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Distribution pattern of surgical affections of the lower urinary tract in dogs: a two-year retrospective study

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This retrospective study was aimed to study the distribution pattern of surgical affections of the lower urinary tract concerning age, gender, breed, season of occurrence and geographical distribution. Out of a total of 35,494 canine cases presented to the university veterinary hospital, overall occurrence of surgical affections of the lower urinary tract was 0.86%, with the most common condition of urolithiasis and/or concretions in 93.81% dogs followed by urethral prolapse (2.93%), urinary bladder mass (2.28%) and urethral rupture (0.98%). Among urolithiasis cases, Pugs were the most commonly affected breed (27.08%). Urolithiasis was most common in male dogs (79.86%) in the age group of 1-8 yr (77.77%) having a mean age of 4.92±0.14 yr. Most of cases of urolithiasis the belonged to Malwa (southern west) region of the Punjab (66.54%) and witnessed in the winter season (45.49%). All 9 cases of the urethral prolapse were recorded in the male American bully breed, 55.56% of which were juvenile and 66.67% of cases were presented in the rainy season. Bull dog and Bully breeds were the most affected with urinary bladder masses, with no gender predilection. Urethral rupture was seen exclusively in male dogs due to dog bite wounds/trauma.

Key words: *Dogs, Urethral prolapse, Urethral rupture, Urinary bladder tumour, Urolithiasis*

Lower urinary tract disorders are common in small animals and may include conditions like cystitis, urethral rupture, urolithiasis, concurrent prostatic affections, urinary bladder tumours, and congenital affections like ectopic ureter (Mendóza-López *et al*., 2017). Urolithiasis is the most commonly encountered surgical affection of the lower urinary tract. The incidence of urolithiasis is higher in dogs as compared to other domestic animals (Amarpal *et al*., 2013) and it tends to occur more commonly in males (Sosnar *et al*., 2005). The formation of urinary calculi is a complex condition influenced by several factors such as diet, age, sex, breed, genetics, season, minerals, and infections (Osborne *et al*., 1986). This can be due to the presence of a long and narrow urethra in males (Albasan *et al*., 2005). The age group in dogs which is most susceptible to calculi has been reported to be around 6-9 years (Hesse, 1990). Taksande (2015) reported that urolithiasis was also witnessed in young dogs and there was a considerable impact of the season on urolith formation with winter season from October to December having the highest incidence (31.25%). Okafor *et al.* (2013) reported that toy and small breeds were most affected with urinary calculi. Other surgical affections of the lower urinary tract in dogs include urethral prolapse (Kirsch *et al*., 2002), urethral rupture (Boothe, 2000, Hassibi *et al*., 2019) and urinary bladder neoplasia (Osborne *et al*., 1989). English bull dog breed has been shown to have a strong predisposition towards urethral prolapse (Kirsch *et al*., 2002). The present study was aimed to screen the records of all the cases of dogs presented at Guru Angad Dev Veterinary and Animal Sciences University over a period of 2 years from October 2021 to September 2023 and evaluate the distribution pattern of surgical affections of the lower urinary tract.

Materials and Methods

This study included a retrospective screening of records of all the canine patients presented with lower urinary tract disorders during October 2021 to September 2023 (2 years). The study aimed to evaluate the age, sex, breed, and geographical distribution of various surgical affections of the lower urinary tract in the dogs presented at Multi Speciality Veterinary Hospital of the Institute. All the dogs diagnosed with lower urinary tract disorders where surgical interventions were done were included. Based on the final diagnosis recorded, the dogs were grouped into four conditions/groups viz., urolithiasis (having urinary bladder calculi/concretions), urethral prolapse, bladder tumour/mass, and urethral rupture. The parameters evaluated from the records included the geographical location (the place/district from where the patient belonged), breed (dogs where the breed was not mentioned were placed under mixed/ non-descript category), age in years and gender.

Results and Discussion

During the 2 year period, a total of 35,494 cases of dogs were presented to the hospital, out of which 307 dogs were suffering from lower urinary tract disorders, and were subjected to suitable surgical interventions. The overall incidence of surgical affections of lower urinary tract was 0.86%. Out of the dogs affected with various surgical affections of lower urinary tract (n=307), urolithiasis and/or

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concretions was the most frequently presented condition (93.81%, n=288) followed by urethral prolapse (2.93%, n=9), bladder mass (2.28%, n=7) and urethral rupture (0.98%, n=3)

The occurrence of urolithiasis during the study period was 0.81% (288 out of 35,494). Similar incidence had been reported by earlier workers (Hesse, 1990) Tion (2012) reported the prevalence rate at 3% in Ukraine.

