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Perioperative Observations During Surgical Management of Bovine Obstructive Urolithiasis

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ABSTRACT

The present study was conducted on 30 male calves suffering from obstructive urolithiasis. The animals were divided into two equal groups based on the whether the urinary bladder was intact (group A) or ruptured (group B). All the animals were operated under same anesthetic technique. It was noted that duration of illness had a significant effect on the status of the urinary bladder while there was non-significant effect of the status of the urinary bladder on the condition of the animal. Cystic mucosa was found inflamed and hemorrhagic in most of the cases and the quantity of urine collected varied from 3.0 17.5 liters. The site of urethral calculi retrieval was pre- and post-scrotal region (3 cases), proximal sigmoid flexure (2 cases) and distal sigmoid flexure (4 cases).

Key words: Calves, urolithiasis, urinary bladder, urine

INTRODUCTION

Urolithiasis in ruminants, especially in cattle, is of considerable economic importance as losses inflicted by this melody are considered very high (Singh and Singh, 1990). Treatment of obstructive urolithiasis has been found to vary depending upon clinical status of animal and duration of obstruction (Larson, 1996; Van Metre

et al., 1996). Medical treatment has been described with marginal success in relieving the obstruction during early stages of the disease (Crookshank, 1970). However, once urethral obstruction is complete, surgical intervention becomes warranted (Haven *et al.*, 1993, House *et al.*, 1996). The choice of procedure depends on the extent of tissue damage secondary to the obstruction, the value of the animal, and the owner's expectations for continued use of the animal (Wolfe, 1998). Recurrent urolithiasis, calculi at multiple sites, badly damaged urethra, atonic bladder or severe cystitis are the common complications that may result in failure of surgical management of obstructive urolithiasis. Peripherative observations thus aid in correct prognosis and chalking out the proper mode of treatment. This paper puts on record the observations recoded during the surgical management of 30 clinical cases of obstructive urolithiasis.

MATERIAL AND METHODS

Thirty male cattle calves, suffering from complete retention of urine, presented for treatment at Teaching Veterinary Clinical Services Complex, Faculty of Veterinary Sciences and Animal Husbandry (F. V. Sc & A. H.), Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-K), Srinagar formed the material of the study. At the time of admission, all the animals were subjected to complete pre-operative evaluation. A complete history regarding the age, breed and sex of the animal, castration and age at the time of castration, duration of illness, managemental practices, feeding habits of the animal, early signs of the disease, previous treatment, if any, were recorded. These animals were subjected to ultrasonographic and peritoneal fluid examinations for confirmation of the tentative diagnosis. The animals were divided into two equal groups based on the whether the urinary bladder was intact (group A) or ruptured (group B). Preoperatively, fluid and

supportive therapy was given to animals with severe dehydration and/or uremia as per the requirement of the case. All the animals were operated under same anesthetic technique i.e. local infiltration and the surgical site for laparocystotomy (paramedian area). All the problems encountered during the operations were recorded. The status of the bladder regarding its serosal condition and its adhesions, if any, were recorded. In cases of ruptured bladders, the location and size of rent(s) were recorded. The data thus obtained was classified and subjected to statistical analysis as per the standard procedures (Snedecor and Cochran, 1976) and inferences drawn**.**

RESULTS

Perioperative observations are critical for chalking out the postoperative management course. These are recorded and depicted in Table 1. The Mean ± SE age for the calves of the group A and B was 5.83± and 6.93± months respectively. Eleven animals (73.33%) of the animals of group A had fair body condition in comparison to eight (53.33%) animals of group B. Four (26.66%) animals of group A and five (33.33%) animals of group B were found to be dull and depressed while as two (13.33%) animals of group B were recumbent. The animals of group A had a mean duration of illness of 45.60±6.75 hours which was significantly lower from that of group B (78.00±7.50) hours. Duration of illness had a significant effect on the status of the urinary bladder. However, there was non-significant effect of the status of the urinary bladder on the condition of the animal. There was a significant effect of the duration of illness on the body condition of the animal (Table 2).

Table 1: Comparison of various parameters between the animal with intact bladder versus ruptured bladder

Parameter	Group A (intact bladder)	Group B (ruptured bladder)
Body condition	Dull and Depressed: 4	Dull and Depressed: 5
	Fair: 11	Fair: 8
		Recumbent: 2
Breed	Cross bred Jersey: 9	Cross bred Jersey: 12
	Cross Bred Holstein : 6	Cross Bred Holstein :2
		Local: 01
Duration of Illness	45.60^{a} ±6.75	78.00^{b}±7.50
Body condition	1.27^{a}±0.12	1.60^{a} ±0.19
Diuretics	5	6
Site of rupture	Nil	Dorasal: 7
		Ventral: 8
Shape of rupture	Nil	Linear 11
		Circular 4
Age of the animals	6.93^{a}±0.75	5.83^{a} ±0.52

Mean±SE with different superscript in a row differ significantly at P <0.05

Table 2: Effect of duration of illness on the condition of the animal

Condition	Duration
Fair	50.00 ± 6.39^{a}
Dull and Depressed	79.33 ± 8.82^{b}
Recumbent	90.00 ± 39.00^{c}

Mean±SE with different superscript in a column differ significantly at P<0.05

Diuretics had been administered to five and six animals of group A and B respectively. Among all animals cystocentesis was performed in seven animals. The site of rupture in the urinary bladder was dorsal in seven animals while in eight animals it was ventral. The shape of the rupture in the urinary bladder was linear in 11 cases while in 4 cases it was circular (Fig.1).

