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Pathomorphology of traumatic reticuloperitonitis in a Holstein Friesian bull in an organised farm

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Abstract

Traumatic reticuloperitonitis (TRP) is a critical and fatal condition affecting cattle worldwide. It arises from the accidental ingestion of sharp metallic objects, primarily nails, wires, or other foreign bodies, which penetrate the reticular wall, leading to inflammation of the pericardium. It poses significant challenges to cattle health and productivity, as well as economic losses in the livestock industry. A 8 year old male Holstein Friesian bull was presented for postmortem examination with a history of recumbency for the past 2 days and sudden death. Postmortem examination revealed that, over the left caudo-lateral portion of diaphragm, the membrane was thickened and it was found adherent to the left caudal portion of pleura forming a thick area of abscess. A long hard nail (of about 9 cm in length) was found piercing through a tract formed beneath the left caudo-lateral portion of diaphragm forming an abscess with thick capsule adjoining the caudal portion of left lung and forming a tract along the anterior portion of the reticulum. Dirty brown fluid oozed out on cut section. Histopathological examination was performed and case was diagnosed as Traumatic reticuloperitonitis.

Keywords: Holstein Friesian bull, traumatic reticuloperitonitis, organised farm, necropsy, pathomorphology

1. Introduction

Hardware disease in bovines is considered to be a major problem in ruminant veterinary practice all over the world (Aref and Abdel-Hakiem, 2013; Nugusu *et al.*, 2013; Abu-Seida and Al-Abbadi, 2014) ^[1, 2, 3, 4]. Large ruminants are more susceptible to foreign body syndrome than small ruminants since, lips are major prehensile organs and are more likely to eat chopped feed (Braun, 2003) ^[5]. In Egypt, a prevalence of 25% was found in buffaloes that were evaluated (Aref and Abdelhakim, 2013) ^[1]; In India, 87% of dairy buffaloes and 93% of buffaloes above the age of two were recorded (Sharma *et al.*, 2015) ^[6].

The clinical manifestations of traumatic reticuloperitonitis in cattle can vary depending on the severity of the condition and the presence of complications. However, affected animals often exhibit a combination of nonspecific clinical signs indicative of systemic illness. These signs may include anorexia and reduced feed intake, depression, lethargy, pyrexia (inflammatory response triggered by the presence of foreign bodies and subsequent infection), decreased milk production, abdominal pain, respiratory distress and cardiovascular Compromise. As per Braun, 2009 ^[7], the major clinical signs associated with Traumatic reticuloperitonitis include asynchronous abnormal heart sounds (muffled heart sounds), tachycardia, jugular vein distension and oedema on certain areas of animal (submandibular, brisket, ventral abdomen). The disease is of high economic importance due to the significant decrease in milk and meat yield, the expense of treatment, fetal losses, and the potential mortality in pregnant animals affected by the disease (Radostits *et al.*, 2007; Tesfaye and Chanie, 2012; Nugusu *et al.*, 2013) ^[8, 9, 2]. The sequeale of this disease is grave due to peritonitis which results from infection by bacteria and protozoa as they contaminate the body cavity through opening and they may also result in puncture of diaphragm and heart causing cardiac failure (Umphrey and Staples, 2009) ^[10].

2. Materials and Methods

A 8 year old male Holstein Friesian bull was presented for postmortem examination to the Central University Laboratory, Centre for Animal Health Studies, Tamil Nadu Veterinary and Animal Sciences University, Chennai – 7 with a history of recumbency for the past 2 days and sudden death. A standard head-to-tail necropsy procedure as per King *et al.*, 2014 [11] was conducted to determine the cause of death. Postmortem examination was carried out and samples were collected for histopathological diagnosis. The tissues collected from major vital organs and the area of abscess was fixed in 10% neutral buffered formalin, embedded in paraffin, sectioned and stained with Haematoxylin and Eosin (H&E).

3. Results and Discussion

Postmortem examination was carried out immediately. The condition of the carcass was emaciated. Visible mucous membranes were pale pink. No discharges were noticed from the natural orifices.

Internal examination revealed presence of approximately 100ml of straw coloured fluid in thoracic cavity and about 200 ml of straw coloured fluid in pericardial sac. The epicardial surface of heart revealed multifocal petechial haemorrhages with engorgement of coronary vessels (Fig.1)



Fig 1: Heart – Multifocal petechial hemorrhages with engorgement of coronary vessels

The pleura was thickened. The left lung showed diffuse areas of congestion on the apical and diaphragmatic lobe. On cut section, blood mixed frothy contents oozed out. In the

diaphragm, over the left caudo-lateral portion, the membrane was thickened and it was found adherent to the left caudal portion of pleura forming a thick area of abscess. A long hard nail (of about 9 cm in length) (Fig. 2) was found piercing through a tract formed beneath the left caudo-lateral portion of diaphragm (Fig.3) forming an abscess with thick capsule adjoining the caudal portion of left lung and forming a tract along the anterior portion of the reticulum (Fig.4). On cut section, dirty brown fluid oozed out. Reticulum contained partially digested feed contents. The liver was enlarged with rounded borders and capsular fibrosis was observed.



