

Unilateral Atrial Ectopic Rhythm in a Golden Retriever

Mário dos Santos Filho¹, Bruna Pereira Gonçalves², Jaíne da Silva²,
Eduarda de Oliveira Silva Lima Machado², Nathália Marques de Oliveira Lemos¹, Bruno Alberigi³,
Alexandre José Rodrigues Bendas³ & Paulo de Tarso Landgraf Botteon³

ABSTRACT

Background: Atrial ectopic rhythm is a type of supraventricular arrhythmia, originating in two distinct points in the atrial region. In the electrocardiographic (ECG) tracing, it is represented by independent depolarizations of sinus P waves and ectopic P waves. The occurrence of this disorder is rare, and the diagnosis criteria are the presence of the described waves within the basal rhythm. In humans, there have been reports related to severe heart failure with an unfavorable prognosis. The present report aimed to describe the clinical case of a dog with unilateral atrial ectopic rhythm without any underlying cardiac disorder.

Case: A 8-year-old male golden retriever was brought to a veterinary clinic for a preoperative evaluation for lipoma removal in the right forelimb. On clinical examination, the owner stated that the patient was active, with no signs of easy fatigue or cough. The canine displayed normophagy, normodipsia, normoquezia, and normouria. On physical examination, he demonstrated a lymphatic temperament with tachypnea. The temperature and capillary filling time were within the normal range, with a normokinetic pulse. Cardiac auscultation revealed a mild grade I/VI murmur in mitral focus and an 80-bpm heart rate. Respiratory auscultation revealed the presence of harsh lung sounds. The cough reflex was positive; the Piparote test, negative. The blood test showed no noticeable changes in blood count and serum biochemistry. Systemic systolic blood pressure was 120 mmHg. On radiographic examination, no evidence of heart or lung abnormalities were identified. After the clinical evaluation, an ECG examination was performed; a unilateral atrial ectopic rhythm was observed with different frequencies between atrial and ventricular rhythm and with P (164°) and P waves (80°). On echocardiographic examination, no morphological abnormalities were seen, though trivial mitral insufficiency was identified in a color Doppler study. Blood was collected to measure electrolytes to check for possible electrolytic abnormalities; the results were within the normal range. The patient was released for and remained stable throughout the procedure, maintaining the rhythm detected during the transoperative time. Upon reassessment in a new ECG examination, the arrhythmia persisted, suggesting that a primary lesion in the atrial tissue was present.

Discussion: An atrial ectopic rhythm diagnosis requires a detailed study with the aim of ruling out heart diseases that may affect the propagation of the cardiac stimulus. However, no morphological or functional abnormalities of note that justified triggering stimuli for the ectopic rhythm were observed. In addition, based on the echocardiographic evaluation, myocardial function was preserved, supporting the canine's release for the procedure. The suspicion of hydroelectrolytic alteration and hypoxia was present after discarding structural causes, though it was discarded due to normal laboratory results. The presence of ectopic P waves was due to the non-interference in the sinus P' waves; consequently, they were found in the sinus heart rhythm. Upon assessing the ectopic P wave frequency, the atrial rhythm frequency was higher than the heart rate, juxtaposing the different irregular intervals within the atrial cycle. The rhythm alone may explain that its severity can be linked to the physical findings. This indicated that they did not influence the presentation of ectopia since the cardiac output, controlled by the sinus rhythm part, was responsible for maintaining the rhythm and the demand of the organism; the electrical conduction system, responsible for atrial systole, represents 15-25% of the blood ejection for the ventricular filling. Patients with rhythm disorders as described need guidance and follow-up for the early detection of clinical signs resulting from the destabilization of the condition.

Keywords: atrial dissociation, supraventricular arrhythmia, electrocardiogram, dogs.

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¹Programa de Pós-Graduação em Medicina Veterinária (Patologia e Ciências Clínicas) & ³Departamento de Medicina e Cirurgia Veterinária, Universidade Federal Rural do Rio de Janeiro (UFRRJ), Seropédica, RJ, Brazil. ²Universidade de Vassouras, Vassouras, RJ. CORRESPONDENCE: M. Santos Filho [mariosantoscg@gmail.com]. PPGMV - Patologia e Ciências Clínicas - UFRRJ. Campus Universitário. BR 465, km 7. CEP 23890-000 Seropédica, RJ, Brazil.

INTRODUCTION

Atrial ectopic rhythm is defined as a supraventricular arrhythmia originating from two distinct points of the atrial tissue but which, on electrocardiographic tracing, are simultaneously visualized as independent depolarizations represented by P (sinusal) and P (ectopic) waves of distinct morphologies [14]. The occurrence of this disorder, although previously described, is rare [8].

