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CASE REPORT
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Extra-luminal Intestinal Obstructions in Young Ruminants

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ABSTRACT

***Background*:** Extra-luminal intestinal obstructions in young calves are acute conditions that most frequently occur in animals up to 2 months of age and can lead to death if there is no prompt veterinary intervention. The presumptive diagnosis is made through the association of clinical signs with findings from laboratory tests and imaging. However, the conclusive diagnosis can only be obtained through exploratory laparotomy. This paper reports 4 cases of extra-luminal intestinal obstruction in cattle up to 18 months of age treated in Lavras-MG.

Cases*:** Over a period of 2 years, 4 ruminants were treated, showing clinical signs suggestive of extra-luminal intestinal obstructions, such as absence of intestinal movements, diarrhea, signs of pain, apathy, recumbency, and when they were able to stand, difficult and staggering gait. ***Case 1. An 18-month-old, male Holstein calf, died on the farm before the clinical diagnosis could be concluded. Necropsy revealed a jejunal twist with necrosis of the affected intestinal segment, as well as a significant inflammatory response, as all organs were covered by fibrin and adhered in a single mass. ***Case 2.*** A 6-month-old Holstein, was referred to the hospital primarily due to recurrent tympany observed during the week. After clinical evaluation and recommendation for exploratory laparotomy, the animal underwent the procedure, where a fibrosed and markedly thickened urachal remnant was found, incarcerating portions of the colon, leading to ischemic lesions and necrosis. ***Case 3.*** A 2-month-old Tabapuã calf, was hospitalized for the treatment of a severe case of hepatogenous photosensitization when it manifested clinical signs of acute abdominal pain and was referred for surgery, where a mesenteric twist was observed. In both animals, euthanasia was performed due to necrosis and extensive ischemic lesions in the intestinal loops. ***Case 4.*** A 1-month-old, female Gir calf, was admitted for the treatment of a severe diarrhea episode that had lasted for 1 week. A few hours after the initial consultation and with the help of ultrasound, which revealed extremely dilated intestinal loops and others collapsed or poorly distended, both without motility, the diagnosis of intestinal obstruction was made. The calf was immediately referred for surgery, where a twist in the mesenteric root was found, with no major local complications; however, the ruminant died before the procedure could be completed.

***Discussion*:** In all cases, changes in the color of the peritoneal fluid and the presence of fibrin in the abdominal cavity were observed, indicating an inflammatory response and vascular injury. The most severe case occurred in the 1st ruminant, while the mildest was in the 4th case, where veterinary intervention was performed a little faster compared to the others. All ruminants were referred for necropsy, which revealed changes consistent with the acute course and severity of the clinical condition, highlighting that cases of acute abdominal pain should be treated as emergencies, requiring early and rapid diagnosis. In this context, it is essential to emphasize the importance of further studies on mechanical intestinal disorders in ruminants, both young and adult, aiming to optimize clinical management, early diagnosis, and treatment implementation.

Keywords: bowel, jejunal torsion, ascending colon strangulation, mesenteric root torsion.

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INTRODUCTION

Digestive system disorders in ruminants account for, on average, 18% of clinical cases, with most cases being related to disorders of the pre-stomachs and abomasum. Involvement of the intestinal segments is less frequent; however, it is common for them to present with an acute clinical course, leading to the death of the animal [1].

Intestinal obstructions are classified as mechanical and functional and can originate either intra-luminally or extra-luminally [3]. The latter are an important cause of acute disease in cattle, often leading to death, resulting in considerable economic losses. Dairy breeds seem to be more susceptible, as well as animals under 2 months of age, with no gender distinction [8].

Animals with mechanical intestinal obstruction show typical signs of colic, stemming from intermittent episodes of acute abdominal pain. In advanced cases, increased heart rate, muscle weakness, and weak pulse occur, resulting from endotoxemic shock and hypovolemia, which ultimately lead to the animal's death [6]. Given the importance of the condition and its rapid clinical course, the objective of this study is to report 4 cases of extra-luminal intestinal obstruction in young ruminants, with an emphasis on the importance of early diagnosis to optimize future therapeutic approaches.

CASES

Four ruminants were treated at the Large Animal Veterinary Hospital of UFLA (HVGA/UFLA) between early 2021 and the end of 2022, all showing clinical signs of colic. Two of the animals were from the Holstein breed, 1 male and 1 female, raised in a semi-extensive system and fed silage and concentrate in the trough. One female was from the Tabapuã breed, and 1 female was from the Gir breed, both raised extensively on *Brachiaria* sp. pasture.

