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# Surgico-therapeutic management of obstructive urolithiasis without cystorrhexis in male cattle-calves

**Rakesh Pooniya, Suresh Kumar Palsania, Suresh Kumar Jhirwal, Rajesh Saini, Anil Kumar and Mohan Lal**

**Abstract**
The study was conducted on twelve (n=12) clinical cases of obstructive urolithiasis in male cattle calves with intact urinary bladder presented to the Department of Veterinary Surgery & Radiology, RAJUVAS, Bikaner. The diagnosis was made on the basis of history and clinical signs (anorexia, depression, bilateral abdominal distension and concretions at urethral orifice). All the animals needed surgical intervention for passive routes for passage of urine till bladder healing occurred and urine continued to pass through normal urethral orifice. The animals were divided into two groups depending on the surgical intervention adopted viz., Tube cystostomy (n=6), Perineal urethrostomy (n=6). Higher incidence of obstructive urolithiasis was more recorded in 1-3 months (42.85%) age followed by the calves of 4-6 months (28.57%), 7-9 months (20%) and 10-12 months (8.57%). Haemoglobin was found to be below; BUN and serum creatinine above the normal reference values in majority of the cases. The mean time for removal of catheter in tube cystostomy and perineal urethrostomy was 13.66 and 15.6 days respectively. The overall survival rate was higher in animals treated by tube cystostomy than perineal urethrostomy. Urine acidifiers like ammonium chloride and sodium chloride and herbal litholytic agents like Cystone tablet were effective in dissolution of urinary calculi.

**Keywords:** Urolithiasis, tube cystostomy, perineal urethrostomy, urine acidifiers

## Introduction
India has largest livestock population in the world. It has about 190.9 million cattle, which is 37.28 per cent of total livestock population in India (N.D.D.B., 2017) [21]. Male calves are usually weaned at an early age as compared to female calves. Also, male calves are offered concentrate, particularly oilseed cake instead of a calf starter or weaning ration. Thus, a high protein diet with no milk and very low water intake leads to formation of urinary calculi (Bhatt *et al.*, 1973) [5]. Obstructive urolithiasis is a condition of the urinary tract in which insoluble mineral and salt concretions develop and aggregate around a nidus of proteineous material within the urinary bladder or urethra. Nidus formation mostly occurs when mucoprotein in the urine coalesce and precipitate with crystals in supersaturated urine (Belknap and Pugh, 2002) [4]. Male ruminants are more likely to be affected because of an extremely long urethra, in contrast to females having a shorter and wider urethra (Matthews, 1999) [18]. Urinary calculi formation usually results from a combination of nutritional, physiologic and managemental factors. It is mainly attributed to imbalanced or excessive intake of mineral (McIntosh, 1978; Radostits *et al.*, 2000) [19, 23]. Steers are most commonly affected by obstructive form of disease because of the anatomical conformation of urinary tract (Larson, 1996; Radostits *et al.*, 2000) [14, 23]. Less frequent types of uroliths include those composed of silica, oxalates or carbonates (Larson, 1996) [14]. Occurrence of urinary calculi has been also found associated with lower weight gain and lighter carcasses (Huntington and Emerick, 1984) [9]. Treatment of obstructive urolithiasis has been found to vary depending upon clinical status of animal and duration of urinary obstruction (Larson, 1996; Van Metre *et al.*, 1996) [14]. However, once urethral obstruction is complete, surgical intervention becomes warranted (Haven *et al.*, 1993) [8]. These surgical techniques include perineal urethrostomy, tube cystostomy, cystorrhaphy with urethrostomy and percutaneous intraperitoneal catheterisation. Perineal urethrotomy and urethrostomy techniques have poor long-term outcome because of stricture formation of urethrotomy/urethrostomy site, which leads to reoccurrence urethral obstruction (Haven *et al.*, 1993) [8]. Prevention remains the mainstay of urolithiasis management. Identification of a case of obstructive urolithiasis should trigger action for the affected individual and the entire herd or flock of origin (Ewoldt *et al.*, 2008) [6].

