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CASE REPORT

Surgical Management of Ruptured and Necrosed Urinary Bladder by Tube Cystostomy in an 8 Month Old Male Buffalo Calf

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ABSTRACT

Obstructive urolithiasis is a major surgical emergency in young male buffalo calves, often leading to life-threatening complications such as urinary bladder rupture. This case report describes the successful surgical management of an 8-month-old male buffalo calf presented with complete urinary obstruction. Clinical examination and exploratory laparotomy revealed a ruptured urinary bladder with partial necrosis of the dorsal wall and uroperitoneum. Following peritoneal lavage, necrotic tissue was carefully debrided and a tube cystotomy was performed using a Foley catheter to establish urinary drainage. Postoperative management included fluid therapy, broad-spectrum antibiotics, analgesics, daily bladder flushing, and dietary modification. Ammonium chloride (200 mg/kg orally for 10 days) was administered as a urinary acidifier to prevent recurrence. The calf recovered uneventfully, with restoration of normal urination after catheter removal on day 10. This case highlights the effectiveness of tube cystotomy combined with bladder debridement and intensive postoperative care in salvaging ruptured bladders in buffalo calf.

KEYWORDS

• Buffalo calf • Obstructive urolithiasis • Tube cystotomy • Ammonium chloride • Surgical management

INTRODUCTION

Obstructive urolithiasis is a frequently encountered surgical condition in male bovine calves, with high incidence in buffaloes due to their narrow urethral anatomy and feeding practices that predispose to urolith formation (Radostits *et al*., 2007; Constable *et al*., 2017). High-concentrate diets, imbalanced calcium-

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to-phosphorus ratio, and low water intake are recognized risk factors (Ramakrishnan *et al*., 2016). Early and accurate diagnosis is therefore essential for effective case management. Among diagnostic modalities, ultrasonography has emerged as a rapid, non-invasive, and highly reliable tool for detecting uroliths, assessing bladder integrity, and confirming uroperitoneum through visualization of free anechoic peritoneal fluid and collapsed bladder walls (Constable *et al*., 1991) Among these, tube cystotomy is considered the treatment of choice for young calves as it relieves obstruction, allows bladder healing, and provides a route for urine diversion (Singh *et al*., 2008; Kumar *et al*., 2011). This report documents the clinical presentation, surgical management, and postoperative care of an 8-month-old buffalo calf with obstructive urolithiasis.

Case History and Clinical Examination

An 8-month-old male buffalo calf was presented to the VSPCA Hospital with a history of anuria, inappetence, and progressive abdominal distension for the past 3 days. The owner also reported signs of restlessness, repeated but unsuccessful attempts to urinate with occasional dribbling of blood-tinged urine, and gradual depression. The calf was maintained mainly on a cereal-based concentrate diet with limited access to green fodder, a known predisposing factor for urolithiasis. On general clinical examination, the calf appeared dull, moderately dehydrated, and in discomfort. The rectal temperature (101.5°F) and pulse rate (88/min) were within normal limits, while the respiratory rate was elevated (34/min) due to abdominal distension. Palpation revealed a distended abdomen with a clear fluid thrill, suggestive of uroperitoneum. The perineal region showed mild edema near the preputial orifice, but no urine flow. On rectal examination, the urinary bladder could not be palpated, supporting suspicion of rupture. Abdominocentesis yielded straw-colored fluid with a typical ammonia odor, consistent with urine. Ultrasonographic examination of the abdomen revealed anechoic free fluid filling the peritoneal cavity with echogenic floating debris. The urinary bladder wall appeared irregular and partially collapsed, further supporting a diagnosis of urinary bladder rupture.

Surgical Technique

Following stabilization with intravenous fluid therapy (normal saline at 20 ml/kg BW) and broad-spectrum antibiotics, the calf was prepared for surgery. Sedation was achieved using xylazine hydrochloride (0.05 mg/kg, IM), and local anesthesia was administered with 2% lignocaine hydrochloride. The surgical site was aseptically prepared. A paramedian laparotomy was performed caudal to the umbilicus. Upon entry into the peritoneal cavity, approximately 4.5 L of urine-like fluid was evacuated. The urinary bladder was identified in a ruptured and partially necrosed state (*Figure* 1), with fibrinous adhesions to surrounding tissues.

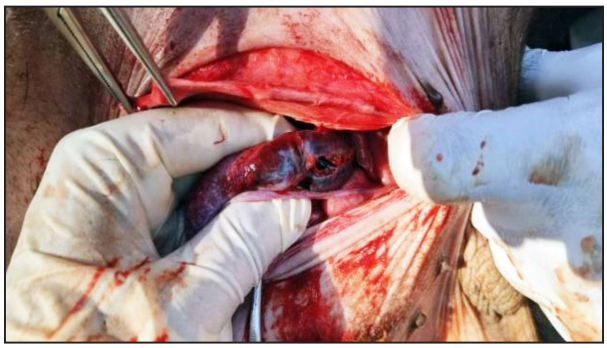

Figure 1: Exteriorization of the ruptured urinary bladder with evident thinning and necrosis of the bladder wall

Necrotic portions of the bladder wall were carefully debrided until healthy tissue margins were exposed. The bladder defect was closed using a double-layer inverting suture pattern (Cushing followed by Lembert) with absorbable polyglactin 910 (Vicryl® 2-0). To ensure urinary diversion and reduce pressure on the suture line, a tube cystostomy was performed. A Foley catheter (12 Fr) was introduced into the bladder through a small stab incision at the dorsolateral aspect and secured with a purse-string suture. The catheter was exteriorized through a separate stab incision in the abdominal wall and fixed to the skin with non-absorbable sutures (*Figure* 2). The peritoneal cavity was thoroughly lavaged with warm sterile normal saline until the effluent appeared clear. The abdominal wall was closed routinely in three layers: peritoneum and muscle with simple continuous sutures, subcutaneous tissue with simple continuous absorbable sutures, and skin with horizontal mattress sutures using nylon. The Foley catheter was flushed daily with sterile saline to maintain patency and was

left in situ for 10 days.

