

Clinical and ultrasonographic differences between cattle and buffaloes with various sequelae of traumatic reticuloperitonitis

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ABSTRACT: This study was performed to document the clinical and ultrasonographic differences between cattle and buffaloes with various sequelae of traumatic reticuloperitonitis (TRP) and the importance of ultrasonography in detection of such sequelae. Twenty nine cows and 33 buffaloes with TRP were investigated. By using ultrasonography and some confirmatory techniques as paracentesis, laparotomy and necropsy, the various sequelae of TRP in both species were clarified. Acute local peritonitis, chronic local peritonitis, acute diffuse peritonitis, reticular abscesses, thoracic abscesses and pericarditis have been detected as sequelae of TRP in both cattle and buffaloes. The clinical findings of all sequelae are described. The results of the present study indicate that the classical symptom of pain and systemic reactions were common in most sequelae of TRP in cattle and less common in buffaloes. No specific findings have been recorded for reticular abscesses in both species. Brisket oedema and distended jugular veins have been shown in both cattle and buffaloes with pericarditis and also in four buffaloes with thoracic abscesses. Hence, it is important to use ultrasonography for early detection of TRP especially in buffaloes and to discriminate between different sequelae which have the same clinical findings.

Keywords: buffaloes; cattle; traumatic reticuloperitonitis; sonography; clinical findings

Most veterinarians who deal with diseased buffaloes build up their diagnosis on reports about TRP in cattle because only few scientific papers exist about TRP in buffaloes and the difference between cattle and buffaloes.

There are many potential causes of abdominal disorders in cattle and buffaloes. Traumatic reticuloperitonitis (TRP) is a relatively common reason for abdominal surgery in both species. The importance of this disease is not only due to its higher prevalence among other digestive disorders (Maddy, 1954), but also due to the difficulty in early prediction and difficulty in evaluation of its sequelae by physical examination. Therefore, additional diagnostic techniques like ultrasonography are often helpful (Braun et al., 1993). It has been used for demonstration of physiological (Kaske et al., 1994) and pathological states of the reticulum in cattle with TRP (Braun et al., 1993; Floeck and Baumgartner, 2001; Floeck, 2006).

The signs of TRP are dependent upon the site of reticular perforation and lesions caused by the foreign body in the surrounding areas. There are numerous scientific papers describing the clinical signs of TRP in cattle. Anorexia, decrease in milk production, fever, tachypnea, reluctance to move and stance with an arched back and abducted elbows are the most common signs (Fubini and Divers, 2007). On the other hand, there are few reports describing it in buffaloes like Saleh et al. (2008), who stated that affected buffaloes show less pain reactions.

MATERIAL AND METHODS

Animals

The examinations were carried out on 62 animals (29 Holstein Friesian cows and 33 buffaloes) with TRP. When they were examined, the animals

were from 3–8 years old. Fifteen cows and 22 buffaloes were pregnant over six months, 10 cows and 10 buffaloes had calved less than four weeks ago and four cows and one buffalo were non pregnant. Body weights ranged between 450 and 700 kg in cows and between 400 and 600 kg in buffaloes.

Clinical examination

All animals underwent a thorough clinical examination as described by Dirksen et al. (1990). Testing for foreign bodies in the reticulum consisted of withers pinch technique, side stick method and turning in acute angle.

Ultrasonographic examination

The reticulum, rumen, spleen, liver, lungs, pleura and heart were examined with a 3.5- and

5-MHz convex transducer (Pie Medical 240 Parus, Maastricht, Netherlands). The hair was clipped on the ventral abdomen and on both sides of the thorax. The reticulum and surrounding tissues were examined as described by Braun and Goetz (1994). The pleura and pulmonary surface were examined as described by Braun et al. (1996). The heart was examined as described by Braun et al. (2001). After the application of transmission gel, the animals were scanned beginning at the ventral abdomen and extending forward to the intercostal spaces on both sides of the thorax. Each intercostal space was examined dorsoventrally.

Confirmatory test

Paracentesis (abdominocentesis and thoracocentesis) under ultrasonographic guidance, laparotomy and postmortem examinations were used to confirm the diagnosis (Table 1).

