

Traumatic Reticuloperitonitis in Cattle of Khorramabad (Center of Lorestan Provenience, West of Iran)

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Abstract: A case series study was conducted from October 2007 to November 2008 in cattle herds in Khorramabad, West of Iran to determine the risk factors and clinical findings of traumatic reticuloperitonitis (TRP). One hundred and four cattle with TRP signs were examined by ambulatory large animal clinic of Veterinary Medicine College. Statistical analysis using multivariable logistic regression showed that magnet administration (OR= 9.1, P=0.02) and positive bar test, history of abrupt and sudden milk drop and grunt and grinding had (OR=5.1, P=0.04) were significantly associated with the TRP in cattle. No relationship between herd sizes and other management practices and clinical signs of TRP were found in this study. Most cases were treated by conservative treatment and magnet administration is best prophylactic procedure to prevent TRP in this region.

Key words: Traumatic reticuloperitonitis • Risk factor • Clinical signs • Iran

INTRODUCTION

Traumatic reticuloperitonitis (TRP) is a relatively common disease in adult cattle caused by the ingestion and migration of foreign bodies in the reticulum. Swallowed metallic objects, such as nails or pieces of wire, fall directly into the reticulum or pass into the rumen and are subsequently carried over the ruminoreticular fold into the cranioventral part of the reticulum. Contractions of the reticulum and the pressure of the calf during late pregnancy or the efforts of parturition promote penetration of the wall by the foreign object; however, the development of severe sequelae to penetration of the reticular wall depends on the characteristics of the foreign body, as well as the direction and extent of the penetration. Perforation of the wall of the reticulum allows leakage of ingesta and bacteria, which contaminate the peritoneal cavity, resulting in local or diffuse peritonitis. The swallowed object can also penetrate into the pleural cavity, causing pleuritis and pneumonitis and into the pericardial sac, causing pericarditis, myocarditis, endocarditis and septicaemia. Occasionally, the foreign body may pierce and infect the liver or spleen. The prevalence of traumatic reticulitis in adult dairy cattle has been attributed to management practices and the lack of

discriminatory dietary habits of cattle. The clinical signs of cattle with TRP are variable, depending on the severity, duration and involvement of other organs. Fever, increased heart and respiratory rate, anorexia, dehydration, decreased milk production, weight loss, ruminal stasis, chronic tympani, abdominal tension and rigid abdominal pain with grunting are the common clinical signs observed in cattle with TRP. Two treatment procedures for TRP were recommended; conservative therapy and surgery [1-4].

Lorestan provenience is located in West of Iran and one of the biggest centers of cattle rearing in Iran. Two production groups are described for dairy cattle in Iran. One of them is small farmers which are familiar agriculturist system. They own about 85% of the cows in Lorestan provenience. The herd density is about 5-30 animals per farm with a low technology level and milk production (4620 Kg/cow/year). The second group is the commercial industrial dairy herds with an average herd size of more than 30 cows. The commercial industrial herds use more advanced technology with average milk production of about 8173 Kg/cow/year. This study was designed to review TRP signs and risk factors in KhorramAbad cattle herds (Ministry of Agriculture, Animal breeding Center website).

