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Diagnostic and therapeutic approaches in buffaloes affected with ruminal indigestion and foreign body syndrome

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Abstract
The clinical research was conducted to evaluate ruminal indigestion and foreign body syndrome in 32 affected buffaloes presented to Veterinary College, Bidar. In group I (13) healthy buffaloes, group II (13) buffaloes with ruminal indigestion and group III (6) buffaloes with foreign body syndrome (FBS) were evaluated. Clinical examination was carried out to evaluate rectal temperature, respiratory rate, heart rate and ruminal contractions. Radiographic examination was carried out to evaluate abnormality in reticulum and diaphragm. On clinical examination rectal temperature, heart rate, respiratory rate varied non-significantly whereas ruminal contractions were significantly reduced to 0.69±0.13 and 1.17±0.15 / 3 min in group II and III buffaloes respectively. Radiographic examination revealed presence of non-potential foreign bodies in reticulum of buffaloes of group II, whereas potential foreign bodies and abnormal silhouette of reticulum with discontinued diaphragmatic line in buffaloes of group III was observed. Exploratory rumenotomy was performed under paravertebral anaesthesia using 2% lignocaine hydrochloride for retrieval of potential foreign bodies (binding wire and nail) to confirm radiographic findings and treat the affected buffalo. So rumenotomy becomes the most essential and first line of treatment in buffaloes affected with foreign body syndrome. Additionally, ultrasonography was used as a diagnostic modality to evaluate reticulum in group II and III buffaloes. Reticular motility/4 minute was significantly reduced in group II and III buffaloes. Uneven contour of reticulum wall, significant increased reticulum wall thickness and distance between abdominal wall to reticulum was observed in group III buffaloes.

Keywords: Buffalo, indigestion, foreign body, radiography, rumenotomy

Introduction
Buffaloes and cows have unselective feeding nature, results in consumption of foreign bodies and these foreign body lodges into the reticulum and resulting in reticular disorders like traumatic reticuloperitonitis (TRP), acute per reticular inflammation, adhesions and abscess (Abdelaal *et al.*, 2009) [1]. These affected ruminants on clinical examinations are initially diagnosed with chronic ruminal indigestion. Pain and inappetence are the important clinical signs elicited by the animal in TRP (Radostits *et al.*, 2007) [14]. As the science advanced in imaging modalities with its application in veterinary field radiography helped in detecting radio dense foreign bodies in reticulum with its location in the body (Braun *et al.*, 1993; Braun *et al.*, 1994) [7, 6]. However the inflammatory and structural changes of the reticulum serosa with its contractile pattern are not detected in radiography (Fubini *et al.*, 1990) [9]. The importance of present study is clinical and radiographic evaluation of reticulum in Indian buffaloes affected with ruminal indigestion and foreign body syndrome. Therefore present study was carried out with the objectives of clinical and radiographic evaluation of reticulum in healthy and compared with buffaloes affected with ruminal indigestion and FBS.

Materials and Methods
The clinical study was carried out in three groups comprising of 32 buffaloes presented to the Veterinary College, Bidar. The group I include 13 healthy buffaloes and treated as control. Whereas group II (13 no.) and III (6 no.) consist of buffaloes affected with ruminal indigestion and FBS respectively. Anamnesis of the patient was recorded to know feed and water intake, duration of illness, rumination, tympany and faecal output.

The detailed signalmen with respect to species, breed, age, sex, body weight and pregnancy status were recorded in all buffaloes of group II and III.

The clinical and physiological parameters like rectal temperature, respiratory rate, heart rate, ruminal contractions per three minute and per rectal examination findings were recorded (Sharma *et al.,* 2009) [15].

Radiographic examination of Thoraco-abdominal in buffaloes was carried out with right lateral reticulography in standing position with exposure factors of KVp 90-113, 53 mAs, 90-110 cm as film focal distance (Makhdoomi *et al.,* 2018) [11] for evaluation for presence of foreign body, abnormality in the reticulum and diaphragm. The research data were evaluated by student t-test (Snedecor and Cochran 1994) [16].

The left flank exploratory rumenotomy was performed aseptically under paravertebral anaesthesia technique in standing position using 2% lignocaine hydrochloride to confirm radiographic findings.