## Material and Methods

The present study was conducted on 12 clinical cases of retention of urine in cattle calves of less than one year of age presented to the Clinics of Department of Veterinary Surgery and Radiology, Bikaner (Rajasthan). History of cases regarding age and sex of the animal, duration of illness, feeding pattern, managemental practices, early signs of disease, previous treatment etc. were obtained from the owner. The diagnosis was confirmed on the basis of history, clinical examination, abdominal palpation and abdomino-centesis as per case status. Venous blood samples were collected for estimation of different haematological and biochemical parameters. Fluid therapy (normal saline), broad spectrum antibiotics and supportive therapy (anti-inflammatory and analgesic drugs) were given to the animal with severe dehydration or uraemia as per the requirement of the case. The animals were allowed to stabilise and prepared for surgery at the earliest as per standard routine procedures. All the animals were operated under epidural anaesthesia or local infiltration of 2% lignocaine hydrochloride of left paramedian area starting from the rudimentary teats or by using both the techniques simultaneously. Six animals were subjected to tube cystotomy and remaining were prepare for perineal urethrostomy.

### Surgical procedure of tube cystotomy

This surgery was also performed in dorsal recumbency. After proper scrubbing of surgical area, incision was given anterior to the rudimentary teat. After incising the skin, fascia, muscles, the peritoneum and urinary bladder were located. After locating the urinary bladder, a direct deep nick incision was given on urinary bladder at dorsal aspect of avascular area. The Foley's catheter was inserted and the bulb of the catheter was inflated with about thirty ml the normal saline solution to fix the catheter in the urinary bladder and anchored to the skin near prepuce. After successful lodging the catheter into the urinary bladder, the peritoneum, muscles and skin were closed in routine manner (Fig. 1-4)

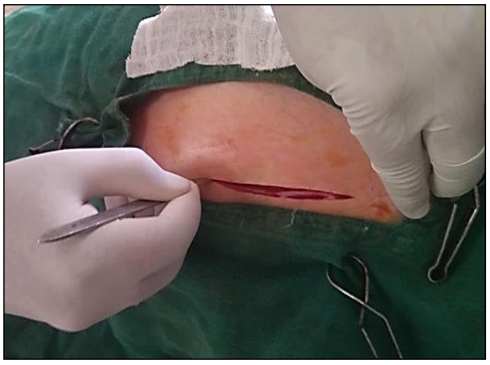

**Fig 1:** Incision on paramedian line

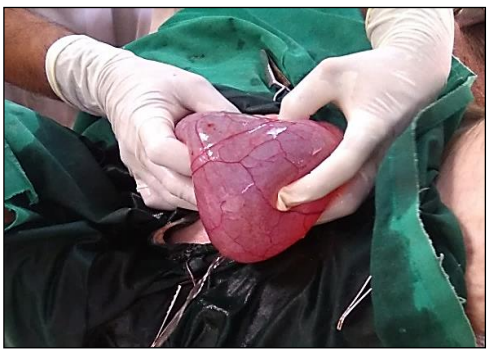

**Fig 2:** Nick on intact urinary bladder

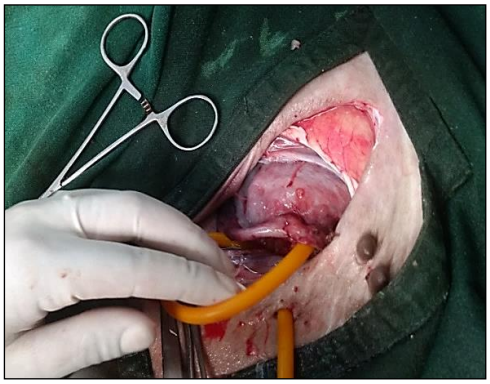

**Fig 3:** Insertation of foley"s catheter

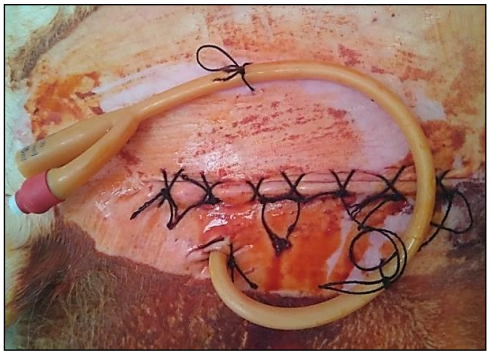

**Fig 4:** Complete placement of catheter

### Surgical procedure of perineal urethrostomy

In this technique, the perineal region of midline between scrotum and little below to the anus was aseptically prepared by shaving, scrubbing with dettol soap and application of povidone iodine solution. A 2-5 cm long incision was given on midline commencing from neck of scrotum to 2-5 cm upward. After dissecting through fascia the sigmoid flexure was exteriorised by manually. A partial penectomy was done at the level of sigmoid flexure and urethra was split up to 1-3 cm length. Proximal stump was ligated properly using catgut no.1 suture material. PVC catheterisation was done in animals from urethrostomy stump to urinary bladder. The newly created penile stump was transfixed at lower commissure of incision with stay suture. The skin incision was closed with simple interrupted suture with silk. A retrograde hydropulsion was done with 50-100 ml of normal saline in order to ensure restoration of urine out flow.