Case 1. **Jejunal torsion.** An 18-month-old, male Holstein calf, showed anorexia and prolonged recumbency (4 days), prompting a veterinary consultation at the property. On clinical evaluation, a heart rate (HR) of 108 bpm, a respiratory rate (RR) of 80 breaths per minute, intense dyspnea, and coarse pulmonary crackles were observed, with a capillary refill time (CRT) of less than 2 s, pale and slightly moist mucous membranes, no ruminal or intestinal movements, liquid feces, and dehydration estimated at 5%. The ruminant presented clinical signs related to pain, such as an arched back, reluctance to move and look at the flank even when lying down and, when standing, the gait was difficult and staggering. Muscle-cutaneous and perianal reflexes were reduced, proprioception tests were impaired, and the extremities were cold. On the blood count, leukocytosis was found at 14,800/mm^3 (4,000 - 12,000/mm^3), with neutropenia of 592/mm^3 (600 - 5,640/mm^3) and eosinopenia of 148/mm^3 (80 - 2,400/mm^3), lymphocytosis of 13,468/mm^3 (1,800 - 9,000/mm^3), altered granulocyte:lymphocyte ratio (Table 1), and hypoproteinemia of 4.9 mg/dL (7.0 - 8.5 mg/dL). The main clinical suspicion was acute respiratory syndrome. Two days after the consultation, the ruminant passed away and was sent for necropsy, where free red fluid was found in the abdominal cavity, along with an excessive amount of fibrin causing adhesions between all the abdominal organs (Figure 1A), which were removed as a single block (Figure 1B). There was also a twist in a segment of the jejunum, affecting approximately 60 cm, with the mucosa being diffusely reddened (Figure 1C). A large part of the small intestine

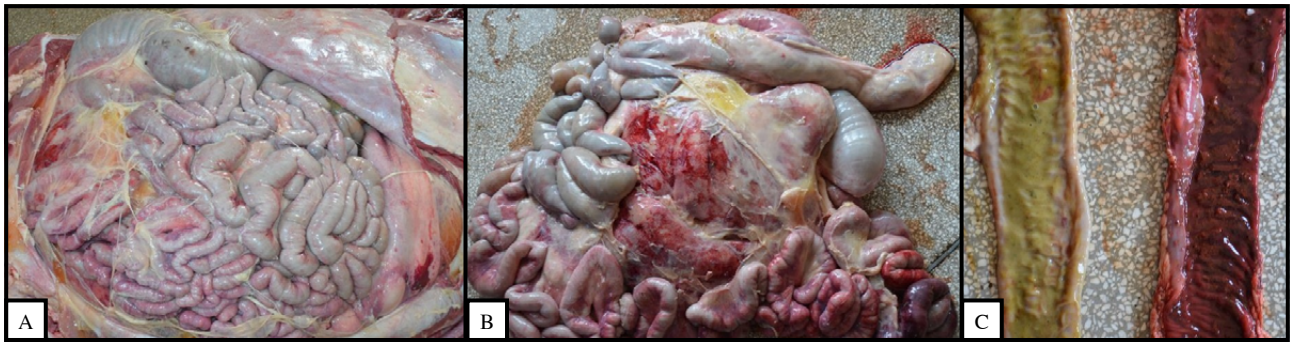

Figure 1. *Case 1.* Jejunal torsion. Necropsy of an 18-month-old male Holstein bovine with intestinal torsion of the jejunal portion. A- Left lateral view of the abdominal cavity, highlighting the abdominal organs covered with large amounts of fibrin (yellowish material). B- Abdominal organs removed from the abdominal cavity as a single block, due to adhesions between the organs. C- Comparison of 2 segments of the jejunum: the 1st (left), removed from a segment without alterations; and the 2nd (right), with diffusely reddened mucosa, removed from the portion affected by torsion.