When the geographical distribution of the dogs presented with urolithiasis was studied, it was found that majority of the dogs (66.54%, n=179) were presented from Malwa region followed by Doaba region of Punjab (n=53, 19.70%). Comparatively fewer cases were reported from the Poadh region (n=19, 6.60%), Majha (n=5, 1.86%) and from other states (n=32, 11.90%). The reason for more number of dogs being presented from the Malwa region may be due to location of the university hospital in this region.

Among all the dogs with urolithiasis (n=288), it was found that Pugs were the most affected breed, accounting 27.08% (n=78), followed by Labrador Retrievers 14.93% (n=43), Non-descript 10.41% (n=30), Pomeranian 9.70% (n=28), Shih Tzu 5.20% (n=15), American Bully 4.86% (n=14), American Pit Bull 4.12% (n=12) German Shepherd 3.82% (n=11). Other breeds accounted for 19.79% (n=57), which included Beagle (n=10), Dachshund (n=7), Rottweiler (n=7), Boxer (n=5), Dalmatian (n=4), Lhasa Apso, Mastiff, Doberman, Bull Terrier (n=3 each), Cocker Spaniel, Gaddi, Golden Retriever, Saint Bernard (n=2 each), and Miniature Pinscher, Yorkshire Terrier, Pakistani Bully, Husky (n=1 each). The earlier study of Takshande (2015) also reported a high incidence of urolithiasis in Pugs and Labrador breeds. However, the study also recorded a high incidence of uroliths in German shepherd dogs, which was not found in our study. Osborne *et al*. (1986) and Okafor *et al.* (2013) reported that toy and small-breed dogs were more prone to urolithiasis. It was opined that toy and small breed dogs pass urine less frequently and had smaller bladder size which might lead to retention of urine in the bladder for longer periods making them prone to urolithiasis (Okafor *et al*., 2013). Another possible cause of higher occurrence in Pugs and Labrador Retrievers may be due to preference of pet parents towards these breeds.

Evaluation of age-wise distribution of dogs with urolithiasis (Table 1) revealed that middle-aged dogs (1-8 yr) (4.92 ±0.14 yr) were most affected. The majority of the dogs with urolithiasis belonged to the age groups of 1-5 yr (n=126, 43.75%) followed by 5-8 yr (n=98, 34.03%), and more than 8 yr (n=61, 21.18%). Only 3 dogs (1.04%) below one year of age also had urolithiasis. These outcomes were similar to earlier reports by Amarpal *et al*. (2013) and Hoxha and Rapti (2017) who have recorded high prevalence of urolithiasis in middle aged dogs.

Table 1: Age-wise distribution of dogs suffering from urolithiasis (n=288)

Age of the dogs	No. of dogs (%)	Mean±SE (Yr)
<1 yr	3 (1.04%)	0.56±0.18
1-5 yr	126 (43.75%)	3.33±0.10
5-8 yr	98 (34.03%)	6.96±0.08
>8 yr	61 (21.18%)	10.21±0.21

Out of the total 288 dogs presented with urolithiasis, 79.86% (n=230) were male, while 20.14% (n=58) were female dogs. Albasan *et al*. (2005) in a study of urolithasis in Dalmatian dogs suggested that the anatomical differences of male as compared to female might be the reason of higher incidence of urolithiasis in males. They opined that the urethra in female dogs was shorter, wider and more distendable and therefore the uroliths were more likely to pass out without causing obstruction. More number of cases of urolithiasis and/or concretions were witnessed in the winter season (131, 45.49%), followed by summer season (n=67, 23.26%), rainy season (n=65, 22.57%) and pre-summer (n=25, 8.68%). These outcomes were similar to the findings of Amarpal *et al*. (2013) and Taksande (2015). Larson (1996) and Amarpal *et al*. (2013) opined that reduced water intake as one of the important factors in urolith formation because reduced water consumption in winter season increased the concentration of urine which in turn increased the probability of mineral precipitation in the urine.

Out of the total 307 cases of surgical affections of lower urinary tract in dogs, urethral prolapse was recorded in 9 (0.33%) dogs. The occurrence of urethral prolapse was worked out to be 0.03% i.e., 9 out of 35,494 cases of dogs presented during the 2 year study period. All 9 cases of urethral prolapse were recorded in male American bully breed dogs. No reports are available incriminating American bully toward urethral prolapse. However, a strong predisposition of English bull dog breed towards urethral prolapse has been suggested (Kirsch *et al*., 2002). Osborne and Sanderson (1995) opined that, brachycephalic breeds genetically face breathing difficulties, thereby having to put extra pressure on the abdomen, which might lead to the urethral prolapse. Age-wise, young dogs below one year of age were affected the most (n=5) followed by dogs between 1 yr and 5 yr of age and dogs above 8 yr of age (2 each). Carr *et al.* (2014) reported high incidence of urethral prolapse in young, uncastrated brachycephalic breeds and possibly due to their increased sexual behaviour. Ragni (2007) also opined that urethral prolapse was mainly the disease of male dogs under 5 yr of age. Rainy season witnessed highest cases (6) of urethral prolapse followed by summer (n=2) and winter season (n=1). Majumder and Bhadra (2015) suggested that due to rain the temperature falls, which in turn intensifies the pheromone signals that potentiate the sexual

