

Traumatic Reticuloperitonitis in Large RuminantsV. Monish^{*1}, G. Sujana²**Abstract: -**

Traumatic reticuloperitonitis (TRP), commonly known as hardware disease or foreign-body syndrome, is an important disease of adult cattle and buffaloes. It develops when sharp foreign objects such as nails, wires, metal fragments or occasionally non-metallic materials are ingested and become lodged in the reticulum. Reticular contractions can drive a sharp object through the reticular wall, resulting in localized peritonitis and adhesions. In advanced cases, the foreign body may migrate through the diaphragm and produce traumatic reticulopericarditis, with potentially fatal pericardial effusion, cardiac compression and congestive heart failure.

The condition has particular practical importance in Indian cattle and buffalo production systems because animals may encounter metallic waste around feed storage areas, construction sites, fencing, discarded wire, agricultural materials and other sources of foreign bodies. Early recognition, appropriate use of rumen magnets, antimicrobial and anti-inflammatory therapy, and timely surgical intervention can prevent progression in selected cases. Once traumatic pericarditis develops, however, prognosis becomes considerably more guarded. Pericardiocentesis may provide emergency decompression and temporary clinical relief in selected animals, but it should not be regarded as a definitive cure for advanced traumatic pericarditis.

Keywords: Cattle; buffalo; traumatic reticuloperitonitis; hardware disease; foreign-body syndrome; traumatic pericarditis; rumen magnet; ultrasonography; pericardiocentesis.

1. Introduction

A cow or buffalo does not deliberately choose a nail, piece of wire or metal fragment as feed. Yet, because of the way cattle gather feed and use their tongues while eating,

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foreign materials present in fodder can easily be swallowed.

The danger begins when a sharp object reaches the reticulum, the forestomach compartment situated cranially and close to the diaphragm. Normal reticular contractions can cause a sharp foreign body to penetrate the reticular wall. Once penetration occurs, bacteria and ingesta may enter surrounding tissues and initiate inflammation.

This apparently simple event can progress through several stages: Foreign-body ingestion → reticular penetration → traumatic reticulitis → localized peritonitis → adhesions/abscess → diaphragmatic penetration → traumatic pericarditis → cardiac tamponade/congestive heart failure.

Understanding this progression is essential because early disease can sometimes be managed successfully, whereas advanced disease involving the heart carries a much poorer prognosis.

2. What Causes Traumatic Reticuloperitonitis?

The major cause is ingestion of sharp foreign bodies. Common materials include nails, pieces of fencing wire, binding wire, metal fragments, broken agricultural implements, construction debris, wire from hay or fodder, and metal fragments associated with feed-processing equipment.

Not every foreign body produces disease. Many objects remain within the reticulum without causing significant injury. Disease develops when the object becomes positioned in such a way that reticular contractions drive it into or through the wall.

The reticulum therefore acts almost like a trap for heavy foreign materials, while its contractions can convert an otherwise harmless object into a penetrating foreign body.

3. Why Are the Risk Important in Indian Cattle and Buffaloes?

TRP is not unique to India. However, several features of cattle and buffalo production can create opportunities for exposure to foreign materials.

- ☞ Contaminated fodder: hay, straw, crop residues and other feeds may become contaminated with wire or metal during harvesting, transportation or storage.
- ☞ Construction and repair activities: animals kept near construction or repair sites may have access to nails, wire and metal fragments.
- ☞ Fencing material: broken or discarded fencing wire is an important potential source.
- ☞ Urban and peri-urban dairy farming: cattle and buffaloes may be kept close to roads, workshops, construction areas and waste material.

☞ Feed-processing equipment: damaged machinery can potentially introduce metallic fragments into feed.

☞ Stall-fed systems: Indian literature has documented foreign-body syndrome in adult cattle and buffaloes and identified environmental exposure as an important practical risk.