Fig 2: A long hard nail (of about 9 cm in length) after separation from the area

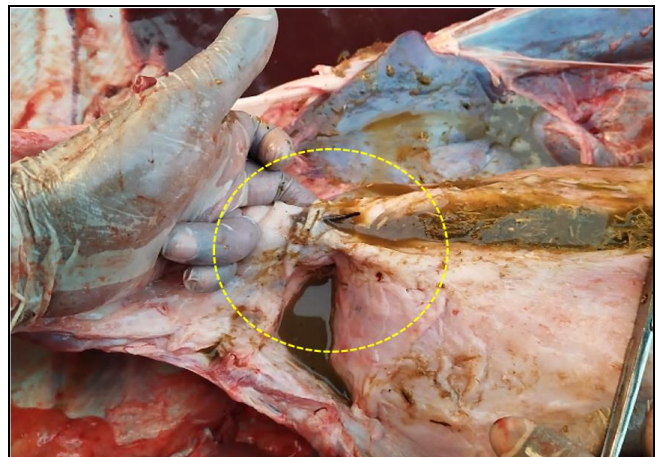


Fig 3: The nail was found piercing through a tract formed beneath the left caudo-lateral portion of diaphragm

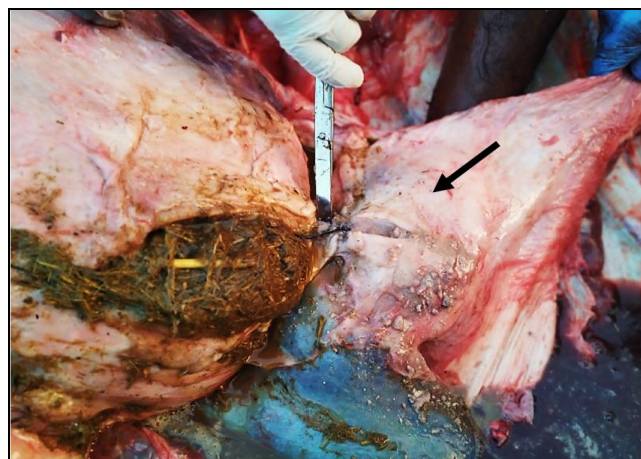


Fig 4: Area of abscess (arrow) with thick capsule adjoining the caudal portion of left lung and forming a tract along the anterior portion of the reticulum

Histopathological examination of the abscess area revealed a thick capsule of fibrous connective tissue and collagen with diffuse congestion of blood vessels and presence of numerous mononuclear inflammatory cells predominantly of neutrophils and lymphocytes and few macrophages were observed (Fig.5 and 6).

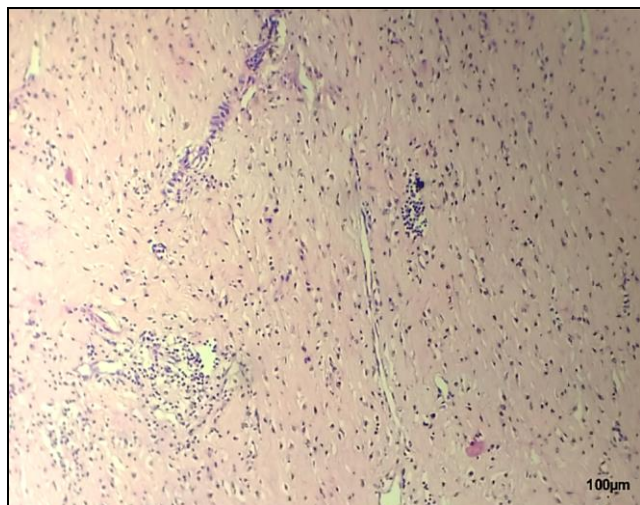


Fig 5: Abscess – Histopathology - Thick capsule of fibrous connective tissue and collagen with diffuse congestion of blood vessels and presence of numerous mononuclear inflammatory cells predominantly of neutrophils and lymphocytes and few macrophages H&E Bar100µm

