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Successful surgical management of cystic and urethral calculi in a dog: A case report

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Abstract
A six year old male non-descriptive dog was presented to the small animal surgical unit of the Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal with a history of anuria and anorexia for the past three days. Examination of animal revealed abdominal distention, dehydration and depression. Radiography and Computed Tomographic examination revealed multiple radio-opaque calculi in urinary bladder and calculus in urethra. Retrograde catheterization failed to push the calculi into urinary bladder. Hemato-biochemical values were all normal except leukocytosis and elevated BUN and Creatinine levels. Under inj. Atropine @ 0.04 mg/kg body weight S/C, inj. Butorphanol @ 0.2 mg/kg body weight I/V and inj. dexmedetomidine @ 5 µg/kg body weight I/v premedication and Zoletil @ 2mg/kg body weight I/V as induction and isoflurane 2% as maintenance cystotomy was performed by mid-ventral approach. Multiple calculi from the bladder and by retro-hydro propulsion, calculus from the urethra were removed. Postoperatively, parenteral antibiotics and analgesia were followed for five days. On the day five of surgery, catheter was removed. The removal of skin suture was done after ten days post-surgery. The dog shown uneventful recovery without any complications.

Keywords: Radiography, computed tomography, cystic and urethral calculi, cystotomy

Introduction
Urolithiasis refers to the development of stones anywhere in the urinary tract, that demands quick and definitive diagnosis as well as prompt surgical and/or medicinal intervention (Formsa & Saini, 2019) [2]. Uroliths are collections of crystalline and noncrystalline solid particles that occur in one or more sites along the urinary tract. Foreign bodies like bullets, urinary catheters, necrotic tissues, blood clot as well as suture materials acts as a nidus for uroliths (Lulich *et al.*, 1995) [7]. Uroliths developed when urine becomes oversaturated with lithogenic substances, and these could interfere with complete and frequent urination (Koehler *et al.*, 2009) [5]. The present case is the report of the management of cystic and urethral calculi in a dog through cystotomy.

Case history and clinical examination
A six year old male non-descriptive dog was presented to the small animal surgical unit of the Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal with a history of anorexia and anuria for the past three days. Clinical examination of animal shown abdominal distention, hematuria, epistaxis, congestion of the conjunctival mucous membrane and dehydration.

Diagnosis
Radiography (Fig 1a) and computed tomographic (Fig 1b) examination revealed multiple radio opaque calculi in urinary bladder and calculus in urethra (Fig 1). Retrograde catheterization failed to push the calculi into urinary bladder. Hematology revealed leukocytosis with 31.88 x 10^3 /mm^3 and serum biochemistry showed elevated BUN with 32.5 mg/dl and Creatinine 4.73 mg/dl level. Percutaneous cystocentesis was performed and urine was removed (Fig 2). Microscopic examination of the urine sediment revealed radio-opaque Monohydrate Calcium Oxalate crystals (Fig 3). Based on symptoms, examination of animal, diagnostic imaging, haematology and serum biochemisty, the present case was clinically diagnosed as urinary obstruction due to cystic and urethral calculi, and surgical correction was planned.

Treatment and Discussion

The dog was premedicated with inj. atropine sulphate @ 0.04 mg/kg body weight S/C, inj. dexmedetomidine 5µg/kg body weight intra venously and inj. butorphanol 0.2mg/kg body weight intra venously. General anesthesia was induced by using zoletil @ 2mg/kg body weight intra venously and with Isoflurane 2% the dog was maintained. The site of surgery was aseptically prepared using 5% povidone-iodine. The dog was placed on dorsal recumbency to perform mid-ventral celiotomy. The distended urinary bladder (Fig 4) was located and taken out. Cystocentesis was performed. After applying stay sutures on the dorsal surface of bladder, an incision was made and the urinary bladder was carefully examined for calculi and concretions and then removed (Fig 5). The Urinary bladder was flushed with normal saline. Calculus from the urethra was removed through retro-hydro propulsion, and the urethra was flushed with normal saline. A sterile polyethylene catheter No. 6 was inserted retrogradely into the urinary bladder and it was secured to the prepuce with a stay suture. The urinary bladder was sutured using No. 0 Poly Glycolic Acid 910 by double-layer Cushing patterns. Postoperatively the dog was administered with inj. RL 10ml/kg body weight intra venously, inj. ceftriaxone 20mg/kg intra venously, inj. tramadol 2mg/kg B.W. S/C and syrup neeri 10 ml PO for 5 days. The site of surgery was aseptically dressed daily by using povidone iodine to prevent infection. On the day five of surgery, catheter was removed. The removal of skin suture was done after ten days post-surgery. The dog shown uneventful recovery.

