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USE OF BARIUM ENEMA FOR IDENTIFICATION AND CLASSIFICATION OF CONGENITAL ANAL ATRESIA IN A DOG: CASE REPORT

Utilização do enema de bário para identificação e classificação de atresia anal congênita em cão: relato de caso

Júlia Borrelli Aielo*[1], Fernanda Barnabé Jurado[1], Marta Maria Circhia Pinto Luppi[2], Paula Cristina Guimarães[3], Carolina Akel Ferruccio[4], Isabel de Siqueira Rotenberg[4], Alice Bueno Tarelho[5], Isabella Leme Silva[6], Michele Andrade de Barros[7]

***Corresponding author:** Júlia Borrelli Aielo, Rua Nelson Walter de Senzi, 170, Jardim Terras de Santa, Limeira, SP, Brazil. CEP: 13482-317.
E-mail: juliaaielo6@gmail.com

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Abstract

Congenital anomalies of the rectum and anus, although rare, have great clinical relevance, with anal atresia being the most common, especially in dogs. This malformation may occur in isolation or be associated with alterations of the gastrointestinal and urogenital tracts. Diagnosis is based on

1 Veterinary resident at the Pontifical Catholic University of Campinas (PUC-Campinas), Department of Diagnostic Imaging, Campinas, SP, Brazil.
2 Professor (Ph.D.) at the Pontifical Catholic University of Campinas (PUC-Campinas), Department of Diagnostic Imaging, Campinas, SP, Brazil.
3 Professor at at the Pontifical Catholic University of Campinas (PUC-Campinas), Department of Anesthesiology, Campinas, SP, Brazil.
4 Veterinary Resident at at the Pontifical Catholic University of Campinas (PUC-Campinas), Department of Anesthesiology, Campinas, SP, Brazil.
5 Veterinary resident at at the Pontifical Catholic University of Campinas (PUC-Campinas), Department of Small Animal Internal Medicine, Campinas, SP, Brazil.
6 Veterinary resident at at the Pontifical Catholic University of Campinas (PUC-Campinas), Department of Large Animal Medical and Surgical Clinics, Campinas, SP, Brazil.
7 Professor (Ph.D.) at at the Pontifical Catholic University of Campinas (PUC-Campinas), Department of Small Animal Internal Medicine, Campinas, SP, Brazil.

history, clinical signs, physical examination, and imaging tests, with the barium enema standing out as an effective method for the anatomical and functional evaluation of the colon and rectum. This report describes a case of type I anal atresia in a two-month-old Lhasa Apso dog, accompanied by two perianal fistulas. The diagnosis was confirmed by contrast radiography with barium enema, and the patient underwent surgical correction. Despite an initially satisfactory postoperative recovery, the animal developed complications due to canine distemper and eventually died. This case highlights the importance of early diagnosis and the use of barium enema in the characterization of anorectal anomalies.

Keywords: Congenital anomalies; dogs; colon; rectum; barium sulfate.

Resumo

As anomalias congênitas do reto e ânus, embora raras, apresentam grande relevância clínica, sendo a atresia anal a mais frequente, especialmente em cães. Essa malformação pode ocorrer isoladamente ou associada a alterações do trato gastrointestinal e urogenital. O diagnóstico baseia-se em histórico, sinais clínicos, exame físico e exames de imagem, destacando-se o enema de bário como método eficaz para avaliação anatômica e funcional do cólon e reto. Este relato descreve um caso de atresia anal tipo I em um cão da raça lhasa apso de dois meses, acompanhada de duas fístulas perianais. O diagnóstico foi confirmado por radiografia contrastada com enema de bário e o paciente foi submetido a correção cirúrgica. Apesar da evolução pós-operatória imediata satisfatória, o animal apresentou complicações decorrentes de cinomose, evoluindo a óbito. O caso reforça a importância do diagnóstico precoce e do uso do enema de bário na caracterização de anomalias anorretais.

Palavras-chave: Anomalias congênitas; cães; cólon; reto; sulfato de bário.

Introduction

Congenital anomalies may arise from genetic factors or from maternal exposure to teratogenic agents during pregnancy. Such defects can be transmitted by one or both parents, with higher prevalence in purebred dogs and in inbred matings. Among the teratogenic agents capable of inducing these alterations are certain drugs administered to the pregnant female, nutritional imbalances, ionizing radiation, toxins, chemical substances, and infectious diseases (Pereira *et al*., 2019).

