SHORT COMMUNICATION

Clinico-pathological Evaluation of Aspiration Pneumonia in Cattle

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Abstract

Aspiration pneumonia is an essential and frequent complication following aspiration of abnormal substances in the airways and alveoli. The objective of this study was to determine the clinical, haemato-biochemical, radiographic, and post-mortem changes and therapeutic management of cattle with aspiration pneumonia. Six Jersey crossbred and four Holstein Friesian crossbred cattle were reported with a history of cough, respiratory distress, oral breathing, inappetence, and pyrexia for 2–5 days following faulty drenching and regurgitation due to ruminal lactacidosis. Three animals were brought immediately after aspiration. Clinical examination revealed cough, extended head and neck, bilateral mucopurulent nasal discharge, dyspnoea, polypnoea, pyrexia, and ozena. Exaggerated tracheal and lung sounds, crackles, wheezes, and pleuretic frictional sounds were noticed on auscultation. Leukocytosis with neutrophilia was noticed on hematological examination. Lateral thoracic radiographs showed pulmonary infiltrates, indicating aspiration pneumonia. Animals were parenterally administered with ceftiofur sodium, flunixin meglumine, and nebulization with ceftiofur sodium and budesonide. Therapeutic outcomes were discussed in detail in this article.

Keywords: Aspiration, Crossbred cattle, Drenching, Pneumonia, Therapy

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Introduction

Aspiration pneumonia is caused by inhalation of large amounts of foreign material, often liquids. The most common cause is careless drenching of crude oils, medications, or passage of stomach tubes during liquid medication administration. Cattle that have parturient paresis, paralysis, or obstruction of the larynx, pharynx, or esophagus may aspirate food or water when attempting to swallow (Smith, 2009). These liquids penetrate to the alveoli depth and run freely into the dependent portions, and aspiratory pneumonia often results (Constable *et al.,* 2017). Very few reports are available regarding aspiration pneumonia and its management in cattle. The present study was undertaken to evaluate the clinical, haemato-biochemical, radiographic, and post-mortem changes and therapeutic outcomes in cattle with aspiration pneumonia.

Materials and Methods

Six Jersey crossbred, and four Holstein Friesian crossbred cattle were presented to Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal with a history of cough, respiratory distress, oral breathing, inappetence, and pyrexia for 2–5 days following faulty drenching and regurgitation due to ruminal lactacidosis. Three animals were reported immediately after aspiration. All the animals were subjected to detailed clinical examination as per standard methods (Rosenberger, 1979). Haemato-biochemistry included hemoglobin, packed cell volume, red blood cells, white blood cells, differential leukocyte count, serum AST total protein, albumin, and globulin were estimated as per standard methods (Jain, 1986). Animals were subjected to lateral thoracic radiography in standing posture as described by Masseau *et al.* (2008) using Wipro GE 525 DX fixed X-ray unit. Data obtained during the study were analyzed and interpreted by student's unpaired 't' test (Snedecor and Cochran, 1994) with SPSS statistical software (version 16). Cattle were medically managed as described by Constable *et al.* (2017).

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Results and Discussion

Aspiration pneumonia is a lung disease characterized by inflammation and necrosis due to the inhalation of foreign material. The severity of the inflammatory response and key signs depend on the type and volume of material aspirated and the distribution of aspirated material in the lungs (Poulsen, 2010).

In the present study, three recently calved cattle were reported with a history of faulty drenching with calcium gel preparations, two with mineral oils, one with herbal liquid preparations, and two with liver tonics by the farmers. Two cattle with acute ruminal lactacidosis had aspirated ruminal contents during regurgitation. Dhillon *et al.* (2020) reported that many farmers use a large variety of liquid supplements or medication drenches to prevent or cure diseases. Inappropriate administration or improper drenching medication techniques for other illnesses by inexperienced persons is the most common cause of aspiratory pneumonia. The causes for aspiration pneumonia in the present study concurrence with Dhillon *et al.* (2020).

Clinical examination revealed cough (10/10, 100%), extended head and neck (8/10, 80%), oral breathing (Fig. 1) (7/10, 70%), bilateral purulent nasal discharge (6/10, 60%), dyspnoea (4/10, 40%), polypnoea (6/10, 60%), pyrexia (8/10, 80%) and ozena (3/10, 30%).

All the cattle noticed exaggerated tracheal and lung sounds, crackles, wheezes, and pleuritic frictional sounds on auscultation. Clinical signs observed in this study supported the earlier findings of Smith (2009) and Constable *et al.* (2017). Aspiration of particulate matter or foreign bodies will cause mechanical obstruction and, depending on the size and location of the obstruction, could cause acute apnoea with rapid asphyxiation to chronic, irritating cough with recurrent low-grade infections (Shakespeare, 2012). Scott (2012) also reported widespread crackles over the affected area in adult cattle with aspiration pneumonia on lung auscultation. The results of the haemato-biochemical analysis are given in Table 1.

Leukocytosis with neutrophilia following aspiration in the present study concurrence with Dhillon *et al.* (2020) and Venkatesakumar *et al.* (2020). Radiographic examination revealed pulmonary infiltrates with alveolar lung pattern (Fig. 2) suggestive of aspiration. Similar findings were recorded by Kogan *et al.* (2008) and Shakespeare (2012).

