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A Clinical Study on Traumatic Pericarditis and Traumatic Reticuloperitonitis in Twelve Holstein Friesian Cattle

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ABSTRACT

Background: Traumatic injury caused by swallowed –sharp foreign object is one of the common conditions in dairy animal resulting into development of traumatic pericarditis (TP) and traumatic reticuloperitonitis (TRP). Under field conditions both conditions mimic the same clinical signs making it difficult to differentiate as well as render to choose ideal therapeutic management. The present study was aimed to evaluate clinical, hematobiochemical and ultrasonographic changes in cattle to clinically differentiate between TP and TRP cases.

Methods: From the period of January 2020 to December 2020, total twelve Holstein Friesian cattle were investigated for TP and TRP. In the present study, six animals each suffering from TP and TRP were included along with six normal healthy animals as control. Different clinical signs, haemato-biochemical parameters and ultrasonographical findings were recorded in each group and comparative analysis was done.

Result: Brisket edema, bilateral jugular vein engorgement and arched back conditions were most reported clinical signs in both the groups. Significant changes were recorded in the values of red blood cells, lymphocyte, blood urea nitrogen, creatinine and SGOT between both the groups. Significant drop in hemoglobin level was observed in TP affected group. No significant changes were observed in white blood cells, packed cell volume, monocyte counts and eosinophil counts. Significant increase in fibrinogen concentration recorded in both the groups. In ultrasonography, accumulation of anechoic fluid around heart in TP and reticular wall thickening in TRP was most consistent findings.

Key words: Holstein friesian, Traumatic pericarditis, Traumatic reticuloperitonitis.

INTRODUCTION

Ingestion of sharp object is one of the most common cause of traumatic reticuloperitonitis (TRP) and traumatic pericarditis (TP) in cattle and buffalo (Rajput *et al.,* 2018). TRP and TP are sporadic conditions in Holstein Friesian cattle caused by perforation of the reticulum by any incisive sharp material. It is a quotidian cause of abdominal surgery in cattle (Mohamed, 2010). Cattle are more susceptible to foreign body syndrome than small ruminants because they do not use their lips for prehension and are likely to choose chopped feed (Braun, 2003). Grain ration feeding is one of the important source of sharp object ingestion. Honeycomb like structure of reticulum helps foreign body to fix in and reticular contraction facilitates foreign body to get through the wall and further pericarditis occurs. It is most common pericardial disorder in cattle (Bexiga *et al*., 2008). Respiratory distress is one of the common finding in both the conditions. Death after foreign body penetration of pericardium is usually caused by progressive fibrosive constrictive pericarditis and epicarditis (Buczinski *et al.,* 2010), cardiac tamponade from perfora of the coronary artery has also been found (Awadhiya *et al.,* 1974). The present study performed to compare the TRP with its most common complication TP based on clinical examination, hematobiochemical analysis and ultrasonographic evaluation.

MATERIALS AND METHODS

The work was carried out during the period from January, 2020 to Decemebr, 2020 at Veterinary Clinical Complex, College of Veterinary Science and Animal Husbandry, Kamdhenu University, Sardarkrushinagar. Total twelve animals aged between 3 to 10 years were tentatively evaluated for TP (Group II) and TRP (Group III). Control group (Group I) comprised of six normal healthy cattle. Clinical examination were recorded for each animal. Details are tabulated in Table 1. Two ml blood was collected in EDTA vials from jugular vein and subjected to evaluate hematological values like PCV%, hemoglobin, differential leukocytes (WBC) and total erythrocytic count (RBC). Five ml blood was collected from same site in clot activator vial for biochemical analysis. Plasma was separated from blood

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and fibrinogen was evaluated in each group by using semi-automatic coagulometer. Ultrasonographic examination of all cattle was performed to evaluate the internal condition. The area over the reticulum and the left and right sides of thethoracic cavity up to the elbow joints were clipped. Gel was applied to facilitate better examination and the 2-5 MHz convex probe was used. Pericardiocentesis was performed in TP cases to relieve pain and same was examined for bacterial culture. The results data were analyzed by using one way ANNOVA in GraphPad Prism 8.0.1 and presented as mean±standard error of mean as given in Table 2.