Anomalies of the rectum and anus are considered rare, with anal atresia being the most common (Vianna; Tobias, 2005; Sundaram *et al*., 2021). It is characterized by partial or complete absence of communication between the rectum and the anus, occurring more frequently in dogs and with higher incidence in females (García-González *et al*., 2012).

Four types of anal atresia have been described: type I – congenital anal stenosis; type II – isolated imperforate anus; type III – imperforate anus associated with a more cranial blind-ending rectal pouch; and type IV – discontinuity of the proximal rectum with normal development of the distal rectum and anus (Vianna; Tobias, 2005).

Anal atresia may occur as an isolated condition or be associated with other anomalies of the gastrointestinal or urogenital tract. Clinical signs vary according to the type of anal atresia and include tenesmus, megacolon, abdominal discomfort, passage of feces through perianal fistulas, vulva or urethra, perivulvar erythema, among others (Santos *et al*., 2017).

According to Trentin *et al*. (2022), diagnosis is based on clinical history, clinical signs, physical examination, and imaging studies such as abdominal ultrasonography and contrast radiography using barium enema to identify and classify anal atresia.

Barium enema is used to evaluate the large intestine, especially the colon and rectum. Its main function is to assess the intestinal mucosa through the introduction of a radiopaque contrast agent based on barium sulfate via the rectal route, allowing the identification of anatomical and functional changes that are not easily detected on plain radiographs. This examination is indicated in cases of

luminal narrowing, endoscopic limitations, and suspicion of mural or extramural lesions with normal mucosa on endoscopic evaluation (Thrall, 2014).

According to Soerensen *et al*. (2021), treatment of anal atresia is surgical, and prognosis depends on the degree of malformation and the presence of secondary complications.

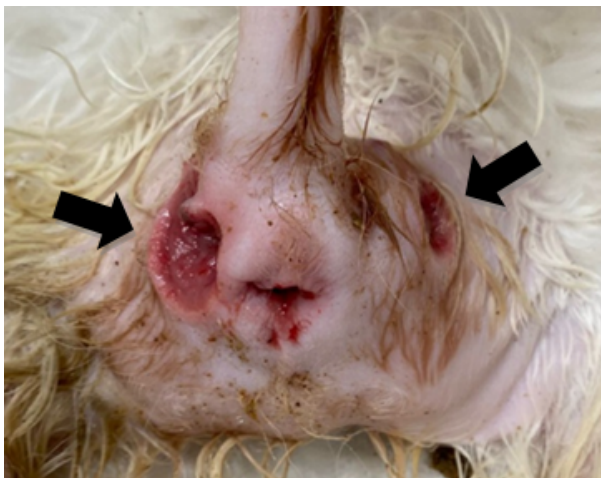
The aim of this report is to present a case of type I anal atresia, associated with two fistulas adjacent to the anal orifice, in a two-month-old Lhasa Apso dog. A barium enema was performed to identify and classify the anal atresia, with the objective of contributing to diagnosis, surgical treatment, and patient welfare.

Case Report

A two-month-old male Lhasa Apso dog, weighing 1.6 kg, was referred to the Veterinary Clinic of the Pontifical Catholic University of Campinas (PUC-Campinas). According to the owner, the animal presented hyporexia, prostration, tenesmus, dyschezia, and diarrhea.

On physical examination, anal sphincter stenosis was observed, accompanied by two fistulas adjacent to the anal orifice. These were acquired through intrarectal pressure that promotes perforation at points of contact and communication between their respective tracts, representing an anomalous deviation of the rectal lumen as a drainage pathway. An increase in volume and erythema of the perianal region were also noted (Figure 1). Vital parameters, including body temperature, heart and respiratory rates, capillary perfusion, and hydration status, were assessed and were within normal limits.

Figure 1 – Photograph of the patient showing two perianal fistulas (arrows)



T Source: Veterinary Clinic PUC-Campinas (2025).

Laboratory tests were requested, including a complete blood count and biochemical panel, as well as imaging studies such as abdominal ultrasonography and contrast radiography.

