

Surgico-therapeutic Management of Obstructive Urolithiasis in Adult Ruminants

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ABSTRACT: Obstructive urolithiasis is urine retention due to the calculi lodgment in the urinary tract. Thus, treatment of urolithiasis is basically to establish normal urinary passage, which can be accomplished in various ways depending on the severity of the condition. The study was conducted on 8 clinical cases of retention of urine in cattle and buffalo breeding bulls presented to the Clinics of Department of Veterinary Surgery and Radiology, College of veterinary and animal science, Bikaner (RAJUVAS) (Rajasthan). A clinical examination (anorexia, depression, bilateral abdominal distension and concretions at urethral orifice), abdominal palpation, history taking, and abdomino-centesis were done to confirm the diagnosis. A distended urinary bladder was discovered during a per-rectal examination. Based on the history and rigorous clinical examination the case was tentatively diagnosed as obstructive urolithiasis. Then Ischial urethrostomy was performed through ischial arch approach after aseptic preparation and restraining the animal. After surgery, all animals urinated continuously via catheter and postoperative follow-up was recorded. All animals uneventfully recovered and the skin sutures were removed on the 12th day of the operation.

Keywords: Urolithiasis, Ischial urethrostomy, abdomino-centesis.

INTRODUCTION

Urine retention resulting from calculi lodged in the urinary system is known as obstructive urolithiasis (Makhdoomi and Gazi 2013). It is a metabolic disease that affects male ruminant. Although the precise cause of the disease is unknown and is caused by a number of factors (Singh and Singh 1990), calculi production typically arises from a confluence of physiologic, dietary, and management factors (Hesse *et al.*, 2009). Because of their incredibly long urethras in male ruminants when compared to female urethra which are shorter and wider urethras, male ruminants are more susceptible to infection (Matthews, 1999). The sigmoid flexure and glans penis in cattle and buffaloes are the most common locations for calculi or calculus, however they can lodge anywhere in the urethra (Gera and Nigam 1979; Sharma and Singh 2001; Divers and Metre 2002). Urolithiasis is more common in males than in females, due to the restricted urethral diameter, calculi can induce a partial or total rupture of the urethra and bladder (Ewoldt *et al.* 2008; Rafee *et al.*, 2015). Uroliths, which are primarily made of phosphate salts, build up in the urinary tract and obstruct the flow of urine, causing urolithiasis (Cowley *et al.*, 2023). Hippuric acid, tyrosine, calcium phosphate, magnesium ammonium phosphate, calcium carbonate, calcium

oxalate, and uric acid were the most common uroliths found in bovine urolithiasis (Parrah *et al.*, 2010). These can be prevented by maintaining the calcium-phosphorus equilibrium in the animal body through dietary mineral supplementation (Kalim *et al.*, 2011). Around 5% to 15% of animals worldwide suffer with urolithiasis, which is becoming a frequent issue with around 50% recurrence rates (Machado *et al.*, 2014). The type of obstruction is the primary determinant of urolithiasis treatment. For example, in cases of minor or partial blockages, medicinal dissolution of urolithiasis is possible and may, on occasion, provide temporary relief (Ewoldt, 2006). But urgent surgical intervention is required for full urethral obstruction (Tamilmahan *et al.*, 2014; Schott *et al.*, 2012).

The goal of treating obstructive urolithiasis is to restore normal urine passage, which can be achieved in a number of methods depending on the severity of the problem. The course of treatment has been observed to vary depending upon the clinical status of the animal and the length of urinary blockage (Larson, 1996; Cowley *et al.*, 2023). Among the methods to create a patent urinary tract include muscle relaxants, urethrostomies, tube cystotomies, and urethral process amputation (Bello *et al.*, 2018). As an alternative, an ischial urethrostomy, also known as a "high perineal

urethrostomy", can facilitate the transit of urine. As a result, administering urinary acidifiers can dissolve stones in the urinary bladder and proximal urethra.

MATERIAL AND METHODS

The present study was conducted on 8 clinical cases of retention of urine in cattle and buffalo breeding bulls presented to the Clinics of Department of Veterinary Surgery and Radiology, College of veterinary and animal science, Bikaner (RAJUVAS) (Rajasthan).

The owner provided information about the animal's, including age and sex, duration of illness, feeding habits, management techniques, early disease signs, and previous treatments. A clinical examination, abdominal palpation, history taking, and abdomino-centesis were done to confirm the diagnosis. When the animal was brought in, it was seen to be dull, depressed, and wringing its tail. It was also shown to be stamping its feet, kicking its abdomen, and stretching. A distended urinary bladder was discovered during a per-rectal examination. The blockage site was then located by passing a flexible urine catheter. Even with constant effort (Retropulsion), the catheter was not flowing past a certain length, which suggests that a urethral obstruction was present. As a result, an ischial urethrostomy was chosen as the treatment method and the problem was provisionally identified as urethral blockage from calculi lodgement. Depending on the condition of the case, the animal with severe dehydration or uraemia received fluid therapy (normal saline), broad spectrum antibiotics, and supportive therapy (anti-inflammatory and analgesic medication).

Preoperative preparation. The animal was kept in standing position. The region surrounding the ischial arch, measuring roughly 25–30 cm and spanning from the anus to the ventral midline, was prepared for surgery. The site was completely cleaned using soap and water. Next, the hair around the surgical site was clipped, shaved, scrubbed, and cleaned using water and Dettol soap to aseptically prepare it (Fig.1).