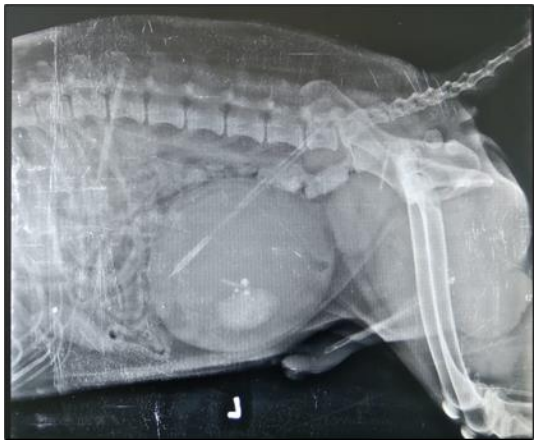

Fig 1a: Radiograph

Fig 1b: Computed tomography

Fig 1: Cystic and urethral calculi

Fig 2: Haemorragic urine on cystocentesis

Fig 3: Calcium oxalate crystal on microscopic view

Fig 4: Distended Urinary bladder

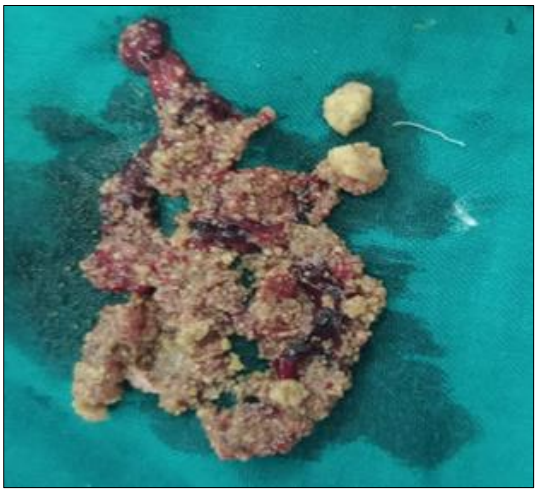

Fig 5: Cystic and urethral Uroliths

Case Discussion

Urolithiasis was an emergency surgical condition that occurs more common in companion dogs and cats than humans because of their quadruped position (Njoku *et al*., 2021) [8]. Age, sex, ionic transport in intestine and kidney, metabolic

disorders, geographical location, fluid intake, diet, and climate are factors involved in development of urolithiasis in dogs (Osborne *et al*., 2009) [9]. The incidence of obstructive urethral urolithiasis was more common in adult castrated male dogs whereas cystic calculi was common in female dogs (Njoku *et al*., 2021) [8]. Older dogs had higher susceptibility than young animals (Formsa *et al*. 2019) [2]. Early castration leads to improper maturation of the urethra due to a lack of testosterone which is responsible for the maturation of the urethra. Complete obstruction results in uremia within 36–48 hours which causes anorexia, dehydration, diarrhoea, vomiting, coma and eventually death of the animal in 72 hours. Uroliths in the urinary bladder and urethra irritate the mucosal surface, resulting in dysuria, haematuria, and stranguria. (Hoxha and Rapti, 2018) [4].

The diagnostic approach to urocystoliths involves abdominal, rectal palpation and failure of retrograde catheterization beyond the obstruction (Hendrickson, 2007) [3]. Survey radiography was effective in detecting radiopaque cystic calculi, while radiolucent uroliths like urate and cystine require contrast radiography or ultrasonography for confirmation (Singh and Sailo, 2013) [10]. In ultrasonography, a characteristic sign of calculi is that the hyperechoic structure exhibits an acoustic shadow below it (Kundu and Ghosh, 2006) [6].

Urolithiasis could be surgically or non-surgically managed. Conservative therapy includes dissolving calculi with appropriate solutions or diets based on the makeup of the urolith and adjusting urine pH (Njoku *et al*., 2021) [8]. Extracorporeal shock wave lithotripsy, ureteric stenting and laser lithotripsy were all noninvasive procedures that could be performed for removing urinary calculi. (Berent, 2011) [1]. Surgical intervention such as Cystotomy, Urethrotomy and nephrotomy comprises incisional removal of calculi from the urogenital tract, particularly those that could not be dissolved, such as calcium oxalate, urate, cystine and silicate stones, depending on their size and location. The most common complication of the urethrotomy was the urethral stricture. If untreated, obstructive urolithiasis results in cystorrhexis, uroabdomen, hydronephrosis, metabolic acidosis, peritonitis, hyperkalemia, cardiac arrhythmias and death. (Njoku *et al*., 2021) [8].

Conclusion

The timely diagnosis and appropriate veterinary intervention will save the life of the animal. Among the available treatment options surgical treatments along with post-operative management will give satisfactory results. Diet modification will prevent reoccurrence.

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