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**Katakam Rajavardan**  
Contract Teaching Faculty,  
Department of Veterinary  
Surgery and Radiology, College  
of Veterinary Science, Korutla,  
Jagityal, Telangana, India

**Jagan Mohan Reddy K**  
Assistant Professor and Head,  
Department of Veterinary  
Surgery and Radiology, College  
of Veterinary Science, Korutla,  
Jagityal, Telangana, India

## Tube cystostomy for management of cystorrhesis in male buffalo calves due to obstructive urolithiasis

**Katakam Rajavardan and Jagan Mohan Reddy K**

### Abstract

The present clinical study was conducted on six (6) male buffalo calves within the age group of 3 to 6 months, presented with cystorrhesis due to obstructive urolithiasis at VCC (Veterinary Clinical Complex), college of veterinary science, Korutla. Diagnosis was made based on the clinical symptoms like anuria, anorexia, bilateral abdominal distention (water belly condition) and abdominocentesis. BUN and serum creatinine values were elevated, along with the pH of urine. All the six cases were surgically treated by cystorraphy followed by tube cystostomy along with oral administration of urinary acidifier (ammonium chloride) for the dissolution of calculi. All the six cases started voiding urine from the natural orifice within 9 to 14 days and recovered uneventfully. Tube cystostomy with Foley catheter worked very well by providing cutaneous urinary diversion in calves with urinary obstruction until the calculi were dissolved by ammonium chloride. It may be concluded that tube cystostomy along with oral administration of ammonium chloride was the best treatment of choice for the management of cystorrhesis due to obstructive urolithiasis in male buffalo calves.

**Keywords:** Cystorrhesis, urolithiasis, cystorraphy, tube cystostomy, ammonium chloride, Foley catheter

### Introduction

Obstructive urolithiasis is the lodgement of calculi, in any part of the urinary tract but most commonly at the distal end of sigmoid flexure in ruminants that results in obstruction of urine flow. Formation of urinary calculi is a condition of multifactorial origin, mainly results from physiological, nutritional and managerial factors. However, it is mainly attributed to excessive or imbalanced intake of minerals particularly calcium, phosphorus and magnesium (Radostitis *et al.*, 2000) [7]. Urolithiasis is more common in male ruminants compared to females due to anatomical conformation of the urethral tract (Smith and Sherman, 1994) [9]. Obstruction in the flow of urine leads to futile and painful attempts by the animal to void urine. If proper treatment is delayed, the urinary bladder or urethra gets ruptured results in rapid deterioration of the condition of the animal. Selection of appropriate surgical treatment depends on the value and intended use of the animal, the location of the obstruction, and the integrity of the urethra and bladder. Various surgical techniques like urethrostomy (Stone *et al.*, 1997) [10], bladder marsupialisation (May *et al.*, 1998) [6], tube cystotomy (Williams and White, 1991) [12], penile catheterization and penile amputation (Winter *et al.*, 1987) [13] to treat urolithiasis are documented in literature. However, obstructive urolithiasis in small and young ruminants resulting in cystorrhesis can be effectively treated by tube cystostomy along with medical dissolution of calculi (Ewoldt *et al.*, 2006) [11].

The present paper describes six cases of male buffalo calves presented with already ruptured urinary bladder from obstructive urolithiasis due to delayed treatment and their management by tube cystostomy along with medical dissolution of calculi and its evaluation for clinical improvement and long term prognosis to be recommended for treatment of such cases under field condition.

