



Case report

Surgical management of obstructive urolithiasis by ultrasound-guided tube cystotomy in a ram

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Abstract

A one-year-old ram was brought to the Veterinary Clinical Complex, veterinary college Hisar, with a history of retention of urine for 3 days. Clinical signs manifested were anuria, preputial twitching, straining for urination, and in-appetence. Obstructive urolithiasis was diagnosed on the basis of history, clinical signs, and ultrasonographic findings. Ram was subjected to an ultrasound-guided tube cystostomy technique after surgical preparation. Post-operatively, anti-inflammatory drugs, and antibiotics were injected intramuscularly for 5 days. Ammonium chloride at a dose of 200 mg/kg body weight was administered orally for 15 days. Ram started normal urination from the 10th postoperative day and had an uneventful recovery. It was concluded that rams obstructive urolithiasis can recover by US guided tube cystotomy.

Keywords: obstructive, urolithiasis, ultrasound-guided tube cystostomy

Introduction

Urolithiasis is a medical condition characterized by the formation of uroliths, which are solid deposits, as a result of various pathological processes [1]. These processes can be either congenital or acquired, leading to an increased concentration of crystalline substances that are less soluble in urine [2]. This condition affects animals of all species, but it holds significant economic importance particularly in feeder steer and lambs [3]. Urolithiasis can lead to potential complications such as urethral obstruction, rupture of the urethra or urinary bladder, and subsequent uremia [1]. Among all species of animals, obstructive urolithiasis is a commonly encountered surgical condition, with a higher incidence observed in cattle, buffalo, and sheep.

Ruminants, in particular, face life-threatening consequences due to obstructive urolithiasis, necessitating immediate attention and potentially resulting in economic losses. While both male

and female animals are affected, males are more prone to this condition due to their long and narrow urethra. Moreover, early-aged castrated males are at a higher risk of developing urolithiasis, as castration leads to a narrowing of the urethral diameter and predisposes the animal to urinary stone blockage [4]. The presence of testosterone hormone is crucial for the normal development of the urethra and the secretion of protective substances in the urine of male animals. Urethral obstruction primarily occurs when calculi become lodged in the urethral passage. Several factors contribute to its development, including sex, age, breed, and season [5], hormonal imbalances [6], feed composition [7], mineral imbalances [8], infections, skin texture, genetic makeup, soil, location, vitamins, and water intake. Singh and Singh [9] emphasized that the chemical composition of urinary calculi varies and depends largely on the dietary composition of individual elements, geographical location, and local management practices.

Ultrasonography has been suggested for the diagnosis of uroliths in sheep and goats [10,11]. Urethral obstruction caused by uroliths or calculi leads to the retention of urine in the bladder, resulting in its over distension [12]. If early treatment is not provided, there is a risk of urinary bladder or urethral rupture, which can rapidly worsen the overall condition of the affected animal. Surgical removal of obstructive uroliths is the only option for saving the life of the animal [13]. Here we report the surgical management of obstructive urolithiasis in a ram by ultrasound guided tube cystotomy.

Material and Methods

A one-year-old ram was brought to the department after experiencing anuria and loss of appetite for the past three days (Fig. 1). The clinical signs exhibited by the ram included anuria, twitching of the preputial area, and straining during urination. Blood was collected for analysis of differential leucocyte count, blood urea nitrogen and creatinine as per standard procedures described previously [14]. Ultrasonographic examination was performed as described previously [10] and revealed that the urinary bladder was still intact (Fig. 2). Following a haemato-biochemical examination, a procedure called ultrasound-guided tube cystostomy [15] was performed.

To ensure a sterile surgical environment, the animal was prepared for aseptic surgery. A 4 MHz sector probe was placed at the planned surgical site to locate the position of the intact urinary bladder. Under the guidance of the ultrasound, a small incision was made in the skin and fascia. A sterilized plunger from an artificial insemination gun was inserted through the urinating port of a Foley's catheter, and the catheter was then advanced into the urinary bladder. The position of the catheter inside the bladder was confirmed by observing the flow of urine through the catheter. To secure the catheter in place against the bladder wall, the balloon on the catheter was inflated with 25 ml of normal saline solution (Fig. 3). After ensuring proper placement of the catheter with the assistance of the ultrasound, a simple interrupted suture was applied to close the incision site using non-absorbable suture material (Silk No. 1) (Fig. 4). The remaining portion of the catheter outside the body was secured to the abdominal wall in a loop fashion using non-absorbable suture material.

Post-operatively, broad-spectrum antibiotics (Ceftriaxone and sulbactam @10mg/kg body weight) and anti-inflammatory drugs (Meloxicam @ 0.3 mg/kg body weight) were administered

intramuscularly for five consecutive days. Ammonium chloride at a dose of 200 mg/kg body weight orally was recommended for 15 days. Ram started urination from normal passage on the 10th postoperative day.

Results and Discussion

Haemato-biochemical examination revealed haemo-concentration, leucocytosis, and elevated levels of blood urea nitrogen and creatinine. Ultrasonographic examination revealed an intact urinary bladder. Ram started urination from normal passage at 10th post-operative day. The skin sutures were removed on the 12th postoperative day. Urolithiasis is a complex disease characterized by the formation of uroliths or calculi in any part of the urinary tract. In small ruminants, the obstruction typically occurs at the level of the urethral process and sigmoid flexure.

The development of calculi is influenced by various factors, including the type of feed and housing practices provided to the animals. The composition of the feed and fodder directly impacts the formation and characteristics of the calculi. Feeds that contain high levels of phosphorus and magnesium, along with low levels of calcium and potassium, are predisposing factors for the recurrence of urolithiasis in animals [3,16].

Animals receiving high grain rations in feedlots are particularly prone to developing urinary calculi. These high-concentrate rations often have a calcium-to-phosphorus ratio of 1:1 [17]. Cereal grains, which are commonly included in these rations, have an abnormally low calcium-to-phosphorus ratio of 1:4 to 1:6 [18]. This imbalanced ratio, along with high magnesium diets and alkaline urine, promotes the formation of phosphatic calculi.



Fig. 1 and 2: Photographs showing ram suffering from urine retention and intact urinary bladder upon ultrasonographic examination.



Fig. 3 and 4: Photographs showing inflated balloon of Foley's catheter inside urinary bladder and simple interrupted suture placement

According to Floeck [19], ultrasonography is a valuable imaging technique that is non-invasive, safe, cost-effective, and provides dynamic information, aiding in the diagnosis of various urinary tract abnormalities. It complements clinical examinations and clinicopathological analyses by offering additional insights into urinary tract diseases. Ultrasonography is highly accurate in detecting urethral calculi, concretions, distended and ruptured urinary bladder, urethritis, hydronephrosis, and nephrolithiasis [20]. This imaging modality can assist in determining the appropriate treatment approach and predicting the prognosis of urolithiasis cases [21]. The primary goal of urolithiasis treatment is to restore a normal urinary passage, which can be achieved through various methods depending on the severity of the condition. Muscle relaxants, amputation of the urethral process, urethrostomy, and tube cystotomy are among the techniques used to establish a patent urinary tract. Additionally, the early-stage use of urinary acidifiers, such as ammonium chloride, may be beneficial in managing the condition.

Conclusion

Obstructive urolithiasis in ram can be diagnosed by ultrasonography and successfully managed by ultrasound guided tube cystotomy.

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