

## **Incidence and management of cystic calculi in dogs in and around Meerut**

### **Abstract:**

A total of 54 animals of either sex with cystic calculi were prospectively studied. The most commonly affected dogs were mature adult dogs aged 3 to 10 years, with juveniles (<1 year) faring less well. The prevalence was highest during extreme winter and summer seasons. Cystic calculi were diagnosed either by radiography or ultrasonography. All the dogs were given urinary alkalizer and calculolytic drugs to dissolve the calculi, and the dogs with urinary obstruction were treated surgically by cystotomy. The majority of the cases showed uneventful recovery.

**Keywords:** Cystic calculi, cystotomy, calculolytic drugs, dogs, incidence, Meerut.

### **Introduction:**

Cystic calculi (urinary bladder stones) are a common condition responsible for the retention and obstruction of urine in dogs (Dvorska *et al.*, 2015). The formation of cystic calculi is generally associated with the precipitation and crystal formation of a variety of minerals (Stiller *et al.*, 2014), though it is a multifactorial disease (Ackerman, 2016). The sequence of events that triggers stone formation is not fully understood. In association with highly concentrated urine, less water and a high dietary intake of minerals and protein may contribute to increased saturation of salts in the urine (Parivar *et al.*, 1996). Disease conditions such as bacterial infections in the urinary tract can also increase urine salt concentration (Weese *et al.*, 2021). The understanding of incidence is important for the treatment and prevention of urinary stones in dogs. Surgery is the primary treatment of obstructive urolithiasis (Larson, 1996).

Cystostomy together with medical dissolution of calculi is considered an effective technique for resolution of calculi in small animals (Ewoldt *et al.*, 2006). Animals with prolonged obstruction have high morbidity due to subsequent uremia. Surgical management of such patients should be done very cautiously. In this study, the incidence of cystic calculi, their diagnosis, and surgical and medical management in 54 cases was reported.

### **Material and Methods:**

All the cases were treated and examined as per standard treatment and examination protocols, so ethical approval was not necessary for this study. A total of 54 dogs of either sex with complaints of dribbling of urine, urinary retention, and urinary obstruction were prospectively studied (**Table.1**). These cases were presented from Meerut and the adjoining areas between the years 2018-2021. A physical examination was done to check the status of the urinary bladder. Further, radiography or ultrasonography was performed to establish the diagnosis (**Fig.1 A and B**). All the animals with urinary obstruction were treated surgically by cystotomy technique, and animals with dribbling of urine were treated with urinary alkalizers and calculolytic drugs.

After the confirmation of calculi in the urinary bladder, all the animals were aseptically prepared for surgery and administered general anesthesia. The surgical interventions were done by keeping the dogs in dorsal recumbency. An intravenous infusion of normal saline was maintained during surgery. An approximately 5-6 cm long midline (in females) and right paramedian skin incision lateral to penis was given (in males). The penis, along with the incised skin, was retracted to the left lateral side till the midline was visualized, followed by a routine laparotomy in the caudal abdomen. The distended urinary bladder was located and exteriorized (**Fig. 2A**). The urine in the bladder was removed by suction through a sterile syringe. Then an

incision was made on the dorsal aspect of the urinary bladder to reach the lumen. The lumen was searched for calculi/concretions and then the calculi were removed (**Fig.2 B**) and the lumen of the urinary bladder was flushed with normal saline. A sterile polyethylene catheter was passed from the urinary bladder through the urethra to check the urethral patency. If the urethra was found obstructed, a urethrotomy was also performed to remove concretions/calculi. A sterile polyethylene catheter (infant feeding tube) was passed from the external urethral orifice to the urinary bladder. The external end of the catheter was kept fixed to the preputial skin by stay sutures. Cystotomy, urethrotomy, and laparotomy wounds were closed, dressed, and protected in a routine manner.

Postoperatively, an amoxicillin-sulbactam antibiotic combination (15 mg/kg, IM) for 5 days, analgesic meloxicam (0.2 mg/kg, IM) for 3-5 days, and antacid pantoprazole (1 mg/kg, PO) for 5 days were administered. The urethral catheter was removed on 8-12 days and skin sutures were removed after healing of the wounds, generally on the 12<sup>th</sup> day.