Therapeutic treatment was initiated with meloxicam (0.1 mg/kg every 24 hours for four days), a nonsteroidal anti-inflammatory drug aimed at reducing inflammation, pain, and fever. Cephalexin (30 mg/kg every 12 hours for 10 days) was also prescribed as an antibiotic to prevent bacterial infectious complications. For pain and fever control, dipyrone drops (2 drops every 12 hours for three days) were indicated. Additionally, lactulose (1 mL every 12 hours for three days) was introduced as a laxative to facilitate intestinal evacuation and prevent constipation. Finally, a topical ointment (nystatin, neomycin sulfate, triamcinolone, and triamcinolone acetonide) was recommended for treatment of the perianal fistulas, applied twice daily for seven days after prior cleaning with water and neutral soap.

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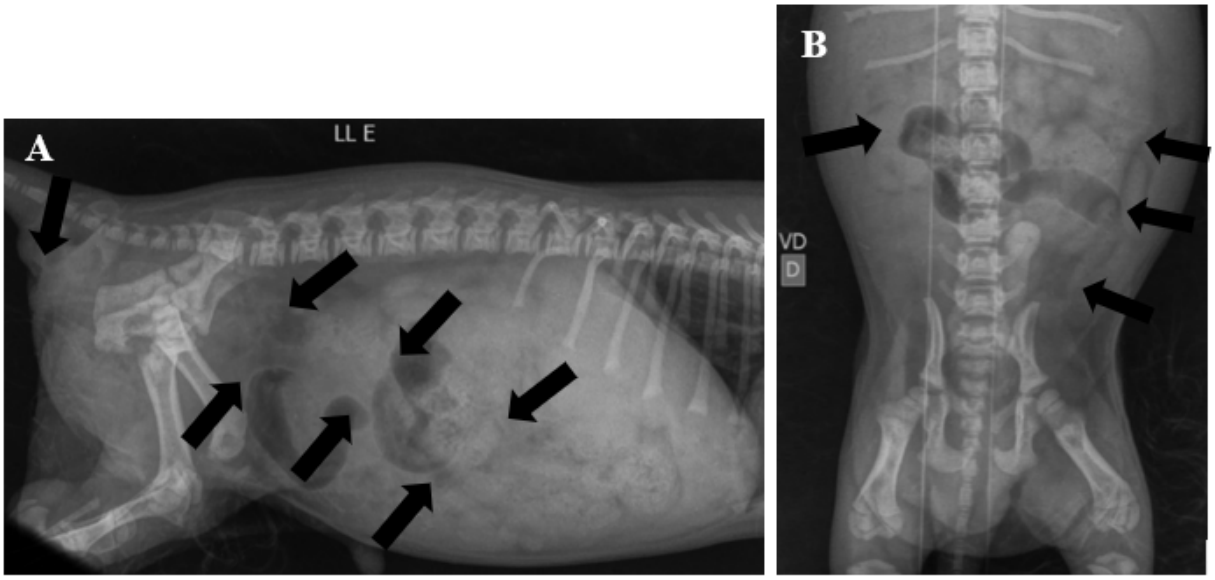
The complete blood count revealed microcytic normochromic anemia and thrombocytopenia, while the leukogram and biochemical panel were within normal limits. Abdominal ultrasonography showed intestinal inflammatory process and fecal retention, with no other relevant findings.

In the contrast radiographic examination, the barium enema technique was used to evaluate the colon and rectum. This involved prior patient preparation with 24-hour fasting and an enema immediately before the examination for intestinal emptying. Plain abdominal radiographs were obtained in laterolateral (left lateral recumbency) and ventrodorsal projections, revealing intestinal loops moderately filled with heterogeneous and gaseous (fecal) content, indicating fecal retention (Figure 2).

Figure 2 – IPlain abdominal radiographic image indicating fecal retention (arrows)

