



## Case Report

# Surgical Management of Chronic Reticulum Impaction in a 3-Year-Old Uda Ram: A Case Report

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### ABSTRACT

**Introduction:** Reticulum impaction is an important but underreported gastrointestinal disorder of small ruminants. Reticulum impaction results from mechanical obstruction due to ingestion of indigestible foreign materials, leading to reduced feed intake, altered rumen motility, weight loss, and sometimes death. This report aimed to share a rare clinical documentation of fatal reticulum impaction following surgical intervention in a Uda ram under semi-intensive management conditions.

**Case report:** A 3-year-old Uda ram weighing 60 kg was presented to the large animal unit of the veterinary teaching hospital, Sokoto, Nigeria, with a 2-week history of inappetence. The ram was managed semi-intensively in a herd and fed on wheat bran and bean husk. Physical examination revealed dullness, unilateral left prescapular lymphadenopathy, slight pallor of ocular and oral mucous membranes, and a firm mass in the left paralumbar region, although vital parameters were all normal. Hematological analysis revealed neutrophilic leukocytosis. A tentative diagnosis of rumen impaction was made based on clinical examination findings. Exploratory laparotomy confirmed reticulum impaction with compacted foreign materials. Despite improvement after post-operative medication with antibiotics, anti-inflammatory drugs, multivitamins, and iron supplementation, the ram developed complications such as diarrhea, tachycardia, and tachypnea, culminating in slaughter by the owner on day five post-surgery.

**Conclusion:** This case highlighted the importance of early detection of reticulum impaction for the prevention of severe consequences following surgical intervention, and feeding a high-quality diet in small ruminant production.

## 1. Introduction

Rumen and reticulum impactions are common digestive disorders in ruminants, particularly in regions where animals scavenge or are fed poor-quality, indigestible materials such as plastics, polythene bags, or fibrous residues<sup>1,2</sup>. These conditions build up when foreign bodies accumulate in the forestomach compartments, impairing ruminal motility, fermentation, and passage of ingesta, leading to symptoms such as inappetence, weight loss, and abdominal distension<sup>3</sup>. Although foreign-body syndrome is more commonly associated with cattle, small ruminants, especially sheep and goats, are also affected, particularly in resource-limited management systems where feeding practices predispose animals to ingest fibrous or inadequate feed materials<sup>4</sup>. Several studies have reported the prevalence of indigestible foreign bodies in the fore stomach of

sheep and goats to be between 5% to 22%<sup>2</sup>. While global studies indicate a prevalence of 5%-22%, the specific risk for Uda rams in West Africa is heightened by semi-intensive feeding practices where bean husks may contain high levels of indigestible fiber<sup>5</sup>.

Small ruminants consuming low-quality roughage, grain by-products, or materials contaminated with non-feed objects are at increased risk of impaction<sup>6</sup>. Clinical signs often include decreased feed intake, reduced rumination, abdominal masses, decreased fecal output, and systemic changes such as dehydration or anemia<sup>7</sup>. Hematological findings may reveal leukocytosis or neutrophilia associated with localized inflammation<sup>6-9</sup>.

Uda rams, a breed indigenous to West Africa, are valued for meat production but are susceptible to such impactions due to



semi-intensive rearing practices involving supplementary feeds like wheat bran and beans or rice husks, which may include contaminants<sup>5</sup>. Untreated cases can progress to chronic wasting, secondary infections, or traumatic reticuloperitonitis if penetrating objects are involved<sup>10</sup>.

Diagnostic approaches typically include history, physical examination, hematology, and exploratory surgery, as imaging modalities such as radiography may not be readily available in field settings<sup>9</sup>. For removing impacted materials, surgical intervention is typically the definitive treatment when medical management fails or when diagnosis suggests complete obstruction<sup>11</sup>. However, post-operative complications such as infection or diarrhea can affect surgical outcomes<sup>12</sup>. The prognosis of reticulum impaction depends on the duration of obstruction, systemic compromise, and postoperative care.

The present study aimed to report details of the clinical presentation, diagnosis, surgical intervention, and management of reticulum impaction in a Uda ram, emphasizing the need for early detection and treatment.

## 2. Case report

### 2.1. Ethical approval

The current study was conducted according to the guidelines of Usmanu Danfodiyo University, Sokoto, Nigeria. The sheep's owner validated the concept for the present case report.