Animals were administered with parenteral ceftiofur sodium @1 mg/kg IM, nebulization with ceftiofur sodium @0.5 mg/kg and budesonide respules @ 2 mg (Budecort 0.5 mg/2 mL) for seven days. Flunixin meglumine @1.1 mg/kg IM was administered for 5 days. In six animals, respiratory distress and pyrexia got reduced with the resumption of feed and water intake after 3 days of therapy. On 7th day of therapy, only six cattle were discharged in an apparently healthy state. Two animals were discharged in the middle of the therapy

Table 1: Haemato-biochemical findings of apparently healthy cattle and cattle with aspiration pneumonia (Mean ± SE)

Parameters	*Apparently Healthy cattle (n=10)*	*Cattle with aspiration pneumonia (n=10)*
Haemoglobin (g/dL)	12.31 ± 0.12	11.98 ± 0.18
Packed cell volume (%)	36.26 ± 0.10	35.87 ± 0.13
Red blood cell (x10^6/cmm)	6.01 ± 0.17	5.82 ± 0.12
White blood cell (x10^3/cmm)	7.02 ± 0.10	16.98 ± 0.14**
Neutrophils (10^3/cumm)	2.32 ± 0.03	12.12 ± 0.03**
Lymphocytes (10^3/cumm)	4.28 ± 0.04	4.21 ± 0.02
Monocytes (10^3/cumm)	0.11 ± 0.01	0.14 ± 0.01
Eosinophils (10^3/cumm)	0.03 ± 0.05	0.04 ± 0.05
Aspartate amino transferase (AST) (units/L)	101.45 ± 0.35	100.32 ± 0.23
Total protein (g/dL)	6.02. ± 0.13	6.26 ± 0.14
Albumin (g/dL)	2.82 ± 0.01	2.98 ± 0.02
Globulin (g/dL)	3.19 ± 0.14	3.28 ± 0.17

**Highly significant at p ≤ 0.01.

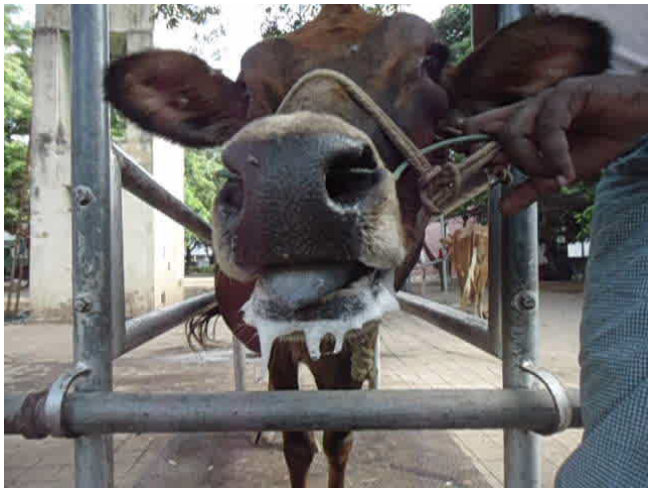

Fig. 1: Cattle showing oral breathing in aspiration pneumonia

Fig. 2: Lateral thoracic radiography in cattle: Pulmonary infiltrates in aspiration pneumonia

Fig. 3: Alternate areas of dark brown discolouration indicating red hepatization and emphysematous areas noticed on the surface of the lungs (Arrows)

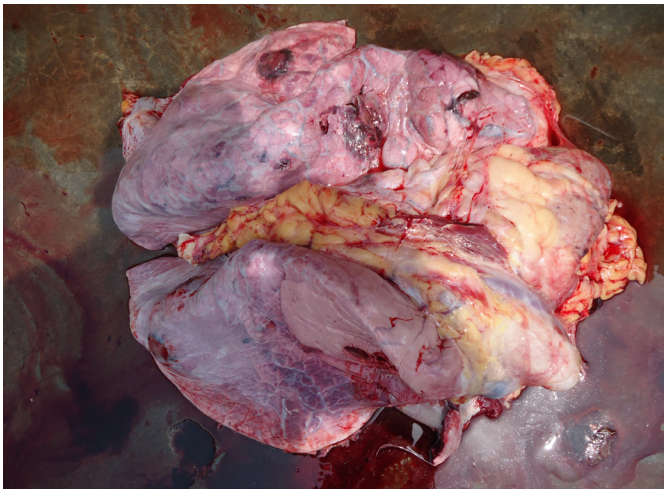

Fig. 4: Interstitial emphysematous area of the lung having patches of blackish discolored aspirated material (Arrows)

as the condition was worsening. Two animals succumbed to death despite therapy, and a post-mortem examination was conducted on these animals.

Therapy followed in the present study was consistent with Constable *et al.* (2017) and Smith (2009). The prognosis was guarded in all the cases of aspiration pneumonia, but some animals could be saved following therapy with antibiotics and anti-inflammatory drugs (Smith, 2009). Nebulization of ceftiofur sodium is the most effective treatment in calves with bovine respiratory disease (Joshi *et al.,* 2017). Dose for systemic antibiotics could be reduced, and maximum drug concentrations could be achieved in lungs with nebulization. Response to therapy was determined by the nature and volume of liquids drenched and the early start of the therapy.

A post-mortem examination conducted in two animals revealed frothy to dry aspirated contents in the trachea and bronchi, alternate areas of dark brown discoloration indicative of consolidation and emphysematous areas on the surface of the lungs (Fig. 3), and interstitial emphysematous areas of the lungs with patches of blackish discolored aspirated material (Fig. 4). Similar findings were reported by Poulsen (2010) and Caswell *et al.* (2012) in cattle with aspiration pneumonia.

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