Table 1. Confirmatory tests used in cows and buffaloes with TRP

TRP sequelae	Diseased animals			Confirmatory tests*	Frequency distribution	
	total (<i>n</i> = 62)	cows (<i>n</i> = 29)	buffaloes (<i>n</i> = 33)		cows	buffaloes
Acute local peritonitis	11	4	7	abdominocentesis	3	4
				laparotomy	3	2
				post mortem	–	–
				none	–	2
Chronic local peritonitis	13	3	10	abdominocentesis	3	6
				laparotomy	1	2
				post mortem	1	–
				none	–	4
Acute diffuse peritonitis	9	6	3	abdominocentesis	5	2
				laparotomy	–	–
				post mortem	1	–
				none	4	1
Reticular abscesses	7	5	2	abdominocentesis	5	2
				laparotomy	1	–
				post mortem	2	–
				none	–	–
Thoracic abscesses	8	2	6	abdominocentesis	1	1
				laparotomy	–	–
				post mortem	–	1
				none	1	6
Pericarditis	14	9	5	abdominocentesis	–	–
				laparotomy	–	–
				post mortem	5	2
				none	4	3

*in 3 animals with acute local peritonitis, 3 with chronic local peritonitis and 2 with reticular abscesses more than one confirmatory test was used

RESULTS

Clinical findings

Acute local, chronic local, acute diffuse peritonitis, reticular abscesses, thoracic abscesses and pericarditis were detected as sequelae of TRP in cows and buffaloes. The clinical findings are shown in Table 2 and 3.

Ultrasonographic examinations

Table 4 gives an overview of the sonographic examination results in cows and buffaloes. Echogenic deposits between reticulum, ruminal atrium and

abdominal wall were detected by placing the transducer just behind the xiphoid cartilage representing acute local peritonitis (Figure 1A,B). The same sonographic appearance was found in patients with chronic local peritonitis but by presence of more distinct echogenic strands and a corrugated appearance of the reticular wall (Figure 2). Acute diffuse peritonitis was characterized by extensive echogenic strands and hypoechoic septated peritoneal fluid in the ventral abdomen between xiphoid and pelvic region (Figure 3). Reticular abscesses were detected as sequelae of TRP by placing the transducer just behind the xiphoid cartilage and moving it right and left. These abscesses appeared as circumscribed masses with hypoechoic to echogenic content surrounded by an echogenic capsule with a size varying

Table 2. General clinical findings of TRP sequelae in cows and buffaloes

Variables		TRP sequelae						total (n = 62)
		acute local peritonitis	chronic local peritonitis	acute diffuse peritonitis	reticular abscesses	thoracic abscesses	pericarditis	
Number of animals	cows	4	3	6	5	2	9	29
	buffaloes	7	10	3	2	6	5	33
Reduced appetite	cows	4	3	6	5	2	9	29 (100%)
	buffaloes	7	10	3	2	6	5	33 (100%)
Scanty faeces	cows	3	3	5	5	2	9	27 (93.1%)
	buffaloes	7	10	2	2	6	5	32 (96.96%)
Ruminal bloat	cows	2	3	6	4	2	7	24 (82.75%)
	buffaloes	4	10	3	2	5	5	29 (87.87%)
Ruminal atony	cows	4	3	6	5	2	9	29 (100%)
	buffaloes	7	10	3	2	6	5	33 (100%)
Positive foreign body tests ^a	cows	4	3	6	5	2	9	29 (100%)
	buffaloes	7	10	3	2	6	5	33 (100%)
Pain reactions ^b	cows	4	1	6	5	2	9	27 (93.1%)
	buffaloes	4	-	2	-	3	3	12 (36.36%)
Systemic reactions ^c	cows	4	1	6	5	2	9	27 (93.1%)
	buffaloes	2	-	1	1	5	4	13 (39.39%)
Decreased milk production	cows	4	3	6	5	2	9	29 (100%)
	buffaloes	7	10	3	2	6	5	33 (100%)

^apositive foreign body tests were indicated by grunting sounds audible by putting the stethoscope on the trachea while foreign body tests were applied (withers pinch technique, side stick method and turning in acute angle)

^bpain reactions included stiffness in gait, arched back, audible grunting sounds, and abducted elbows