In animals with dribbling of urine and diagnosed with very fine concretions in the urinary bladder, a sterile polyethylene catheter (infant feeding tube) was passed to the urinary bladder from the urethra to dislodge and push back any concretions. The catheter was secured to the preputial skin and urinary flow was maintained. After this maneuver, all the affected animals were given urinary alkalizer disodium hydrogen citrate (Syp. Alkasol) and the calculolytic drug Tab. Cystone till the cystic concretions were not seen ultrasonographically, and the catheter was removed accordingly.

## **Result and Discussion:**

Cases of cystic calculi were more prevalent in the extreme winter and summer. Mature adult dogs (3-10 years) (48%) were most affected, followed by young adult dogs (1-3 years) 28% and juvenile dogs (<1 year) 11% were least affected, followed by geriatric dogs (>10 years) 13% (**Fig. 3**). Anesthesia, cystotomy, and urethrotomy procedures, along with catheterization of the urinary bladder and fixation of the external end of the catheter with preputial skin, were achieved without difficulties. The majority of the dogs showed uneventful recovery except for a few minor incidences of infection and pus formation at surgical sites.

Cystic calculi are a common problem in dogs (Ling *et al.*, 1998) and are seen mostly in extremely cold and hot climates (Singh *et al.*, 2011). This may be associated with less water intake and more water losses during winter and summer, respectively. Diagnosis of cystic calculi can be made either by radiography or ultrasonography. Sometimes, the diagnosis of the cystic calculi by radiography becomes difficult if they are radiolucent (Larson, 2009) or very fine. By ultrasonography, radiolucent and very fine calculi/concretions can be diagnosed easily as hyperechoic structures showing acoustic shadowing below them. Acoustic shadowing distal to floating calculi/concretions was not seen. Similar findings were also reported by Verma *et al.* (2006) and Dehmiwal *et al.* (2016). Surgery is the primary treatment for obstructive cystic calculi, except for very fine calculi/concretions which can be managed by urinary alkalizers and calculolytic drugs. Nutritional management may reduce the occurrence of calculi formation significantly in dogs.

### **Conclusion:**

In this study, the incidence of cystic calculi in dogs in and around Meerut was recorded. Such cases were managed effectively by surgery and medicinal treatment after diagnosis either

by radiography or ultrasonography. Further, elaborative research is required on nutritional management to prevent the occurrence of urolithiasis in dogs.

### **References:**

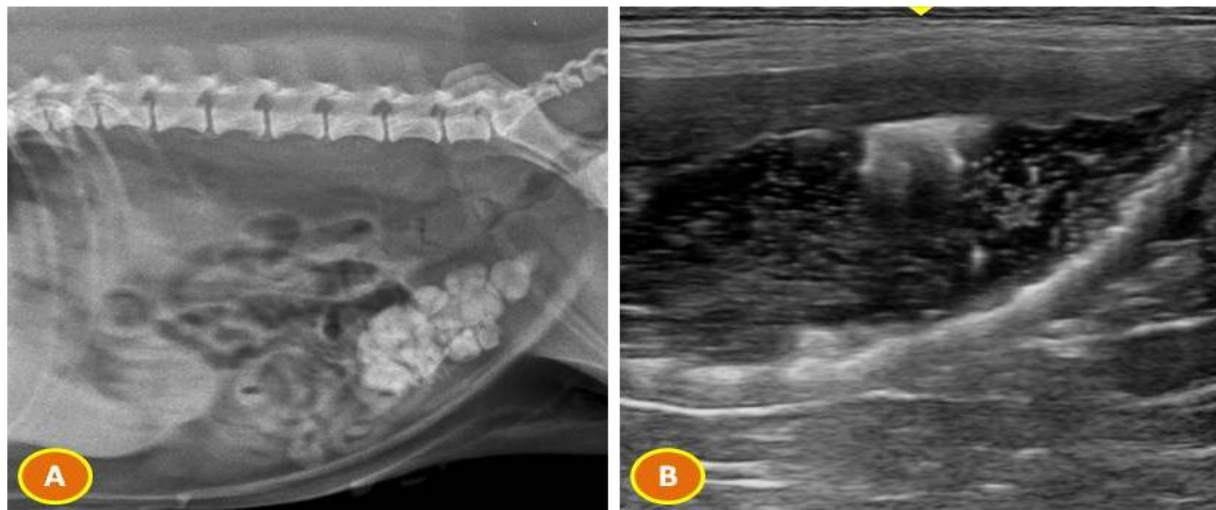
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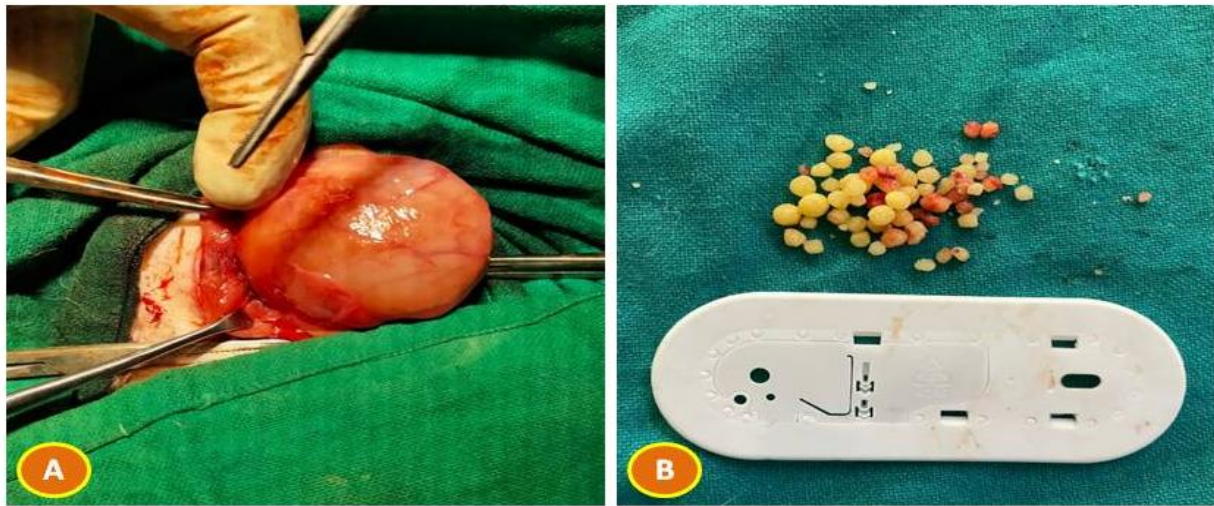
**Table: 1. Incidence of cystic calculi as per the age groups.**