**Fig 5:** Incision on midline of perennial region

**Fig 6:** Exteriorized of sigmoid flexure

**Fig 7:** Inseration of PVC catheter into sigmoid flexure

**Fig 8:** Complete suturing with PVC catheter

**Postoperatively, antibiotic** streptomycin @ 10 mg/kg were administered once a day, for 5-7 days, Meloxicam @ 0.2-.05 mg/kg body weight IM was administered once a day for 3 days. Oral ammonium chloride and 2-4 Cystone (Himayala drugs) tablets were also prescribed during postoperative period which prevent reoccurrence of the condition. Owners were advised to blocked catheters cleaned by flushing with normal saline solution.

**Hemato-biochemical parameters**

For the estimation of hemato-biochemical studies, 10 ml blood was collected in each animal from jugular vein using aseptic syringe and stored in sterile vial containing EDTA. The haematological parameters such as hemoglobin (Hb) by Sahli's hemoglobin meter, total leucocytic count (TLC) by Haemocytometer and differential leucocytic count (DLC) by using Giemsa's staining were estimated from the fresh blood sample as per standard technique. Blood urea nitrogen (BUN) in mg/dl and serum creatinine (Sr.Cr.) in mg/dl were also estimated by using IDEXX auto analyzer at TVCC, RAJUVAS, Bikaner.

**Results and Discussion**

The present study was undertaken to diagnose obstructive urolithiasis in calves, to estimate haemato-biochemical parameters and to evaluate the surgico-therapeutic management of all affected cases. The symptoms exhibited by the cases with intact bladder only included kicking at belly and straining for urination (83.33%), restlessness and concretions encrustation at urethral orifice (75%), mild bloat (66.67%), grinding of teeth (41.66%) and anorexia and swelling on ventral abdomen (25%).

In the present study, history taken from owners revealed that most of the clinical cases were maintained on concentrate ration like cotton seed cake, groundnut cake and grains. Wang *et al.* (1997) [28] reported more incidence of obstructive urolithiasis in animals fed high grain diet with Ca: P ratio as low as 1:1. Bailey (1975) [3] stated high protein diet and changes brought about by weaning to be the possible causes of obstructive urolithiasis in ruminants.

In the present study, the incidence of obstructive urolithiasis was mostly found in early winter to end of winter under temperate conditions, pointing towards the inadequate water intake and lack of green fodder as another predisposing factor for the development of uroliths. Kopper (1967) [13] and Muhee (2006) [20] also recorded highest number of cases of urolithiasis in calves during winter season. Radostits *et al.* (2007) [24] also opined that certain feed including cotton seed meal and mylosorghum were credited with causing more urolithiasis than other type of feed.

In the present study, calves of age group between 1-3 months had the highest (42.85%) occurrence of obstructive urolithiasis, followed by the calves of 4-6 months (28.57%), 7-9 months (20%) and 10-12 months (8.57%). Muhee (2006) [20] also recorded highest incidence (27.27%) of obstructive urolithiasis in the calves of 3-4 months age followed by 4-5 months age group (19.32%) and lowest (10.23%) in 1-2 months age group. In similar studies Amarpal *et al.* (2013) [1] reported 43.92 per cent cases of obstructive urolithiasis in buffalo calves of 4-6 months of age and 27.70 per cent cases in the calves of 0-3 months of age and only 4.05 per cent cases in animals of one year of age or above.

In the present study, tube cystotomy was done in six cases. The time of completion of surgical procedure was around 30-40 minutes. Dribbling of urine from the external urethral orifice in the treated animals started after 7-8 postoperative days and free flow of urine started after 8-9 postoperative days. Foley's catheter dislodgement and loss was observed in only one cases out of six animals.