Results and discussion

The mean duration of illness was 3.53 and 4.83 days in group II and III buffaloes affected ruminal indigestion and FBS respectively suggestive of early case presentation. On the contrary, the duration of illness was 15.11±2.50 days in bovines with localized peritonitis (Athar *et al.,* 2010a) [3]. Tympany was observed only in 50% (3) buffaloes of group III affected with FBS. Recurrent tympany was observed in 92.9% buffaloes affected with hardware disease (Mostafa *et al.,* 2015) [12]. The rumination was suspended in 84.21% (16) buffaloes and intermittent in 15.79% (3) buffaloes of group II and III buffaloes affected with ruminal indigestion and FBS respectively. Similar findings were observed in cattle affected with rumen impaction due to indigestible foreign bodies (Vanitha *et al*., 2010) [17].

Rectal temperature, respiratory rate and heart rate were non-significantly varied among the three groups. However, ruminal contractions were significantly decreased ($p \leq 0.01$) in group II and III when compared to group I buffaloes. Decreased ruminal contractions were due to reduced calcium levels (Hussain *et al.,* 2014) [10]. In cattle affected with FBS significant decreased ruminal contractions were due to presence of huge amounts of foreign body in the fore stomach which impairs the initiation of biphasic contractions of rumen and reticulum through vagus nerve (Fani *et al.,* 2019) [8]. On per rectal examination doughiness of rumen and scanty mucoid faeces was recorded in buffaloes of group II. Similar findings were observed in cow affected with ruminal impaction due to indigestible foreign bodies (Nayak *et al.,* 2014) [13]. Whereas in group III buffaloes along with doughiness of rumen foul odoured, hard, pelleted and scanty with mucoid faeces was observed. Similar findings like scanty and pelleted faeces were observed in bovines affected with rumen impaction due to indigestible foreign bodies (Boodur *et al*., 2010) [5]. The clinical parameters are given in Table 1.

Table 1. Mean ± SE values of Clinical parameters in group I, II and III buffaloes

Sl. no	Clinico-haemato biochemical parameters	Group I	Group II	Group III
1	Rectal temperature (ºF)	100.46±0.29	100.08±0.46	100.25±0.79
2	Respiratory rate (breathes/minute)	18.62±1.11	23.23±3.65	17.67±2.89
3	Heart rate (beats/minute)	56.46±2.25	63.69±3.84	64.00±5.01
4	Ruminal contraction (number of contractions/3 min)	2.62±0.14	0.69±0.13**	1.17±0.15**

Mean values bearing superscript* differ significantly at ($p \leq 0.05$) between the groups
Mean values bearing superscript** differ significantly at ($p \leq 0.01$) between the groups

Radiographic examination in group I buffaloes revealed normal silhouette of reticulum and diaphragm with intact diaphragmatic line as shown in Figure 1. Radiographic examination of group II only 4 (30.76%) buffaloes revealed presence of non-potential foreign bodies as shown in Figure 2. Similarly in bovines affected with rumen impaction usually foreign bodies were not found in the reticulum. However in few cases if found which was incidental and it might be due to the non-selective feeding nature of the bovines (Athar *et al*., 2010b) [4]. In group III radiographic evaluation of 6 buffaloes revealed abnormal silhouette of reticulum with discontinued diaphragmatic line in 33.33% (2) buffaloes and the potential foreign bodies were found both in the abdomen of reticular ventral floor (4 buffaloes) and also intrathoracic (2 buffalo) as shown in Figure 3 and 4. Radio dense metallic foreign body within the thorax and overlying ventral border of the heart with discontinuation of the diaphragm in buffaloes were observed (Aref and Abdel-hakiem, 2013) [2] suggestive of diaphragmatic hernia and FBS. In one buffalo of group III potential foreign body (binding wire) was detected on radiography with intact diaphragmatic line as shown in Figure 5.