It would be inaccurate to say that Indian cattle inherently have a higher biological susceptibility to TRP. The important issue is environmental exposure and management, which can increase the opportunity for foreign-body ingestion.

4. Why Does the Reticulum Become the Main Site?

The reticulum is located cranially in the abdomen and has a characteristic honeycomb structure. Dense foreign materials tend to settle in the reticulum. During normal contractions, a sharp object can become positioned against the reticular wall. Repeated contractions may then push the object through the wall.

The foreign body may remain inside the reticulum, partially penetrate the wall, completely perforate the wall, cause localized peritonitis, form adhesions or an abscess, penetrate the diaphragm, or reach the pericardial region.

5. Clinical Signs: What Should the Veterinarian Look For?

Clinical presentation varies according to the stage of disease.

5.1 Acute TRP

The onset may be relatively sudden. Typical findings include sudden reduction in feed intake, reduced or absent rumination, decreased milk production, reduced rumen motility, mild to marked fever, abdominal pain, arched back, reluctance to move, stiff or careful gait, grunting, bruxism, shallow or rapid respiration and reduced faecal output.

The animal may show pain when lying down, standing, defecating or moving. An arched back is a useful clinical clue, although it is not specific to TRP.

5.2 Chronic Traumatic Reticuloperitonitis

Chronic cases can be much more difficult to recognize. The animal may appear to improve temporarily and then relapse. Possible findings include poor appetite, progressive weight loss, reduced milk yield, poor rumination, reduced rumen contractions, recurrent mild tympany, poorly digested faeces and intermittent diarrhoea or constipation.

This explains why some cases are missed in the field: the dramatic abdominal pain of the initial penetration may disappear as the acute inflammation subsides.

6. Clinical Identification of TRP

Traditional foreign-body tests include the withers pinch test, back-grip test, percussion over the reticular region and

carefully performed pole test. These are useful clinical screening tools but are not definitive. False-negative results can occur, particularly in chronic cases.

A modern diagnosis should integrate history, clinical examination, laboratory findings and imaging rather than relying on one field test.

7. Laboratory Findings

Depending on the stage and severity, laboratory abnormalities may include neutrophilic leukocytosis, left shift, increased fibrinogen, hyperproteinemia or hyperglobulinemia, and changes associated with dehydration or systemic inflammation.

Laboratory findings should be interpreted together with clinical examination and imaging rather than used in isolation.

8. Radiography: Finding the Foreign Body

Radiography can be particularly valuable when the suspected object is metallic. Radiographs may reveal nails, wire, metallic fragments and their position relative to the reticulum. Radiographic assessment can also help determine whether a foreign body has become attached to a rumen magnet after treatment.

9. Ultrasonography: Looking Beyond the Foreign Body

Ultrasonography is extremely valuable because TRP is not simply a problem of finding a nail—it is a problem of

understanding what damage that nail has caused.

Ultrasonography may demonstrate altered reticular contractions, reticular wall abnormalities, fibrin deposition, perireticular fluid, reticulophrenic adhesions, reticular abscesses, localized peritonitis and diffuse peritonitis. In complicated cases, thoracic ultrasonography can also identify pericardial and pleural abnormalities.

A useful modern approach is: Clinical examination + radiography + ultrasonography.

10. Peritoneal Fluid Examination

When peritonitis is suspected, ultrasonography-guided abdominocentesis can provide additional information. Inflammatory peritoneal fluid may be cloudy, watery to viscous, foul smelling, rich in fibrin and associated with increased cellularity.

Comparing serum and peritoneal fluid glucose can support the diagnosis of septic peritonitis, while other biomarkers have also been investigated.

11. Treatment: Act Early

Treatment depends on the location of the foreign body, whether it is magnetic, degree of penetration, presence of peritonitis or abscess, response to conservative treatment, availability of surgery, economic value of the animal and prognosis.

Treatment can broadly be divided into conservative and surgical management.

