

CASE REPORT

# OSTIUM SECUNDUM TYPE INTERATRIAL COMMUNICATION IN DOG

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## ABSTRACT

Interatrial communication is a congenital heart disease rarely diagnosed in veterinary clinics. This case describes the atrial septal defect in a two years old female dog, from Yorkshire race, treated at Veterinary Hospital of Ingá - Uningá University Center, where the owner reporter that the animal had intermittent coughing episodes, exercise intolerance and syncope. During the clinical examination was observed cyanotic mucous, on the cardiac auscultation regular cardiac rhythm with discreet systolic murmur. The animal was sent to complementary tests, chest radiography, electrocardiogram and echocardiogram. The chest radiography test verified a right atrium increase, the doppler-echocardiograph test demonstrated an interatrial communication of *ostium secundum* type measuring approximately 0.41 cm in longitudi-

nal axis. The performance of complementary tests such as X-ray, electrocardiogram and echocardiogram, are essential for diagnosis, the disease in question only diagnosed after the echocardiogram. No treatment was performed because the animal showed intermittent clinical signs, without other signs of cardiac insufficiency. The owner was instructed to observe the clinical signs and return to six-monthly evaluations. After six months, the radiographic assessment data remained, there were no notable changes, showing the progression of the cardiopathy.

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**KEY-WORDS:** Heart disease; congenital heart disease; interatrial communication.

## INTRODUCTION

The cardiovascular system is composed of a closed and continuous system responsible for two circulations, the systemic and pulmonary. Its main functions are the supply of nutrients, removal of waste products and transport of regulatory substances, consisting of the blood system, lymphatic and hematopoietic organs (Stephenson, 2008). According to König; Rubert; Liebich (2011) the heart is a central muscular organ with capacity for contraction and relaxation, divided into four cavities, being the right and left atria and the right and left ventricles separated by the interatrial and interventricular septa respectively, without communication, and reside in a fibroelastic sac called the pericardium.

Moore and Persaud (2008) observed that in the fetal circulation oxygenated blood arrives from the placenta through the umbilical vein. As it approaches the liver it passes through the ductus venosus, which communicates the umbilical vein with the caudal vena cava. Through it, the blood arrives in the right atrium and is directed through the foramen ovale to the left atrium. After birth, the arterial duct, the venous duct, the foramen ovale, and the umbilical vessels are no longer needed.

Nordon and Prigenzi (2012) noted that congenital heart disease can be classified into cyanogenic or acyanogenic. Born (2009)

found that cyanogenic is characterized by increased blood volume and the consequent increase in venous return, leading to congestion, associated with decreased peripheral vascular resistance, causing an increase in right-left shunt. Silveira et al., (2008) shows that in acyanogenic patients there is an increase in the left-right shunt, thus leading to pulmonary blood hyperflow.

The atrial septal defect is one of the acyanogenic congenital heart diseases (CAVALCANTE et al., 2011). It was indicated by Chetbolt et al., (2006) that atrial septal defect is rare in animals, being diagnosed 0.7 - 3.4% in dogs and 10% in cats. On the report of Guglielmi et al. (2002) this communication can be classified in four types: ostium primum, when the defect is located in the inferior part of the interatrial septum; ostium secundum, a more dorsal defect of the septum and is located in the fossa ovalis, venous sinus involving the dorsal part of the atrial septum, near the junction of the cranial vena cava; and coronary sinus defect, which originates from an interruption in the formation of the wall between the coronary sinus and the left atrium. Ozyigit et al., (2006) observed that ostium primum atrial septal defect is more common in cats, whereas ostium secundum atrial septal defect is more common in dogs.

During fetal life, most of the blood, which enters the right through the vein inferior vena cava, passes to the left through the foramen ovale and ostium secundum (GARCIA; FERNANDEZ, 2001). This orifice occludes in the third week after the birth, and it

may not close and be held responsible for the paradoxical embolism, that is, the passage of emboli from venous to arterial current. Animals with this birth defect sometimes have cyanosis, due to the mixture of the two blood, due to what followed of persistence of the foramen ovale (SANTOS, 1979).