The diagnosis is based on the interpretation of the electrocardiographic record, which differentiates it from other supraventricular arrhythmias [11]. The diagnostic criteria for a unilateral atrial ectopic rhythm are the presence of an ectopic atrial rhythm that does not result in ventricular depolarization and does not interfere with the base rhythm [5], as well as the origin of the site of its depolarizations [6], which result from the frontal axes of different degrees of P waves (164°) and P waves (80°) [11].

Thus, this report aimed to describe the clinical case of a golden retriever, with electrocardiographic alterations and primary and baseless causes of unilateral atrial ectopic rhythm, without hemodynamic repercussions.

CASE

A 8-year-old castrated male golden retriever who weighed 35 kg was treated at a private veterinary clinic in the city of Resende - Rio de Janeiro, Brazil, for the purpose of preoperative evaluation for lipoma removal in the righthindlimb. On clinical examination, and based on history-taking and anamnesis with the owner, the patient was active, with no signs of easy fatigue or coughing. He never had an episode of syncope or seizures and presented with normophagia, normodipsia, normochezia, and normouria.

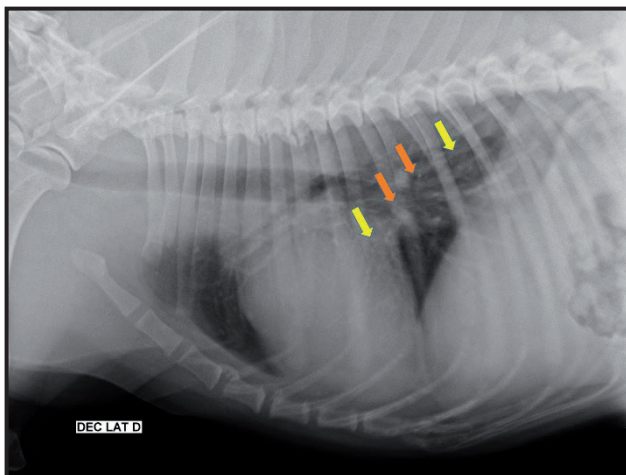


Figure 1. Chest radiograph in the right lateral view, showing bronchial (yellow arrows) and interstitial (orange arrows) patterns, interpreted as a characteristic of bronchitis. [Source: Mário dos Santos Filho].

The patient was cooperative, alert, responsive, and had a lymphatic temperament. On physical examination, his body temperature and capillary filling time were within normal limits and the pulse was normokinetic. Cardiac auscultation revealed a grade I/VI mitral murmur, and respiratory auscultation evidenced the presence of increased continuous expiratory noise. The cough reflex was determined to be positive but discreet. The Piparote test was performed and the result was negative. The blood test showed no changes. Systemic systolic blood pressure was 120 mmHg (ref.: 110-140 mmHg). It was measured using a vascular Doppler device¹ with veterinary cuffs² coupled to the sphygmomanometer³ [1].

The radiographic examination showed no significant changes in the cardiac silhouette, and the pulmonary pattern presented a mild bronchial and interstitial pattern in the dorsocaudal lobes (Figures 1 and 2).

After clinical evaluation and radiographic interpretation, the electrocardiographic examination was performed using the InCardio⁴ electrocardiographic device, which showed unilateral atrial ectopic rhythm,