12. Conservative Treatment

For appropriate cases, treatment may include a rumen magnet, antimicrobial therapy when bacterial infection or systemic disease is suspected, anti-inflammatory/analgesic therapy, and supportive care such as correction of dehydration, nutritional support and management of ruminal dysfunction.

A properly administered rumen magnet can capture ferromagnetic foreign bodies and reduce further trauma. However, magnets cannot reliably retrieve non-ferromagnetic objects or objects deeply embedded in tissue. A magnet should therefore not be considered a universal cure for TRP. Only one rumen magnet should generally be administered to an animal according to standard veterinary guidance.

Antimicrobial choice should be based on veterinary assessment, local resistance considerations, drug regulations and withdrawal requirements. NSAIDs may be used where appropriate to control inflammation and pain.

13. When Is Surgery Necessary?

Surgery becomes an important consideration when the foreign body does not attach to the magnet, the foreign body is penetrating deeply, clinical signs persist despite conservative therapy, a reticular abscess is present, or imaging indicates a surgically accessible lesion.

Rumenotomy or laparorumenotomy permits removal of foreign bodies directly from the reticulum. Published Indian clinical reports describe successful recovery after surgical removal in selected cases.

14. The Most Dangerous Complication: Traumatic Pericarditis

The story changes dramatically when the foreign body progresses through the diaphragm toward the heart. This produces traumatic reticulopericarditis or traumatic pericarditis.

The foreign body may introduce gastrointestinal bacteria into the pericardial space, resulting in severe inflammatory exudation and fibrin formation. The pericardial sac may accumulate purulent fluid, fibrin and inflammatory debris. This can compress the heart and interfere with normal cardiac filling.

15. Recognizing Traumatic Pericarditis

Important clinical signs include anorexia, marked reduction in milk yield, fever initially, tachycardia, jugular venous distension, brisket oedema, peripheral oedema, ascites, weakness, exercise intolerance, muffled heart sounds and respiratory distress in advanced cases.

As cardiac function deteriorates, signs of right-sided congestive heart failure may develop. Ultrasonography can demonstrate pericardial effusion, fibrin strands and epicardial changes. Pleural effusion, hepatic

congestion and caudal vena cava dilation may also occur.

16. How Does Pericarditis Develop?

Sharp foreign body → Reticular penetration → Localized peritonitis → Adhesion to diaphragm → Diaphragmatic penetration → Pericardial contamination → Fibrinopurulent pericarditis → Pericardial effusion and adhesions → Restricted cardiac filling → Congestive heart failure / cardiac tamponade.

This progression illustrates why early recognition of TRP is so important.

17. Pericardiocentesis: what is its role?

Pericardiocentesis means introducing a needle or catheter into the pericardial space to remove accumulated fluid.

Its diagnostic role is to obtain pericardial fluid for assessment of colour, odour, character, cellular composition, protein and bacterial involvement.

Its therapeutic or emergency role is to remove accumulated pericardial fluid and temporarily reduce pressure on the heart, potentially improving cardiac filling in selected animals.

Indian clinical reports have described pericardiocentesis in bovines with traumatic pericarditis, with reduction of brisket oedema and improvement of appetite in some animals. The procedure may therefore serve as an emergency measure, including in field

situations when performed by an experienced veterinarian.

18. Pericardiocentesis is Not the Same as a Cure

Removing pericardial fluid does not necessarily remove the original foreign body or eliminate the underlying infection. In traumatic pericarditis, the fluid is often fibrinopurulent, and extensive adhesions involving the pericardium, epicardium, and myocardium may already be present.

Therefore, pericardiocentesis can decompress the pericardial sac and provide temporary clinical benefit, but advanced traumatic pericarditis generally carries a poor prognosis. Published reports indicate that drainage may have a useful emergency or short-term salvage role without reliably curing the underlying disease.

19. Pericardiocentesis: Important Practical Considerations

Because the pericardial space contains the heart and major vessels, pericardiocentesis is an invasive procedure and should be performed by a veterinarian experienced in bovine thoracic procedures.