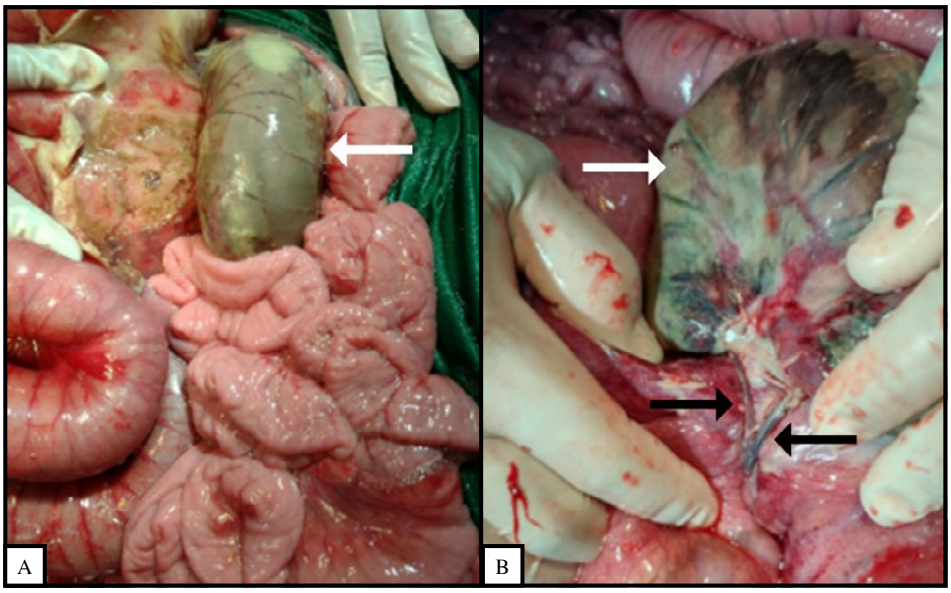

Figure 2. *Case 2.* Ascending colon strangulation. Exploratory laparotomy in a 6-month-old female Holstein cow with strangulation of the colon due to a fibrosed urachus remnant. A- Devitalized colon loop, with darkened (grayish) color and cold to the touch (white arrow). B- Residues of markedly fibrosed and thickened urachus (black arrows) and devitalized colon loop (white arrow).

was found to be insinuated into the pelvic cavity. Histopathological analysis revealed diffuse necrosis of the jejunum, neutrophilic inflammatory infiltration, thrombosis, and hemorrhage.

Case 2. **Ascending colon strangulation.** A 6-month-old female Holstein heifer presented with a history of apathy and recurrent episodes of bloat over a 4-day period prior to veterinary consultation. On the day before the evaluation, the animal was reported to spend long periods in recumbency and, when walking, showed slow and labored movement. Still on the property, an ororuminal intubation was performed along with the administration of a commercial 30% silicone-based solution[1]. The animal showed slight improvement in symptoms; however, a few hours later, the clinical signs recurred.

Given the history, the heifer was referred to the Veterinary Hospital of UFLA (HVGA/UFLA). On physical examination, heart rate was 86 bpm, respiratory rate 52 breaths per minute, rectal temperature 39.4°C, capillary refill time less than 2 s, pale pink mucous membranes, and absence of intestinal and ruminal motility. The animal appeared apathetic and showed signs of abdominal pain. An abdominal ultrasound was performed, revealing marked acoustic shadowing/reverberation artifacts caused by gas distension. This finding, associated with the clinical signs and the evident discomfort, led to the decision to proceed with an exploratory laparotomy.

During surgery, reddish free fluid, fibrin, and devitalized ascending colon loops were found, presenting dark coloration and cold to the touch (Figure 2A), due to strangulation caused by a remnant of the urachus, which appeared as a markedly fibrotic and thickened cord (Figure 2B). Given the extensive damage to the colon, euthanasia was elected during the procedure.

Case 3. **Mesenteric root torsion.** A 2-month-old female Tabapuã, was diagnosed at 22 days of age with a severe case of hepatogenous photosensitization, showing satisfactory progression and clinical remission of the signs of this condition in response to the treatment provided. However, on the 52nd day of hospitalization, the ruminant presented intermittent episodes of abdominal pain, marked by clinical signs of colic followed by periods of apathy. Abdominal distension was also observed more pronounced in the left abdominal quadrant and mild in the others, along with anorexia and diarrhea. Given the worsening of the condition, the ruminant was intensively monitored in the subsequent hours. There were no significant changes in body temperature, mucous membrane color, capillary refill time, or ruminal movements. However, the heart rate ranged from 100 to 164 bpm, and the respiratory rate ranged from 16 to 30 breaths per minute.

