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Surgical Management of Urolithiasis in Male Dogs: A Clinical Review of 10 Cases

Mudasir Ahmad Shah*, Abas Rashid Bhat, Mohammed Arif Basha and Abhishek Saxena

Division of Veterinary Surgery, IVRI, Izatnagar, Bareilly, UP - 243122, India

Corresponding Author: syedmudasirshah907@gmail.com; drmudasirshah@ivri.res.in

Urolithiasis poses an acute life threatening emergency and most frequently obstructs the lower urinary tract in male dogs (Franti *et al*., 1999). It has been reported that the upper urinary tract calculi are uncommon in dogs and cats with majority of uroliths (Osborne and Fletcher, 1995). The most probable causes include infections, nutritional deficiencies and mineral imbalances. The mineral deposits which form in the bladder of male dogs get flushed out of the bladder with urine and lodge in the penis just behind the os penis which is the most commonly reported site of obstruction followed by ischial arch (Franti *et al*., 1999). Diagnostic imaging techniques like radiography and ultrasonography are sensitive in diagnosis, with abdominal ultrasonography having 90% sensitivity, 98% specificity and 97% accuracy (Webb, 2000).

Treatment of urolithiasis can be attempted by retrograde urethral hydropropulsion for urethroliths followed by cystotomy (Osborne *et al*., 1999), failing of which urethrotomy or urethrostomy is indicated (Smeak, 2000). Other techniques like bladder marsupialization, surgical tube cystostomy and minimal invasive surgical tube cystostomy with their short and long-term complications have been attempted. However, in this study the cases were relieved by retrograde urethral hydropropulsion, cystotomy and urethrotomy.

Caste History and Surgical Procedure

Ten male dogs comprising 4 Labradors, 3 German shepherds and 3 Pugs between 3-6 years of age were presented to the Teaching Veterinary Clinical Complex, IVRI, Izatnagar with the history of stranguria and hematuria. These dogs were dull, depressed and dehydrated with the history of vomition and dehydration. As per owner information initially there was dribbling of blood tinged urine from urethral orifice but in later stages urination stopped completely. Diuretics and anti-inflammatory drugs tried by local veterinarians but without response. The dogs were tentatively diagnosed to have urolithiasis, however for confirmation different diagnostic tools like hematology, biochemical analysis, radiographic and ultrasonographic examinations were used. In all the dogs, retrograde hydropropulsion was attempted by advancing infant feeding tube of appropriate size (8F/6F) through the urethral orifice upto the obstruction at the level of os penis. Every attempt was made to increase hydrostatic pressure by infusing normal saline mixed with 2 % lignocaine hydrochloride so as to facilitate the movement of the uroliths into the urinary bladder. The procedure was accompanied by repeated rhythmic digital pressure applied to the urethra at the ischial arch. Before attempting any surgical treatment the dogs were subjected to general anaesthesia by administering Atropine (0.04 mg/kg b.wt.) subcutaneously followed by butorphanol (0.2 mg/kg b.wt.)

and diazepam (0.5 mg/kg b.wt.) i/v with a gap of 5 minutes each. 1% propofol (6 mg/kg b.wt.) was administered i/v for induction 10 minutes after last preanaesthetic. Isoflurane was used for maintenance of anaesthesia. Standard surgical procedures were adopted for Cystotomy (Fig. 1) and urethrotomy. It may be noted here that urethra was catheterized with infant feeding tube of appropriate size (with its feeding port cut) from ure-thral orifice to bladder in all the cases irrespective of the surgical approach adopted (Fig. 2). The catheter was fixed to prepuce with a single simple interrupted silk suture.

Postoperative care

Post-operatively, all the dogs were administered ceftriaxone injection (10 mg/kg body weight, bid, IM) for 7 days, melonex (0.2 mg/kg body weight, od, IM) for 3 days along with fluid and B-complex. Oral urinary antiseptic cystone for 20 days and oral urinary alkalizer like alkasol for 10 days were prescribed. Flushing of urinary catheter with normal saline twice a day was advised. Antiseptic dressing of the surgical wounds using povidone iodine was done and owners were advised for removal of the skin sutures after 14 days.

Results and Discussion

Male dogs are having relatively longer urethra along with a ventral groove in the penile bone harbouring urethra, thus restricting urethral expansion (Evans and Christensen, 1993; McLoughlin, 2011) and causing partial or complete obstruction of urethra (Franti *et al*., 1999). Due to this anatomical peculiarity urethral obstruction is more common at the base of the os penis rather than along the bone (Osborne *et al*., 1999). In the present study all the cases were brought early to clinics and physical examination revealed mild discomfort during abdominal palpation and a distended urinary bladder. On hematological examination an increase in TLC, DLC and Packed Cell Values was observed in all the cases. BUN, Serum creatinine, SGOT and SGPT were also above normal (Data not shown). Primarily radiography has been found to be very helpful tool in detecting radiopaque calculi and in this study all the cases were found to have multiple uroliths in urinary bladder by conventional radiography in lateral view of caudal abdomen (Fig. 3). Abdominal ultrasonography was done in all the dogs to confirm the cystoliths which revealed hyperechoic oval to round images surrounded by anechoic fluid (Fig. 4). Further, uroliths in the penile urethra just behind the os penis were found in 7 dogs (3 Pugs, 2 Labradors,