Where available, ultrasonographic guidance is preferable, particularly in complicated cases. Published Indian work has described access through the fifth intercostal space just dorsal to the elbow using a spinal needle under local infiltration analgesia,

followed by drainage and lavage. However, the exact site and technique should be determined from the individual animal's anatomy, ultrasound findings, degree of effusion and operator expertise. Blind procedures carry risks including cardiac injury, vascular injury and pneumothorax.

20. Complications of TRP

Abdominal complications include localized or diffuse peritonitis, reticular abscess, reticulophrenic adhesions, hepatic or splenic involvement, vagal indigestion and recurrent tympany.

Thoracic complications include pleuritis, pleuropneumonia, diaphragmatic adhesions and traumatic pericarditis.

Cardiovascular complications include pericardial effusion, fibrinous pericarditis, cardiac tamponade, restrictive or constrictive pericarditis, right-sided congestive heart failure, hepatic congestion, ascites and brisket oedema.

21. When Should the Veterinarian Suspect Pericarditis Rather Than Simple TRP?

A useful clinical clue is the change from abdominal disease to cardiovascular disease.

Initially: anorexia + reduced rumination + abdominal pain + reduced rumen motility.

Later: jugular distension + brisket oedema + muffled heart sounds + tachycardia.

This progression should raise strong suspicion of traumatic pericarditis. Ultrasonography of both the reticulum and thorax becomes particularly valuable at this stage.

22. Prevention: The Most Economical Treatment

The simplest treatment for hardware disease is to prevent hardware from reaching the animal's mouth.

Practical measures include keeping hay, straw, crop residues and other feeds clean; removing construction waste; maintaining fencing; inspecting feed-processing equipment; avoiding contaminated grazing areas; and considering preventive rumen magnets at an appropriate age in cattle under veterinary guidance.

Prevention should be viewed as a herd-level management practice rather than merely an individual treatment.

23. A Practical Field Approach

When an adult cow or buffalo presents with anorexia, reduced rumination, decreased milk yield and abdominal pain, TRP should be included among the differential diagnoses.

Step 1 — History: ask about onset, recent calving, feed source, access to construction areas and previous foreign-body problems.

Step 2 — Clinical examination: assess temperature, heart rate, respiratory rate,

rumen motility, pain response, faecal output, jugular veins, brisket and heart sounds.

Step 3 — Foreign-body tests: perform appropriate tests carefully.

Step 4 — Laboratory evaluation: CBC, fibrinogen and relevant biochemical tests can support the diagnosis.

Step 5 — Imaging: ultrasonography and radiography provide stronger diagnostic information than clinical tests alone.

Step 6 — Determine disease stage: uncomplicated TRP, localized peritonitis, abscessation, diffuse peritonitis or traumatic pericarditis.

Step 7 — Select treatment: conservative therapy, reassessment, and surgery when indicated. If cardiac involvement is present, prognosis and animal welfare should be discussed carefully with the owner.

24. Take-Home Message

Traumatic reticuloperitonitis begins as a foreign-body problem, but it can become a whole-body disease.

A small piece of wire may progress from:

Reticulum → Peritoneum → Diaphragm → Pericardium → Heart.

The veterinarian should therefore not stop at identifying the foreign body. The real objective is to determine how far the disease has progressed and which organs have already been affected.

Modern diagnostic tools such as ultrasonography and radiography allow better assessment of these cases. Early treatment with an appropriate rumen magnet and medical therapy can be useful in selected cases, while rumenotomy may be necessary when conservative management fails.

Once traumatic pericarditis develops, pericardiocentesis can have an important emergency and short-term/palliative role, particularly when severe pericardial effusion is compromising cardiac function. However, advanced fibrinopurulent pericarditis involving the myocardium and epicardium carries a poor prognosis.

The best treatment for hardware disease is prevention—but the best chance of saving an affected animal is early recognition.

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