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MATERIAL AND METHODS

One hundred and four cattle with TRP signs were examined by ambulatory large animal clinic of Veterinary Medicine College of Lorestan University from October 2007 to November 2008. A questionnaire was used to collect general information about the herd such as breed and herd size as well as herd management practices and clinical signs. Most questions were directed to evaluate the management practices that were thought to be associated with increased risk of TRP and to be important in clinical diagnosis of TRP. Complete description of questions is provided in table 1. Completion of the questionnaires was performed by authors of this study during examination. Questions about general herd information were answered directly by herd owners or other persons of farm staff. Some questions were answered 3-7 days after treatment, necropsy or slaughter. Routine clinical examination was done for each case. Body temperature, heart and respiratory rate, rumen contractions rate and quality were examined and documented. Upward movements of the fist, the withers pinch or bar tests were done to identify anterior abdomen pain by placing a stethoscope on the trachea to increase the sensitivity of these tests as described in other references [4-6]. The cases were divided into three groups according to clinical findings; acute local peritonitis (ALP), chronic local peritonitis (CLP) and acute diffuse peritonitis (ADP). In this study sudden and complete anorexia, marked drop in milk yield in history and arched back, abdominal pain detection, mild to severe fever, atony and decreased rate and quality of rumen contraction, acute free gas bloat in clinical examinations were considered as acute local peritonitis and abnormal appetite and milk yield, rumen smaller than normal, weak and irregular rumen contraction, chronic bloat, stiffness gait, chronic grunting and grinding considered as chronic local peritonitis. Severe depression, fever and then hypothermia, alimentary tract atony, tachycardia, tachypnea and severe abdominal pain considered as acute diffuse peritonitis. Each cases were treated based on its condition, cattle with acute local peritonitis were treated by orally magnet administration, parenterally broad spectrum antimicrobials such as penicillin (44000 IU/kg) and streptomycin (11 mg/kg) or trimethoprim- sulfadoxine (15 mg/kg) and flunixin meglumine (1.1 mg/kg), immobilization and ruminotomic for five days, some chronic local peritonitis were treated by ruminotomy and others treated conservatively. Cattle suspected of acute diffuse peritonitis were recommended to undergo slaughter or necropsy.

The unit of statistical analysis was case. To evaluate associations between suggested risk factors and clinical signs, univariable and multivariable logistic regression analyses were used. All statistical analyses were conducted using SPSS software (Version 11.5).

RESULTS

Questionnaire findings in this study were summarized in table 1. Cattle in this study were feed wheat hay (all herds), dry alfa alfa (93 herds), corn silage (36 herds), concentrate (86 herds) and bakery bread (78 herds). Seventy three herds were used chopped roughage. In this study, 67 (64.42%) cases were diagnosed to have acute local peritonitis, 21 (20.19%) cases to have chronic local peritonitis and 7 (6.7%) to have acute diffuse peritonitis. Clinical signs of heart failure including muffled heart sounds, jugular vein distention, pulsation, edema of the brisket and ventral neck were detected in 9 cases, representing 8.6% of cases with Traumatic pericarditis (TP). These cases were referred to slaughterhouse. Sudden death was seen in an animal with chronic active pericarditis, indicating that the congestive heart failure had been developing for months. Vomiting were observed in two acute local peritonitis cases and recovered at 2 days after treatment. Shivering behind elbow and thigh was seen in 6 (8.95%) acute local peritonitis cases and 2 (28.57%) acute diffuse peritonitis cases. Following conservative therapies for acute local peritonitis, 53 (79.10%) cases were returned to normal eating and rumination after 3 ± 0.4 days. Grunting and grinding disappeared 6 ± 0.5 days post treatment in 55.1% of cases. All cases with chronic local peritonitis signs were treated by conservative therapy but 12 (57.14%) cases were returned to normal production. In six chronic local peritonitis cases, surgery was done and 4 (66.66%) cases were completely treated. In ruminotomy, reticular adhesion between the cranioventral aspects of reticulum, ventral abdominal wall and diaphragm were obvious. Direct spleen perforation with multifocal abscess formation was observed at necropsy of a cow with chronic local peritonitis. Other chronic local peritonitis cases recommended slaughtering due to economic costs for farmers. Five of seven acute diffuse peritonitis cases were referred to slaughterhouse and two cases were necropsied. In most slaughtered or necropsied cases, a mount turbid, foul-smelling fluid (purulent) containing clots of fibrin were present and loops of intestine and omentum stuck together by thick layers of fibrin. The types of foreign bodies found in cattle ruminotomy or necropsies are summarized in table 3.