### 2.2. Study location

In April 2025, a 3-year-old Uda ram weighing 60 kg was brought to the large animal unit of the veterinary teaching hospital, Usmanu Danfodiyo University, Sokoto, Nigeria, with a complaint of reduced feed intake for the past two weeks before presentation. The ram was managed semi-intensively in a flock of 14 rams fed wheat bran and bean husks. There was no vaccination history, but the ram had been treated with unknown drugs by the owner. No other animals in the flock exhibited similar signs.

### 2.3. Clinical examination

The ram appeared dull and moderately emaciated with a body condition score of 3 on a scale of 5. A hard mass was palpable in the left abdomen; the location and consistency of the mass raised further suspicion of the forestomach involvement, which warranted further diagnostic evaluation, and left prescapular lymphadenopathy was observed. Vital parameters included the rectal temperature of 39.7°C (normal range: 38-40°C), pulse rate of 72 beats/min (normal range: 70-90 beats/min), and respiratory rate of 28 cycles/min (normal range: 20-30 cycles/min), all within physiological limits for sheep<sup>8</sup>. However, ocular and oral mucous membranes were slightly pale, with a capillary refill time of less than two seconds. The clinical signs included dullness, pale mucous membranes, inappetence, abdominal mass, and lymphadenopathy. A tentative diagnosis of rumen impaction was made. Due to the absence of a diagnostic imaging facility and the chronicity of the clinical signs, exploratory laparotomy was used as a confirmatory and therapeutic procedure.

### 2.4. Hematological findings

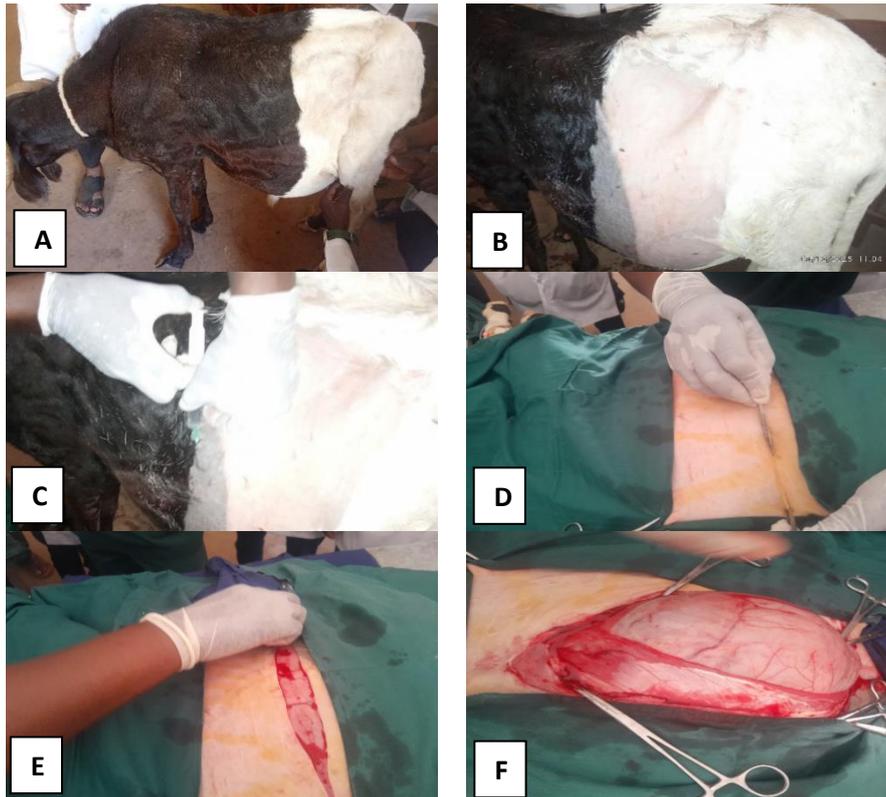
Hematological test results revealed a packed cell volume of 26.0% (reference: 22.0-45.0%), hemoglobin concentration of 8.70 g/dL (reference: 9.0-15.0), red blood cell counts of  $9.04 \times 10^6$  cells/mm<sup>3</sup> (reference: 9.0-15.0), and white blood cell count of  $16.35 \times 10^3$  cells/mm<sup>3</sup> (reference: 4.0-12.0). Neutrophilia was noted at  $10.30 \times 10^3$  cells/mm (reference: 0.7-6.0  $10^3$  cells/mm<sup>3</sup>) while lymphocytes, monocytes, eosinophils, and basophils were within normal ranges<sup>8</sup>. Interpretation indicated neutrophilic leukocytosis, suggestive of inflammation or infection secondary to impaction.