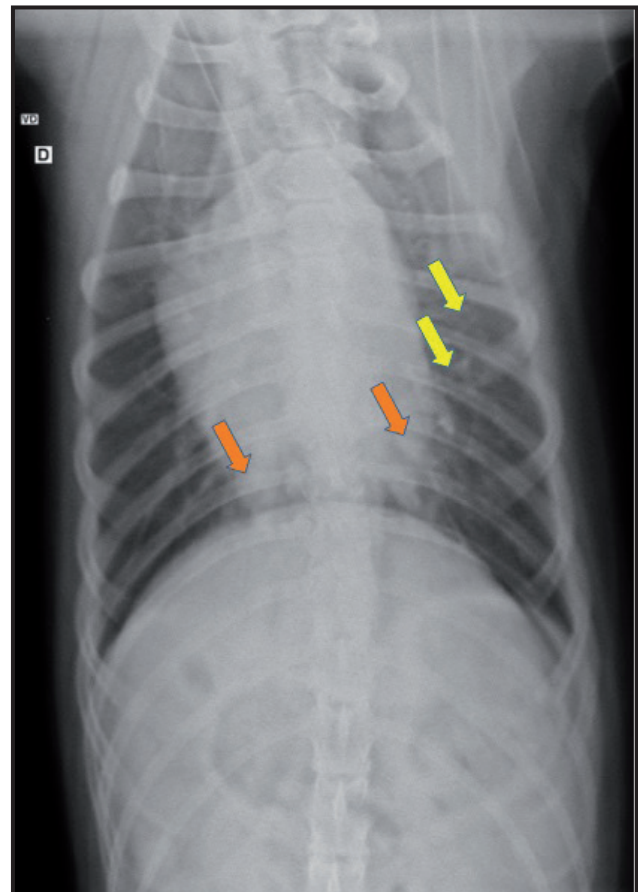


Figure 2. Chest radiograph in ventrodorsal view, showing bronchial (yellow arrows) and interstitial (orange arrows) patterns, interpreted as a characteristic of bronchitis. [Source: Mário dos Santos Filho].

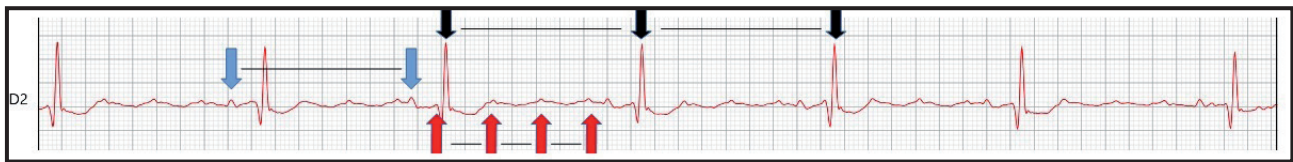


Figure 3. Preoperative electrocardiographic tracing in lead D2, with a velocity of 50 mm/s and amplitude of 10 mm/mV (N). A unilateral atrial ectopic rhythm is observed with different frequencies between the atrial and ventricular rhythm, with sinus P waves (blue arrow) and ectopic P waves (red arrows), which do not conduct impulses to the ventricles. Note regular P-led R-R intervals (black arrows), translating into sinus rhythm. [Source: Mário dos Santos Filho].



Figure 4. Postoperative electrocardiographic tracing in the D2 lead, in mini-Holter mode, with a speed of 25 mm/s and amplitude of 10 mm/mV (N). A unilateral atrial ectopic rhythm with different frequencies can be observed between the atrial and ventricular rhythm, with sinus P waves and ectopic P waves, which do not carry impulses to the ventricles. Note that R-R intervals are slightly irregular and P-guided, translating into sinus arrhythmia. [Source: Mário dos Santos Filho].

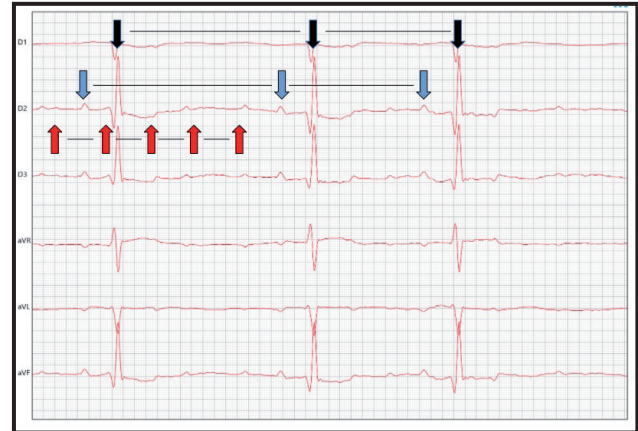


Figure 5. Electrocardiographic tracing in bipolar and unipolar leads (D1, D2, D3, aVR, aVL and aVF), with a velocity of 100 mm/s and amplitude of 20 mm/mV (2N). A unilateral atrial ectopic rhythm with different frequencies can be observed between the atrial and ventricular rhythm, with sinus P waves (blue arrow) and ectopic P waves (red arrows), which do not conduct impulses to the ventricles. Note that R-R intervals (black arrows) are slightly irregular and led by P, translating into sinus arrhythmia. [Source: Mário dos Santos Filho].

with different frequencies observed between the atrial and ventricular rhythm and with sinus P waves (164°) and ectopic P waves (80°) that did not conduct impulses to the ventricles (Figure 3).

In view of the finding, an echocardiographic examination was performed. No morphological or functional changes were found. There was only a slight mitral escape, with no hemodynamic repercussions. Blood collection was carried out to measure electrolyte levels (sodium, phosphorus, and potassium) in order to investigate possible hydroelectrolytic alteration; the values obtained were within the normal range for the species. After a joint analysis of the tests, the patient was medicated for pulmonary support and treated before proceeding to surgery.

