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## Diagnosis of reticular abscess in buffaloes: A review

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### Abstract

Abscess formation adjacent to reticulum is considered as one of the squeal of the hardware disease. Some of pre-reticular abscesses are recorded firmly attached to the reticulum and located at or above the ventral floor of the reticulum. The general signs of indigestion including anorexia, ruminal tympany, scanty faeces, reduced milk production and atonized rumen are considered shared signs between different gastrointestinal disturbances especially those of reticulo-rumen origin like traumatic reticuloperitonitis and peri-reticular abscesses. The condition is difficult to diagnose only on the basis of clinical signs and symptoms. The radiography could not be an effective tool for diagnosis of this condition. However, imaging technique like ultrasonography could be of high diagnostic value in detecting reticular abscess in buffaloes.

**Keywords:** Buffalo, radiography, reticulum, reticular abscess, ultrasonography

### Introduction

Affections of bovine fore-stomach due to ingestion of metallic foreign bodies are the subject of attention all over the world and of major economic importance due to severe loss of production and sometimes death of the animal. The honey-comb structure of the reticulum, reticular contraction, pressure of gravid uterus and efforts of parturition promote penetration of the reticular wall by sharp foreign bodies. The consequences from ingested sharp foreign bodies are traumatic reticulitis, reticuloperitonitis, diaphragmatic hernia, reticular abscess, pleuritis, pneumonitis, pericarditis, myocarditis, endocarditis and septicaemia. (Ward and Ducharme, 1994; Radostits *et al.*, 2007; Divers and Peek, 2008) [23, 18, 10]. Bovine radiography had diagnostic value in diaphragmatic hernia, reticular abscess, reticular foreign bodies and reticulo-phrenic adhesions. Radiographic examination of the reticulum is a sensitive and specific method for detecting foreign bodies whereas ultrasonography provides excellent data about reticular motility, fibrinous deposit and abscesses (Braun *et al.*, 1993a) [6]. The abscesses may be effectively drained into the reticulum by an incision through the reticular wall from the luminal side using rumenotomy approach (Trent, 2004) [22].

### Materials and Methods

The diagnosis of diaphragmatic hernia is based on clinical signs, radiographic and ultrasonographic findings.

### Clinical signs

Gastrointestinal disturbances especially those affecting reticulum as traumatic reticuloperitonitis, diaphragmatic hernia and reticular abscess were represented as major problems commonly affecting ruminants (Braun *et al.*, 1994) [4]. The general signs of indigestion including anorexia, ruminal tympany, scanty faeces, reduced milk production and atonized rumen were considered shared signs between different gastrointestinal disturbances especially those of reticulo-rumen origin like traumatic reticuloperitonitis, peri-reticular abscess and diaphragmatic hernia (Braun *et al.*, 1998) [7].

Fubini (2004) [12] reported that abscess formation adjacent to the reticulum was considered one of the squeal of hardware disease and observed peri-reticular abscess firmly attached to the reticulum and located at or above the ventral floor of the reticulum. Cows with cranial abdominal abscess often show signs of vagal indigestion. Saini *et al.* (2005) [19] studied clinical features of reticular abscessation in 97 buffaloes and observed signs of recurrent tympany, anorexia, scanty faeces, decreased milk production, history of fever and normal to increased ruminal motility. The hardware or foreign body syndrome remains primary disease of cattle rather than other ruminants. It occurs when pieces of wire or other sharp metal objects have

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been taken by cattle along with its food (Orpin and Harwood, 2008) [17]. The honeycomb like structure of the reticulum provides sites for fixation of a foreign body. The contractions of the reticulum and pressure of calf during late pregnancy may be sufficient to push a sharp foreign body through the wall and inducing the diseases like traumatic reticuloperitonitis, reticular abscess and reticular diaphragmatic hernia (Ghanem, 2010) [14]. Abouelnasr *et al.* (2012) [1] recorded clinical findings in buffaloes with traumatic reticuloperitonitis, diaphragmatic hernia and peri-reticular abscess and observed the signs of reduced appetite, scanty hard faeces, recurrent tympany, persistent tympany, dropped milk production and hypomotile to static rumen. Desiye and Mersha (2012) [9] observed that cattle kept in farm yards stables or at other sites close to human mechanical activities were prone to swallow metallic objects such as nails or pieces of wires that have been carelessly left in their feeding areas. Perforation of the reticular wall by a sharp foreign body leads to consequences of traumatic reticuloperitonitis, reticular abscess and reticular diaphragmatic hernia in cattle. Singh (2013) [21] evaluated 20 buffaloes suffering from foreign body syndrome and recorded history of inappetance, complete anorexia, persistent or recurrent tympany, suspended rumination, scanty faeces and drop in milk yield in most of the animals affected with reticuloperitonitis and reticular abscess.