In the present study, perineal urethrostomy was performed in

six cases. PVC catheter was removed after sixteen postoperative days and skin sutures after ten days. In five out of six case perineal urethrostomy was successful and these animals were recovered uneventfully where as one animal was found died on 8th postoperative day.

The evaluation of these two surgical procedures were done on the basis of postoperative complications like catheter loss, catheter dislodgement, catheter blockade, free flow of urine, healing of surgical wound. Blockage of catheter was also reported one each in cases treated by tube cystostomy and perineal urethrostomy, in present study. The blockade of catheters in these cases was corrected by flushing with normal saline solution post-operatively as and when required.

In present study, foley's catheter was lost in one animal that was treated by tube cystotomy on the day of 4th postoperatively. One case was required second surgical intervention which was treated by tube cystotomy. Similar findings were reported by Mahajan *et al.* (2017) [15] and Khurma *et al.* (2017) [12].

The mean time for removal of catheter in tube cystostomy and perineal urethrostomy was 13.66 and 15.6 days respectively. Badami *et al.* (2016) [2] removal of catheter was removed on 10th post-operative day. Animal started normal urination and had an uneventful recovery.

In the present study the mean value for hemoglobin (Hb) was reported 8.77±0.29 mg/dl. These values were found lower than the normal reference value as reported by Kataria and Kataria (2005) [10]. Sharma *et al*. (1985) [25] also observed decrease value of hemoglobin in clinical cases of obstructive urolithiasis.

In the present study in two animals TLC values were found to be above 13.8 thousand/mm$^3$, which was above than normal value. Gera and Nigam (1981) [7] also recorded elevated total leucocytic count in clinical cases of bullocks suffering from urolithiasis. Kelly (1984) [11] stated that TLC measurement was considered valuable aid in diagnosis and prognosis of the disease, as it formed the basis for assessing the reactivity of bone marrow against bacterial infection.

In the present study, the base value of DLC showed slight neutrophilia and lymphocytopenia in eleven cases. Monocyte count was found slightly decreased as compared to reference value. No role of basophil count was found because in all of the cases basophil count was zero. Gera and Nigam (1981) [7] also reported similar findings and opined that these changes might be due to infection and stress inflicted on affected animals.

In the present study, marked neutrophilia was seen in most of the cases. The mean value of neutrophils was higher (40.22±1.83%) than the reference value (28.91±1.12%). Marter and Crump (2003) [17] reported retention of urine along with lack of feed and water produced stress which through hypothalamus-pituitary axis released the glucocorticoid cortisol, a corticosteroid from adrenal cortex, in increased concentrations and higher cortisol probably reduced the number of lymphocytes and increased the number of neutrophils.

The elevated base values of BUN recorded in all cases of present study. These findings were in agreement with those of Villar *et al*. (2003) [26]. Sharma *et al*. (2006) [27] also reported elevated values of BUN in obstructive urolithiasis due to the onset of acute renal failure manifested by a decreased glomerular filtration rate as a result of back pressure on the kidneys and absorption of these substances from the urine present in the urinary bladder in the intact urinary bladder cases.

In the present study in nine cases elevated base value of serum creatinine was reported but in remaining animals it showed a normal range value. The findings in present study were in consonance with the findings of Gera and Nigam (1981) [7] and Villar *et al.* (2003) [26].

In present study, overall success rate was 91.66 per cent (11/12). The cases which were treated by tube cystostomy recorded success rate of 100 per cent, in the cases which were treated by perineal urethrostomy the success rate was 83.33 per cent. The percentage of recovered animal without any complication was 83.33 per cent (5/6) in cases which were treated by tube cystostomy, eighty per cent (4/5) in cases which were treated by perineal urethrostomy. Parrah *et al*., (2014) [22] and Mangotra *et al*., (2017) [16] also reported the similar finding in cases of surgical management of obstructive urolithiasis.

## Conclusion

Obstructive urolithiasis occurred more frequently under specific managemental condition like heavy concentrate feeding with higher mineral concentration in ground water in Bikaner and Churu districts. Tube cystostomy was very effective and highly successful surgical technique for the management of obstructive urolithiasis in calves. The disease can be prevented to a large extent by modifying the prevailing managemental practices i.e. feeding of concentrate and roughage in proper ratio, encouragement of more water intake and advised to add sodium chloride to the drinking water @ 3-4 per cent to enhance frequent water intake.

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