RESULTS AND DISCUSSION

Cattles with traumatic reticulo-peritonitis (TRP) and traumatic pericarditis (TP) exhibited different clinical signs. Brisket edema and bilateral engorgement of jugular vein were the most reported clinical signs in TP and elucidation of pain at xiphoid region in TRP (Fig 1 and 2). Similar clinical signs were also reported previously (Roth and King, 1991; Radostitis, 2007; Braun, 2008; Hajighahramani *et al*., 2010; Reddy *et al.,* 2014; Suthar *et al.,* 2017). Significant increase in granulocyte and SGOT (AST) value observed in TP and TRP groups as compared to control (Fig 12). Significant increase in blood urea nitrogen (BUN) and creatinine was observed only in TP group as compare to the control group. Significant reduction in red blood cell (RBC) and lymphocyte count was observed in TRP and TP groups and significant decline in hemoglobin was observed in only TP group. Decline in RBC and hemoglobin values might be due to possible organ damage and internal hemorrhage

Table 1: Clinical findings in different groups of cattle.

Parameters	Group	Animal					
Age (Year)	A	6	7	7.5	9	9	6.6
	B	7	9	6	8	7.5	10
	C	6	7	5.5	8.5	7	9
Temperature (°F)	A	100.4	99.9	101.3	100.9	101.7	102
	B	103	102.2	99	101	100.2	99.7
	C	101.6	102.2	103	103.6	102.5	101.3
Heart rate (per minute)	A	62	68	70	72	65	66
	B	87	91	84	92	83	77
	C	65	72	84	76	84	86
Respiratory rate (per minute)	A	40	38	41	45	35	49
	B	48	51	70	72	64	75
	C	39	52	52	67	56	58
Mucus membrane	A	Normal	Normal	Normal	Normal	Normal	Normal
	B	Pale	Pale	Pale	Pale	Normal	Pale
	C	Normal	Congested	Congested	Congested	Congested	Pale
Lymphnode	A	Normal	Normal	Normal	Normal	Normal	Normal
	B	Normal	Normal	Normal	Normal	Normal	Normal
	C	Normal	Normal	Normal	Normal	Normal	Normal
Pain test	A	Negative	Negative	Negative	Negative	Negative	Negative
	B	Positive	Negative	Negative	Positive	Negative	Negative
	C	Positive	Positive	Positive	Negative	Positive	Positive
Heart sound	A	Normal	Normal	Normal	Normal	Normal	Normal
	B	Normal	Muffled	Normal	Muffled	Muffled	Muffled
	C	Normal	Normal	Tachycardia	Normal	Tachycardia	Tachycardia
Jugular vein	A	Normal	Normal	Normal	Normal	Normal	Normal
	B	Bilateral Distension	Bilateral Distension	Bilateral Distension	Bilateral Distension	Bilateral Distension	Bilateral Distension
	C	Normal	Normal	Normal	Normal	Normal	Normal
Brisket edema	A	Absent	Absent	Absent	Absent	Absent	Absent
	B	Present	Present	Present	Present	Present	Present
	C	Absent	Absent	Absent	Absent	Absent	Absent
Ferroscopy	A	Negative	Negative	Negative	Negative	Negative	Negative
	B	Negative	Negative	Negative	Positive	Negative	Negative
	C	Positive	Positive	Positive	Negative	Negative	Positive

Group A= Control; Group B= TP; Group C= TRP.



Fig 1: Arch back condition in cattle.



Fig 2: Brisket edema in cattle.

(Fig 10 and 11). No significant changes were observed in white blood cell (WBC), packed cell volume (PCV), monocyte count, eosinophil count and albumin in any groups. Similar values were reported by Saleh *et al.* (2008). Rise in BUN and creatinine levels may be due to renal impairment and dehydration resulting into azotemia (Mohamed, 2010). Similar results were reported by Sasikala *et al*., 2018. In our study, fibrinogen concentration was significantly elevated in TRP and TP group indicating greater inflammatory changes as compared to healthy animals (Fig 13). Fibrinogen is an acute-phase protein and may be increased as early as 2 to 3 days after the onset of illness (Francoz and Guard, 2015). Fibrinogen is often increased in the absence of changes in leukocyte numbers and therefore is a better indicator for inflammation. Therefore, fibrinogen estimation is one of the most important tool to identify the magnitude of inflammation and period of illness in dairy animals. In clinical condition TP and TRP are associated with presence of foreign body which is confirmed by standard radiographic technique (Fig 4).