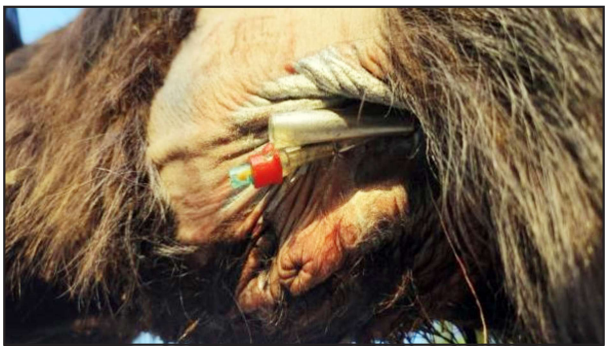

Figure 2: Foley's catheter secured in place after tube cystotomy in a buffalo calf, ensuring continuous urinary drainage

Postoperative Care

Postoperatively, the calf was administered ceftriaxone (20 mg/kg, IM, once daily for 5 days), meloxicam (0.5 mg/kg, IM, once daily for 3 days), and intravenous fluids (dextrose normal saline, 2 L daily for 3 days) to correct dehydration and electrolyte imbalance. As part of dietary management, ammonium chloride was administered orally at 200 mg/kg body weight daily for 10 days as a urinary acidifier to prevent recurrence of uroliths (Kumar *et al*., 2010; Sutradhar *et al*., 2010). The animal was advised to be maintained on a roughage-rich diet with restricted concentrate feeding and provided free access to clean water. The Foley's catheter remained functional, allowing normal urine drainage. It was removed on the 10th postoperative day after ensuring free passage of urine via the urethra. The surgical wound healed uneventfully by the 14th day.

DISCUSSION

Obstructive urolithiasis is one of the most common surgical emergencies in male buffalo calves, largely attributed to their anatomical predisposition of a long and narrow urethra, particularly at the sigmoid flexure and vermiform appendage (Radostits *et al*., 2007). High-concentrate, low-roughage feeding practices, coupled with inadequate water intake, increase the risk of urolith formation by altering urinary pH and mineral saturation (Singh *et al*., 2010; Rakesh *et al*., 2018). In the present case, the calf was maintained predominantly on cereal-based concentrate, which likely contributed to stone formation and subsequent obstruction. Urinary bladder rupture is a frequent sequela to prolonged obstruction and can lead to uroperitoneum and electrolyte imbalance, which are life-threatening if not corrected promptly (Van Metre *et al*., 1996). In this case, ultrasonography was particularly useful to confirm the presence of free anechoic fluid in the peritoneal cavity and the collapsed bladder wall, which supported the diagnosis of rupture. Ultrasonography is now considered a reliable diagnostic tool in differentiating uroperitoneum from other causes of abdominal distension (Constable *et al*., 1991). Surgical management of bladder rupture depends on the extent of tissue damage. In this calf, partial bladder necrosis necessitated debridement of devitalized tissue followed by double-layer closure to ensure watertight healing. Placement of a tube cystostomy provided effective urinary diversion, thereby minimizing pressure on the suture line and allowing the bladder to heal. Tube cystostomy is widely regarded as a simple, cost-effective, and reliable method for management of urolithiasis and bladder rupture in bovines (Tiruneh, 2000; Suthar *et al*., 2010). Postoperative care is crucial for successful recovery. In the present case, ammonium chloride was administered as a urinary acidifier to prevent recurrence of urolithiasis. Ammonium chloride supplementation has been shown to reduce urine pH, increase solubility of phosphate salts, and minimize urolith formation in ruminants (Koul *et al*., 2010; Thakur *et al*., 2017). Regular flushing of the catheter and systemic antimicrobial therapy further reduced the risk of ascending infections. The calf showed uneventful recovery with restoration of normal urination following catheter removal. This case emphasizes the importance of early diagnosis and aggressive surgical intervention in cases of ruptured and necrosed bladder. Tube cystostomy, combined with meticulous debridement and appropriate postoperative management, can result in favorable outcomes even in severe cases.

CONCLUSION

Rupture and necrosis of the urinary bladder are life-threatening sequelae of obstructive urolithiasis in young buffalo calves. Early diagnosis using ultrasonography is critical for timely surgical intervention. In the present case, tube cystostomy combined with debridement and repair of the necrosed bladder wall

proved to be a practical and effective surgical approach. Postoperative administration of ammonium chloride as a urinary acidifier, along with appropriate supportive therapy, aided in preventing recurrence and facilitated smooth recovery. This case highlights that even in complicated presentations with bladder rupture and necrosis, prompt surgical management and careful postoperative care can ensure favorable outcomes.

Ethical Approval

The surgical procedure was performed following institutional ethical guidelines for animal treatment and welfare. Informed consent was obtained from the animal owner before treatment.

Conflict of Interest: The authors declare no conflict of interest.

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