Arias et al., (2012) show that the diagnosis of atrial septal defect is based on complementary examinations, the echocardiogram being the main method, providing data such as right heart enlargement, and is confirmed with color Doppler. That radiographs in atrial septal defect show cardiomegaly, especially volume overload of the right heart (NEUWALD et al., 2007).

This paper aims to report the clinical case of an adult Yorkshire breed dog with an ostium secundum atrial septal defect.

## CASE DESCRIPTION

A 2-year-old female Yorkshire dog weighing 2.3 kg was seen at the Veterinary Hospital of the Ingá University Center - Uningá. During the anamnesis, the owner reported that the animal had been previously diagnosed with tracheal collapse 6 months ago, and no drug therapy was performed for the diagnosed disease.

Since then, the animal presented episodes of intermittent cough, exercise intolerance, and syncope. During clinical examination, cyanotic mucous membranes were observed; on cardiac auscultation, regular heart rhythm with a discrete systolic murmur. It was also verified heart rate 100bpm

(beats per minute), respiratory rate 30mpm (movements per minute), body temperature 38.8oC and TPC (capillary perfusion time) 2, considered normal physiological parameters according to Feitosa (2014).

After clinical evaluation, tests were requested, such as blood count, serum biochemistry, such as alanine aminotransferase (ALT), alkaline phosphatase (AP), urea and creatinine. The collection was performed in the jugular vein with a 25x7 needle and a 3 ml syringe. After collection, the blood was packaged in vacutainers corresponding to the tests requested. The results obtained, according to the hematological and serum analyses, were within the normal range, corroborating with the reference values of the norms of the Clinical Pathology Laboratory of the Veterinary Hospital of Uningá. The animal was referred for further tests such as chest radiography, electrocardiogram and echocardiogram.

The radiographic evaluation was performed at the Veterinary Hospital of the Ingá-Uningá University Center, using a 70Kv (Kilovoltage) and 100 Ma (Milliamperage) technique in the Philips x-ray machine, and a Konica Minolta semi-automatic developer, model Regius II.

Figure 2(A) shows a thoracic radiograph, ventro-dorsal position in which a slight increase in the right atrium is observed, with no further changes in cardiac silhouette. In figure 2(B), animal in right lateral position with unchanged lung fields, preserved tracheal caliber in its cervical and thoracic portion.

The electrocardiogram was performed at a private diagnostic center, lo-

Figure 2: Radiographic examination of a Yorkshire breed dog. (A): ventral dorsal position, arrow indicates slight increase in the right atrium showing cardiomegaly. (B): right lateral position, arrow indicates preserved tracheal caliber in its cervical and thoracic portions.