^csystemic reactions included: temperature > 39.5°C, pulse > 90/min, and respiratory rate > 50/min in both species

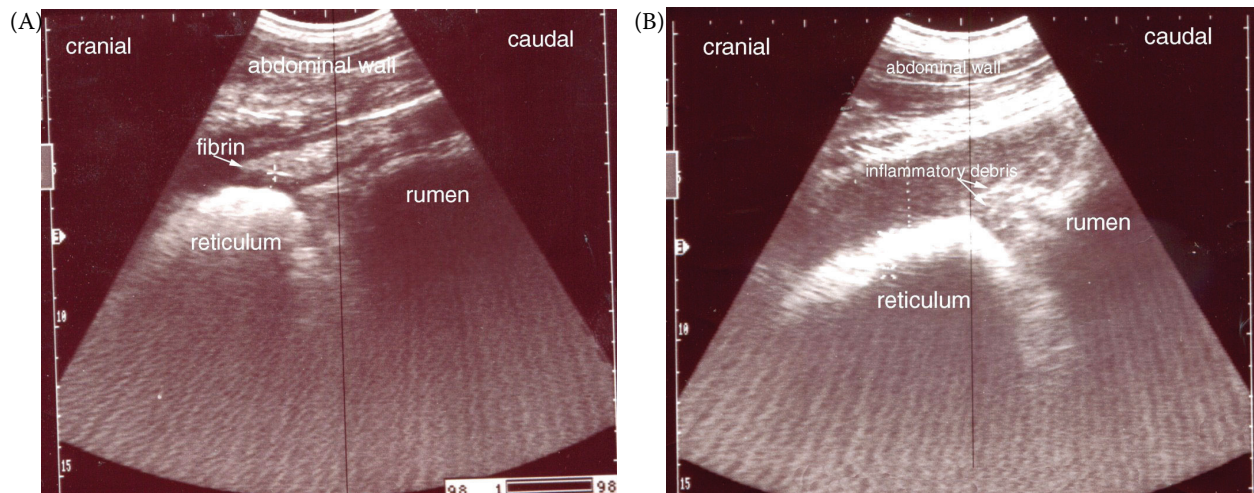


Figure 1. Sonogram of a cow (A) and a buffalo (B) with acute local peritonitis. Notice the half moon shape of the reticulum with echogenic fibrinous deposits between reticulum, rumen and abdominal wall (3.5 MHz)

Table 3. Specific clinical findings in cows and buffaloes with thoracic abscesses and pericarditis

Variables	TRP sequelae			
	thoracic abscesses		pericarditis	
Animals	cows (<i>n</i> = 2)	buffaloes (<i>n</i> = 6)	cows (<i>n</i> = 9)	buffaloes (<i>n</i> = 5)
Muffled heart sounds	–	–	7 (77.77%)	5 (100%)
Splashing heart sounds	–	–	1 (11.11%)	–
Brisket oedema	–	4 (66.66%)	8 (88.88%)	5 (100%)
Distended jugular veins	–	4 (66.66%)	9 (100%)	5 (100%)
Abnormal lung sounds (wheezes and crackling)	1 (50%)	5 (83.33%)	1 (11.11%)	–
Dyspnoea	1 (50%)	5 (83.33%)	–	1 (20%)
Cough	1 (50%)	5 (83.33%)	–	1 (20%)

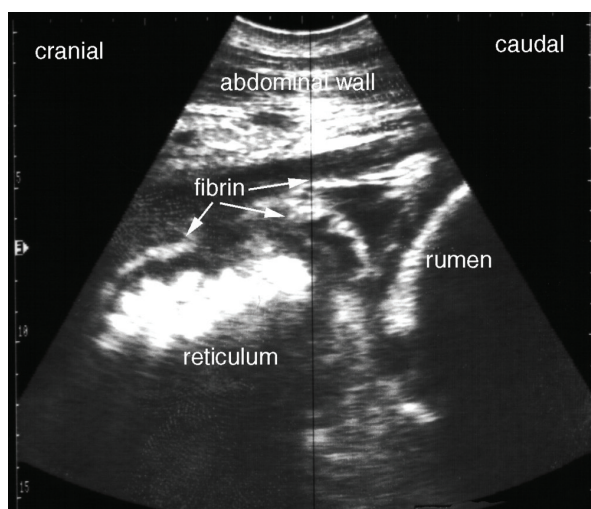


Figure 2. Sonogram of a buffalo (3.5 MHz) with chronic local peritonitis. The ultrasonographic image shows echogenic fibrinous strands between reticulum, rumen, and abdominal wall. Notice the corrugated appearance of the reticular wall