Table 1: Distribution of risk factors for TRP history and clinical findings in cattle herds in Khorramabad (Center of Lorestan Provenience, West of Iran)

Risk factors and clinical sings		Total	ALP	CLP	ADP	TP	Risk factors and clinical sings		Total	ALP	CLP	ADP	TP
Age*	6 months - 2year	14	10	4	-	-	Body weight loss	50kg	43	43	-	-	-
	2-5 year	53	31	15	2	5		75kg	27	20	4	3	-
	> 5 year	37	26	2	5	4		100kg	12	-	9	2	1
Sex	Male	23	21	2	-	-	Fever	Emaciation	22	4	8	2	8
	Female	81	46	19	7	9		No	26	6	16	3	1
Location	North - East	44	27	7	3	7	Heart rate	Mild	64	49	5	3	7
	West	21	15	4	2	-		Severe	14	12	-	1	1
	Central and other	39	25	10	2	2		40-60	4	-	4	-	-
Season	Spring	16	10	2	3	1	Respiratory rate	60-90	44	28	15	-	1
	Summer	19	12	7	-	-		90-120	37	34	2	-	1
	Fall	26	19	4	-	3		>120	19	5	-	7	7
	Winter	43	26	8	4	5		40-60	52	36	13	2	1
Breed	Holstein	24	14	5	3	2	Rumen contraction per minute	60-80	22	31	8	5	8
	Cross-Breed	71	51	9	4	7		0.5	43	29	12	-	2
	Native	9	2	7	-	-		1	16	7	9	-	-
Grinding teeth*	Yes	72	53	18	-	1	Contraction quality	2	-	-	-	-	-
	No	32	14	3	7	8		No	45	31	-	7	7
Pregnancy*	Early trimester	12	6	2	1	3	Seen sharp foreign body	Week	61	42	5	7	7
	Mid trimester	20	14	6	-	-		Normal	40	25	13	-	2
	Last trimester	48	36	12	-	-		Strong	3	-	3	-	-
	No	24	11	1	6	6		Yes	55	35	11	6	3
Milk drop*	Half	24	14	10	-	-	Cattle lick ground*	No	49	32	10	1	6
	One third	46	36	7	-	3		Yes	61	39	13	5	4
	One forth	34	17	4	7	6		No	43	28	8	2	5
Bar test*	Yes	82	54	17	3	8	Anorexia	Sudden	71	57	5	7	2
	No	22	13	4	4	1		Gradual	33	10	16	-	7

*Significant factors in the univariable analysis (P < 0.2)

ALP: Acute local peritonitis, CLP: Chronic local peritonitis ADP: Acute diffuse peritonitis, TP: Traumatic pericarditis

Table 2: Multivariable logistic regression analysis of risk factors for TRP

Risk factor	Wald statistic	SE	OR	95% CI	P
Cattle had a magnet					
Yes	5.19	0.86	9.1	1.29 - 31.49	0.02
No	-	-	1.00	-	-
Elicitation of a grunt following the bar test					
Yes	4.01	0.98	6.3	2.06 - 41.11	0.04
No	-	-	1.00	-	-
History of abrupt and sudden milk drop over a 24-hour period					
Yes	3.57	0.88	5.1	4.25 - 39.12	0.04
No	-	-	1.00	-	-
Hear grunt or groan					
Yes	3.17	0.81	4.4	7.89 - 46.25	0.04
No	-	-	1.00	-	-

Table 3: Kind of foreign bodies found in cattle ruminotomy or necropsy

Kind of Foreign Bodies	No. of Dairy cattle with Foreign bodies (%)*
Wire	10(34.5)
Nail and Knife	12(41.4)
Rope and bond of hay	5(17.3)
Other materials	2(6.8)
Total	29(100)

*In parentheses is shown percentage of cattle with a given kinds of foreign bodies

Grunt and groan with defecation and urination were noticed in 38 (56.71%) acute local peritonitis cases and 13 (61.90%) chronic local peritonitis cases. Grinding was observed in 52 (77.61%) acute local peritonitis cases and 18 (85.71%) chronic local peritonitis cases. Hypermotility of rumen and polyuria were not seen in this investigation. Arched back position and stiffness gait were observed in 46 (68.65%) acute local peritonitis cases and 11 (52.38%) chronic local peritonitis cases. Dyspnea was noticed in 2 (28.57%) acute diffuse peritonitis cases.