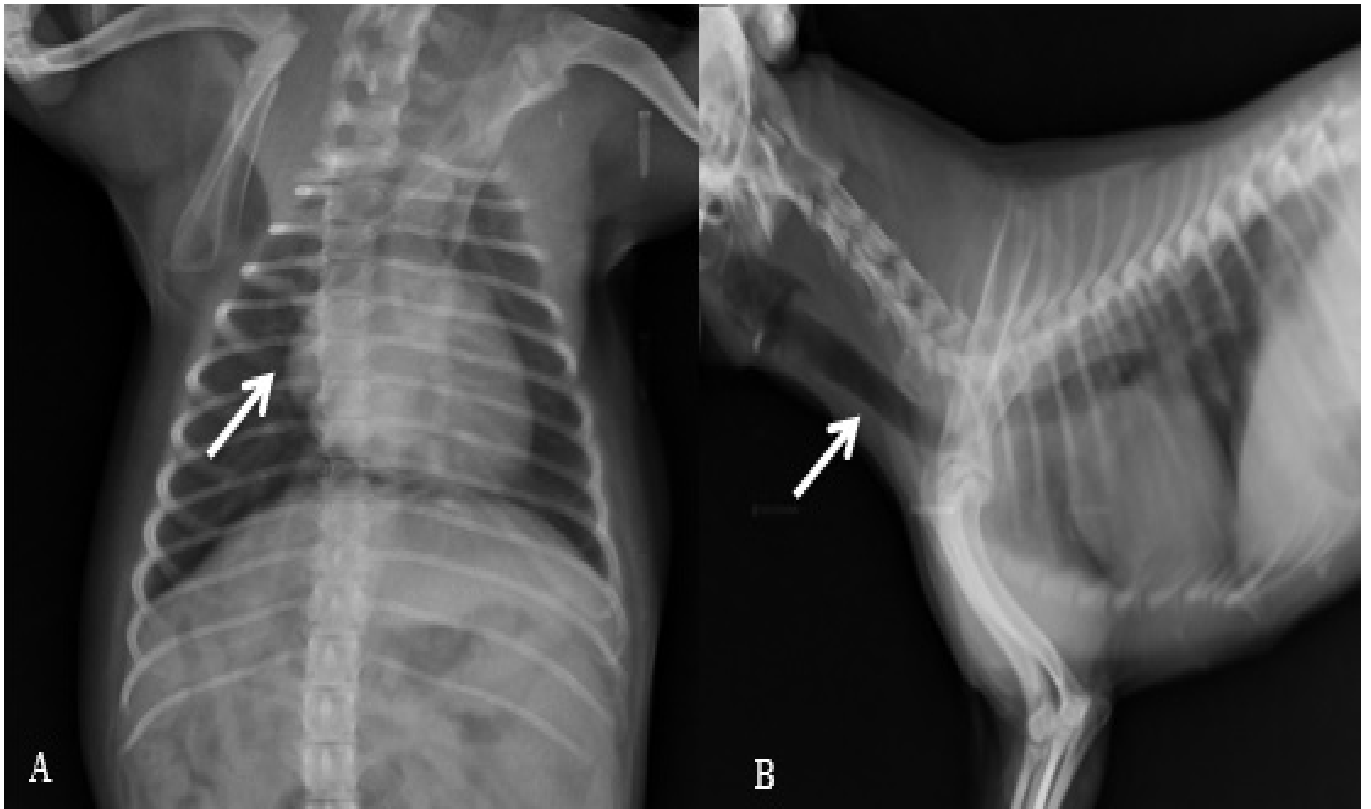


Figure 3: Echocardiogram, arrow indicates atrial septal defect.



Figure 4: Color flow echocardiogram.

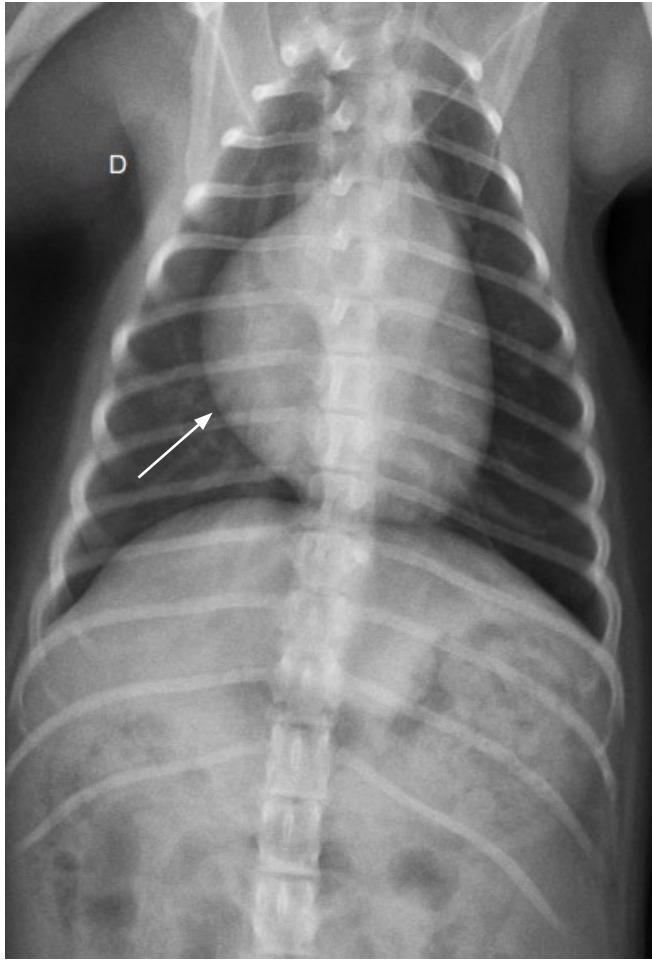


cated in Maringá, with a TEB digital device. It was verified sinus arrhythmia with wandering pacemaker, heart rate 100bpm and presenting the following derivations: DII/50mm/s Sens N.; P wave: 0.04 sec X 0.10 to 0.30Mv; PR interval: 0.08s; QRS complex:0.04s; R wave: 0.90mV; ST segment: normal; QT interval: 0.19s; T wave: negative; precordial: positive QRS and negative T in V10.