Due to the episodes of acute pain, Flunixim Meglumine[2] [Flunixim Injetável® - 2.2 mg/kg, IV] was administered. After approximately 90 min,

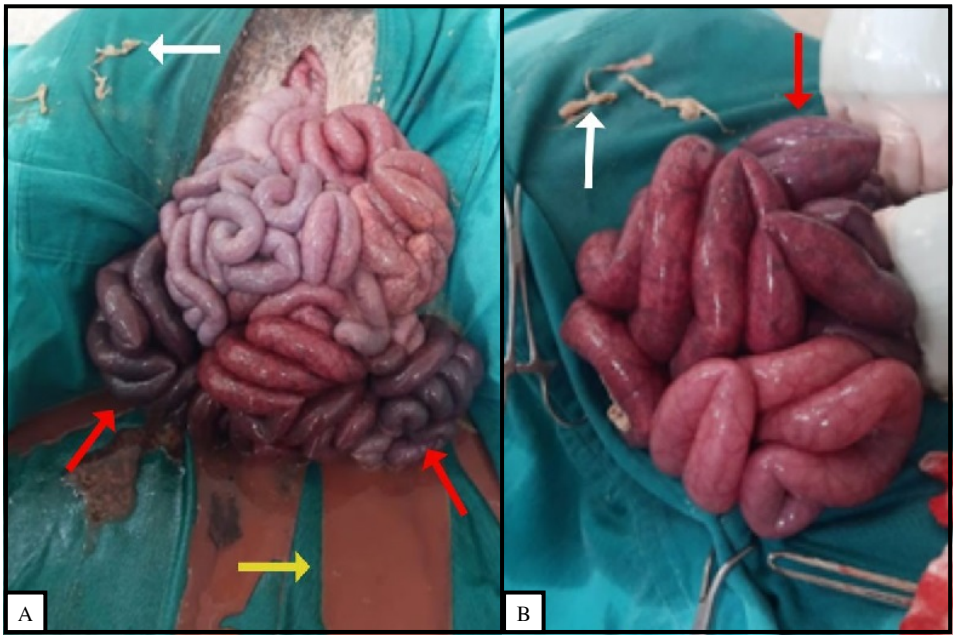

Figure 3. *Case 3.* Mesenteric root torsion. Exploratory laparotomy in a 2.5-month-old female Tabapuã calf with necrosis of parts of the duodenum and jejunum due to mesenteric torsion. A- Brownish, turbid fluid from the abdominal cavity (yellow arrow); exteriorization of the duodenum and jejunum loops, with portions showing signs of vascular compromise (red arrows). B- Compromise and devitalization of duodenal loops (red arrow). A & B- Surgical drape with portions of fibrin removed from the abdominal cavity (white arrows).

the animal still exhibited uncontrollable pain, so Dipyrone+Hyoscine[3] [Dipyrone and Hyoscine Injetável® - 10 mL/animal, IV] was given. Over the next 3 h, another episode of intense pain occurred, during which the heart rate reached 164 bpm, prompting the administration of Butorphanol[4] [Butorphanol tartrate Injetável® - 0.02 mg/kg, IV].

Due to the ineffectiveness of analgesics in controlling the pain, the animal was referred for exploratory laparotomy. Following the opening of the abdominal cavity, a large amount of brownish, cloudy, fetid free fluid was observed, along with a moderate amount of fibrin on the surface of the organs, and necrosis of several duodenum and jejunum loops (Figure 3). Upon examining the abdominal cavity, it was determined that mesenteric torsion had occurred, leading to compromised regional blood supply and subsequent necrosis of sections of the small intestine. Consequently, euthanasia was performed due to the extent of the lesions and the impossibility of performing enterotomy on the necrotic portions and involvement of more than 70% of this intestinal portion.

Case 4. **Mesenteric root torsion.** A 1-month-old female Gir, was referred to the HVGA/UFLA with a history of diarrhea lasting for 1 week. According to the caretakers, no treatment had been administered, only oral rehydration with an enteral hydroelectrolytic solution.

Upon inspection, the ruminant exhibited severe enophthalmia, extreme apathy, and was maintained in lateral recumbency. The tail and pelvic limbs had crusts formed from dried liquefied feces, and the animal passed liquid brownish feces with blood streaks and a fetid odor.

