




SURGICAL TECHNIQUES AND POSTOPERATIVE MANAGEMENT IN THE TREATMENT OF ABOMASAL DISPLACEMENT IN COWS

TÉCNICAS CIRÚRGICAS E MANEJO PÓS-OPERATÓRIO NO TRATAMENTO DO DESLOCAMENTO DE ABOMASO EM VACAS

TÉCNICAS QUIRÚRGICAS Y MANEJO POSTOPERATORIO EN EL TRATAMIENTO DEL DESPLAZAMIENTO DE ABOMASO EN VACAS

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Marcos Vinícius de Carvalho Botelho¹, Ana Laura Alison², Carlos Roberto Cruz Ubirajara Filho³

ABSTRACT

Abomasal displacement (AD) in dairy cows is a common condition in ruminant clinical practice, occurring due to multifactorial etiologies such as hypomotility, tympany, acidosis, diets rich in concentrates and poor in effective fiber, abrupt dietary changes, and especially conditions associated with the postpartum period. Thus, abomasal displacement leads to economic impacts and production losses. The condition is characterized by the migration of the abomasum from its normal anatomical position to the left side (LDA), which is more common, or to the right side (RDA), and may progress to volvulus, a surgical emergency. Treatment consists of anatomical repositioning of the organ and permanent fixation through techniques such as abomasopexy or omentopexy to prevent recurrence. The choice of technique should be based on the severity of the clinical condition and the animal's status. Postoperative management is as critical to success as the surgical technique itself. During this period, clinical and biochemical monitoring is required, with emphasis on biomarkers of intestinal injury, such as I-FABP and TFF3, restoration of metabolic balance, provision of an adequate diet rich in fiber with proper adaptation to support ruminal motility recovery, adequate hydration for electrolyte correction, and, when necessary, the use of antibiotics and anti-inflammatory drugs.

Keywords: Abomasal Displacement. Surgical Techniques. Abomasopexy. Omentopexy. Postoperative Management. Dairy Cows. Biomarkers.

RESUMO

O deslocamento de abomaso (DA) em vacas leiteiras é uma afecção comum na clínica de ruminantes, ocorrendo por etiologias multifatoriais como hipomotilidade, timpanismo, acidose, dietas ricas em concentrado e pobres em fibra efetiva, mudanças bruscas na alimentação e principalmente afecções associada ao período pós-parto. Deste modo, deslocamento de abomaso ocasiona impactos econômicos e prejuízos na produção. O deslocamento é caracterizado pela migração do abomaso de sua posição anatômica normal, para o lado esquerdo (DAE), mais comum, ou direito (DAD), podendo evoluir

¹ Undergraduate student in Veterinary Medicine. Centro Universitário de Lavras (UNILAVRAS).

² Undergraduate student in Veterinary Medicine. Centro Universitário da Fundação Educacional de Barretos (UNIFEB).

³ Professor. Universidade Federal do Agreste de Pernambuco (UFAPE).



para vólculo, uma emergência cirúrgica. O tratamento da afecção consiste na reposição anatômica do órgão e a fixação permanente feito pelas técnicas de abomasopexia ou omentopexia, para que evite recidivas. O método de escolha da técnica deve ser feita dependendo da gravidade do quadro clínico e das condições do animal.. O manejo pós-operatório é fundamental para o sucesso tanto quanto a técnica cirúrgica. Neste período é necessário realizar monitoramento clínico e, bioquímico, com destaque em biomarcadores de lesão intestinal, como I-FABP e TFF3, restabelecer o equilíbrio metabólico, fornecer dieta adequada, rica em fibra e com boa adaptação, ajudando na recuperação da motilidade ruminal, hidratação adequada para correção de eletrólitos e, quando necessário, uso de antibióticos e anti-inflamatórios.

Palavras-chave: Deslocamento de Abomaso. Técnicas Cirúrgicas. Abomasopexia. Omentopexia. Manejo Pós-Operatório. Vacas Leiteiras. Biomarcadores.

