THE SCIENCE WORLD
A Monthly e Magazine
ISSN:2583-2212
Popular Article
April, 2026 Vol.6(4), 1026-1034

Traumatic Reticuloperitonitis

Valluru Ravikanth[1], Sriram Divya[1], Yadala Ravikumar[1], Venkatesh Yadav J[1]
[1]Department of Veterinary Pathology, College of Veterinary Science, PVNRTVU, Korutla.
doi.org/10.5281/ScienceWorld.19780150

Traumatic reticuloperitonitis or hardware disease or more recently tyre wire disease is commonly noticed in cattle and buffalo. It is caused by localized inflammation in the wall of the reticulum, usually resulting from perforation by a sharp object (eg, nail or wire) ingested by the animal. The most common clinical findings include decreased feed intake, decreased rumen motility, mild fever, poorly digested faeces, and signs of pain. Foreign body tests (eg, back grip, percussion of the reticulum with a mallet, or pole test) to elicit a grunt are an important step in the clinical examination. Ultrasonographic evaluation is essential to identify inflammatory lesions of the reticulum, and radiography enables visualization of foreign bodies. Traumatic reticuloperitonitis is treated with a rumen magnet and antimicrobial therapy, and laparorumenotomy is an option when there is no response to medical treatment. The disease is much less common in other ruminants such as goats and sheep.

Introduction:

Traumatic Reticuloperitonitis (TRP) or hardware disease is one of the common diseases reported in adult cattle and buffalo and is caused by the ingestion of foreign bodies that perforate their foregut. Cattle and buffalo have a unique mouth anatomy and due to their long prehensile tongue, they grasp feed without any selection of the feed items. Due to their unselective feeding habit, foreign bodies, metallic or non-metallic, mixed with the feed often enter their stomach. It is called "hardware disease" because it is caused by cattle ingesting sharp, metallic objects like nails, screws, and pieces of wire (hardware) that get stuck in their reticulum.

Traumatic Reticuloperitonitis (TRP) is otherwise referred to as "tyre wire disease" because wires from discarded tires used on farms are a frequent cause of the condition. On

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 15/04/2026

many farms, old vehicle tires are commonly used to weigh down plastic sheeting covering silage clamps (large piles of fermented feed). As these tires degrade or are cut, the internal steel wire cording becomes exposed, breaks off, and falls into the feed. Cattle are indiscriminate eaters and do not use their lips to carefully sort their feed for foreign objects, unlike more selective eaters like sheep and goats. They are also often fed chopped mixed feed, which can conceal metallic debris. Once swallowed, heavy metallic objects fall into the reticulum. The normal, strong contractions of this stomach can cause the sharp wire or nail to penetrate the organ's wall.

The risk and sequelae of TRP syndrome are considerably higher in buffalo than in cattle and extremely common within developing countries, possibly due to less organized small-scale farming and the low standards of animal management and feeding regimes (Misk *et al*. 2001). The foreign body may affect organs like the liver, spleen, heart, or lungs and sometimes the nerves leading to the clinical conditions like vagal indigestion (Braun *et al.* 2020).

Etio-pathogenesis

The main cause of TRP is a combination of a lapse in good management and the non-selective eating habits of large ruminants (Mousavi *et al.* 2007). Bovines are more likely to ingest foreign bodies than small ruminants since they do not use their lips for prehension and thus food taken into mouth by out-swept curling action of tongue aided by backward pointing tongue papillae and very little mastication will ingest foreign bodies in feedstuffs which will fall directly in reticulum and is unlikely to be forced to rumen (Misk *et al.* 2001). The foreign bodies get lodged into the honey comb pattern of reticulum which may puncture or perforate the reticulum (Roth and King 1991, Braun *et al*. 2018). Normal physiological contractions of reticulum are sufficient to facilitate foreign body's penetration through the wall. Reticular motility plays an important role in mixing of ingesta (primary contraction cycle) and eructation of gases (secondary contraction cycle), and additionally facilitate piercing of foreign body. Metallic foreign bodies like nails, wires and nets are often heavy enough to settle down in the fore stomach. Due to the fore gut contractions, some of these foreign bodies pierce its wall (potential foreign body) and lead to complications. The foreign body penetration is also aided by the pressure of the foetus in advanced pregnancy and uterine contractions at the time of delivery (Ghanem 2010, Anteneh and Ramswamy 2015, Ibrahim and Gomaa 2016).