After the definitive diagnosis of the heart disease, the animal was monitored for

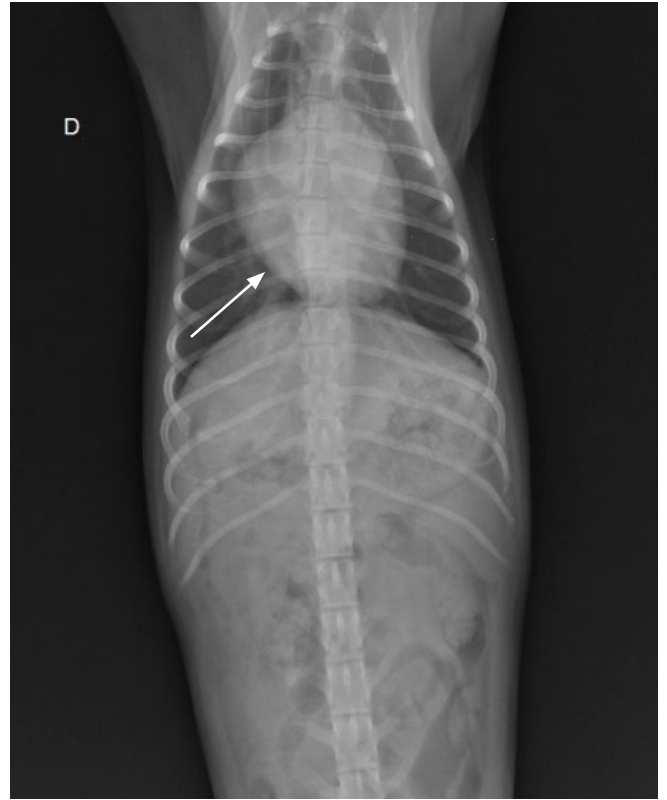
12 months for evaluation and control of the heart disease. After three months of this diagnosis, the animal returned to the Uningá Veterinary Hospital for a new clinical evaluation. During a new physical examination, it was observed by cardiopulmonary auscultation, mild cardiac arrhythmia, without significant changes in relation to the previous auscultation. A new chest radiographic exam was requested and showed a significant increase in the right atrium in relation to the previous exam (Figure 6).

Figure 6. Chest radiography, in ventral dorsal position. Arrow indicates right atrial enlargement showing cardiomegaly.



The patient returned six months after the second radiographic exam and underwent new exams for follow-up and disease progression. According to the results obtained in the imaging exam, no significant changes were observed when compared to the results obtained in the previous exams, and the same pattern of the cardiac silhouette was maintained, demonstrating that there was no evolution of the disease as illustrated in (Figure 7). No medication was prescribed and periodic follow-up every 6 months was requested.

Figure 7. Chest radiography, ventro dorsal position, arrow indicates cardiomegaly of the right atrium, with no change in relation to the previous examination.



## DISCUSSION

The congenital heart defects represent one of the most frequent causes of mortality in dogs under one year of age (ARIAS et al., 2012). It was indicated by Chetboul et al., (2006) that few reports have been published describing the natural history of interatrial communication in veterinary medicine, and most of these concern isolated cases. In the present study, a 2-year-old Yorkshire breed animal was diagnosed with an ostium secundum atrial septal defect, and the measurement of the

interatrial foramen/fossa was performed through complementary examinations.

Ozyigit et al. (2005) reported that the fossa ovalis varies in shape and size, and may be elliptical, oval, kidney-shaped and round, the average size of the fossa ovalis is 23mm. In this study we did not verify the shape of the oval fossa, but the size, being approximately 0.41cm in longitudinal axis.

According to Chetboul et al. (2006) in studies conducted on breeds predisposed to interatrial communication, there is a greater predisposition in large companion animals, being observed with higher prevalence in Boxer dogs. This differs from the present study, in which the adult dog of the Yorkshire breed is classified as a small companion animal.