RESUMEN

El desplazamiento de abomaso (DA) en vacas lecheras es una afección común en la clínica de rumiantes, que ocurre debido a etiologías multifactoriales como hipomotilidad, timpanismo, acidosis, dietas ricas en concentrados y pobres en fibra efectiva, cambios bruscos en la alimentación y, principalmente, afecciones asociadas al período posparto. De este modo, el desplazamiento de abomaso ocasiona impactos económicos y pérdidas en la producción. Se caracteriza por la migración del abomaso desde su posición anatómica normal hacia el lado izquierdo (DAI), más frecuente, o hacia el lado derecho (DAD), pudiendo evolucionar a vólculo, una emergencia quirúrgica. El tratamiento consiste en la reposición anatómica del órgano y su fijación permanente mediante técnicas como la abomasopexia u omentopexia, con el fin de evitar recidivas. La elección de la técnica debe basarse en la gravedad del cuadro clínico y en las condiciones del animal. El manejo postoperatorio es tan fundamental para el éxito como la técnica quirúrgica. En este período es necesario realizar monitoreo clínico y bioquímico, con énfasis en biomarcadores de lesión intestinal, como I-FABP y TFF3, restablecer el equilibrio metabólico, proporcionar una dieta adecuada rica en fibra con buena adaptación que favorezca la recuperación de la motilidad ruminal, asegurar una hidratación adecuada para la corrección de electrolitos y, cuando sea necesario, el uso de antibióticos y antiinflamatorios.

Palabras clave: Desplazamiento de Abomaso. Técnicas Quirúrgicas. Abomasopexia. Omentopexia. Manejo Postoperatorio. Vacas Lecheras. Biomarcadores.



1 INTRODUCTION

Abomasal displacement (AD) is one of the most prevalent metabolic and anatomical disorders in high-producing dairy cows, occurring predominantly in the postpartum period and resulting in substantial economic losses for the livestock industry (Plemyashov et al., 2024; Luo et al., 2022). The condition is characterized by the migration of the abomasum from its physiological position on the floor of the abdominal cavity to the right of the midline, migrating to the left (DAE) or right (DAD) side of the abdominal cavity, and may progress to abomasal volvulus (AV), a critical surgical emergency associated with severe ischemic damage (Braun et al., 2022; Ider et al., 2023). Although the exact etiology remains debated, evidence points to a multifactorial nature involving genetic predisposition, gastrointestinal hypomotility, and imbalances in the rumen microbiota (Plemyashov et al., 2024; Qin et al., 2024).

The etiopathogenesis of abomasal displacement is multifactorial and involves abomasal hypomotility, gas accumulation, changes in energy balance, subclinical ketosis, hypocalcemia, retained placenta, metritis, and changes in feeding management. The immediate postpartum period favors intense lipid mobilization and increased serum concentrations of non-esterified fatty acids (NEFA) and beta-hydroxybutyrate (BHBA), factors associated with a higher risk for the disease (Luo et al., 2022). In addition, recent evidence indicates genetic participation in the predisposition to AED, especially in high-productivity Holstein cows (Plemyashov et al., 2024).

From a clinical and productive point of view, abomasal displacement causes a reduction in food consumption, a sharp drop in milk production, loss of body condition, digestive changes, and an increase in involuntary disposal. In cases of right displacement or volvulus, vascular involvement, tissue ischemia, necrosis, and rapid systemic deterioration may occur, configuring a surgical emergency (Braun et al., 2022; Ider et al., 2023).

The therapeutic intervention for AD aims at anatomical replacement of the organ and permanent fixation (abomasopexy or omentopexy) to prevent recurrence of the condition. The success of the treatment depends not only on the surgical technique employed — whether by open, laparoscopic approaches or non-invasive methods such as (conservative) rolling — but also on a rigorous postoperative management focused on restoring metabolic homeostasis and the integrity of the intestinal barrier (Braun et al., 2022; Ider et al., 2023).



Although conservative methods have been described, surgical treatment remains the most effective and definitive therapeutic approach, especially in intensive production systems. The choice of technique depends on the type of displacement, the clinical status of the animal, the surgeon's experience, available infrastructure, and operational cost (Qin et al., 2024).

Given the systemic complexity of the disease, which includes excessive lipid mobilization and insulin resistance, understanding the biomarkers of tissue injury and microbial changes is critical to optimizing the prognosis and functional recovery of affected cows (Luo et al., 2022; Qin et al., 2024).

2 METHODOLOGY

The present investigation is a bibliographic review of a narrative nature, elaborated with the aim of synthesizing and analyzing contemporary scientific evidence about surgical techniques and postoperative management in the treatment of abomasal displacement in cows. Data were prospected in the PubMed database, using the descriptors "Abomasum" and "Therapeutics", which were articulated using the Boolean operator AND, in accordance with the MeSH terminology. Articles published in the last five years, with full text available and written in English, that had a direct relationship with the central theme were selected for analysis. Productions with low methodological rigor, duplicates and studies without focus on therapeutic interventions or applied pathophysiology were excluded. The selection process took place in two phases: initial screening of titles and abstracts, followed by the analytical evaluation of full texts to confirm relevance. The information extracted was organized from a descriptive and qualitative perspective.