### Materials and Methods

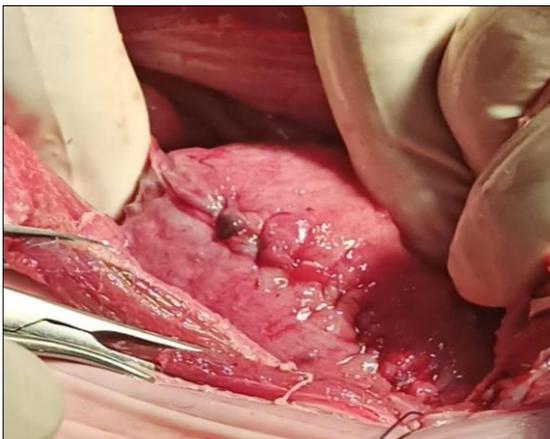
The present study was conducted in 6 male buffalo calves aged between 3 to 6 months suffering from anuria, retention of urine, anorexia, depression, bilateral abdominal swelling (water belly condition) (Fig. 1), and were diagnosed with cystorrhesis due to obstructive urolithiasis based on the clinical symptoms, abdominocentesis. Routine clinical examination along with CBP, serum biochemical analysis, estimation of pH and creatinine values of abdominal fluid was done. The fluid and electrolyte imbalances were corrected before surgery.

**Corresponding Author:**  
**Katakam Rajavardan**  
Contract Teaching Faculty,  
Department of Veterinary  
Surgery and Radiology, College  
of Veterinary Science, Korutla,  
Jagityal, Telangana, India

All the calves were sedated with xylazine hydrochloride @ 0.1 mg/kg bwt and placed in right lateral recumbency and the caudal abdomen was aseptically prepared for surgery. Left caudal paramedian incision lateral to the rudimentary teats was selected for laparotomy and 2% lignocaine hydrochloride was infiltrated along the line incision. A 4-6 cm long skin incision was taken in the pre-pubic region, the abdominal cavity was entered by incising abdominal muscles and peritoneum. The fluid in the abdominal cavity was drained out, bladder was located and examined for calculi and ruptured edges of the bladder wall was sutured in a simple continuous manner using monofilament absorbable suture material (Fig. 2).



**Fig 1:** Buffalo calf with water belly condition.



**Fig 2:** Cystorraphy performed in a simple continuous manner.



**Fig 3:** Insertion of Foley catheter in to the bladder through subcutaneous tunnel.

Foley catheter size 12-16 was inserted into the abdomen through a separate skin incision and subcutaneous tunnel connecting the primary incision. A small nick incision was made into the bladder away from the cystorraphy site, through which Foley catheter was inserted and the balloon was

inflated to anchor the catheter in the lumen of the bladder (Fig. 3), then the abdominal cavity is irrigated with normal saline and the abdominal incision was closed in a routine manner. The remaining portion of the Foley catheter outside the body was anchored to the abdominal skin (Fig. 4).

Post-operatively ceftriaxone sodium @ 25 mg/kg for 7 days and meloxicam @ 0.2 mg/kg for 4 days were administered along with antiseptic dressing of the incision site until the skin sutures were removed on 12<sup>th</sup> post-operative day. The owner was advised to administer ammonium chloride, a urinary acidifier @ 300 mg/kg per-oral mixed in water for 20 days and to flush catheter with normal saline if they notice any obstruction. The catheter was blocked from the 5<sup>th</sup> post-operative day for one hour in order to check the patency of the urethra, once the dribbling of urine is seen then the duration was gradually increased until the normal flow of urine is noticed through the natural orifice, then the Foley catheter was removed.

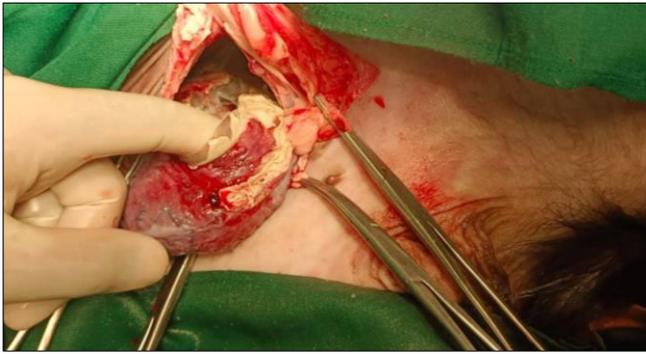
### Results and Discussion

All the six male buffalo calves were presented after 3 to 4 days since they exhibited anuria, this delay in the treatment of obstructive urolithiasis resulted in over distention and rupture of the bladder (cystorrhexis) indicated by fluid thrill on palpation of abdomen and was confirmed by abdominocentesis. The serum creatinine and BUN values were abnormally elevated. The pH values of the abdominal fluids ranged between 8 to 9 and the abdominal fluid creatinine concentration is two to three times higher than the serum creatinine concentration, this indicated that urine is present in the peritoneal cavity.