The contaminated penetrated foreign body may result in local or diffuse peritonitis and may also reach into the thoracic cavity and the adjacent abdominal anatomic structures

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 15/04/2026

including the liver and spleen (Abdelaal *et al.* 2009, Braun 2020). The most important complications of TRP are traumatic pericarditis (Braun 2009; Mohamed, 2010; Khalphallah *et al*., 2017), hepatic inflammation or abscesses (Dirksen 2002), splenic inflammation or abscesses (Nuss *et al.* 2009), pleuropneumonia (Dirksen 2002), vagal indigestion (Rehage *et al.*1995) and generalised peritonitis (Dirksen 2002). Foreign body, if reaches serosal layer establishes a local infective focus. Foreign bodies which penetrate ventrolateral wall of reticulum result in reticular fistula. The medial wall of reticulum is abundant of low thresh hold tension receptors, so any insult to medial reticular wall musculature leads to dysfunction of these receptors which result in diminished and hypomotality of rumeno-reticulum. There could be a complete atony of rumeno-reticulum with variable degree of tympany. Acute localized peritonitis commences 24 h after the penetration of foreign body, leading to high fever increased pulse and rigor particularly in abdomen muscles which causes tucked up appearance. Acute diffuse peritonitis may be associated with leukopenia with a degenerative left shift due to migration of circulating neutrophils to the site of inflammation combined with reduced bone marrow response (Tornquist and Rigas 2010). Non-metallic foreign bodies like sand, ropes, polythene bags or plastic items are often non-potential but due to the fore gut contractions these foreign bodies may stack together and block ingesta movement within the gut leading to the obstruction (Braun *et al.* 2020).

Clinical signs

Animals with TRP show a variety of symptoms which depend on whether the condition is acute or chronic and the body structure penetrated.

Acute condition

Acute condition is characterized by sudden onset of anorexia (due to stasis of forestomach) and a drop in the milk yield. There is elevated rectal temperature, heart rate and respiratory rate. Reluctance in walking due to pain and if the animal is moved downhill, grunting may be noticed. Arching of back along with tense abdomen leads to tucked-up appearance (Abdelaal *et al.* 2009, Braun *et al*. 2018). Defaecation and urination elicit pain. Initially, arched back, ruminal tympany and spontaneous grunting are considered characteristic clinical findings. Rumination and rumen motility is decreased or absent. Distension of left paralumbar fossa occurs due to moderate free-gas bloat and rumen contents are doughy on palpation. Animals pass poorly digested faeces and constipation or diarrhoea may occur. Pressure on xiphoid elicits pain and forms the basis of poll test diagnosis. Pinching of withers causes depression of back and a grunt is elicited (Wither Pinch test). Although the grunt may be audible, it is best detected by auscultation of trachea. By 3rd or 4th day, the

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 15/04/2026

clinical signs subside and spontaneous recovery may occur as a result of localization of the inflammatory process. The early signs of TRP in buffaloes are less evident than cattle. So, it may be difficult to differentiate it from other diseases (Macedo *et al.* 2021).

Chronic condition

In this condition, the appetite and milk yield do not return to normal even after prolonged medical management and the animal loses its body condition. Rumen motility is decreased and chronic recurrent bloat occurs. Faeces are reduced in quantity and undigested faeces become more common. Poll test or wither pinch test may not elicit any response, but gait may be stiff. Cows and buffaloes with thoracic abscesses and pericarditis have respiratory signs of cough, dyspnoea and abnormal lung sounds (Abdelaal *et al*. 2009). In traumatic pericarditis, tachycardia is the primary clinical sign. Heart rate may be mildly elevated or sometimes can be high (Braun *et al.* 2007). The severity of tachycardia is directly proportional to the degree of compression of the heart by pericardial effusion. Pericardial effusion causes the heart sounds to be muffled and asynchronous. Distension of the jugular veins, oedema of the submandibular region, brisket and ventral abdomen has been reported (Jesty *et al.* 2005, Braun *et al.* 2007a). Animal stands with abducted elbows with oedema and jugular vein distension, although absence of these signs does not rule out pericarditis. Pericardial fluid may drain into the reticulum through a patent foreign body tract (Gründer 2002). The increase in body temperature and tachypnea is suggestive of a systemic reaction, possibly related to a toxemia due to foreign body injury (Ghanem, 2010). Associated with brisket oedema and positive venous pulse, the suppurative stage of pericarditis occurs, in which there is a reduction in myocardial contractility (Khalphallah *et al*., 2017).