Palawska et al., (2013) observed that blood flow in atrial septal defect occurs from left to right, due to the left side pressure being higher compared to the right side, causing physiological and anatomical adaptations depending on the evolution of the heart disease. According to Guglielmini et al, (2002) right to left blood flow happened in cases where the atrial septal defect is secondary to heart disease, causing right-sided heart pressure. In the present report, Doppler showed turbulent systolic flow in the right atrium, suggestive of tricuspid insufficiency, being of discrete degree, and color flow mapping verified bi-directional shunt, which may be left-right or right-left, with an overload of the right atrium, thus showing that the pressure is higher on the left side.

This overload can cause ascites, pleural effusion, pulmonary hyperflow, paradoxical septal motion, and widening of the main pulmonary artery. In the present study, no such changes were observed, since the pulmonary artery systolic pressure was estimated to be at least 14 mmHg (CAVALCANTE et al., 2011).

Guglielmini et al., (2002) noted that four of five symptomatic dogs with atrial septal defect showed exercise intolerance, syncope, dyspnea, and weakness and were adults 1.5-11 years old. These data show that atrial septal defect can remain compensated over several years and that cardiac auscultation is mostly normal. These findings corroborate the present report, where the patient had episodes of intermittent cough, exercise intolerance, and syncope, and on cardiac auscultation regular heart rhythm with a mild systolic murmur.

Diagnosis of atrial septal defect is based on complementary examinations, chest radiographs show cardiomegaly (NEUWALD et al., 2007). Modern echocardiography and Doppler techniques offer a good view of the morphology of the interatrial septum thus, facilitate early detection of atrial septal defect in awake animals (GUGLIELMINI et al., 2002). This statement corroborates with the results obtained in the present work.

Drug treatment is used when the animal has congestive heart failure, diuretics and angiotensin-converting enzyme inhibitors are administered, and when there is myocardial failure, drug therapy with positive inotropic drugs is performed. Caval-

cante et al., (2011) noted that for surgical treatment of some ostium secundum type defects, an Amplatzer device can be implanted to close the orifice. The animal in this report received no treatment, as it eventually presented with clinical signs. When the last chest radiograph was taken, as mentioned above, the cardiomegaly of the right atrium was stabilized.

## CONCLUSION

The interatrial communication is a disease that presents itself in an asymptomatic way, thus requiring a good clinical and physical evaluation of the patient during the consultation, as well as complementary exams such as chest X-ray, electrocardiogram, and echocardiogram as fundamental for the diagnosis.

# COMUNICAÇÃO INTERATRIAL DO TIPO *OSTIUM SECUNDUM* EM CÃO

## RESUMO

Comunicação interatrial é uma cardiopatia congênita raramente diagnosticada em clínicas veterinárias. Este caso descreve o defeito do septo atrial em um cão fêmea, da raça Yorkshire de 2 anos de idade, atendido no Hospital Veterinário do Centro Universitário Ingá – Uningá. O animal apresentava episódios de tosse intermitente, intolerância a exercícios e síncope. Durante exame clínico observou-se mucosas cianóticas, na auscultação cardíaca ritmo cardíaco regular com sopro sistólico discreto. O animal foi encaminhado para realização de exames complementares, radiografia torácica, eletrocardiograma e ecocardiograma. No exame de radiografia torácica verificou aumento do átrio direito, o exame de ecocardiografia-doppler demonstrou uma comunicação inte-

ratrial do tipo *ostium secundum* medindo aproximadamente 0,41 cm em eixo longitudinal. A realização dos exames complementares como radiografia, eletrocardiograma e ecocardiograma, é fundamental para diagnóstico, sendo a doença em questão somente diagnosticada após a realização do ecocardiograma. Nenhum tratamento foi realizado já que o animal apresentava sinais clínicos intermitentes sem outros sinais de insuficiência cardíaca. O proprietário foi orientado a observar os sinais clínicos e retornar para avaliações semestrais. Após seis meses, os dados da avaliação radiográfica permaneceram, não havendo alterações digna de nota evidenciando a progressão da cardiopatia.

**PALAVRAS CHAVE:** Cardiopatia; congênita; comunicação interatrial.



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