On physical examination, heart rate (HR) was 100 bpm, respiratory rate (RR) was 20 breaths per minute, with shallow respiratory movements, intestinal hypermotility, temperature of 34.5ºC, cold extremities, absence of the sucking reflex, and pearl-colored mucous membranes, making it impossible to estimate capillary refill time (CRT) due to intense dehydration and mucosal coloration. Given the critical condition indicative of hypovolemic shock, emergency therapy was initiated with Hydrocortisone[5] [Succinato sódico de hidrocortisona Injetável® - 0.5 mg/kg, IM], Dexamethasone[6] [Dexamethasone Injetável® - 0.2 mg/kg, IV], Flunixim Injetável®[2] [2.2 mg/kg, IV], 7.5% saline solution[1] [NaCl 7,5% Injetável® - 500 mL, IV], followed by intensive fluid therapy with hydroxyethyl starch[7] [Hydroxyethyl starch Injetável®] and lactated Ringer's solution[1] [Lactated Ringer's Injetável®] with glucose at 5%. In the 1st h, clinical parameters such as HR, RR, respiratory sounds, mucous membrane color, CRT, and

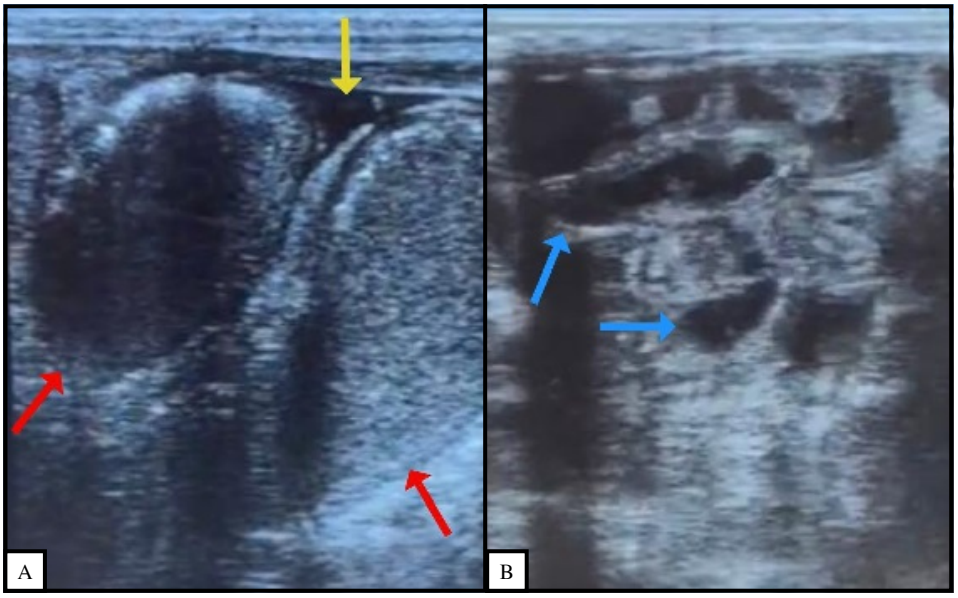

Figure 4. *Case 4.* Mesenteric root torsion. Abdominal ultrasound (transverse sections of small intestine loops) in a 1-month-old female Gir bovine with mesenteric root torsion. A- Dilated intestinal loops with the presence of content (red arrows), free fluid (yellow arrow). B- Slightly distended intestinal loops (blue arrow).

temperature were monitored to stabilize the animal's condition and remove it from imminent risk of death. Additionally, the ruminant was kept on oxygen therapy throughout the hospitalization period due to respiratory difficulty. After approximately 2 h from the start of treatment, the calf showed significant improvement in overall condition, with stabilization of clinical parameters. A 1L solution with 1.3% bicarbonate was then administered to correct the metabolic acidosis typically seen in cases of diarrhea. The animal was subsequently maintained on fluid therapy with hydroxyethyl starch[7] [Hydroxyethyl starch Injetável®] and lactated Ringer's solution with glucose at 5%, adjusting for maintenance and total losses.

Over the next 12 h, the clinical condition remained stable. The ruminant was able to rise, walk, and lie down on its own, showing interest in its surroundings and in the bottle, although it rejected the bottle even after the sucking reflex was reestablished. However, the ruminant then began to show restlessness, marked by successive lying down and getting up, followed by apathy and abdominal distension. There was also constant tenesmus, with rare defecation and continued absence of borborygmi indicating a lack of intestinal motility.

Therefore, 50 mL of a commercial silicone-based solution[8] [Silicone 'polydimethylsiloxane' - Oral®] diluted in 100 mL of water was administered. Initially, the abdominal distension decreased, but it recurred after 2 h, and the medication was administered again, but without success. The ruminant began to have difficulty rising and, when able, moved slowly and staggeringly, requiring support to avoid falling. Given this condition, along with tenesmus and the absence of intestinal motility, the suspicion of torsion or intestinal obstruction arose. An emergency ultrasound was performed, revealing extremely dilated loops of intestine and others collapsed or only slightly distended, all without motility, which supported the main suspicion. There were no ultrasound windows to assess the pre-stomachs, and a small amount of free fluid was observed (Figure 4).