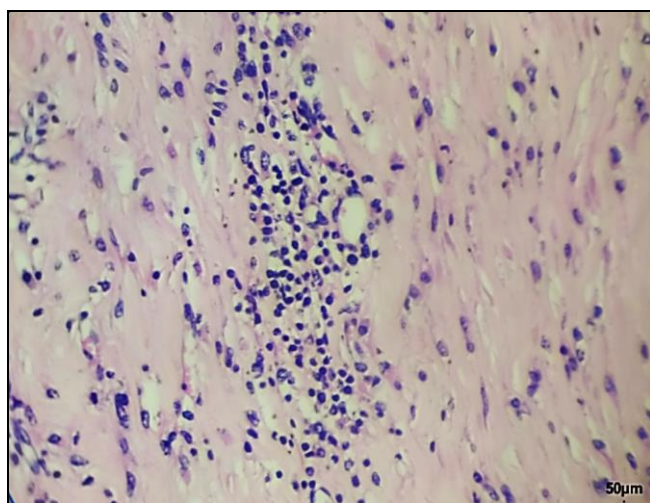


Fig 6: Abscess – Histopathology – Presence of mononuclear inflammatory cells H&E Bar50µm

Heart revealed multifocal areas of hemorrhages with congestion of blood vessels and mild to moderate thickening of pericardium. Multifocal mild to moderate degeneration of cardiomyocytes observed with focal area of infiltration of mononuclear inflammatory cells mostly of lymphocytes and occasional neutrophils observed. Lung revealed moderate thickening of pleural membrane, multifocal areas of severe edema alternating with areas of mild emphysema observed. There was multifocal areas of hemorrhages with congestion of blood vessels. Multifocally, mild to moderate multifocal peribronchiolar mononuclear cell infiltration was observed. Liver showed capsular thickening with periportal infiltration of mononuclear inflammatory cells predominantly of neutrophils and occasional lymphocytes. The reticulum showed mild to moderate hyperplasia with multifocal hemorrhages in the submucosa and lamina propria and

infiltration of mononuclear cells. The above findings were in accordance with the reports by Ghanem, 2010; Abu-seida and Al-abbadi, 2016; Macedo *et al.*, 2021 [12, 3, 13].

Sharp foreign body syndrome (SFBS), often known as hardware disease or Traumatic reticuloperitonitis, is a fatal and prevalent disease that mostly affects cows, particularly in developing nations where standards for animal care are poor (Misk *et al.*, 1984) [14]. Foreign objects that pierce the reticulum initially cause irritation before being forced into the reticular wall by ruminal contractions. This can lead to a number of complications, including rupture of the left gastro-epiploic artery, diaphragmatic hernia, traumatic pneumonia and mediastinal abscess, traumatic pericarditis, and tamponade. The accumulation of fibrinous exudates and fluid in the pericardial sac cause adhesions constricting the ventricles and regional arteries affecting cardiac function and death of the animal. In the present case, a long hard nail of about 9 cm in length was found piercing through a tract formed beneath the left caudo-lateral portion of diaphragm forming an abscess with thick capsule adjoining the caudal portion of left lung and forming a tract along the anterior portion of the reticulum. As a result of development of abscess, the animal succumbed to cardio-respiratory compromise and septicemic shock resulting in death of the cow.

Braun, 2009 [7] have reported that the diagnosis of traumatic reticuloperitonitis in cattle involves a combination of clinical evaluation, imaging techniques, and ancillary diagnostic tests. Diagnostic approaches *viz.*, thorough physical examination; ultrasonography for evaluating the presence of foreign bodies in the reticulum and assessing the extent of pericardial effusion or inflammation; radiographic imaging, particularly with a metallic foreign body marker, can help visualize the location and orientation of ingested objects especially of metallic in nature within the reticulum; abdominocentesis and pericardiocentesis.

Based on the necropsy findings and histopathological examination, the case was diagnosed as Traumatic reticuloperitonitis and the macroscopic and microscopic lesions observed are in agreement with earlier reports (Radostitis *et al.*, 2007; Baydar *et al.*, 2016) [8, 15].

4. Conclusion

The management of traumatic reticuloperitonitis in cattle involves a combination of medical and surgical interventions aimed at addressing the underlying cause, relieving clinical signs, and preventing complications. Key management strategies include surgical removal of foreign bodies, broad spectrum antibiotic therapy to control secondary bacterial infections and reduce the risk of systemic dissemination. Anti-inflammatory and analgesic therapy may be prescribed to alleviate pain, reduce fever, and mitigate the inflammatory response associated with the condition. Intravenous fluid therapy may be indicated in cases of dehydration, shock, or cardiovascular compromise resulting from TRP. Close monitoring of affected cattle is necessary to assess response to treatment, monitor clinical progress, and detect any signs of deterioration or complications. Supportive care measures, such as proper bedding, environmental management should be implemented. Management of cattle on semi-intensive or intensive methods may predispose cattle to this condition. Proper managerial practices such as physical screening of feeds and fodder with the help of appropriate sieves and magnets are recommended.

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