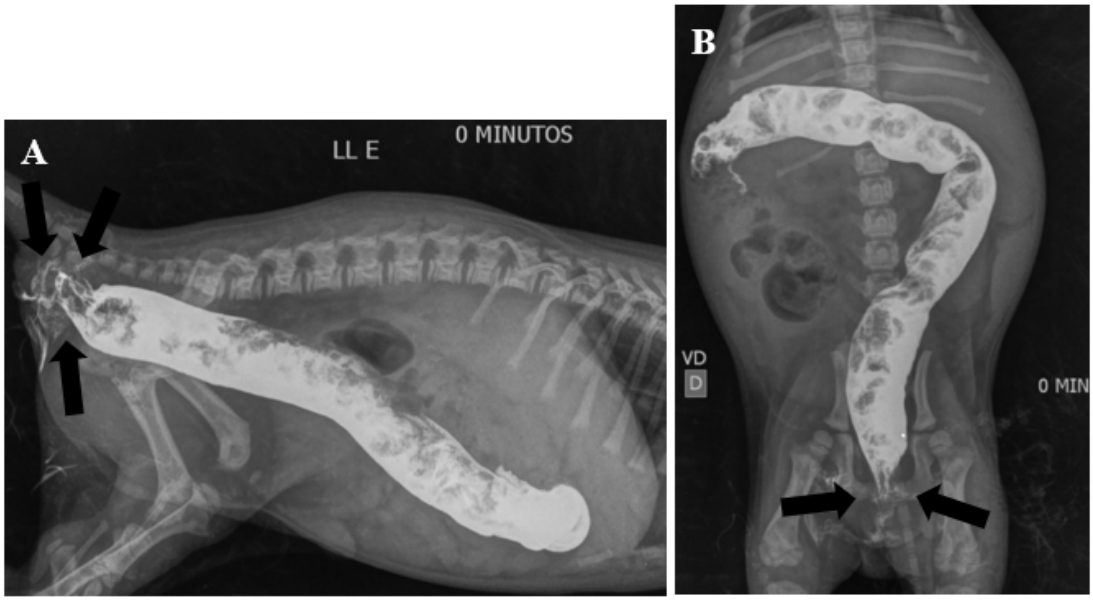


Source: Veterinary Clinic PUC-Campinas (2025).
Note: A: Left laterolateral projection (LL); B: Ventrodorsal projection (VD).

Subsequently, barium at room temperature was administered via a size 6 rectal catheter in a volume of 11.2 mL (7 mL/kg) (Thrall, 2014). The procedure was performed under general anesthesia, which is required in most cases. The anesthetic protocol included methadone (0.2 mg/kg) combined with dexmedetomidine (1 mcg/kg) as pre-anesthetic medication, allowing venous catheterization after 10 minutes. This was followed by intravenous administration of ketamine (1 mg/kg) and propofol titrated to effect (2 mg/kg/min) until satisfactory immobilization for the procedure was achieved, reaching a total dose of 6 mg/kg.

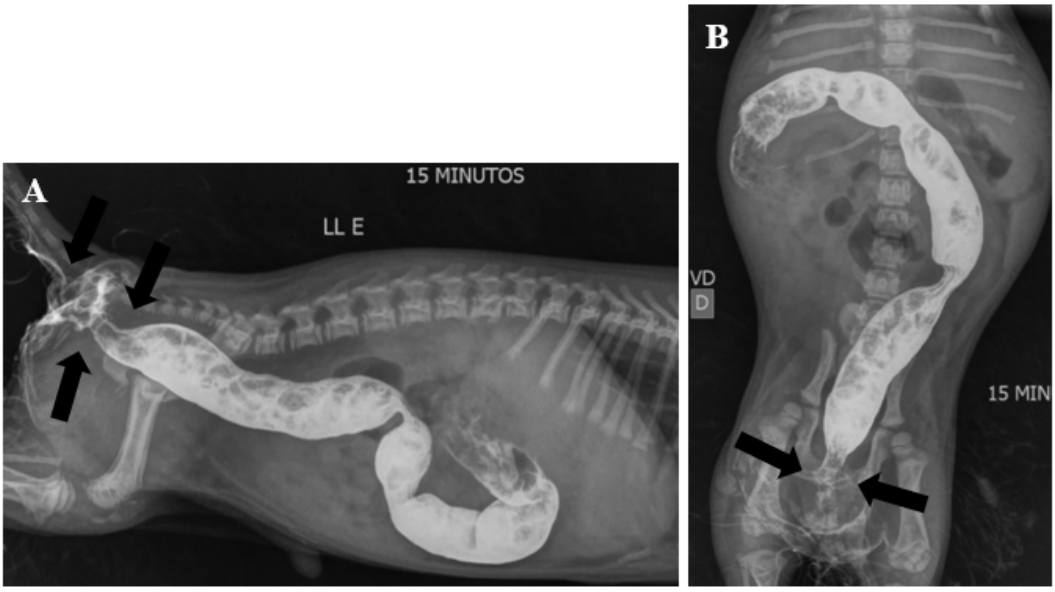
Abdominal radiographs were then obtained sequentially: immediately after contrast administration (Figure 3), after 15 minutes (Figure 4), after 30 minutes (Figure 5), and finally after 1 hour and 20 minutes (Figure 6). A moderate amount of radiopaque contrast was observed filling the transverse and descending colon and rectum, with no signs of leakage, progressing through the rectal route and through two perianal fistulas. This finding demonstrated stenosis of the distal rectum, consistent with type I anal atresia.