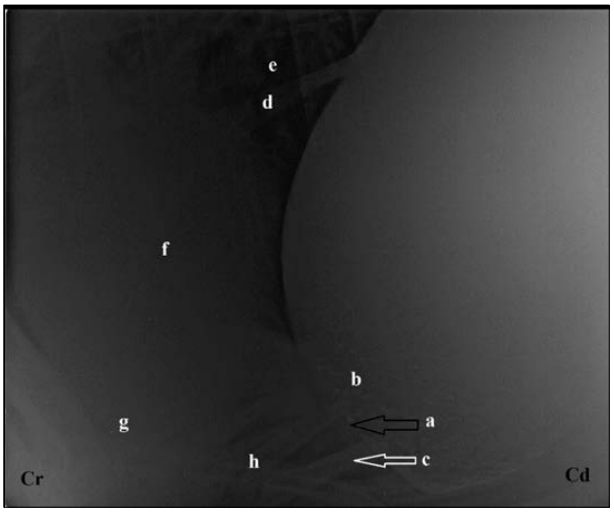

Fig 1: Right lateral thoraco-abdominal plain radiograph in a healthy buffalo of group I represents reticulum in relation to other visceral organs. a) Reticulum wall b) Reticulum c) Diaphragmatic line d) Caudal venacava e) Lung f) Heart g) Sternum. Cr: Cranial, Cd: Caudal

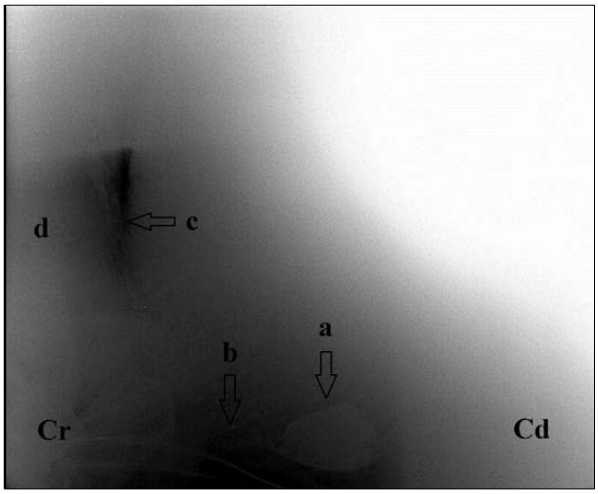

Fig 2: Photograph showing non-potential foreign body in the reticulum of group II buffaloes affected with ruminal indigestion. a) Non-potential foreign body b) Reticulum wall d) Diaphragmatic line d) Heart Cr: Cranial, Cd: Caudal

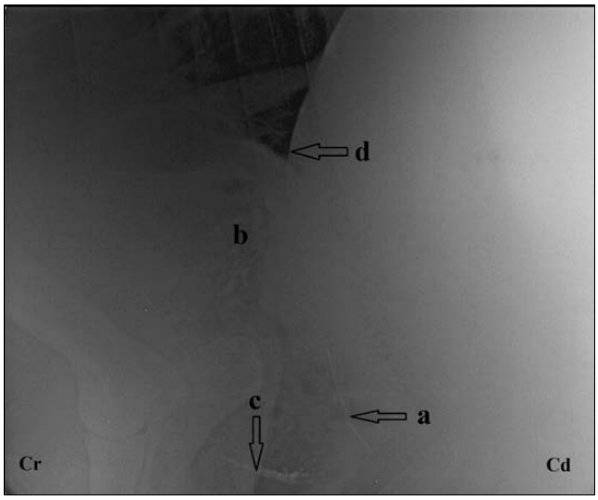

Fig 3: Photograph showing potential foreign body (binding wire) in the thoracic part of herniated reticulum of buffalo in group III affected with FBS. a) Potential foreign body (binding wire) b) Reticulum c) Reticulum wall d) Diaphragmatic line. Cr: Cranial, Cd: Caudal

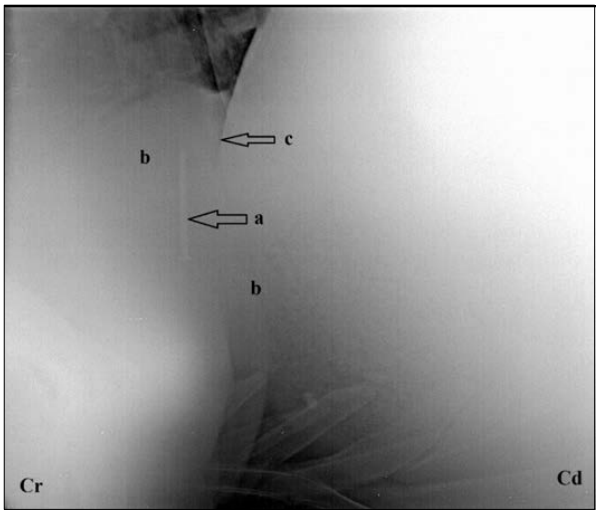

Fig 4: Photograph showing potential foreign body (nail) in the thoracic part of herniated reticulum in buffalo of group III affected with FBS a) Potential foreign body (nail) b) Reticulum c) Diaphragmatic line. Cr: Cranial, Cd: Caudal