Urinary bladder in group A was smooth and had bluish tinge (Fig. 2) in majority of the cases however in three cases it was haemorrhagic while in one case the serosa was rough, inflamed and chocolaty (Fig. 3, 4, 5). In group B cases, majority of the bladder had leathery appearance, and however in one case the rent had healed spontaneously (Fig. 6) and in one case, there was erosion of cystic serosal layer. Adhesion of the urinary bladder was found in five cases, mild adhesions with omentum only in 3 case and severe adhesions with peritoneum and omentum in another case (Fig. 7). In one case, massive adhesions of urinary bladder with peritoneum and omentum were observed only in one case with ruptured urinary bladder.

Cystic mucosa was inflamed and haemorrhagic in most of the cases (Fig.8) and the quantity of urine collected varied from 3.0 17.5 liters. Difficulty encountered was only with the suturing of the bladder at the neck and prolapse of intestines through abdominal wound during bladder handling. In Some animals, in which normograde cysto-urethral catheterization was performed, the catheter was obstructed by the calculi, necessitating one (6 cases) to two (3 cases) urethral incision for their removal in all but one case in which 2 loop shaped calculi were expelled out of external urethral orifice. The site of urethral calculus retrieval was pre- and post-scrotal region (3 cases), proximal sigmoid flexure (2 cases) and distal sigmoid flexure (4 cases) (Fig. 9).

Fig. 1: Circular rupture and necrotic serosa of urinary bladder

Fig. 2: Intact urinary bladder with smooth serosal surface

Fig. 3: Intact urinary bladder having smooth serosa with haemorrhagic lines.

Fig. 4: Intact urinary bladder with rough and haemorrhagic serosa

Fig. 5: Intact urinary bladder with rough, inflamed and chocolaty serosal surface.

Fig. 6: Partially healed rent in the urinary bladder wall

Fig. 7: Massive adhesions of urinary bladder.

Fig. 8: Haemorrhagic mucous membrane of urinary bladder

Fig. 9: Impacted calculus mass in the urethra.

DISCUSSION

Duration of illness had a significant effect on the physical status of the animal and the status of the urinary bladder. Cases that were presented at the earlier stage had intact urinary bladder while as the cases that had late presentation had ruptured urinary bladder In group A animals, smoothness and dark brownish coloration of intact bladder surfaces could be attributed to overstretching of the bladder wall and rupture of capillaries.

Rupture of urinary bladder in group B cases could be attributed to the prolonged duration of illness, as the history of administration of diuretics was available only in 6 out of 15 cases. Adam (1995) opined that the administration of frusemide might be

responsible for the early rupture of urinary bladder. Rupture of the urinary bladder can take place at any site where weakness might have been caused by the intraluminal urine pressure or weakness existed due to other causes. More ruptures on ventral side (n=8) than on the dorsal side (n=7) of the urinary bladder contradict the observations of Monoghan and Boy (1990), and Sockett *et al.* (1986). Ruptures were distributed throughout the bladder wall i.e., apex, body and neck, thereby suggesting that weak points anywhere in the bladder wall could result in rupture by the intraluminal urine pressure. Variable degree of roughness, haemorrhagic necrosis and leathery appearance of bladder surface in ruptured urinary bladder cases could be due to rupture of vessels and capillaries at the time of bladder rupturing. Bladder rupture seemed to have no effect on the urolith retrieval sites within the bladder, as uroliths could be retrieved equally from cases with intact and ruptured urinary bladders.

Serosal surface of the bladder wall was inflammed and rough in all the ruptured urinary bladder cases which could be due to poor circulation, inflammation and necrosis of the bladder wall. Haemorrhagic serosal surface could be due to the rupture of vessels and capillaries at the time of bladder rupture, while chocolaty colour of bladder surface observed could be because of decreased perfusion due to overstretching of the bladder before rupture. Adhesions of urinary bladder with omentum and peritoneum could be due to the fact that upon rupture, eroded serosal surface could come into contact with adjacent omentum and peritoneum. Secondly in both such cases there was history of field diagnostic abdominocentesis/cystocentesis, which might have damaged both the serosal surface of the bladder and peritoneum/omentum and brought them together for healing. Bovine peritoneum lacks the plasminogen activators, which convert plasminogen to plasmin, a specific fibrinolytic inhibitor, which blocks the lysis of fibrin (Trent and Bailey, 1986). A favourable environment for adhesion formation is thus provided after initial trauma of the peritoneum in cattle. Quantity of urine obtained from complete obstructive

urolithiasis cases varied according to the duration of illness as more quantity of urine was obtained from the cases with the prolonged duration of illness. Suturing of bladder at neck was difficult because of the inaccessibility of this portion of the bladder. Adhesion formation was again found predisposed by cystocentesis in addition to other likely factors. Multiple calculi/concretions were retrieved in majority of the cases, while single or 2 calculi could be retrieved in one case each. In majority of the bladder rupture cases, calculi could be retrieved only from cystic lumen. Sigmoid flexure was the most common site of calculus lodgment, thus confirming the observations of Gera and Nigam (1979) and Sharma and Singh (1993). Calculi were found at different places in urethra i.e., in pre-scrotal region, distal sigmoid flexure, proximal sigmoid flexure, and pre- and post- scrotal region. Sharma and Singh (1993) also opined that in bovine, calculi can lodge anywhere in the urinary tract but mostly in the region of sigmoid flexure or in pre-scrotal region near the glans penis.

CONCLUSION

The present report emphasizes the need to treat the cases of the urolithiasis at the earliest as the duration of illness has a significant effect on the body condition of the animal.

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