Figure 3 – Radiographic image immediately after contrast administration, showing moderate filling of the transverse and descending colon and rectum, without leakage, and progression via the rectal route and through two perianal fistulas, demonstrating stenosis of the distal rectum consistent with type I anal atresia (arrows)



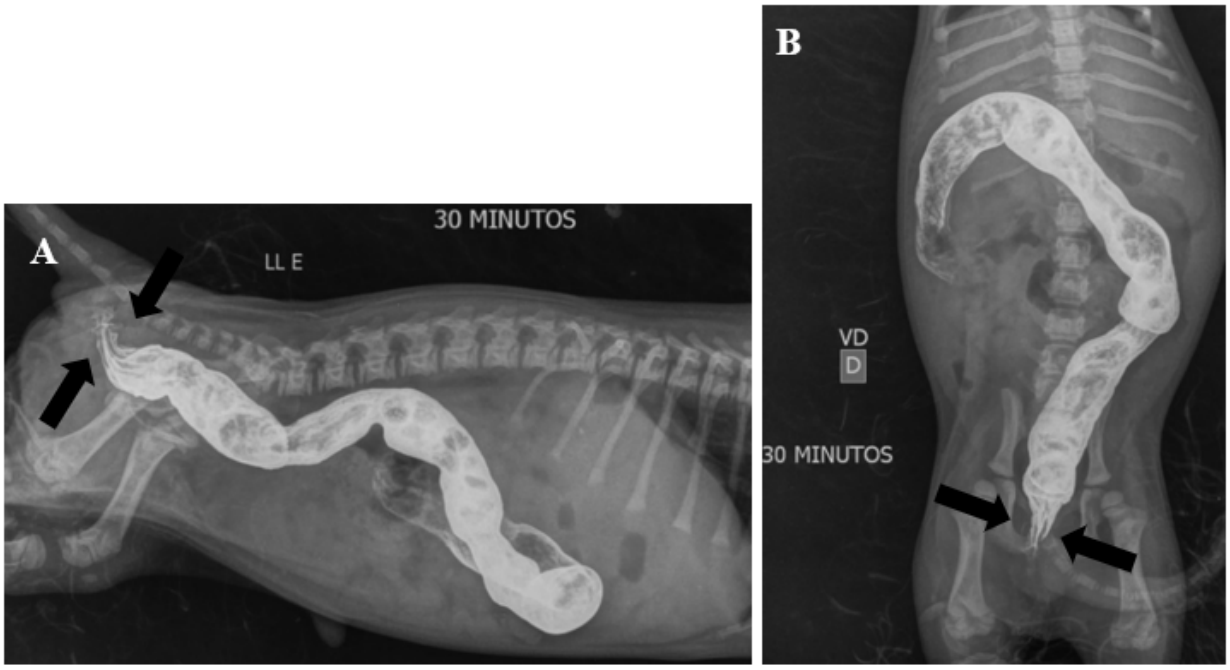
Source: Veterinary Clinic PUC-Campinas (2025).
Note: A: Left laterolateral projection (LL); B: Ventrodorsal projection (VD).

Figure 4 – Radiographic image 15 minutes after contrast administration, showing moderate filling of the transverse and descending colon and rectum, without leakage, and progression via the rectal route and through two perianal fistulas, demonstrating stenosis of the distal rectum consistent with type I anal atresia (arrows)