response and aggression of dogs. Out of the total 9 cases with urethral prolapse, 7 came from the Malwa region while 2 were reported from the Doaba region. However, no conclusion could be drawn from this geographical distribution because it was presumed that location of the institute in Ludhiana (Malwa region) may have led to more number of cases being reported from the Malwa region.

Seven (2.28%) cases of urinary bladder mass were recorded out of 307 surgical affections of lower urinary tract over the two year period of our study. The occurrence of urinary bladder mass was 0.02% i.e., 7 out of 35,494 cases of dogs presented during the period of retrospective study. Out of the total 7 cases of urinary bladder masses in the present study 3 cases were presented from Malwa region while 2 dogs were presented from Doaba region (Hoshiarpur and Kapurthala districts) and 2 cases were reported from Haryana (Ambala). No conclusion could be drawn as small number of cases of bladder tumour was reported during the period of study. Among the dogs presented with urinary bladder masses, it was recorded that Bull dogs/Bully dogs were the most affected breeds (n=4) which included bull dogs (n=2), American bully and Bull terrier (one each). The occurrence of bladder mass was also recorded in Pug, Lhasa Apso and Golden Retriever (1 each). No such reports are available in literature where Bulldog/Bully dogs have been found to be predisposed to bladder masses. However, Scottish Terriers have been reported to have 18-20 times higher risk of transitional cell carcinoma (TCC) than other dog breeds, while Shetland Sheepdogs, Beagles, West Highland White Terriers, and Wire Hair Fox Terriers have been proposed to be 3-5 times more likely to develop Transitional Cell Carcinomas (TCC) than other dog breeds (Mutsaers *et al*., 2003). Middle aged dogs aged between 1 yr and 5 yr were affected the most (n=3) with urinary bladder masses followed by dogs between 5 and 8 yr and dogs above 8-yr-old (2 each). Norris *et al*. (1992) also reported a higher incidence in older dogs with a mean age of 9.2 yr. Similar findings have been reported by other workers who reported that older dogs were more prone to bladder tumours especially transitional cell carcinomas (Henry, 2003). Male dogs accounted for 57.14% of the urinary bladder masses (4 out of 7), while urinary bladder masses were recorded in 3 female dogs. However, no gender predisposition could be established. A higher occurrence of urinary bladder tumours has been reported in female dogs by previous workers (Strafuss and Dean, 1975, Caywood *et al*., 1980). In the opinion of the previous authors, male dogs urinated more frequently thereby reducing the contact time between bladder epithelium and urinary carcinogens, while the female dogs urinated less frequently thereby increasing the contact time (Strafuss and Dean, 1975). Norris *et al*. (1992) also reported a high female:male ratio (1.95:1) in dogs with urinary bladder and urethral tumours. However, they could not conclude any sex predilection in their study as well. It was recorded that two cases each were witnessed in rainy, summer and winter season while one animal was presented in pre-summer season.

Urethral rupture was recorded in only 3 dogs during the retrospective study period of 2 years. One case each was reported from Barnala district (Malwa region), Rup Nagar district (Poadh region) and Yamuna Nagar (Haryana). Out of the three cases of urethral rupture, one case was recorded in American bully aged 1.3 yr, the second was observed in a pug aged 6 yr, while the third was reported in a Pomeranian dog, aged 0.4 yr. All the cases of urethral rupture were recorded in males, which could be due to long urethral passage and more accessibility of urethra in males (Hassibi *et al*., 2019). In the Pomerenian dog, history was not known to the owner and the animal was presented with necrosis of glans penis and rupture of urethra near the urethral orifice. It was presumed that the case was of a dog bite as recorded for the remaining two animals as well. Two cases of urethral rupture were recorded in winter season, while one was reported in rainy season.

From the study it was concluded that the incidence of surgical affections of lower urinary tract in dogs in Punjab was 0.86% and urolithiasis was found to be the most common affection. Winter season, Pugs, middle age group male dogs were found to be more susceptible to uroliths. Male American Bully below 1 yr of age had higher risk of urethral prolapse particularly during the rainy season.

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