Xylazine hydrochloride and 2% lignocaine used in this study provided adequate analgesia throughout the procedure. Similar anaesthetic protocol was followed by (Mangotra *et al.*, 2017) [5]. The left caudal paramedian site, lateral to the rudimentary teats gave satisfactory exposure of the ruptured urinary bladder. In one of the buffalo calves multiple calculi were found in the lumen of the ruptured bladder along with whitish chalky deposits on the margins of the bladder wall near the ruptured site (Fig. 5). The Foley catheter was inserted without any difficulty in all the cases, urine was seen freely flowing from the catheter after its insertion. Obstruction of the catheter due to clots were noticed on the 4<sup>th</sup> post-operative day in one of the calves, which was flushed with normal saline to relieve the obstruction. Normal passage of urine through the urethra resumed within 9 to 14 days. In one of the case the catheter was removed prematurely by the owner on the 7<sup>th</sup> post-operative day once the dribbling of urine is seen.



**Fig 4:** Abdominal incisional closure and anchoring of Foley catheter to the abdominal skin.



**Fig 5:** Photograph showing white chalky deposits on the ruptured margins of the urinary bladder.

Obstructive urolithiasis is a condition that causes economic loss to the farmer mainly due to cost of treatment and death of the animal resulting from delayed treatment. High rate of mortality in cases of obstructive urolithiasis is mainly due to ruptured bladder and uremia (Gasthuys *et al.*, 1993) [2]. Incidence of urolithiasis is commonly seen in male buffalo calves than females, mainly due to anatomical differences (Tamilmahar *et al.*, 2014) [11]. Presence of sigmoid flexure is the main reason that obstruction is commonly seen in male buffalo calves in this study. Diet is considered to be a major factor in formation of urinary calculi. High phosphorus and low calcium levels in the concentrate diet may predispose them to the urolithiasis (Singh *et al.*, 2005) [8]. In the present study, history of early weaning, change of diet and shift to concentrate ration and intake of less water during winter months might have predisposed to urolithiasis. Similar finding were observed by (Kumar *et al.*, 2016 and Mangotra *et al.*, 2017) [4, 5]. The calculi blocks the urinary passage leading to over distension of bladder, crossing its physiological limits, leading to ischemia, protrusion of mucosa through the musculature of urinary bladder causing seepage of urine finally leading to cystorrhhexis, uroperitoneum and uremia (Gugjoo *et al.*, 2013) [3]. The complete obstruction of urethra and cystorrhhexis necessitates immediate surgical treatment (Tamilmahar *et al.*, 2014) [11].

The affected buffalo calves in the current study were treated with tube cystostomy along with medical dissolution of calculi showed normal recovery rate without any complications. Ammonium chloride used as urinary acidifier helped in dissolution of the calculi. This technique was found to be promising to treat urolithiasis in young animals (Ewoldt *et al.*, 2006) [1]. A higher success rate with tube cystostomy could be attributed to its simplicity, less complication and early relief from the urinary obstruction. However, in some cases, blockade of Foley catheter was reported due to improper post-operative care including untimely flushing of catheter by the animal owners.

### Conclusion

Urolithiasis in male buffalo calves is multifactorial in origin, complete urethral obstruction and untimely treatment can result in severe complications like cystorrhhexis and uremia. This can be treated effectively by tube cystostomy along with dissolution of calculi by ammonium chloride and proper post-operative management.

### Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have

appeared to influence the work reported in this paper.

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