



## Case Study

# Management of Obstructive Urolithiasis in a Male Buffalo Calf Using Tube Cystostomy Technique

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### Abstract

A 3-month-old male Murrah crossbred buffalo calf was presented to Veterinary Teaching Hospital (VTH), Rampur, Chitwan with a history of anuria for the past 4 days. Physical examination was carried out to check the status of the urethra and urinary bladder. Ultrasonography revealed an intact distended bladder. Based on the history of anuria and above examinations, the condition was diagnosed as obstructive urolithiasis. Meloxicam (0.3 mg/kg) was injected intramuscularly as a preemptive analgesia and Streptopenicillin (0.6 g) was administered intramuscularly as a prophylactic antibiotic. The calf was sedated with Xylazine-HCl (0.2 mg/kg) and analgesia was achieved with epidural administration of Lignocaine-HCl (3 ml) at lumbosacral space (L6-S1). The left ventral paramedian site was aseptically prepared and laparotomy surgery was performed. The subcutaneous tunnel was made to pass the leading edge of the catheter and outlet is affixed with skin by placing stay suture on the ventral aspect of the abdomen. The urinary bladder is identified, isolated and decompressed by aspirating with 60-CC syringe and the 3-way Foley catheter was introduced on the dorsal aspect of the urinary bladder. Peritoneum was sutured with Catgut # 2-0 in continuous suture pattern and all the muscle layers were sutured together with Catgut # 2 using modified ford lock sutures. Subcutaneous tissue was sutured with Catgut # 1 in continuous pattern and skin was sutured using nylon # 1 in simple interrupted pattern. The calf was placed in sternal recumbency till it gets recovered from the anesthesia. The urinary acidifier ammonium chloride (13g) twice a day daily orally upto 30 days was prescribed. The same antibiotic was administered once a day daily for 5 days and the wound was dressed daily with povidone iodine till complete healing of the wound. Finally, the skin suture was removed after 14 days.

**Keywords:** Urolithiasis, Calf, Foley's catheter, Tube Cystostomy

### Introduction

Urolithiasis is the lodgment of uroliths, anywhere in the urinary system but most frequently at the distal end of sigmoid flexure in ruminants that results in obstruction of urine flow (Radostitis *et al.*, 2000). Urolithiasis is more common in male ruminants compared to females due to anatomical conformation of the urethral tract (Smith and Sherman, 1994). The female has short, wide, and straight

urethra, while the male has long, narrow and tortuous urethra which makes them more prone to urethral obstruction, particularly distal aspect of the sigmoid flexure in bovines and urethral process in sheep and goats. The gradual narrowing of the urethral orifice is a major predisposing factor for obstructive urolithiasis (Smith and Sherman, 1994). In addition, factors such as diet, age, breed, genetic makeup, season, soil, water, mineral, and urinary

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tract infections plays an important role in the formation of urolithiasis (Udall and Chow, 1969). The clinical signs and physiological parameters of urolithiasis may vary with the degree of urethral obstruction, its duration, age and sex of the animals, and status of urinary bladder and urethra. Urethral obstruction in calves is a fatal disorder that predisposes to high mortality rate unless the animal is subjected to emergency surgical treatment for correction of the obstruction.

Medical treatment of obstructive urolithiasis in ruminants has generally been unsuccessful. Multiple surgical techniques have been described for treatment of such affection including urethrotomy (Singh *et al.*, 2010), urethrostomy (Khan *et al.*, 2009), penile transection with urethral fistulation (Misk and Semieka, 2003), tube cystostomy (Kushwaha *et al.*, 2007), bladder marsupialization (May *et al.*, 1998) and laparotomy and urethrotomy (Abdel and Sedeek, 2005). In spite of all these surgical techniques, it is often disturbing for the surgeon to treat an affected calf, as the surgeon has to assess the advantages against disadvantages of each technique including benefits against the cost of treatment, and to determine the effect of the technique on breeding capability of the calf.

Currently the most successful method of treating obstructive urolithiasis both in cattle and small ruminants is surgical tube cystostomy. It diverts urine through a catheter placed from the urinary bladder exiting through the body wall. The catheter is then intermittently plugged to encourage urination through the urethra.

## Materials and Methods

A 3-month-old male Murrah crossbred calf was presented to Veterinary Teaching Hospital (VTH), Rampur, Chitwan with a history of anuria, inappetance, dull and depression. Cardinal parameters like heart rate, rectal temperature, and

respiratory rate were within the normal range. Physical examination revealed distended abdomen and urinary bladder, while the ultrasonography revealed an intact distended bladder. Based on these findings, the condition was diagnosed as obstructive urolithiasis.