S.No.	Age group	Group code	Number of cases
1.	Juvenile (<1 year)	J	06
2.	Young adult (1-3 years)	Y	15
3.	Mature adult (3-10 years)	M	26
4.	Geriatric (>10 years)	G	07
<b>Total</b>			<b>54</b>

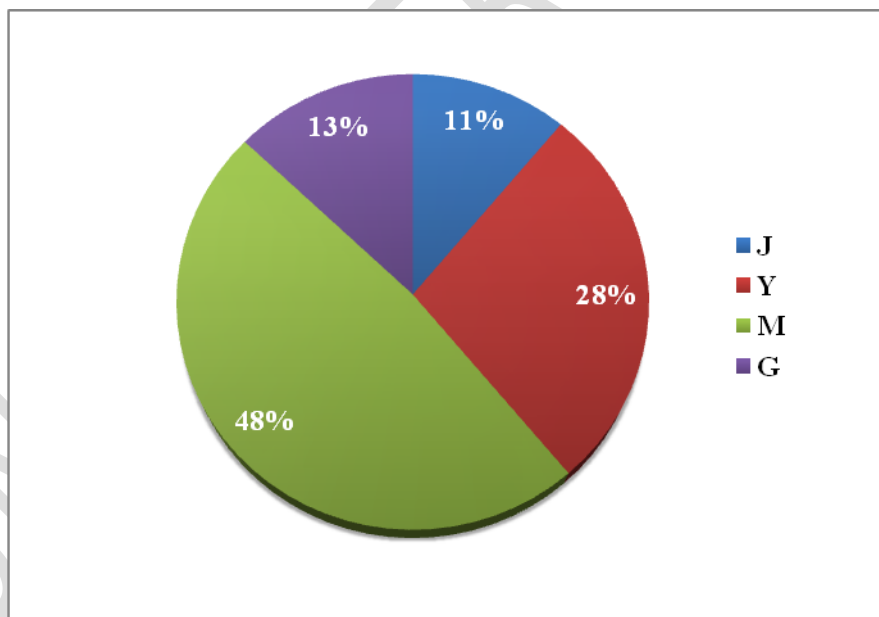
**Legends of the figures:**



**Figure: 1. Radiographic (A) and ultrasonographic (B) diagnosis of cystic calculi in dogs.**



**Figure: 2. Intra-operative view of exteriorization of urinary bladder (A) and removed calculi (B).**



**Figure: 3. Incidence of cystic calculi in different age groups.**

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