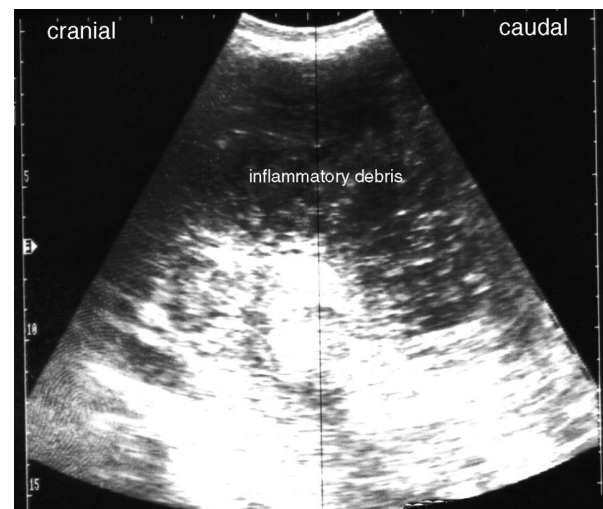


Figure 3. Sonogram of a buffalo with acute diffuse peritonitis with hypoechoic exudate interspersed with echogenic fibrinous strands (3.5 MHz)

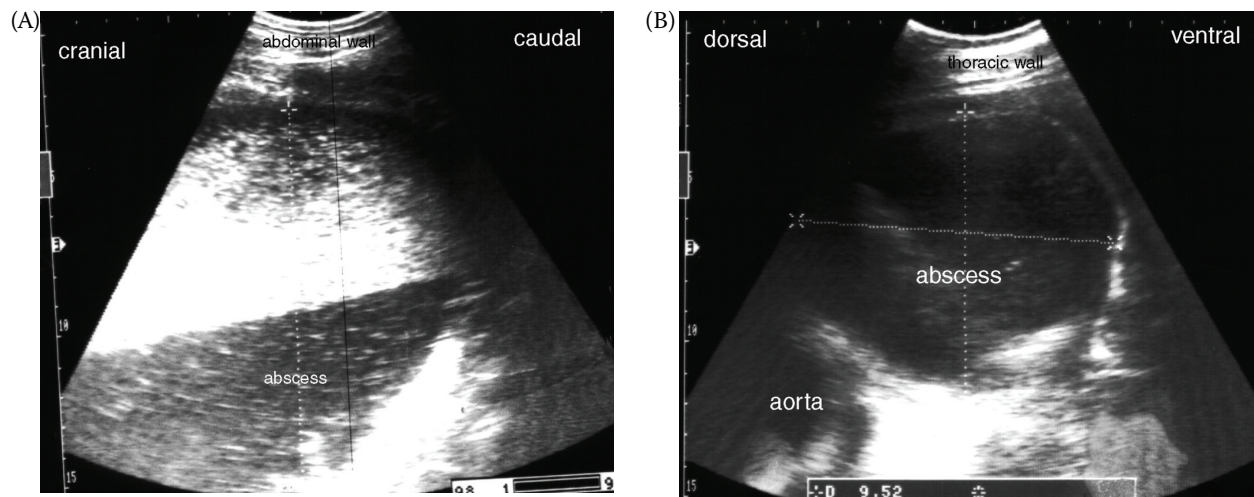


Figure 4. Sonogram of a reticular abscess in a cow with a diameter of 13 cm and echogenic sedimentation (A) and a thoracic abscess in a buffalo with a diameter of 10 cm (B) (3.5 MHz). 4A was obtained from the ventral abdominal wall and 4B from the 4th intercostal space

from 2–15 cm (Figure 4A). Thoracic abscesses appeared as circumscribed areas in the mediastinal region with anechoic content with echogenic debris in one and completely echogenic content in seven cases. The size varied from 10–15 cm (Figure 4B). Pericarditis was detected in the same area and was classified into two types by echocardiography. Suppurative pericarditis was characterized by presence of hypoechoic to echogenic fluid in the pericardial sac (Figure 5A), and fibrinous pericarditis by presence of echogenic fibrinous strands within the pericardial sac (Figure 5B). The frequency and

magnitude of reticular contractions was reduced or absent in all patients.