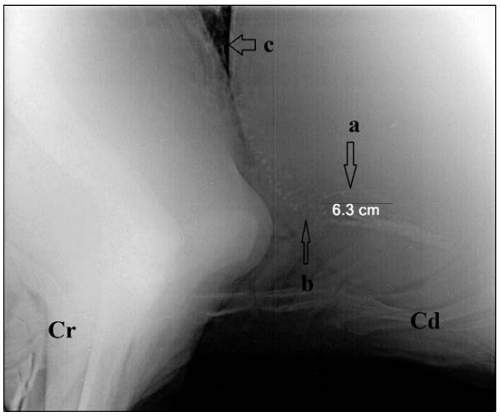

Fig 5: Photograph showing potential foreign body (binding wire) in the reticulum of group III buffaloe affected with FBS a) Potential foreign body (binding wire approximately 6.3 cm) b) Reticulum c) Diaphragmatic line. Cr: Cranial, Cd: Caudal

Additionally as a diagnostic modality ultrasonography was performed in group II and III buffaloes. In group III buffaloes, irregular shape and uneven contour of reticulum wall was observed as shown in figure 6 and 7 respectively. Liver abscess was detected ultrasono graphically in one buffalo and to confirm the findings ultrasound guided fine needle aspiration of pus was performed. The liver abscess was turgid with diameter of 4.32 cm before ultrasound guided aspiration of pus and became flaccid with diameter of 2.66 cm after ultrasound guided aspiration of pus as shown in Figure 8.

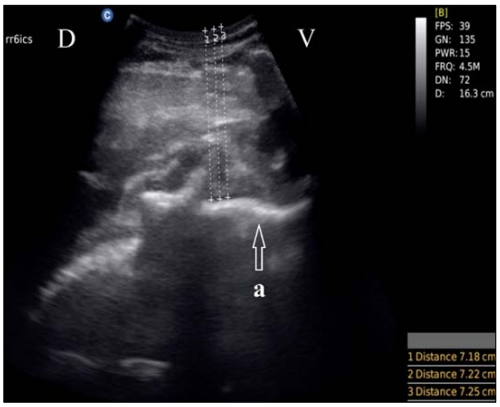

Fig 6: Ultrasound image showing B-mode scanned image of irregular shape of reticulum wall (a) on lateral examination in group III buffalo affected with FBS. D: Dorsal, V: Ventral

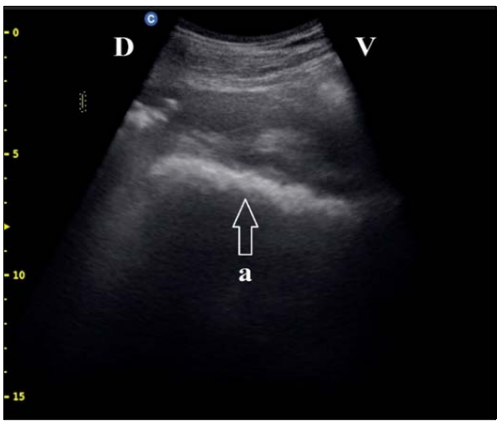

Fig 7: Ultrasound image showing B-mode scanned image of uneven contour of reticulum wall (a) on lateral examination in a buffalo of group III affected with FBS. D: Dorsal, V: Ventral