Diagnosis:

Based on clinical signs and cow-side tests like

- Reduced ruminal movements, rumen size and appetite, typically with changes in faecal consistency (firmer, porridge-like faeces or more undigested particles);
- Reluctance to repeatedly allow the back to be hyperextended as part of the withers pinch test. The abdomen may be guarded and repeated pinching of the withers may produce a pain response, which manifests as excessive salivation.
- Elicitation of a grunt following the bar test and this should be performed at least four times; it involves placing a bar under the xiphisternum with two operators on either side of the animal who first lift the bar slowly and then lower it rapidly.
- Muffled heart sounds on cardiac examination, which are suggestive of traumatic pericarditis.

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 15/04/2026

- It was suggested that a heart rate of over 80 bpm could be considered significant in the diagnosis of pericarditis.
- Distension of the jugular veins. In a standing cow, with its head held in the normal position, the pulse should be visible in the lower third of the neck only with no distension cranially. In cases of chronic pericarditis with constriction of the pericardium, pronounced distension of both jugular veins may be visible.

Other diagnostic tests include

- **Radiography:** Note, however, the presence of a metallic object within the rumen is not diagnostic as this is a common finding;
- **Ultrasonography:** This is a useful modality to check for evidence of local abscesses;
- **Exploratory Laparotomy:** This is a simple and definitive diagnostic procedure that can be used to establish the presence of reticulitis or local peritonitis. It involves making a simple left flank incision in the paralumbar fossa under local anaesthesia and carrying out a manual exploration of the outer surface of the reticulum and abdomen. If there is evidence of perforation, the surgeon can simply proceed to rumenotomy to explore the contents of the reticulum;
- **Abdominal Paracentesis:** Analysis of the fluid obtained may reveal evidence of peritonitis.
- **Electrocardiography:** It is an important parameter for an animal with cardiovascular disorders (Reddy *et al*., 2015). Decreased amplitude of the QRS complex, electrical alternation (configuration of the P, QRS or T complexes regularly) and distortion or elevation in the ST segment are common ECG changes in cases of traumatic pericarditis (Foos, 1985; Tharwat, 2011).
- **Echocardiography:** The echocardiographic examination is a simple and well-established tool for cardiac evaluation, being performed from the third to fifth intercostal space of both antimers (Buczinski, 2009; Hassan and Torad, 2015). In suppurative pericarditis, a large amount of hypoechogenic to echogenic fluid is usually observed in the pericardial sac, while in fibrinous is possible to evidence echogenic fibrin deposits and cords in the epicardium (Abu-seida and Al-abbadi, 2016).
- **Ferroscopy** Performing a metal detector scan on the ventral and lateral thoracic and abdominal wall can provide information on the presence of ferromagnetic foreign bodies (Sawandkar *et al*., 2009), although it is not possible to differentiate between perforating and non-perforating objects (Reddy and Sasikala, 2012).

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 15/04/2026

Laboratory Tests

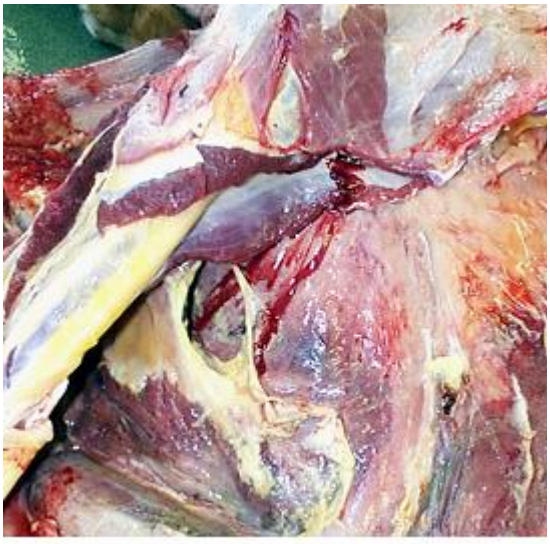
In cases that require confirmation of a diagnosis, further laboratory tests may be useful, although haematological results may not be as convincing in cases of tyre wire disease compared with more traditional cases of TRP.

