performed through a mid-ventral approach and urinary bladder was exteriorized. An incision was made on dorsal surface of the bladder, away from the urethra.

A large single cystic calculus was removed through the incision site (Fig. 3). The bladder was closed by Cushing's followed by lambert's suture pattern. Muscles, subcutaneous tissue and skin were closed as per the standard protocol. The surgical wound was dressed and bandaged.

Post-operatively, Ceftriaxone at a dose rate of 20 mg/kg body weight was administered intramuscular for 5 days. Meloxicam at a dose rate of 0.3 mg/kg body weight was administered daily once for five days intramuscularly. Owner was advised for daily wound dressing, application of fly repellent spray and to use elizabethian collar to prevent self-mutilation. Low protein diet and salt free water was also advised for daily requirements. Skin sutures were removed on 12th post-operative day and the animal recovered uneventfully.

Results and Discussion

Urolithiasis is the formation of calculi from less soluble crystalloids of urine as a result of acquired physiological and pathological changes (Jattennavar and Kalmath, 2012) [5]. The cystolith recovered from the bladder was round with smooth edges weighing 75 grams and was yellowish-white in appearance. The most frequent anatomical location of calculi in the male is in the urethra followed by urinary bladder however in females, calculi are usually located in the urinary bladder (Uma *et al.,* 2018 and Saharan *et al.,* 2018) [10, 8]. In the present case a large solitary calculi was observed in the urinary bladder. Uroliths are not produced unless sufficiently high urine concentration of uroliths forming constituents exist and transit time of crystals within the urinary tract is prolonged and for certain stones like struvite, cystine and urate other favourable conditions for crystallizations are required (Uma *et al.,* 2018) [10]. Urine retained for more than 24 hours become alkaline due to release of ammonia from break down of urea (Brodey, 1955) [2]. Alkaline urine may lead to precipitation of struvite, calcium carbonate and calcium phosphate calculi (Osborne *et al.,* 1992) [7]. Haematuria and dysuria exhibited by dogs might be due to irritation of bladder mucosa caused by urolith (Uma *et al.,* 2018) [10] and was consistent in the present case also. Elevated blood urea nitrogen and serum creatinine levels were attributed to the prolonged retention of urine and damage caused to the kidneys due to the hydrostatic pressure. High levels of minerals in the diet and sometimes calcium have been directly linked to canine urinary bladder calculi formation. A diet with excess protein also contribute to calculi formation (Griffith, 1979) [4]. Radiography can be used to diagnose the conditions of cystic calculi but the diagnosis becomes challenging if urinary stones are radiolucent (Saini and Singh, 2002) [9]. In the present case also cystolith was easily diagnosable through radiography. Struvite, calcium phosphate and calcium carbonate crystals are radio dense hence can be easily visualised by radiography and ultrasonography. Surgical management is considered more effective treatment for urolithiasis since it alleviates the clinical signs quickly and are associated with better clinical outcome than medical dissolution of calculi which can be a long term procedure. In the present case also surgical removal of the cystolith was performed owing to the deteriorating condition of the animal and the related secondary complications due to urine retention. Nutritional management and control of urinary tract infections has been found to be the best preventive strategy against urolithiasis (Bartges, 2013) [1].

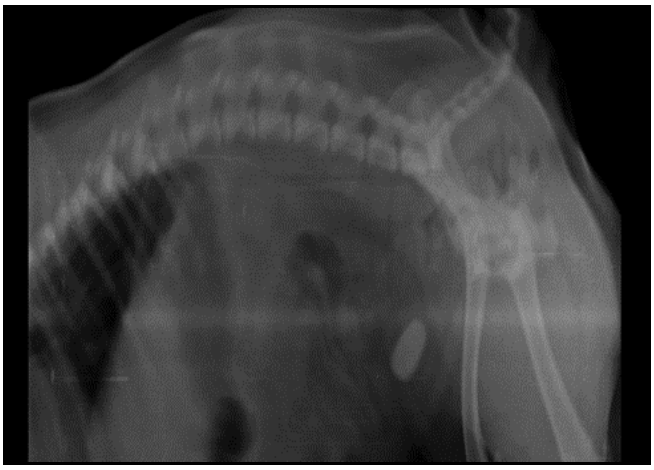

Fig 1: Survey radiograph of abdomen showing single large solitary calculi in Urinary bladder

Fig 2: Ultrasonography showing hyperechoic calculi with acoustic shadowing

Fig 3: The large cystolith retrieved from the urinary bladder

Conclusion

In conclusion, urolithiasis, resulting from the crystallization of urinary solutes, presents significant clinical challenges, particularly in the management of large bladder calculi as seen in the present case. The solitary cystolith, identified via radiography, was surgically removed due to its considerable size and the animal's declining condition. This case highlights the importance of prompt surgical intervention to alleviate symptoms and prevent further complications associated with urine retention. Preventative measures, including proper nutritional management and control of urinary tract infections, are essential to reduce the incidence of urolithiasis and ensure better long-term outcomes for affected animals.

References

1. Bartges J. Rock n roll: Medical management of struvite and urate uroliths. In: Proc. Western Vet. Conf. The University of Tennessee, Knoxville, TN, USA; c2013.
2. Brodey RS. Canine urolithiasis - A survey and discussion of fifty-two clinical cases. Journal of the American Veterinary Medical Association; c1955. p. 126-129.
3. Dehmiwal D, Behl SM, Singh P, Tayal R, Pal M, Saharan S, *et al*. Diagnosis and management of cystolith in dogs. Haryana Veterinarian. 2016;55(1):103-105.
4. Griffith DP. Urase stone. Urological Research. 1979;7(3):215-221.
5. Jattennavar PS, Kalmath GP. Urethral obstruction by urinary calculi in a Pomeranian dog. Indian Journal Animal Research. 2012;46(1):100-102.
6. Koehler LA, Osborne CA, Buettner MT, Lulich JP, Behnke R. Changing paradigms in diagnosis and treatment of urolithiasis. Vet. Clin. North American Small Anim. Prac. 2009;39(1):161-181.
7. Osborne CA, Kruger JP, Lulich JP, Bartges JW, Polzin DJ, Molitor T, *et al*. Feline matrix crystalline urethral plugs - A unifying hypothesis of causes. Journal of Small Animal Practice. 1992;33:172-177.
8. Saharan S, Kumar S, Mathew RV, Jaglan V, Jain VK. Large cystolith in a German Shepherd dog. Indian J. Vet. Surg. 2018;39(2):146.
9. Saini NS, Singh SS. Ultra sonographic and radiographic diagnosis of renal calculi in dogs. Indian J. Vet. Surg. 2002;23(1):55.
10. Uma S, Kumar R, Lakkawar AW, Nair MG. Cystolith in a dog: A case report. Journal of Entomology and Zoology Studies. 2018;6(1):924-927.