DISCUSSION

TRP is a relatively common disease in cattle and buffaloes; it occurs when pieces of wire, or other sharp metal objects, have been eaten by the animals along with its food and penetrate the reticular wall as a result of the contractions during the cudging process. Unlike sheep and goats, cattle and buffa-

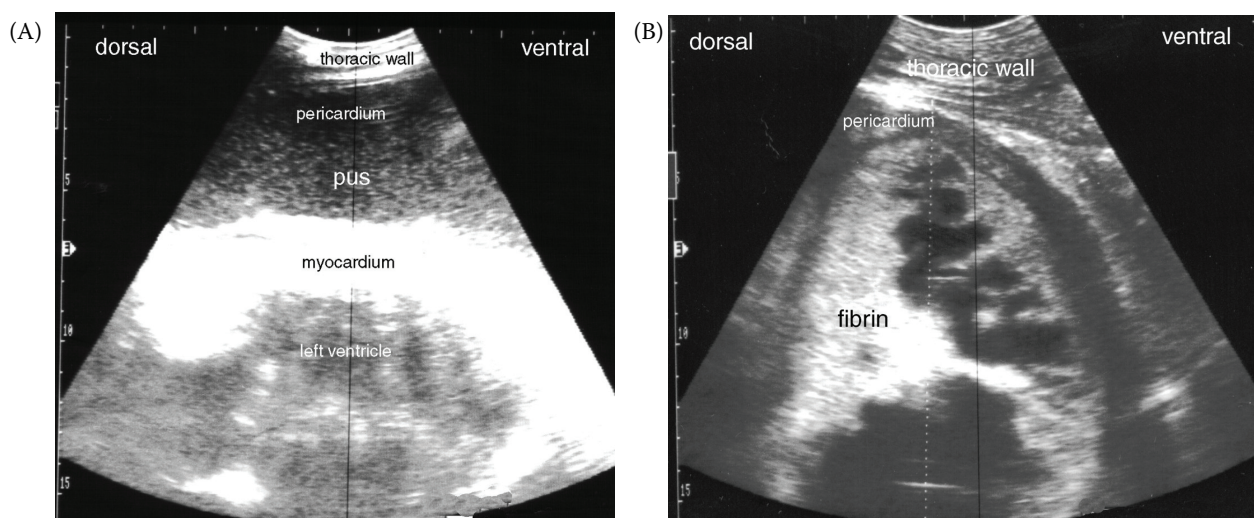


Figure 5. Sonogram of the left thorax of a cow with suppurative pericarditis (A) and a buffalo with fibrinous pericarditis (B) obtained from the 4th intercostal space. The hypoechoic content in the pericardial sac represents pus (A) and echogenic bands between the hypoechoic thick pericardium and the heart represent fibrin (B) (3.5 MHz)