These tests are all non-specific and include measurement of the:

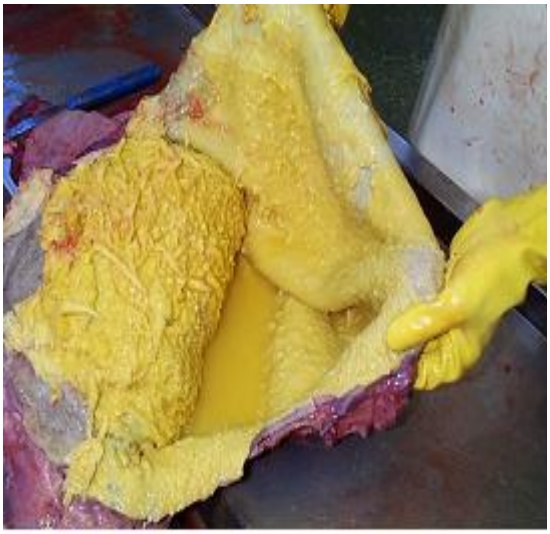
- Total white blood cell count, which will indicate leucocytosis in cases of TRP;
- Differential white blood cell count, which will reveal neutrophilia and left shift in animals with TRP;
- Acute phase proteins, such as fibrinogen or haptoglobin, the levels of which will be raised in the presence of TRP.

Large piece of wire in the wall of the reticulum.

Cattle with traumatic reticuloperitonitis.



Extensive peritonitis following neglected case of traumatic reticulitis.



Large accumulation of pus in the sac (pericardium) surrounding the heart following penetration by piece of wire from the reticulum.

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com

Published 15/04/2026

Treatment:

Therapy involves four components:

- **Confinement:** Restricting movement is essential to prevent migration of the wire cranially. This will also allow the ruminal magnet to work, if used.
- **Pain Relief:** The use of non-steroidal anti-inflammatory drugs (NSAIDs) for analgesia will greatly speed recovery. This must be combined with confinement for optimal results.
- **Antibiotic Treatment:** At least five days of broad-spectrum antimicrobial treatment is generally recommended. The preferred treatment is trimethoprim/sulfonamide.
- **Magnet Bolus:** Administration of a magnet bolus on the first day will often aid recovery.
- **Surgical Treatment:** Surgery is the 'gold standard' treatment for traumatic reticulitis. Immediate surgery will offer the best results as there is less risk of penetration in the cardiac area. Delayed surgery should be carried out two days after the onset of conservative treatment in all non-responsive cases. Removal of a foreign body by surgery provides clear evidence of the diagnosis and indicates what type of material is present within the reticulum.

Summary:

Traumatic reticuloperitonitis, a common ailment in cattle and buffalo is still a challenge in veterinary medicine, especially in developing countries and it has huge economic impact on farmer's economy. Earlier disease was diagnosed after post mortem or slaughter but now-a-days. TRP can be diagnosed through clinical symptoms, haemato-biochemical tests and through ancillary diagnostic imaging tests. Its treatment can be initiated through conservative

Means, and if this fails, invasive surgical procedures may be ensued. The condition if diagnosed and treated early has good prognosis that reduces as the time gap increases. Treatment is usually not rewarding, so it is essential to use preventive measures to prevent the disease.

References:

Abdelaal A M, Floeck M, Maghawry S E and Baumgartner W. 2009. Clinical and ultrasonographic differences between cattle and buffaloes with various sequelae of traumatic reticuloperitonitis. *Veterinarni Medicina* 54: 399–406.

Anteneh M and Ramswamy V. 2015. Hardware disease in bovine. *Academic Journal of Animal Diseases* **4**(3): 146–59.

Abu-seida, A.M. and O.S. Al-Abbadi. 2016. Recent advances in the management of foreign body syndrome in cattle and buffaloes: A review. *Pak. Vet. J.*, **36**(4): 385-393.

Braun, U., B. Lejeune, G. Schweizer, M. Puorger and F. Ehrensperger. 2007a. Clinical findings in 28 cattle with traumatic pericarditis. *Vet. Rec.*, **161**(16): 558-563.

Braun U, Lejeune B, Schweizer G, Puorger M and Ehrensperger F. 2007. Clinical findings in 28 cattle with traumatic pericarditis. *Veterinary Record* **161**: 558–63.

Braun, U. 2009. Traumatic pericarditis in cattle: Clinical, radiographic and ultrasonographic findings. *Vet. J.*, **182**(2): 176-186.

Braun, U., S. Warislohner, P. Torgerson, K. Nuss and C. Gerspach. 2018. Clinical and laboratory findings in 503 cattle with traumatic reticuloperitonitis. *BMC Vet. Res.*, **14**(1): 66.

Braun, U., C. Gerspach, S. Ohlerth, S. Warislohner and K. Nuss. 2020. Aetiology, diagnosis, treatment and outcome of traumatic reticuloperitonitis in cattle. *Vet. J.*, **255**: 105424.