The ruminant was immediately sent for surgery, where mesenteric root torsion was found. The small intestine loops showed early vascular injury, characterized by engorged vessels, red serosa, and petechiae, as well as the mesentery itself (Figure 5). No lesions were found in the colon loops. The peritoneal fluid was reddish in color, and there was a significant amount of fibrin in the abdominal cavity. The ruminant died before the surgical procedure was completed due to cardiorespiratory arrest.

DISCUSSION

According to the available scientific literature, most mechanical intestinal obstructions in young ruminants are caused by intussusception, volvulus, and obstructions due to phytobezoars, particularly in dairy breeds. However, this study presents 2 cases of intestinal torsion: 1 case of jejunal torsion in an 18-month-old

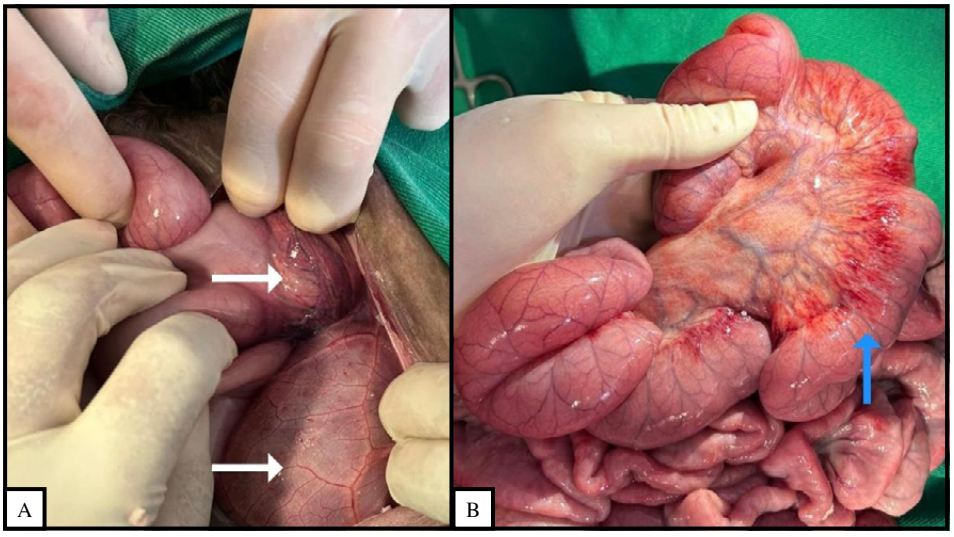

Figure 5. *Case 4.* Mesenteric root torsion. Exploratory laparotomy in a 1-month-old female Gir bovine, with mesenteric root torsion. A- Intestinal loops, still in the abdominal cavity, distended and with engorged vessels (white arrows). B- Exteriorization of portions of the mesentery, duodenum and jejunum loops showing vascular compromise and petechiae on the serosa of the loops (blue arrow).

bovine (*Case 1*), which showed *post mortem* changes compatible with those described in the literature, and another case of mesenteric root torsion in a 1-month-old heifer (*Case 4*), after presenting a clinical picture of severe diarrhea, similar to that described by [1]. In the other 2 cases, there are also some singularities, such as being from a beef breed (*Case 3*) and the presence of fibrous remnants of the urachus, which caused strangulation of the colon (*Case 2*), as also mentioned by Francoz [5].

The clinical signs of mechanical intestinal obstructions are extremely nonspecific, requiring a thorough clinical examination, from history taking, physical examination, and the choice of complementary tests, in order to reach an accurate diagnosis as quickly as possible, and then subject the patient to the most appropriate surgical procedure in a timely manner within the available healthcare conditions [10]. In the cases presented, various factors contributed to the worsening of the animals' clinical condition, such as the delay in requesting veterinary care and transporting the animal to the hospital, corroborating the findings of Muiño *et al.* [8], which point to a strong correlation between accurate diagnosis and rapid referral with favorable prognosis.

Among the 4 cases described here, notable similarities can be identified in clinical signs and overall progression of the condition, supporting Afonso [1], who states that in any case of mechanical intestinal obstruction, regardless of the cause, animals initially present with intermittent acute abdominal pain, commonly referred to as colic. This acute pain arises from the disorganized myoelectrical activity of the intestinal smooth muscle, characterized by prolonged and increased amplitude of peak waves that sometimes occur in groups [8].