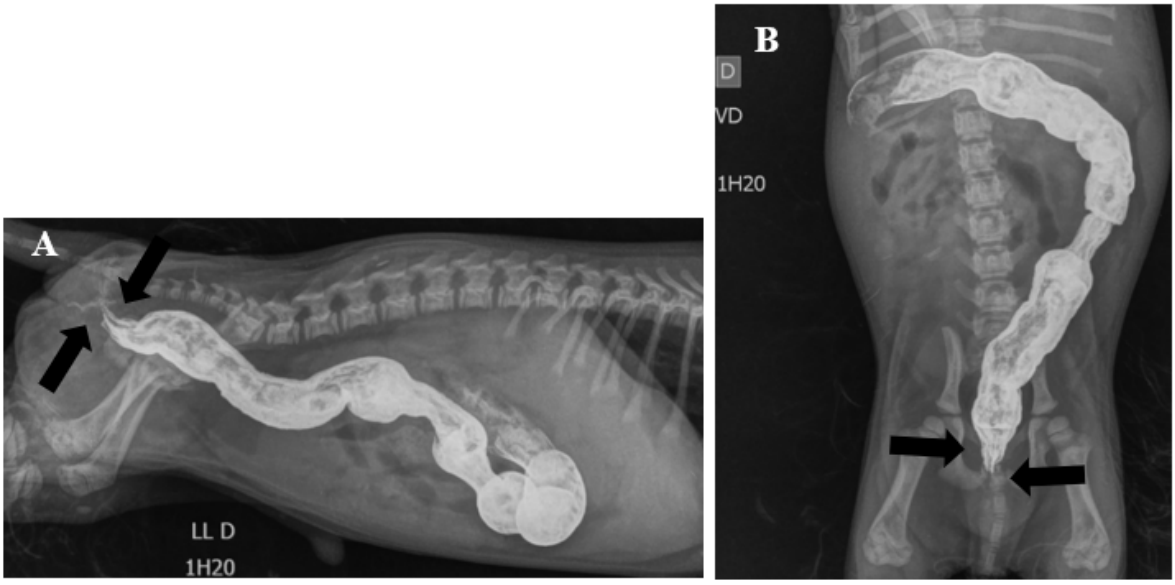
Source: Veterinary Clinic PUC-Campinas (2025).
Note: A: Left laterolateral projection (LL); B: Ventrodorsal projection (VD).

Figure 5 – Radiographic image 30 minutes after contrast administration, showing moderate filling of the transverse and descending colon and rectum, without leakage, and progression via the rectal route and through two perianal fistulas, demonstrating stenosis of the distal rectum consistent with type I anal atresia (arrows)



Source: Veterinary Clinic PUC-Campinas (2025).
Note: A: Left laterolateral projection (LL); B: Ventrodorsal projection (VD).

Figure 6 – Radiographic image 1 hour and 20 minutes after contrast administration, showing moderate filling of the transverse and descending colon and rectum, without leakage, and progression via the rectal route and through two perianal fistulas, demonstrating stenosis of the distal rectum consistent with type I anal atresia (arrows)



Source: Veterinary Clinic PUC-Campinas (2025).
Note: A: Left laterolateral projection (LL); B: Ventrodorsal projection (VD).

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After confirmation of the diagnosis, the patient was referred for corrective surgery. Pre-anesthetic medication consisted of methadone (0.3 mg/kg) administered intramuscularly, followed by venipuncture and administration of dexmedetomidine (2 mcg/kg) associated with ketamine (1 mg/kg). Induction was performed with propofol (2 mcg/kg/min) until an adequate surgical plane was achieved. Maintenance was carried out with isoflurane in a non-rebreathing circular system, combined with continuous infusions of remifentanil (12 mcg/kg/h), ketamine (0.6 mg/kg/h), and dexmedetomidine (0.5 mg/kg/h). A lumbosacral epidural block was also performed using lidocaine (0.22 mL/kg) and morphine (0.1 mg/kg). Throughout the procedure, the patient received lactated Ringer's solution at a maintenance rate.

For correction of anal atresia, a number 4 urethral catheter was used to identify the anal orifice, followed by a 0.5 cm circumferential incision around the anal fold. After tissue excision, rectal mucosa was anastomosed to the skin using a simple interrupted suture pattern with 3-0 nylon (Figure 7). The perianal fistulas healed by second intention.

Figure 7 – Photograph of the patient after surgical correction of anal atresial

T Source: Veterinary Clinic PUC-Campinas (2025).

In the immediate postoperative period, the patient received dipyrone (25 mg/kg) and dexamethasone (0.08 mg/kg) subcutaneously, as well as intravenous cephalothin (30 mg/kg). The following medications were prescribed: meloxicam (0.1 mg/kg every 24 hours for four days), cephalexin (30 mg/kg every 12 hours for 10 days), dipyrone drops (2 drops every 12 hours for three days), tramadol hydrochloride 100 mg/mL (1 drop every 8 hours for three days), and lactulose (1 mL every 12 hours for three days). The owner was instructed to perform local cleaning with water and neutral soap and apply cold compresses twice daily for 7 days. Additionally, continued observation was recommended, with veterinary care advised if necessary.

Ten days after the surgical procedure, the wound showed good healing, complete closure of the fistulas, and the dermorrhaphy sutures were removed, indicating positive postoperative progression.