#### Ultrasonographic diagnosis

To diagnose the reticular abscess transducer is placed parallel to ribs at the level of elbow (6<sup>th</sup> to 7<sup>th</sup> intercostals space) and then moving towards the midline. First of all, locate the reticulum using real time B-mode and observed for three minutes without moving the transducer. Echogenic structures of the different shapes and sizes with anechoic to hypoechoic centre surrounded by echogenic capsule are the main ultrasonographic findings in cases of reticular abscess. Ultrasonography provides more information about various sites of abscesses in the reticulum and characterizing contents of the pus cavity. The reticular motility could be observed in real time B+M mode at each intercostal space without moving the transducer for three minutes. Reduced to no reticular motility is commonly observed in the cases of reticular abscess in buffaloes. Sometimes in few cases reticular abscess could be imaged at the 5<sup>th</sup> intercostals space with incomplete or no reticular motility. In these cases, possibly due to extreme pressure on diaphragm (due to severe tympany) the reticulum could be observed at the 5<sup>th</sup> intercostal space. Braun (2003) [3] revealed that ultrasonography is an ideal diagnostic tool for investigating gastrointestinal disorders in cattle. Ultrasonographically, inflammatory fibrinous changes and abscesses could be imaged, however, magnets and foreign bodies were difficult to visualize because of the gaseous content of the reticulum. Reticular abscesses have an echogenic capsule of varying thickness which surrounds a homogeneous hypoechogenic to moderately echogenic centre. Senna *et al.* (2003) [20] also reported that ultrasonography was superior to radiography in evaluation of reticular contour, fibrinous deposits, abnormal gas/fluid accumulation and intra-abdominal masses. El- Esawy *et al.* (2015) [11] ultrasonographically diagnosed reticular abscesses and observed circumscribed areas of mixed echogenicity surrounded by a hyperechoic membrane of varying sizes (2-10cm). A another study revealed ultrasonographic features of the reticulum in normal and hardware diseased in 20

apparently normal and 85 hardware diseased buffaloes and observed significant increase of reticular wall thickness between buffaloes with traumatic pericarditis, local peritonitis, abdominal and thoracic abscesses and normal buffaloes. The distance between reticulum and abdominal wall was significantly higher in hardware diseased than normal buffaloes. It was concluded that ultrasonography provides exact information concerning the reticular features in various complications of hardware disease in buffaloes (Mostafa *et al.*, 2015) [16].

#### Radiographic diagnosis

The radiological examination for reticular abscess can be performed using Siemens Large Animal X-ray machine having maximum mA of 600 and KVP of 150 in standing position by restraining in cattle trevis. The following findings are recorded upon the radiological examination i.e. nature and location of foreign body (metallic or non-metallic), status of diaphragmatic line (clearly visible or hazy in appearance), abnormal gas shadow in the reticulum, adhesions and fluid bed on radiograph.

Fubini *et al.* (1990) [13] compared radiographic and surgical findings in 123 cattle suspected of having traumatic reticuloperitonitis. Radiography of the reticulum proved to be a sensitive test for detection of a foreign body. An abnormal foreign body position on a radiograph has been a good predictor of foreign body perforation. When abnormal reticulum size, abnormal reticulum location and gas shadows adjacent to the reticulum were found simultaneously on a radiograph, hepatic or peri-reticular abscess are likely. It was concluded that standing reticular radiography was proved to be useful diagnostic aid in cattle with traumatic reticuloperitonitis. The plain and contrast radiographs could help in diagnosis and provide valuable information about diaphragmatic abscess and reticulo-phrenic adhesions (Krishnamurthy, 1993) [15]. Braun *et al.* (1993b) [5] evaluated radiographs of the reticulum in 151 cattle. The radiographic findings in animals, which had no pathological changes in cranio-ventral abdomen, compared with those in animals with traumatic reticuloperitonitis. Features that found to be reliable in diagnosis of condition included atypically positioned foreign bodies, abnormal gas shadows in region of reticulum and depressions in cranio-ventral margin of the reticulum. In addition to reticulum, remainder of cranio-ventral abdomen was also assessed radiographically. Various parameters were used to determine reliability of radiography of the reticulum in diagnosis of this condition. Its prevalence was 50%, sensitivity of the radiographic diagnosis 76%, specificity 93%, accuracy 85%, positive predictive value 92% and negative predictive value was 80%.

In a study Chander *et al.* (1997) [8] analysed radiographs of cranio-ventral abdomen of 212 adult buffaloes suspected for traumatic reticuloperitonitis. Lateral recumbent plain and contrast radiographs of cranio-ventral abdomen taken and analysed. The 174 cases had foreign bodies in the reticulum of which 18% cases had non-potential foreign bodies. Fifty one cases had abnormal gas pockets but foreign bodies were associated in 33 cases only. Abnormalities in size, shape and location of reticulum were also detected in 21 cases associated with foreign body syndrome. Radiographically, presence of gas pocket or discrete area of gas accumulation was indicative of reticular abscess.

Fubini (2004) [12] stated that pre-reticular abscess may be detected by the radiography and observed radio-opaque

foreign bodies and fluid/gas interface on radiographs. Saini *et al.* (2005) <sup>[19]</sup> performed radiological examination in 29 buffaloes. Only 7 animals were confirmed radiographically for reticular abscess and suggested that radiography could not be an effective tool for diagnosis of this condition. In majority of animals (n=22) radiography failed to diagnose reticular abscess giving false positive results and abscess was confirmed on laparotomy. Athar *et al.* (2010) <sup>[2]</sup> studied radiographic features of reticular abscess in bovines. Diagnosis of reticular abscess could be made in 36.36% cases on the basis of radiographic signs and observed oval or round radiolucent density/gas density adjacent to diaphragmatic line on radiographs.

### Conclusions

Ultrasonographic technique is less stressful and more accurate as compared to radiography in cases of reticular abscess in buffaloes. Ultrasonography is also helpful in characterizing the contents of an abscess that cannot be made using radiography in buffaloes.

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