With univariable analysis and after removing the correlated variables, seven factors were selected based on P value <0.2 (Table 1) and were included in the multivariable step-wise logistic regression analysis. Sex and breed were not included in this analysis because of accidental examination of cases. In the final logistic model, four out of seven factors were significant at the 0.05 level. No significant interaction was detected in the regression model. The Wald statistic, standard error, odds ratios and the 95% confidence level for the factors are provided in table 2. Cattle without magnet had 9.1 times the odds of being affected. Also bar test positive, history of abrupt

and sudden milk drop, grinding and grunt had 6.3, 5.1 and 4.4 times more likely to have TRP than cattle without such history and signs. Other mentioned factors were not significant in the statistical analysis.

DISCUSSION

In the present study, age had effect on the prevalence of the disease; it seems that when age increased, the prevalence of TRP increased because animals were exposed to further foreign bodies [1, 2]. No significant difference was seen between age and kind of peritonitis. On the other hand, we speculated that higher incidence of TRP in female cattle was related to the longer period of keeping females than males and to the fact that more females were examined in this period by ambulatory clinic [1]. Cross-Breed Holstein has biggest population among other breeds in this region, so more Cross-Breed Holstein cases were examined in this period. More cases were examined during winter and it is probably due to the fact that in this season cattle are feed more with chopped roughages, silage and are kept more in stable [1]. Based on our results, 48 (46.15%) cases were observed in last trimester. It is probably due to the combination of weight and size of the gravid uterus that probably allows the organ to act like a pendulum as a cow gets up and down; this can apply physical pressure to the rumen and reticulum, contributing to perforation by an existing sharp metallic object [3]. Other cases occurred post parturition and were not related to dystocia and estrus [7]. No significant different was seen between pregnancy age and kind of peritonitis. According to results, history of magnet administration and sudden milk drop were best points in the diagnosis of TRP in field based on history. This investigation showed that pica (lick ground) has a very important role in cattle suspected to TRP in this region which is in agreement with the findings of others [2, 3, 11]. It was reported that none of farmer use tire on plastic cover of silage unlike U.K. reports [8 -10]. Based on clinical necropsy and findings of this study, intermittent anorexia, chronic bloat, weight loss, poor hair coat, decreased milk production, changes in manure consistency and rumen dysfunction were best indexes for chronic local peritonitis [1-3].

In the present study, the researchers knew that cattle affected with traumatic reticuloperitonitis that results in a diffuse peritonitis have much more severe signs than those affected with localized peritonitis [1-3]. Cattle developing diffuse peritonitis resulting had fever, elevated heart rates (100 to 120 beats/min), elevated

respiratory rates (65 to 80 breaths/min), total rumen and gastrointestinal stasis, a total cessation of milk flow and appetite, scant loose manure and often have an audible grunt and grinding. The grunt or groan is most apparent when the animal arises, lies down, or is made to move about. In this investigation, 65 (62.5%) diseased animal were conservatively treated [1-3]. It seems that initial conservative treatment and use of magnets is valuable. A complete blood count (CBC) may or may not be helpful because many patients with TRP have normal CBCs, but in ambulatory clinic we unable to do it. The most helpful ancillary tests are abdominal ultrasonography and reticular radiography. Unfortunately radiology and ultrasonography technique were unavailable in ambulatory clinic at this time. Consequently, most TRP cases were treated by conservative treatment and magnet administration is the best prophylactic procedure to prevent TRP in this region.

In conclusion, TRP is one of the most important diseases in Khorramabad that can be prevented by magnet administration.

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