The progression of clinical signs is closely correlated with the pathogenesis of intestinal obstructions. When mechanical blockage occurs in the physiological transit of ingesta in the intestine, there is a picture of hypomotility in the small intestine and pre-stenotic hypermotility when the lesion occurs in the colon, resulting in either a reduction or increase of intestinal movements upon auscultation. The obstruction may result in the absence of defecation, diarrhea, or black feces covered with mucus [9]. In this study, it was observed that, except for ruminant 3, the others showed an absence of intestinal movements on abdominal auscultation. Ruminants 1 and 3 had diarrhea. No information was obtained about the fecal score of ruminant 2. Ruminant 4 had diarrhea with streaks of blood in the 1st few hours of treatment, followed by constant tenesmus with no evacuation during the brief hospitalization.

Mechanical obstruction causes interruption of local blood flow, leading to ischemia, cellular injury, and necrosis of the affected intestinal portion, as observed in ruminants 1 and 2, resulting in intense local inflammatory response, neutrophil chemotaxis, and activation of the coagulation cascade, producing fibrin to isolate the affected region or leading to peritonitis

[2]. In all the ruminants in this study, peritonitis was observed, with varying amounts of fibrin, with ruminant 1 being the most severe, given the large amount of fibrin covering the organs and causing adhesions between them.

Cellular injury culminates in an increase in vasoactive amines, which predispose to increased vascular permeability, facilitating the extravasation of proteins into the extracellular space and causing hypoproteinemia, as observed in the blood count of ruminant 1. Furthermore, toxins and bacteria may be released into the bloodstream, further increasing the inflammatory response and leading to endotoxemic shock [2], which likely occurred in ruminants 2, 3, and 4, had euthanasia not been performed and/or death had not occurred due to the findings and the surgical intervention, respectively.

In these intestinal obstructions, metabolic alkalosis, hypochloremia, and hypokalemia with compensatory respiratory acidosis are common [10]. These parameters can only be assessed through blood gas analysis, measuring blood pH, standard base excess (SBE), and carbon dioxide pressure (pCO2) [5]. However, in the 4 reported cases, it was not possible to perform such tests due to their immediate unavailability and the financial conditions of the owners. In the case of bovine 4, the diagnosis and surgical referral were done relatively quickly, so there was no time for further adjustment of fluid therapy.

Intestinal ischemia drastically reduces intestinal absorption, lowering calcium and phosphorus concentrations and causing anorexia, which creates a vicious cycle, as observed in ruminants 1 and 2, where caretakers reported reduced intake and inappetence. Thus, close observation of vital parameters and the overall clinical picture was essential in managing the cases. The rapid progression of the disease often does not allow for intense dehydration; however, cardiovascular shock may occur due to the degradation of vascular functions, as observed by Desrochers & Anderson [4] and in the present study, where ruminant 1 exhibited signs of shock, culminating in death, which likely would have occurred with the other animals cited, as they already presented signs of cardiovascular alterations.

The blood count presents some characteristic findings, but does not clarify the cases of intestinal obstruction. In general, an inflammatory profile is found, with an increase in immature neutrophils due to ischemic necrosis, large numbers of neutrophils with moderate to severe toxicity, and a regenerative left shift [1,6]. The hematocrit is usually elevated due to dehydration [10]. However, in the case of ruminant 1, considerable neutropenia was observed, possibly indicating the worsening of the condition, bone marrow insufficiency in response to the infectious process, and the translocation of neutrophils to the infectious site. Lausch *et al.* [7] suggest that neutropenia in these cases arises from endotoxemia, leading to leukocyte sequestration in the abdominal cavity and dysfunction in microcirculation. However, in ruminant 1, it is difficult to say that the leukocyte changes were solely due to intestinal injury, given the patient's primary diagnosis. In the other cases, there was not enough time to perform laboratory tests.

Peritoneal fluid analysis is a valuable complementary test, as in severe intestinal obstruction cases, the peritoneal fluid is red to brown, cloudy, and foul-smelling, and may contain fibrin. Microscopy reveals large numbers of degenerated neutrophils and bacteria [10].