Furthermore, one of the patient's contacts presented clinical signs of canine distemper during the same period. After confirmation by ELISA testing, all puppies were placed under quarantine. For the present patient, a follow-up complete blood count was recommended, revealing structures suggestive

of Lentz bodies (viral inclusions characteristic of canine distemper) in erythrocytes and neutrophils. Symptomatic treatment for distemper was initiated, and ELISA and PCR tests were requested; however, the patient showed acute worsening of the viral condition and died 10 days after suture removal. Due to the condition of anal atresia, fistulas, and previously described complications, the patient had not received primary vaccination and therefore lacked immunity against viral diseases such as distemper.

Discussion

Congenital anomalies are an important cause of mortality in newborn and young animals (Sundaram *et al*., 2021). Although rare, anal atresia remains a significant clinical challenge due to its diverse presentations and potential associations with other congenital anomalies of the gastrointestinal and urogenital tracts; therefore, patients with anorectal anomalies should be carefully evaluated for additional abnormalities (Bae *et al*., 2018).

Barium enema stands out for its ability to provide a detailed assessment of the colon and rectum, allowing the identification of anatomical and functional alterations not evident on plain radiographs. This examination is particularly indicated when congenital anomalies, such as anal atresia, are suspected. In the present case, the contrast technique enabled visualization of contrast progression and detection of two perianal fistulas associated with stenosis of the distal rectum, findings consistent with type I anal atresia.

It is important to emphasize that this examination involves certain risks, especially in cases of intestinal perforation, which may lead to leakage of intestinal contents and contrast material into the abdominal cavity, resulting in peritonitis. In suspected cases of intestinal perforation, the use of non-ionic water-soluble iodinated contrast agents is recommended, as they are considered safer (Thrall, 2014). Therefore, the choice of contrast medium should be individualized, considering both the clinical condition and the integrity of the intestinal mucosa.

Thus, the findings of this report are consistent with the literature regarding the importance of barium enema in the diagnosis of congenital anomalies of the rectum and colon. This early and accurate diagnostic approach is crucial for establishing appropriate therapeutic strategies, increasing the likelihood of surgical success and improving the prognosis of affected patients.

Anal atresia in newborn and young animals represents a significant clinical challenge due to the physiological fragility of these patients and the stress caused both by the condition itself and by the procedures required for treatment. Investigation of such anomalies should be conducted shortly after birth, as early diagnosis enables timely interventions, contributing to reduced neonatal mortality and improved therapeutic outcomes (Pereira *et al*., 2019).

Final considerations

This report highlights the relevance of imaging diagnostics, particularly contrast radiography using barium enema, in the identification and classification of congenital anorectal anomalies in dogs. In the case described, the examination was essential for confirming type I anal atresia associated with perianal fistulas and for guiding surgical treatment, which showed favorable immediate postoperative outcomes. Despite subsequent complications of infectious origin, the study reinforces that early diagnosis and the appropriate use of imaging techniques are fundamental for the effective management of anal atresia and contribute to advancing knowledge on the diagnosis and treatment of these malformations in small animals. &

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CRediT Author Statement

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- **Ethical approval**: The study was conducted in accordance with the ethical principles applicable to research. As this is a clinical case report involving diagnostic and therapeutic procedures performed in routine hospital practice, submission to an Ethics Committee was not required. The animal's legal guardian was duly informed and consented to the procedures performed.
- **Data and materials availability**: The data supporting this study are fully described within the article. The bibliographic materials used are available in scientific databases. Additional information may be made available by the authors upon request.

- **Author contributions**: AIELO, J. B.: study conception, clinical case follow-up, data collection, interpretation of imaging findings, manuscript drafting, and final review. JURADO, F. B.: clinical follow-up of the patient, data collection, and manuscript review. LUPPI, M. M. C. P.: supervision of the diagnostic imaging sector, interpretation of radiographic examinations, and critical manuscript review. GUIMARÃES, P. C.: participation in anesthetic and surgical management of the patient and technical manuscript review. FERRUCCIO, C. A. and ROTENBERG, I. de S.: support in anesthetic management and perioperative patient care. TARELHO, A. B.: clinical follow-up of the patient and contribution to data collection. SILVA, I. L.: contribution to clinical evaluation and manuscript review. BARROS, M. A. de: clinical supervision, scientific guidance, and final critical review of the manuscript.

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