A methylxanthine bronchodilator [Aminophylline⁵ - 10 mg/kg], mucolytic [Acetylcysteine⁶ - 10 mg/kg], and nebulization with 0.9% saline solution⁷ was prescribed [9], all administered twice a day and for a period of 21 days. A review was performed and a significant improvement in lung noise was observed [4].

Thus, the patient was released for the procedure. The same observations remained stable throughout

the transoperative period, and the rhythm previously detected during anesthetic monitoring persisted. His postoperative recovery was uneventful. In a new reassessment 10 days after surgery, on electrocardiographic examination, the electrophysiological cycle was noticed over the recording time, with irregularly regular R-R intervals (Figure 4) [15]. The arrhythmia previously detected persisted and could not be correlated with the presence of the nodule extracted during surgery, suggesting a primary cause of atrial ectopy (Figure 5).

The patient has had no clinical manifestations related to rhythm disturbance at the time of writing. The owner brought him to the clinic for sporadic follow-up reassessments.

DISCUSSION

Preoperative electrocardiographic exams are confirmed as an important tool in the early detection of arrhythmias, which can be limiting factors for any procedure that requires anesthesia [15]. The use of the electrocardiogram, as a preoperative routine, enabled the early detection of this arrhythmia [5].

The diagnosis of an atrial ectopic rhythm requires a detailed study with the objective of ruling out cardiopathies that may affect the propagation of the cardiac stimulus [15]. However, on echocardiographic examination, no noteworthy morphological or functional changes [5], such as regions of fibrosis or intramural infarctions [2], were observed that would justify triggering stimuli for the ectopic rhythm [3]. Additionally, according to the echocardiographic assessment, the myocardial function was preserved. Considering that the electrolytes were within the normal range, it is not possible to correlate which electrolyte disturbances were predisposing factors for this alteration [1].

The sympathetic stimulus that could be triggered by stress during the exam [11] was not correlated in the present case since the mean heart rate was within the normal range. Furthermore, it is important to emphasize that the catecholaminergic stimulus results in an alteration in the triggering of the cardiac impulse [10]. This reduces the interval between waves, though it does not affect its morphology or the trigger site of the stimulus [15].

The use of aminophylline has been prescribed for the treatment of lung disease [8]. Although its sympathomimetic effect can influence the heart rate [13], because no significant change in heart rate was noted while observing the patient's respiratory signs for improvement [12] and the maintenance of the rhythm alteration [2], it is possible to affirm that this drug did not influence the result [9]. Just as the drug had no influence, if the nodule was malignant, it could stimulate arrhythmias [6]. After its withdrawal, it showed no influence on the detected electrocardiographic disturbance.

As it is a rare alteration, drug protocols are unknown by the author to date. In the present report, as there were no underlying associated diseases or clinical signs, the author decided to monitor the patient. Although the use of radiofrequency ablation of the

ectopic focus could have been an option [8], given the clinical picture and the unavailability of the technique in the region [14], it was not performed.

The rhythm described indicated that there was no influence on the physical findings [10], as the cardiac output was maintained. The presence of arrhythmia did not lead to the manifestation of symptoms, likely due to the low atrial participation (15-25%) in the left ventricular filling [6] and, consequently, in the cardiac output [14].

A unilateral atrial ectopic rhythm in dogs is rare; to the best of the author's knowledge, there has only been one previously published report [8]. This rhythm should be observed as a factor [2], both initially and secondarily, in order to rule out extra-cardiac causes [4], such as neoplasms, electrolyte disturbances, and hypoxia, to guide the diagnosis [7].

The study findings demonstrate the importance of the electrocardiographic evaluation as some arrhythmias have a silent character and do not, in fact, show changes in the clinical findings.

MANUFACTURERS

¹MedMega Indústria de Equipamentos Médicos. São Paulo, SP, Brazil.

²Xuzhou Jia Li Duo Import and Export Co. Ltd. Xuzhou, Jiangsu, China.

³Heine Optotechnik Industries. Herrsching, Bavaria, Germany.

⁴InPulse Animal Health Ltda. Florianópolis, SC, Brazil.

⁵Novartis Biociências S.A. São Paulo, SP, Brazil.

⁶Vetnil Indústria e Comércio de Produtos Veterinários Ltda. São Paulo, SP, Brazil.

⁷Laboratório Farmacêutico Arboreto. Juíz de Fora, MG, Brazil.

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