Buczinski, S. 2009. Cardiovascular ultrasonography in cattle. *Vet. Clin. N. Am.-Food A.*, **25**(3): 611-632.

Dirksen G. 2002. Traumatische Hauben-Bauchfellentzündung, pp. 400–14. (Eds) Dirksen G, Gründer H D and Stöber M. *Innere Medizin und Chirurgie des Rindes*. Parey Buchverlag, Berlin.

Ghanem M M. 2010. A comparative study on traumatic reticuloperitonitis and traumatic pericarditis in Egyptian cattle. *Turkish Journal of Veterinary and Animal Sciences* **34**(2): 143–53.

Gründer H D. 2002. Krankheiten des Herzens und des Herzbeutels, pp. 159–181. (Eds) Dirksen G, Gründer H D and Stöber M. *Innere Medizin und Chirurgie des Rindes*, fourth ed. Parey Buchverlag, Berlin.

Hassan, E.A. and F.A. Torad. 2015. Two-dimensional and M-mode echocardiographic measurements in the healthy donkeys (*Equus asinus*). *J. Equine Vet. Sci.*, **35**(4): 283-289.

Ibrahim, H.M.M. and N.A. Gomaa. 2016. Traumatic pericarditis in cattle: risk factors, clinical features and ultrasonographic findings. *Journal of Veterinary Science and Medical Diagnosis*, **5**(3): 7-15.

Jesty S A, Sweeney R W, Dolente B A and Reef V B. 2005. Idiopathic pericarditis and cardiac tamponade in two cows. *Journal of the American Veterinary Medical Association* **226**: 1555–58.

Khalphallah A, Elmeligy E, Elsayed H K, Abdellaah B E A, Salman D, Al-lethie A-l A and Bayoumi S A. 2017. Ultrasonography as a diagnostic tool in Egyptian buffaloes (*Bubalus bubalis*) with traumatic pericarditis. *International Journal of Veterinary Science and Medicine* **5**(2): 159–67.

Macedo G G, Ferreira L V O and Chiacchio S B. 2021. An overview of traumatic reticulopericarditis in cattle and buffaloes. *Buffalo Bulletin* **40**(2): 213–25.

Misk N, Semieka M and Ali S. 2001. Varieties and sequellae of ingested foreign bodies in buffalo and cattle. *Assiut Veterinary Medical Journal* **46**: 250–73.

Mousavi G, Hassanpour A, Tabrizi B A and Rezaie A. 2007. Electrocardiographic changes in buffalo with traumatic reticuloperitonitis. *Italian Journal of Animal Science* **6**: 1029–31.

Mohamed, T. 2010. Clinicopathological and ultrasonographic findings in 40 Water buffaloes (*Bubalus bubalis*) with traumatic pericarditis. *Vet. Rec.*, **167**(21): 819-824.

Nuss K, Schweizer G, Gerspach C and Braun U. 2004. Haubenund Labmagenfremdkörper bei einer Kuh—Diagnostik und Therapie. *Tierärztliche Praxis* **32**: 122–25.

Rehage J, Kaske M, Stockhofe-Zurwieden N and Yalcin E. 1995. Evaluation of the pathogenesis of vagus indigestion in cows with traumatic reticuloperitonitis. *Journal of American Veterinary Medical Association* **207**(12): 1607–11.

Roth L and King J M. 1991. Traumatic reticulitis in cattle: A review of 60 fatal cases. *Journal of Veterinary Diagnostic Investigation* **3**: 52–54.

Reddy, M.V.B. and P. Sasikala. 2012. A review on foreign bodies with special reference to plastic pollution threat to livestock and environment in Tirupati rural areas. *International Journal of Scientific and Research Publications*, **2**(12): 215-222.

Reddy, S.B., R. Venkatasivakumar, L.S.S.V. Reddy, S. Vani and S. Sivajothi. 2015. Analysis of base apex lead electrocardiograms of adult buffaloes. *Journal of Dairy, Veterinary and Animal Research*, **2**(6): 220-223.

Sawandkar, P.G., V.D. Aher, V.M. Salunke, S.V. Dandekar, V.S. Satpute and S.K. Khade. 2009. Radiography verses metal detector in diagnosis of metallic foreign body syndrome in bovine. *Royal Veterinary Journal*, **5**: 35-38.

Tornquist S J and Rigas S. 2010. Interpretation of ruminant leukocyte responses, pp. 307–313. (Eds) Weiss D J and Wardrop K J. *Schalm's Veterinary Hematology*. Wiley Blackwell, Ames, Iowa.