3 RESULTS

Data from the recent literature indicate that the choice of correction technique is influenced by the severity of the displacement and the clinical condition of the animal. In a comprehensive study with 1982 cows, it was observed that AED is significantly more common (67.7%) than DAD (17.1%) and VA (15.2%), and most cases underwent surgical correction or the rolling method (Braun et al., 2022). In this same study, 81.5% of the affected animals were in the first 28 days of lactation, evidencing the strong association between the disease and the transition period (Braun et al., 2022).



Among the main clinical findings observed by Braun et al. (2022) were a reduction in rumen motility in 89.7% of cases, a decrease in intestinal motility in 61.1%, hypokalemia in 83%, an increase in the concentration of rumen chlorides in 67%, and metabolic alkalosis in a significant portion of the animals. Ultrasonography showed high diagnostic efficiency, allowing confirmation in 97.9% of AED cases and 90.2% of DAD/volvulus cases, demonstrating its relevance in clinical routine.

Replacement and fixation surgery, as demonstrated in case reports with radiographic support, promotes immediate resolution of gas accumulation and restoration of gastrointestinal patency, evidenced by the normalization of the abdominal silhouette on postoperative imaging tests (Kazama et al., 2022).

Regarding postoperative management and recovery monitoring, the analysis of biomarkers of gastrointestinal injury has emerged as a valuable tool. Research indicates that cows with DAD and AV have elevated levels of Intestinal Fatty Acid Binding Protein (I-FABP) and Clover Factor 3 (TFF3) before surgery, reflecting ischemic and mucosal damage (Ider et al., 2023). The gradual reduction of these markers in the 24 hours following the surgical procedure is a positive indicator of tissue regeneration and therapeutic success (Ider et al., 2023). In addition, surgical treatment has a direct impact on microbial ecology; cows with AED have a marked rumen dysbiosis, with reduced bacterial diversity and an increase in pathogenic taxa, a condition that tends to stabilize after anatomical correction and return to normal diet (Qin et al., 2024; Luo et al., 2022).

In the genetic study conducted by Plemyashov et al. (2024) with 360 high-production Holstein cows, 185 animals with a history of AED and 175 healthy controls, 14 single nucleotide polymorphisms (SNPs) associated with predisposition to left abomasal displacement were identified. Among the candidate genes highlighted were ABCB11, SOX4, RGS18 and PNPLA4, related to metabolic processes, body conformation and physiological regulation, suggesting important heritability for the disease.

4 DISCUSSION

Academic discussion on the treatment of abomasal displacement emphasizes that early intervention is the determining factor to minimize irreversible ischemic damage. The transition from DAD to AV drastically worsens the prognosis due to impaired blood perfusion, which justifies the elevation of biomarkers such as TFF3, which is essential for



gastrointestinal mucosal repair (Ider et al., 2023). Postoperative management should therefore focus on mitigating oxidative stress and restoring the intestinal barrier to avoid systemic complications (Ider et al., 2023; Braun et al., 2022).

Another critical point debated is the correlation between displacement and the metabolic profile of the animal. Cows with AED often suffer from severe negative energy balance and lipid mobilization, which alters the fecal microbiome and plasma metabolite composition (Luo et al., 2022; spectrum.01972-22). This complexity suggests that surgical therapeutics must be accompanied by metabolic support to reverse insulin resistance and associated ketosis (Luo et al., 2022). Additionally, advances in genomics reveal that predisposition to AED may have genetic underpinnings linked to transcription factors such as SOX4 and SOX11, opening prospects for preventive management and selection of more resistant strains to complement traditional surgical approaches in the future of veterinary medicine (Plemyashov et al., 2024). In summary, the integration between precise surgical techniques, postoperative biochemical monitoring, and nutritional/metabolic support constitutes the gold standard for effective management of abomasal displacement (Braun et al., 2022; Ider et al., 2023).

5 CONCLUSION

Abomasal displacement (AD) in cows is characterized as a complex disease, of multifactorial etiology, whose therapeutic approach requires integration between surgical intervention such as abomasopexy or omentopexy and should make the choice of the surgical technique should be individualized, considering the type of displacement (left, right or volvulus), the severity of the clinical condition and the available operating conditions, and careful postoperative management should be done effectively for the success of the disease. In view of the high economic and sanitary importance of abomasum displacement in dairy cattle, it is essential to understand the main surgical techniques available and the postoperative management protocols that maximize productive recovery and reduce losses.

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