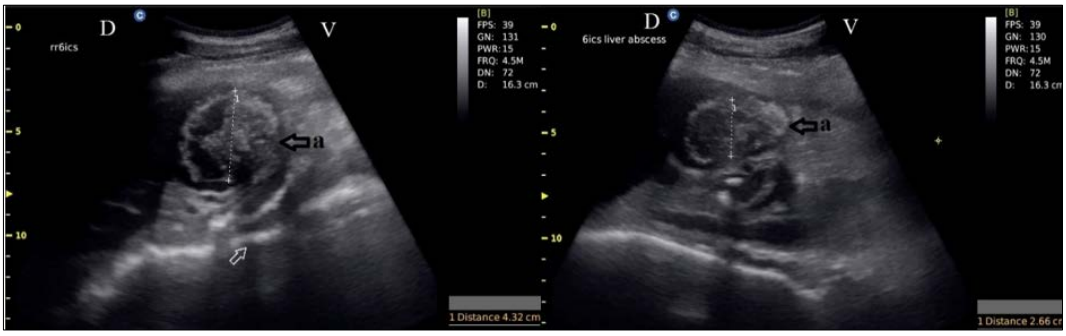

Fig 8. Ultrasound image showing turgid liver abscess (a) with measured diameter of 4.32 cm before ultrasound guided fine needle aspiration of pus and flaccid liver abscess (a) with measured diameter of 2.66 cm after ultrasound guided fine needle aspiration of pus in a buffalo of group III. D: Dorsal, V: Ventral

Exploratory rumenotomy was performed in 3 buffaloes of group III affected with FBS. It was a primary step in treatment of buffaloes affected with FBS with retrieval of potential and non-potential foreign bodies from rumen and reticulum as shown in Figure 9. Laparo-rumenotomy was performed in sharp foreign body syndrome affected buffaloes and foreign bodies were retrieved which were detected on radiography (Aref and Abdel-hakiem, 2013) [2]. Exploratory rumenotomy helped in confirming radiographic findings. The potential foreign bodies were found both in the abdomen of reticular ventral floor (4 buffaloes) and also intrathoracic (2 buffalo). The six radiopaque foreign bodies were nail (1 buffalo), binding wire (2 buffaloes) and other three buffaloes with metallic sharp foreign bodies as shown in Figure 10.

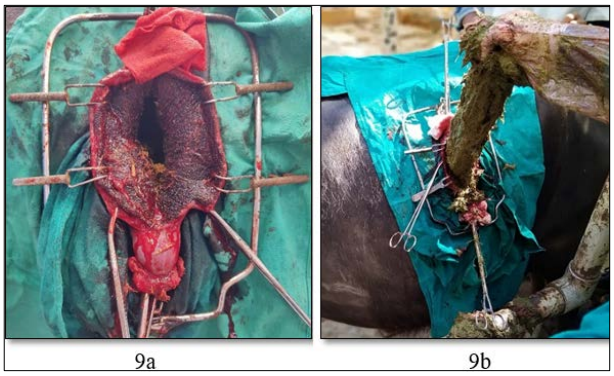

Fig 9: Photograph showing (9a and 9b) exploratory rumenotomy using weingarth rumenotomy set in group III buffaloes affected with FBS

Fig 10: Photograph showing (10a and 10b) potential foreign body (nail), potential foreign body (binding wire) and non-potential foreign body (stones and keychain) retrieved from reticulum by exploratory rumenotomy in buffaloes of group III affected with FBS

Conclusion

In buffaloes affected with ruminal indigestion and foreign body syndrome have not showed significant variation in clinical parameters evaluation like rectal temperature, heart rate, respiratory rate however, ruminal contractions were significantly reduced to 0.69±0.13 and 1.17±0.15 /3 min in group II and III buffaloes respectively when compared to control group. Radiographic examination revealed presence of non-potential foreign bodies in reticulum of buffaloes of group II and group III in addition to that abnormal silhouette of reticulum with discontinued diaphragmatic line was observed in buffaloes of group III. Ultrasonography could be used as imaging tool for diagnosis, therapeutic, post therapeutic and prognostic indicator of reticulum in buffaloes affected with ruminal indigestion and FBS. Radiographic and ultrasonographic findings were complimentary to each other in buffaloes affected with ruminal and foreign body syndrome. Rumenotomy becomes the most essential and first line of treatment in buffaloes affected with foreign body syndrome. However, buffaloes with ruminal indigestion therapeutic management were enough to recover from indigestion. To confirm the clinical, radiographic, ultrasonographic and fine needle aspiration findings laparo-rumenotomy was very important surgical procedure in buffaloes affected with foreign body syndrome. So, exploratory rumenotomy was performed under paravertebral anaesthesia using 2% lignocaine hydrochloride for retrieval of potential foreign bodies (binding wire and nail) from affected buffaloes.

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