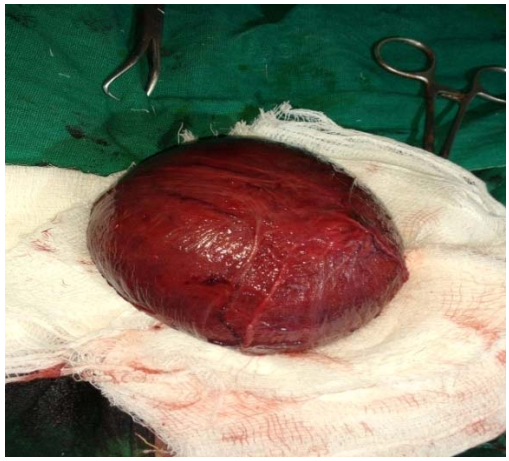

Fig. 1: Distended urinary bladder retracted outside abdomen for cystotomy

Fig. 2: Catheterization of urethra with infant feeding tube

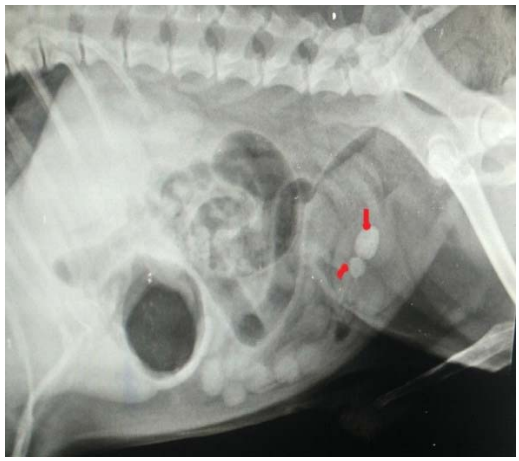

Fig. 3: Radiopaque calculi (arrows) inside urinary bladder

2 German shepherds) on radiography with just a single calculus in 5 dogs each and two calculi in 2 dogs each.

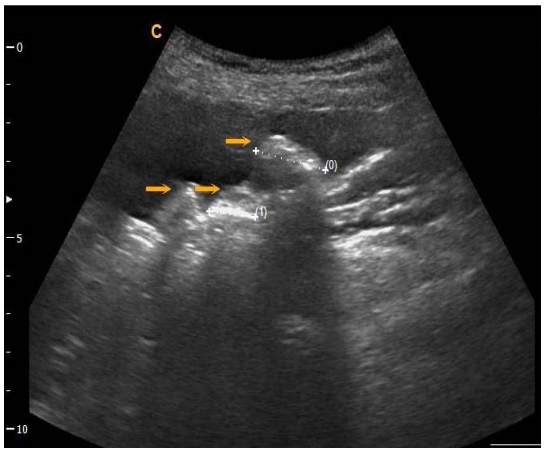

Fig. 4: Cystoliths inside urinary bladder

Fig. 5: Cystoliths

Retrograde urethal hydropropulsion followed by cystotomy and urethrotomy can be adopted to remove large cystic calculi and small urethal calculi. Before attempting any surgical procedure, retrograde hydropropulsion was attempted in all the cases and out of 7 dogs with urethroliths only 4 dogs got their uroliths retropulsed into urinary bladder and the procedure failed to relieve 3 Pugs. The 3 Pugs with calculi lodged behind the os penis in addition to cystotomy were also subjected to urethrotomy. The shape of the calculi retrieved from all the cases varied from oval, round to semilunar with smooth to granular surface (Fig. 5). Urinary bladder was flushed with normal saline so as to retrieve all the concretions and an infant feeding tube of appropriate size with its feeding port cut was passed into urethra through normograde approach so as to maintain patency and to avoid any urethral strictures. It has been observed that early detection of small urocystoliths that recur despite appropriate medical therapy facilitates non-surgical removal by voiding urohydro-propulsion (Koehler *et al*., 2008). However, no such case was observed in our study and all the dogs needed surgical intervention. Nutritional management and control of urinary tract infection has been found to be the best preventive strategy against urolithiasis (Bartges, 2013). Owners were recommended to increase water consumption so as to encourage diuresis and reduce aggregation and crystallization of mineral deposits. Further, it has been observed that providing flavoured or running water may encourage increased water intake (Westropp and Buffington, 2005). Oral urinary alkalizers were prescribed to all the dogs to reduce recurrence of naturally occurring sterile struvite urocystoliths. Owners were also advised to regularly flush the urethral catheters with normal saline so as to avoid any blockade. It has been reported that urethral incisions heal in 7 days provided the epithelium is continuous (Weaver and Schulte, 1962). Urethral catheters were removed after 10 days in dogs subjected to cystotomy only, whereas in Pugs which also underwent urethrotomy catheters were removed after 15 days.

All the dogs recovered normally, except a mild urethral hemorrhage in 3 Pugs after the initial hours of surgery.

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 whenever the need arises.

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Conflict of Interest: All the authors express no conflict of interest.

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