Ultrasonography

Ultrasonography is an integral part of bovine medicine as an important diagnostic tool. Abnormal ultrasonographic changes helps in diagnosis of conditions like TP and TRP. In traumatic pericarditis accumulation of fluid along with fibrin strands was noticed around the pericardium in our study (Fig 3). Fibrin deposits can be evaluated to determine the severity of the traumatic pericarditis (Fig 5 and 6). There was increase in the distance between pericardium and epicardium due to accumulation of hypoechoic effusion (Fig 7, 8 and 9). Ultrasonography of the abdomen revealed hyperechoic reticulum, adhesion with abdominal wall and

Table 2: Values of different hemato-biochemcial parameters in different groups.

Parameters	(n)		
	Control (n=6)	TP (n=6)	TRP (n=6)
WBC (10^3/µL)	8.05±0.97	10.12±1.61	12.47±0.94
RBC (10^6/µL)	6.22±0.34	4.82±0.58*	5.02±0.34*
Hemoglobin (gm/dl)	9.23±0.39	7.30±0.33*	7.88±0.57
HCT (%)	24.07±0.59	21.18±1.01	23.00±1.47
LY (%)	50.48±3.62	33.27±5.22*	32.52±4.02*
MO (%)	1.72±1.26	0.75±.032	0.40±0.27
EO (%)	4.75±0.72	4.92±1.40	2.28±0.80
GR (%)	31.38±1.63	61.00±6.46**	61.58±6.57**
SGOT (IU/L)	40.85±3.09	83.70±7.43**	99.13±9.52**
Albumin (g/dl)	3.39±0.34	2.43±0.31	3.50±0.21
TP (g/dl)	6.05±0.72	8.70±1.02*	8.01±0.33
BUN (mg/dl)	3.97±0.38	33.330±10.36*	17.67±3.97
Creatinine (mg/dl)	0.76±0.10	2.50±0.70*	1.25±0.31
Fibrinogen (mg/dl)	306.50±7.31	630.83±7.78**	463.17±9.02**

Significance * P<0.05; ** P<0.01.



Fig 3: Pericardiocentesis in cattle having TP.

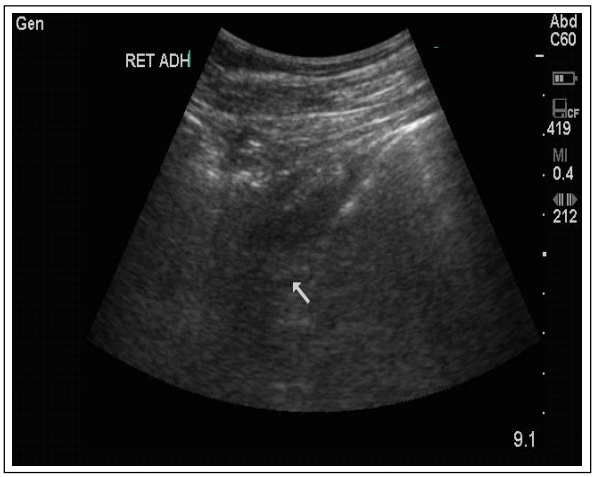


Fig 6: Reticular adhesion with abdominal wall in cattle with TRP.

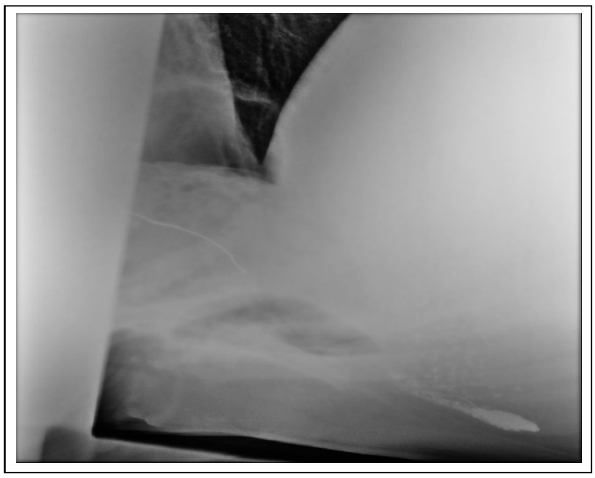


Fig 4: Radiographic examination in cattle displaying foreign body.