### 2.5. Surgical procedure and management

Feed was withheld completely for 24 hours before surgery. Presurgical parameters were within acceptable limits for temperature (38.2°C), pulse (72 beats/min), respiratory rate (24 cycles/min), and capillary refill time (2 seconds), with slightly pale mucous membranes<sup>8</sup>. Exploratory laparotomy confirmed reticulum impaction due to indigestible materials. Standard rumenotomy was performed to evacuate the impacted contents, as it is recommended for such cases<sup>11</sup>. The surgery was performed with the animal in right lateral recumbency on the surgical table.

The surgical site was prepared aseptically using Purit<sup>®</sup> antiseptic (chlorhexidine gluconate, 0.3% w/v, British Pharmacopoeia, cetrimide B.P. 3% w/v; Saro LifeCare Limited, Lagos, Nigeria) for scrubbing, rinsed with methylated spirit (Binji Global Pharmaceutical Company, Sokoto, Nigeria), and subsequently disinfected with povidone-iodine (Iodine Tincture 2.6% w/v solution; Apacco Pharmaceutical Company Limited, Ogun, Nigeria). The site was draped in a rectangular pattern (Figure 1). Local anesthesia was achieved by subcutaneous infiltration of 2% lignocaine hydrochloride (Bharat parenteral limited, India) in an inverted L-block pattern around the surgical site (Figure 1A, 1B, and 1C). A vertical skin incision was made on the left paralumbar fossa (Figure 1D), followed by careful dissection through the subcutaneous tissues and muscle layers to expose the rumen (Figure 1E). While the rumen was relatively empty, the incision was extended cranially to the reticulum, which was found to be massively impacted (Figures 1F and 2A). Approximately 8 kg of impacted material was manually removed (Figure 2B).

Following evacuation, the reticulum was thoroughly lavaged, and both the rumen and reticulum were closed using size 1 chromic catgut in a double-layer inverting suture pattern; A Cushing pattern was over sewn with Lambert pattern (Figure 2C). The muscle layers were closed using size 1 chromic catgut in a simple continuous pattern. The subcutaneous tissue was approximated with size 1 chromic catgut, and the skin was closed using size 1 nylon in a Ford interlocking suture pattern (Figure 2D). Post-surgical management included intramuscular injections of procaine penicillin for five days (20,000 IU/kg, Nigeria), streptomycin for five days (12.5 mg/kg, Nigeria), multivitamin for five days (1 mL/10 kg; containing Vitamin A 3000 IU, D3 2000 IU, E 4.0 mg, B1 10 mg, B6 5 mg, B12 10 µg, B3 12.5 mg, D-Panthenol 10 mg, D-Biotin 10 µg/mL, Nigeria), 2.5% diclofenac for five days (2.5 mg/kg, Nigeria), 10% iron dextran for three days (10 mg/kg, Apacco Pharmaceutical Company Limited, Ogun, Nigeria)<sup>9</sup>. The surgical site was dressed daily, and gentian violet was applied (Figure 2E and 2F).



**Figure 1.** Procedure before surgery in a 3-year-old Uda ram weighing 60kg with chronic reticulum impaction. A: Patient on the day of presentation, B: surgical site after shaving, C: Local infiltration of 2% Lignocaine hydrochloride, D: Surgical area draped with rectangular drapping pattern, E: Vertical skin incision, F: Rumen exteriorisation



**Figure 2.** Post-surgical procedure of a 3-year-old Uda ram weighing 60kg with chronic reticulum impaction. A: Rumen closure using Cushing oversewn with Lembert suture pattern, B: removal of 8 kg impacted feed, C: Closure of the reticulum, D: Skin closure using Ford interlocking suture pattern with nylon, E: Surgical site after the application of gentian violet, F: Patient on the third day of follow-up.

## 2.6. Post-operation outcome

On Day 1 post-surgery, the ram exhibited alertness with mild bradycardia (64 beats/min). On Day 2, the ram was mildly bradypneic (16 cycles/min), and pale mucous membranes were noted; a small amount of hay was introduced. On Day 3, the ram was weak, passing out, having pasty diarrhea, and tachypneic (40 cycles/min). On Day 4, the ram became recumbent, tachycardic (104 beats/min), tachypneic (42 cycles/min), and pasty diarrhea persisted despite additional Vetcotrim bolus and 5% dextrose saline. The progressive deterioration characterized by diarrhea and cardiorespiratory instability suggested postoperative endotoxemia, ruminal dybiosis, or electrolyte imbalance<sup>10</sup>. Due to the progressive clinical deterioration and the economic constraints of the management system, the owner decided on emergency slaughter on the fifth postoperative day.