Since, the exact site of obstruction was not known, surgical tube cystostomy was initiated. The calf was sedated by injecting Xylazine-HCl (0.2 mg/kg) intramuscularly. Epidural anaesthesia was achieved with injection of 2% Lignocaine-HCl (3 ml) at lumbosacral space junction. Local infiltration of 2% Lignocaine-HCl (10 ml) was also done at the site of incision. The animal was placed in right lateral recumbency and all the legs were tied. Left side of the abdomen near to inguinal region was prepared for aseptic surgery (Fig. 1A). An oblique skin incision was made in the inguinal region. The skin, fascia, muscles and the peritoneum was incised for identification and isolation of the urinary bladder (Fig. 1B). The bladder was intact but inflamed. A subcutaneous tunnel parallel to the prepuce was created through which the Foley's catheter was passed with the pointed end towards the incision (Fig. 1C). Foley's catheter was taken out of the abdominal cavity where the catheter tip was held in Mayo hemostat forcep and directly stabbed the bladder at an avascular area and its bulb was inflated with 40 ml of sterile normal saline to affix the tube within the bladder and the catheter was secured within the lumen by tying the purse-string suture. Peritoneum was sutured with Catgut # 2-0 using simple continuous suture and all the muscular layers were sutured together using Catgut # 2 in continuous suture pattern. Subcutaneous tissue was sutured with Catgut # 2-0 in continuous suture pattern. Finally, the skin was sutured using nylon # 1 in simple interrupted pattern. The Foley's catheter was affixed with stay sutures at multiple sites on the ventral abdomen (Fig. 1D).



**Fig. 1:** Aseptically prepared surgical site (A); Identification and isolation of Urinary Bladder (B); Foley's catheter tunneled to exterior (C) and The Foley's catheter was sutured at multiple sites on the ventral abdomen (D)

Postoperatively, Streptopenicillin (0.6 g) and Meloxicam (0.3 mg/kg) was administered intramuscularly for 5 days and for 2 days, respectively. The owner was advised to give ammonium chloride (200 mg/kg) twice daily, orally for 30 days. The surgical wound was dressed with povidone iodine till it completely healed. The catheter was allowed to drain freely until normal urination resumed, after which it was clamped on every alternate day with infusion set flow regulating clamp to determine the urethral patency. The skin sutures were cut after 14 days of surgery. Likewise, the cystostomy tube was taken out after 1 month.

## Results and Discussion

Obstructive urolithiasis causes economic loss to the farmer due to loss of animals and cost of treatment. Mortality rate seems very high which is mainly due to rupture of urinary bladder or urethra. It is more prevalent in the extreme winter and summer. Occurrence of urolithiasis in peak winter may be due to the decreased water intake and deficiency of vitamin- A, arising from lesser availability of green fodder (Radostitis *et al.*, 2000). Desquamated epithelial cells occur due to deficiency of vitamin A and infections (Jones and Miesner, 2009). Excess sunlight and vitamin-D play an important role in urolithiasis in summer. This may be related to water balance of animals, during winter animals will not take much water and produce concentrated urine (Kushwaha *et al.*, 2007).

During summer, urine may be more concentrated due to increased water loss because of heat. Although, urolithiasis equally affects male and female animals but obstruction occurs mainly in males due to presence of long and narrow urethra (Tamilmahan *et al.*, 2014). The formation of urinary calculi in ruminants can be due to number of factors. Diet is considered to be a major factor. High phosphorous and low calcium are commonly used as concentrate rations which predispose the animal to phosphate uroliths (Funaba *et al.*, 2001). Diet given (concentrate) and the changes brought about by weaning may be contributing factors for development of obstructive urolithiasis in young ruminants.

Treatments for obstructive urolithiasis include medical dissolution of calculi and surgical management. In general, less severe cases can be corrected with medical management. Some report says that medical treatment is not effective for long term and only provided temporary relief (Ewoldt *et al.*, 2006). In severely obstructed cases, surgery is the only option.

Surgical tube cystostomy is the most optimistic procedure for obstructive urolithiasis in ruminants, especially with intact bladder. The procedure is relatively simple, and requires a short duration of anaesthesia and results in restoration of full urethral patency in successful cases (Fortier *et al.*, 2004). It is found to be successful in cases with simultaneous urethral rupture. The free flow of urine through the external urethral orifice could be due to many

factors. Such as, by giving anti-inflammatory drugs relived the spasm and inflammation of urethra, calculolytic agent like Ammonium chloride and Sodium chloride along with water to reduce the pH of urine. It also promotes the dissolution of calculi, by passing of urine through the Foley's catheter. The frequent plugging of catheter could bring urethral patency by flushing urethra of all debris and calculus material (Ewoldt *et al.*, 2006). Complication of tube cystostomy might be due to blockade of tube with blood or tissue debris, urethral rupture, tube dislodgement, and infection (Misk and Semieka, 2003). Different surgical treatments are available for obstructive urolithiasis but each operation have their own advantages and disadvantages. Tube cystostomy surgery provides alternatives to those operations.

## Conclusion

Tube cystostomy is a quick, practicable, field-applicable, and reliable method for the management of obstructive urolithiasis in ruminants. Surgical management along with medical management provided better treatment options for obstructive urolithiasis in ruminants.

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## Competing interests

The authors declare that they have no competing interests.

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