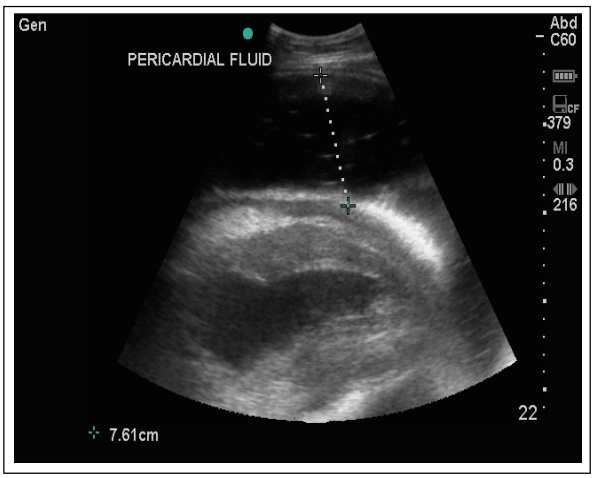


Fig 7: Presence of anechoic fluid around the heart in TP.

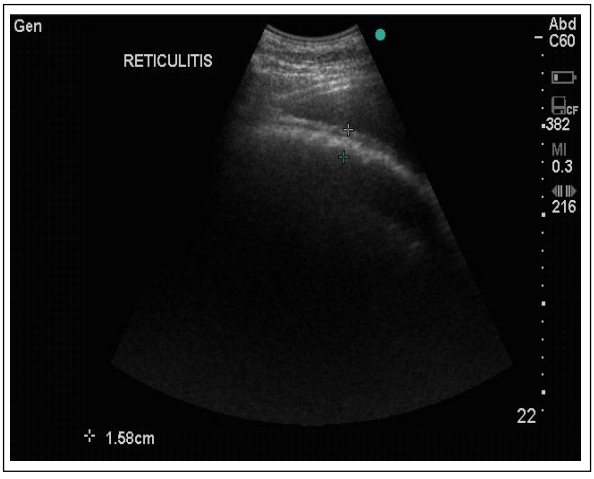


Fig 5: Reticulum with hyperechoec border in cattle with TRP.

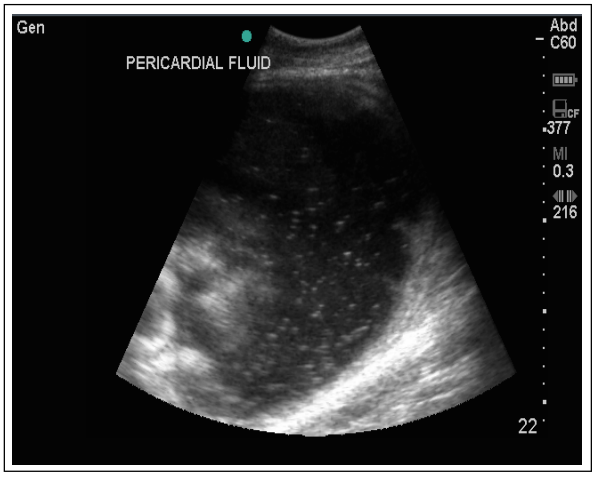


Fig 8: Hyperechoic dots indicates presence of fibrinous and purulent exudate.