## 3. Discussion

The present case highlighted the challenges of reticulum impaction in small ruminants, where key risk factors in the present case, namely the ingestion of low-quality and indigestible feed materials such as bean husk, likely contributed to feed accumulation and fore-stomach obstruction<sup>1</sup>. The semi-intensive management system and absence of routine prophylactic veterinary care further align with previously reported predisposing conditions for reticulum and rumen impaction in small ruminants<sup>7</sup>. Clinically, the presence of pale mucous membranes and a low-normal packed cell volume suggested mild anemia, a finding commonly associated with chronic impaction due to prolonged reduction in nutrient intake and absorption<sup>2</sup>. The neutrophilic leukocytosis observed in this study indicated an active inflammatory response, which has been attributed to bacterial translocation or mucosal irritation resulting from sustained contact between the reticular mucosa and coarse, indigestible materials in chronic impaction cases<sup>13</sup>. Similar hematological alterations have been reported in small ruminants suffering from chronic digestive obstruction<sup>5</sup>. The decision to perform an exploratory laparotomy was guided by the presence of a palpable hard abdominal mass, persistent inappetence, and hematological evidence of systemic inflammation. Although exploratory laparotomy and rumenotomy remain the gold standard for definitive diagnosis and treatment of fore-stomach impactions, with reports of favorable outcomes following foreign body removal<sup>11,14</sup>, the prognosis in small ruminants is often guarded to poor when presentation is delayed beyond 7–10 days<sup>12</sup>. In the present case, postoperative complications, including diarrhea and cardiovascular instability, were observed and may have resulted from ruminal dysbiosis or endotoxemia<sup>10</sup>. The massive quantity of impacted material (8 kg) likely exerted prolonged pressure on the reticular mucosa, predisposing to mucosal necrosis and facilitating systemic absorption of bacteria and toxins. Consequently, the fatal outcome observed is consistent with delayed presentation, systemic compromise, and postoperative complications, all of which are well-documented predictors of poor prognosis in small ruminant gastrointestinal surgeries<sup>13,15</sup>. The owner's decision to opt for emergency slaughter further highlighted the influence of economic constraints in low-resource settings, where extended postoperative care and

intensive supportive therapy may not be feasible<sup>3</sup>. To mitigate the future risks, measures emphasized to the client were prompt veterinary consultation, avoidance of self-medication, provision of quality feed and clean water, and improved environmental sanitation, all of which are critical in reducing the incidence of fore-stomach impactions in small ruminants<sup>13</sup>. Notably, this case demonstrates that, unlike several reported cases with favorable surgical outcomes, advanced chronic reticulum impaction in small ruminants may result in fatal postoperative outcomes despite technically successful surgical intervention, particularly under semi-intensive management systems.

## 4. Conclusion

The current findings indicated that reticulum impaction is a treatable condition in ruminants; however, delayed intervention may lead to a fatal outcome. The present study indicated the importance of early detection, comprehensive clinical and laboratory assessment, and timely referral for effective management. Strengthening flock management, ensuring adequate feeding practices, and promoting routine veterinary oversight are essential to reducing incidence and mortality in small ruminants. Further studies into the prevalence of reticulum impaction in Nigerian breeds such as Uda rams are warranted to inform targeted interventions.

### Declarations

#### Competing interests

The authors declare that there is no conflict of interest regarding the publication of this paper

#### Availability of data and materials

The data of the current study are available upon a reasonable request.

#### Ethical considerations

The authors declare that this article is based on an original study and has not been submitted before, in part or in full, for publication or assessment elsewhere. All sources of information and data used in this study have been duly acknowledged and referenced according to accepted academic standards. The authors confirmed that no AI was used during the conduct of the present study.

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#### Authors' contributions

Hassan Abubakar and Salisu Buhari collected the clinical data and performed the surgery. Hassan Abubakar Bodinga Ibrahim, Yusuf Olamilekan, Nura Abubakar, and drafted the manuscript. Shittu Basit Opeyemi assisted with postoperative management, and Umar Salisu Ahmad supervised the study. All authors reviewed and approved the final edition of the manuscript.

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