In the cases described here, peritoneal fluid analysis could have been a determining factor for diagnosis and prognosis. Macroscopically, if a reddish fluid with fibrin and a foul odor is observed, it can be definitively stated that the prognosis is unfavorable, and exploratory laparotomy would be the last technique to confirm the diagnosis ante-mortem confirmation. However, due to the emergency nature of the cases, abdominocentesis was not performed, with referral for laparotomy being made mainly based on the findings of the ultrasound examination.

In cases of intestinal obstructions in adult bovines, 1 of the main diagnostic techniques is transrectal palpation. Accurate and correct diagnosis in young animals is difficult, largely due to the impossibility of performing this examination [11], as occurred in the cases reported here. Except for bovine 1 which, although age of 18-month-old, had a body condition much below average for its age, making transrectal palpation unfeasible.

Abdominal ultrasonography is helpful in clinical diagnosis and surgical referral [10]. Image formation depends mainly on the type of obstruction. In extra-luminal intestinal obstructions, free hypoechoic fluid is generally observed between dilated intestinal loops. In small intestine segments, there may be either

echogenic or anechoic content. The combination of dilated small intestine loops with collapsed ones, with little or no motility, is indicative of an obstructive process [11]. As observed in the 2nd and 4th cases described, abdominal ultrasonography is an excellent resource for surgical referral when well combined with clinical findings. In the case of ruminant 2, large amounts of free fluid in the abdominal cavity were visible on ultrasound, as well as hyperechoic contents resembling fibrin, extremely distended small intestine loops, and absence of image formation in the rumen area. In the case of ruminant 4, large quantities of extremely dilated small intestine loops were observed, while others were collapsed, all without motility, with small amounts of free fluid between the loops occupying all ultrasound windows; the pre-stomachs were not visible. These findings, combined with the animals' history and the intense pain manifested by ruminant 2 and the apathy shown by ruminant 4, were decisive for surgical referral.

The rapid clinical course of the disease, the delay in requesting veterinary care, or even in referring the animal to a referral center are determining factors for the animal's survival. There are cases, such as those described here, where the patient is so debilitated that there is no time to wait for laboratory results, requiring diagnosis based on available resources and stabilization of the clinical condition in the shortest time possible to refer the animal for surgery, still under the risk of death [8].

The treatment of extra-luminal intestinal obstructions in ruminants is strictly surgical. When evaluating the deterioration of physiological functions, the primary clinical concern is to re-establish the hydro-electrolyte balance and blood volume through intravenous fluid and electrolyte administration, minimizing cardiovascular shock risks, surgical risks, and anesthetic risks [3]. Therefore, for bovines 1, 2, and 3, the fluids of choice were Ringer's Lactate and 0.9% saline solution, administered alternately. This choice occurred in all cases due to the impossibility of performing a blood gas analysis to assess the patients' electrolyte deficits, which could have included metabolic acidosis due to diarrhea. Thus, alternating 2 balanced solutions, in an effort not to worsen metabolic alkalosis or acidosis, is generally a good alternative [9]. In the case of bovine 4, only Ringer's Lactate was used due to the previous history of severe diarrhea. Fluid therapy should be done aggressively, but it is essential to monitor pulmonary function to prevent edema, especially in neonates.

Surgical referral should be done as soon as possible after stabilizing the patient's circulatory condition, determining the main differential diagnoses for abdominal pain, recognizing the factors indicating immediate surgery, deciding if it is feasible considering financial resources and nearby treatment centers, and presenting the prognosis to the owner.

Cases of intestinal obstruction in ruminants are always complex and difficult to resolve, largely due to inadequate referral timing [3]. Sometimes, caretakers/owners believe they can solve the problem and only request veterinary care after the condition has evolved for several days, as occurred with bovines 1 and 2, such that systemic compromise renders any intervention ineffective. Among the cases described here, ruminant 3 had better survival chances, but the lack of precise diagnostic tests hindered immediate surgical referral.

It is very difficult to guarantee a good prognosis, even when the patient is operated on quickly, as ruminants are highly resistant to pain and only exhibit it when extreme, as in cases of peritonitis and torsion. However, the brief interval between noticing pain and performing emergency laparotomy may not be sufficient to prevent ischemia of the intestinal segments, and euthanasia may be required.

Extra-luminal intestinal obstructions in bovines are difficult to diagnose, with acute abdominal pain, which can have multiple causes. Extra-luminal obstructions must be included in the differential diagnosis list, and prompt treatment or referral to a specialized center is essential, as it is an acute condition with surgical resolution that leads to rapid deterioration of the patient's overall condition, resulting in death.

MANUFACTURERS

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