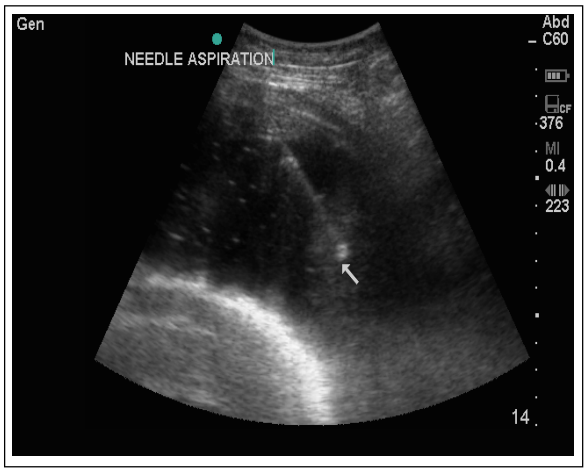


Fig 9: Ultrasonography guided pericardiocentesis of accumulated fluid.

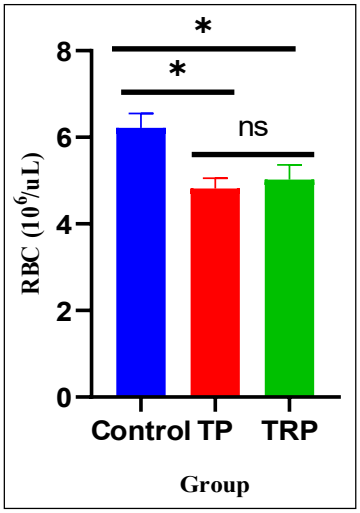


Fig 10: Significant decrease in RBC count in TP and TRP group as compare to control group.

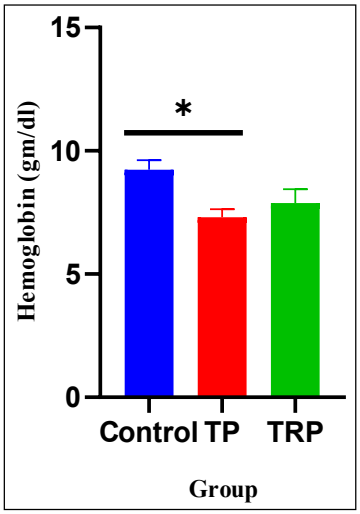


Fig 11: Significant decrease in hemoglobin value in TP group as compare to control group.

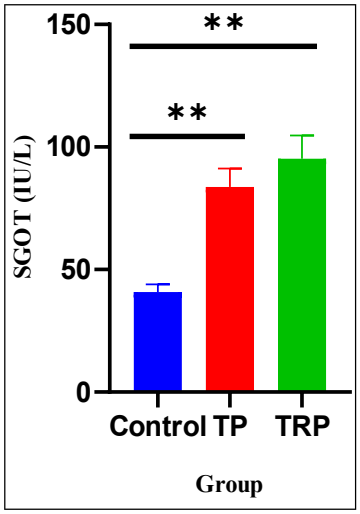


Fig 12: Significant increase in SGOT count in TP and TRP group as compare to control group.

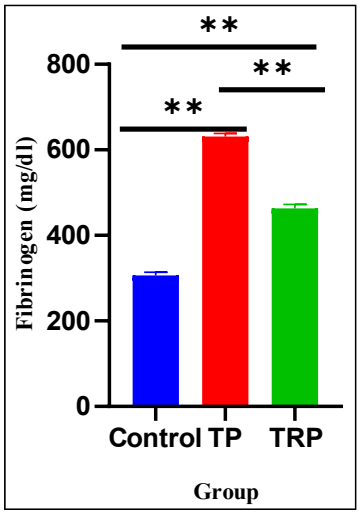


Fig 13: Significant alteration in fibrinogen concentration.

diminished or no reticular movement. Similar finding were reported by Ibrahim and Gomma (2016), Mohamed (2010) and Flock (2004).

CONCLUSION

TRP and TP are one of the challenging conditions in large animal practices. Brisket edema, bilateral jugular vein engorgement, arch back condition and pain at xiphoid region are the most reported sign TP and TRP. The leukogram and fibrinogen concentration are an aid in diagnosis of TP and TRP in cattle. Accumulation of fluid around heart in TP, thickening of reticular wall and adhesion of reticulum with abdominal wall in TRP are the most reported ultrasonogaphic findings. Prevention of such conditions can be done passing feed over magnet to check the ingestion of foreign material.

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Conflict of interest

All authors declare that they have no conflict of interest.

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