Anesthesia. Using the 16G needle, 2% lignocaine hydrochloride was used to provide the caudal epidural anesthetic at a dosage rate of 0.22 mg/kg, as recommended by Azari *et al.* (2014); Atiba *et al.* (2015). After that, 2% lignocaine hydrochloride was locally infused into the surgical site to produce further anesthetic effect.

Surgical procedure. The surgical site was covered by a sterile surgical drape. A 10 to 15 cm long incision was made 5 centimeter (cm) below the rectum and continued for 10 cm (Fig. 2), deep enough to incise through the dense layer of fascia overlying the retractor penis muscles. Blunt dissection was used between the retractor penis muscles to visualize the bulbospongiosus muscle. Care was taken to incise directly on midline through the bulbospongiosus muscle into the urethra. A curved artery forceps was passed below the urethra to lever it out (Fig. 3). A small incision was made to remove the fascial layer surrounding the urethra, being careful not to cut into the veins. On the ventral aspect of the penile body, the urethra was located in the urethral

groove. The obstructive urolith was palpated after a thorough examination of the urethra.

When a urolith was palpated, the urethra was incised where it was located, and the urolith was subsequently forced out. In case the calculus was securely embedded, it was extracted using an Allis tissue or Artery forceps. Following the removal of the urolith, a catheter of the proper size was passed in the bladder, and the other end was secured in the subischial area. The catheter's size should be such that it fits the urethra snugly. Moreover, muscles remain unsutured. Using silk no. 2, simple interrupted sutures or an interrupted horizontal mattress, the skin and subcutaneous tissue was sutured. The urethral catheter was left extending past the urethral aperture by two to three centimeters (Fig. 4).

RESULTS AND DISCUSSION

Postoperative outcome. Post-operatively, injection Streptopenicillin 5.0 gm IM (intramuscular) o.d. for 7 days; injection Meloxicam @ 0.2 mg/kg IM o.d. for 3 days and antiseptic dressing of the surgical site were done with 5 % solution of Povidone-iodine on alternate days till suture removal. Powder Ammonium Chloride 25 gm orally o.d. was given for one month. Skin sutures were removed on 12th post-operative day and the bull was given complete sexual rest for 2 months. Recovery was uneventful in all the cases with no post-operative complications.

The most prevalent urogenital issue in male animals is urolithiasis, which can be caused by a number of variables including dietary deficiencies, infections, metabolic imbalances, and environmental influences (Kumar *et al.*, 2006). The development of urinary calculi in domestic animals can be attributed to a variety of factors, such as feeding heavy concentrate with low roughage diets, dehydration, water deprivation, alkalinity of the urine, mineralized water, alkaline water supplies, an excess of sodium bicarbonate in the diet, vitamin imbalances, and high protein rations (Makhdoomi and Ghazi 2013). A history, clinical findings, ultrasonography, and radiographic exams can all be used to identify it (Radostits *et al.*, 2000).

All domestic animal species can be treated for obstructive urolithiasis with conservative and surgical methods (Janke *et al.*, 2009). Early detection and management are crucial because the effectiveness of the treatment depends on how long the clinical course takes (Ermilio, 2011). The major treatment option for obstructive urolithiasis is surgery (Türk *et al.*, 2016). More favorable results will come from surgical management of urolithiasis combined with hydration, anti-inflammatory medications, systemic antibiotics, and acidifying therapy. The particulars of each instance, such as the location of obstruction and rupture and the animal's worth, may influence the surgical techniques and procedures chosen (Ewoldt, 2008). An ischial urethrostomy has the advantage of a perineal urethrostomy in that the bull's reproductive potential can be salvaged. Due to the greater width of the urethra at the location of an ischial urethrostomy, stricture formation is less likely to occur (Cowley *et al.*, 2023).



Fig. 1. Animal was aseptically prepared for surgery.



Fig. 2. Incision given 5 cm below rectum.



Fig. 3. Exteriorising urethra using artery forceps.



Fig. 4. Streamlined flow of urine after completion of surgery.

CONCLUSIONS

Obstructive urolithiasis was more common under certain management conditions, such as intensive concentrate feeding and greater mineral concentrations in the groundwater. Ischial urethrostomy was a successful and effective surgical procedure for the treatment of obstructive urolithiasis. By altering the current management procedures, such as feeding concentrate and roughage in the right proportions, encouraging increased water intake, and advising the addition of sodium chloride to drinking water at a rate

of 3–4% to increase frequent water intake, the disease can be largely prevented.

FUTURE SCOPE

Diseases of urinary system are very common in young and adult male ruminants because of the specific curvatures in the urethra called ischial arch and sigmoid flexor. Due to extensive length of the urethra, it is very common that the calculi will lodge at these sharp angles in urethra. Once the urolith is lodged in lumen of urethra, it becomes emergency to immediately operate the animal and make passage for the urine flow, otherwise it leads to major consequences like bladder rupture, urine filled abdomen and uremia. Using such a simple technique like ischial urethrostomy, surgeon can save the life as well as the breeding value of animal.

Author contributions: Mohan Lal sharma conceived and designed the analysis; Anita Kumari and Jyoti collected the data and contributed data or analysis tools; Dr. S.K. Jhirwal Performed the analysis; Dr. Mahendra Tanwar and Mohan lalsharma wrote the paper.

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Conflict of Interest. None.

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