Table 4. Ultrasonographic findings in cows and buffaloes with TRP sequelae

TRP sequelae	Shape of reticulum	Cows	Buffaloes	Reticular motility (biphasic contractions)/3 min	Cows	Buffaloes	Site of lesion detection
		<i>n</i>			<i>n</i>		
Acute local peritonitis	half moon shape with inflammatory deposits on its serosal surface	4	6	slow with one contraction	1	1	just behind the xiphoid cartilage
	corrugated and loss of shape	–	1	slow with two contractions	1	–	
	not seen	–	–	absent	2	6	
Chronic local peritonitis	half moon shape with inflammatory deposits on its serosal surface	2	1	slow with one contraction	–	–	just behind the xiphoid cartilage
	corrugated and loss of shape	1	9	slow with two contractions	–	–	
	not seen	–	–	absent	3	10	
Acute diffuse peritonitis	half moon shape with inflammatory deposits on its serosal surface	3	1	slow with one contraction	–	–	extend from just behind the xiphoid cartilage to the pelvic region in the ventral abdomen
	corrugated and loss of shape	1	1	slow with two contractions	–	–	
	not seen	2	1	absent	6	3	
Reticular abscesses	half moon shape with inflammatory deposits on its serosal surface	1	–	slow with one contraction	–	–	just behind the xiphoid cartilage
	corrugated and loss of shape	2	1	slow with two contractions	–	–	
	not seen	2	1	absent	5	2	
Thoracic abscesses	half moon shape with inflammatory deposits on its serosal surface	2	5	slow with one contraction	–	2	3 rd and 4 th intercostal spaces on both sides of the thorax
	corrugated and loss of shape	–	1	slow with two contractions	1	–	
	not seen	–	–	absent	1	4	
Pericarditis	half moon shape with inflammatory deposits on its serosal surface	8	3	slow with one contraction	1	1	3 rd and 4 th intercostal spaces on both sides of the thorax
	corrugated and loss of shape	1	2	slow with two contractions	2	–	
	not seen	–	–	absent	6	4	

loes do not use their lips to discriminate between very fibrous feed and metallic objects in feedstuffs (Fubini and Divers, 2007).

Clinical findings

All animals in the present study had reduced appetite, decreased milk production and ruminal atony, most of them had scanty faeces and ruminal bloat, as reported by Braun et al. (1993) and Saleh et al. (2008). Additionally Radostits et al. (2007) stated that the presence of such symptoms is considered as a general sign for indigestion. Foreign body tests

were positive in all cows and buffaloes with different sequelae of TRP while signs of pain and systemic reactions were observed more commonly in cows than in buffaloes. Therefore, the diagnosis of such conditions was easier in cows than in buffaloes (Saleh et al., 2008). According to Mohamed and Oikawa (2007) animals with reticular abscesses had no specific signs in both species. Abnormal heart sounds, distended jugular veins and brisket oedema can be detected in animals with pericarditis (Fubini and Divers, 2007). These symptoms were found in four buffaloes with thoracic abscesses in the present study. Radostits et al. (2007) reported that mediastinal abscesses might cause congestive

heart failure. Respiratory manifestations including cough, dyspnoea and abnormal lung sounds were found in the present study in most cows and buffaloes with thoracic abscesses as well as in few cases with pericarditis. So it is difficult to differentiate involvement of heart, lung or mediastinal region by clinical examination alone. Hence it is necessary to use additional techniques for the diagnosis of such conditions and differentiate between its various sequelae.

Ultrasonographic examinations

Perforation of the reticular wall by a sharp foreign body initially produces an acute local peritonitis which may recover, spread to cause acute diffuse peritonitis, become persistent to cause chronic peritonitis, or may extend beyond the peritoneum and cause involvement of other organs such as pericardium to cause acute pericarditis (Radostits et al., 2007). Ultrasonography provided exact information concerning the various sequelae of TRP in both species. Moreover, ultrasonography made it possible to determine the location and extent of the lesions accurately, and the site best suited for abdomino- and thoraco-centesis. Reduced or absent biphasic reticular contractions and deposition of inflammatory materials on its serosal surface were the classical ultrasonographic findings in TRP in both species, according to Braun et al. (1993). Braun et al. (1998) and Mohamed and Oikawa (2007) described reticular and thoracic abscesses as circumscribed masses with anechoic to echogenic content. Echocardiography in animals with TRP has proven a good diagnostic procedure for distinguishing traumatic pericarditis from thoracic abscesses. Moreover, traumatic pericarditis has been classified into suppurative and fibrinous pericarditis according to the ultrasonographic appearance of inflammatory materials within the pericardial sac, as described at necropsy findings by Fubini and Divers (2007) and Saleh et al. (2008).

In conclusion, the results of the present study clarify the importance of ultrasonographic examination of cattle and buffaloes with TRP. More routine use of ultrasonography may aid in early diagnosis of TRP and detection of its sequelae which are difficult to detect by clinical examination alone. Both cows and buffaloes in the present study had nearly similar ultrasonographic appearance of TRP but there were some clinical differences.

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