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Defeito do septo interatrial extenso do tipo *ostium secundum* em paciente canino idoso

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Resumo. Lesões do tipo shunt no septo que separa as duas câmaras atriais estão entre as malformações cardíacas congênicas mais comuns. Na maioria dos casos, estão associadas a altas taxas de morbidade e mortalidade. Uma cadela, sem raça definida, de 12 anos de idade foi encaminhada para consulta devido a sintomas como intolerância ao exercício e aumento de volume abdominal. O exame ecocardiográfico revelou comunicação interatrial do tipo *ostium secundum* (shunt da esquerda para a direita). A paciente sobreviveu por 8 meses após o diagnóstico. Durante a necropsia, foi detectado um defeito de 21 mm de diâmetro no septo atrial. Com base na localização, foi confirmada a comunicação interatrial tipo *ostium secundum*. A peculiaridade deste caso é que a paciente viveu por mais de 13 anos, em estado assintomático, com uma comunicação interatrial de amplo diâmetro, em comparação com seu porte e peso.

Palavras-chave: Defeito septal atrial, doença cardíaca congênita, *ostium secundum*

Large sized ostium secundum-type defect in an elderly canine patient

Abstract. Shunt lesions in the septum separating the two atrial chambers are among the most common congenital heart malformations. It is in most cases associated with morbidity and mortality. A 12-year-old mixed-breed female canine was referred for a detailed examination due to symptoms, such as exercise intolerance and peritoneal fluid leakage. Echocardiographic examination revealed an atrial septal defect (ASD) of the ostium secundum type (left to right shunt). The patient lived for 8 months after the diagnosis. Upon performing the necropsy, a defect of 21 mm in diameter was detected in the atrial septum. Based on the location, an *ostium secundum* type atrial septal defect was diagnosed. The peculiarity of this case is that the patient lived for over 13 years, in an asymptomatic state, with a large atrial septal defect, relative to the animal’s size and weight.

Keywords: Atrial septal defect, congenital heart disease, *ostium secundum*

Introduction

Atrial septal defect (ASD) is the second most common congenital heart malformation reported in humans (Naqvi et al., 2018), and it exhibits the same incidence rate in veterinary medicine (Chetboul et al., 2006). It has also been described in dogs, cats, and more recently, in rabbits (Chetboul et al., 2006; Nakata et al., 2018). ASD is characterized by a direct contact between the right and left atria cavities that allow shunting of blood, mostly culminating pulmonary venous return to pass from the left to the right atrium (Diaconu, 2011; Naqvi et al., 2018; Tobler & Greutmann, 2020). These cavities can appear

alone or in association with other defects ([Tobler & Greutmann, 2020](#)). The complications associated with ASD depend on the location and size of the defect, haemodynamic effect, and the relative compliance of the two ventricles ([Tobler & Greutmann, 2020](#)).

The manifestation age is variable, and the treatment of small ASD is usually not required ([Chetboul et al., 2006](#); [Tobler & Greutmann, 2020](#)). However, a large defect may be associated with a large shunt with crucial blood flow changes ([Chetboul et al., 2006](#)). Therefore, it is unexpected that an elderly dog with a large sized ostium secundum can survive for long.

Here, we describe a case report of a mixed-breed female canine who lived for over 13 years, in an asymptomatic state with a large ASD. Since human and canine hearts share many characteristics at both the organ and cellular levels ([Camacho et al., 2016](#)), this study is relevant to human and veterinary cardiologists and echocardiographers, obstetric sonographers, interventionalists, pathologists, and surgeons.

Case report

A 12-year-old mixed-breed female canine weighing approximately 4 kg was referred for a detailed examination due to symptoms, such as 2 months of exercise intolerance and leakage of peritoneal fluid at a teaching veterinary hospital. The findings on general examination included cardiac systolic murmur (Levine VI/VI) on auscultation, tachypnea, and peritoneal fluid. Echocardiography revealed dilatation of the right and left side heart and pulmonary artery, with left atrial-to-aortic diameter ratio of 3.02. Further, the colour flow Doppler indicated the presence of an ASD with a left-to-right shunt. There was an intense echocardiographic signal for mitral and tricuspid valves regurgitation. Chest radiography revealed right heart dilatation. Based on the location, an ostium secundum type atrial septal defect was diagnosed. The patient was treated with loop diuretic, aldosterone receptor antagonist, angiotensin-converting enzyme (ACE) inhibitors, and a selective inhibitor of phosphodiesterase 3 (PDE3), with periodic monitoring for 8 months until death. The necropsy was performed on the day of death, and during dissection classes for undergraduate veterinary students, a secondary type of interatrial communication ([Figure 1A](#)), which was 21 mm in length ([Figure 1B](#)), thickening of the atrioventricular valves ([Figure 1C](#)), pleural effusion, hepatic congestion, and peritoneal and tracheal fluid ([Figure 1D](#)) were demonstrated.

Discussion

Septal defects are classified into three different types, including *ostium secundum* defect, *ostium primum* defect, and *sinus venosus* defect, based on their location. *Ostium secundum* type ASD is the true defect found in the region of *fossa ovalis*, and is the most common type reported in humans, dogs, and cats ([Chetboul et al., 2006](#); [Saxena et al., 2005](#)).

Patients with ASD are often diagnosed during adulthood as the symptoms appear with aging ([Tobler & Greutmann, 2020](#)). This could be because small shunts do not possess significant sequelae, in contrast to the ventricular septal defects (VSDs) that are more hemodynamically relevant and typically diagnosed during childhood ([Tobler & Greutmann, 2020](#)). For example, a significant left-to-right shunt results in right ventricular (RV) volume overload and increased pulmonary blood flow ([Guglielmini et al., 2002](#)).

To the best of our knowledge, only one study was conducted retrospectively in veterinary, in which the researchers found that 73.7% of cases of ASD were asymptomatic ([Chetboul et al., 2006](#)). Clinical signs are the consequences of pulmonary hypertension, atrial tachyarrhythmias, and sometimes associated mitral valve disease. The most common clinical signs included the hearing of systolic murmur over the left heart base, exercise intolerance, dyspnea, and cough in dogs and cats. Moreover, cyanosis and syncope were also caused if the blood flow was in the shunt changes direction, the right-to-left shunting was detected in less than 10% of cases, and only one case was considered to be the result of a large ASD.

Symptoms usually take 30-40 years to develop in humans ([Diaconu, 2011](#)). However, there are more and more cases reported in elderly people. For example, recently, a 101-year-old patient was diagnosed with ASD ([Matsumoto et al., 2019](#)). In dogs, the mean age at the time of diagnosis is less than four-year-old ([Chetboul et al., 2006](#)).

In humans, small atrial septal defects of 4 to 5 mm are very likely to decrease in size or completely close without medical interventions ([Saxena et al., 2005](#)). It usually occurs within the first 2 years of life ([Naqvi et al., 2018](#)). However, in humans, a larger defect of more than 2 cm in diameter may be associated with a large shunt with crucial blood flow changes ([Diaconu, 2011](#); [Warnes, 2005](#)).

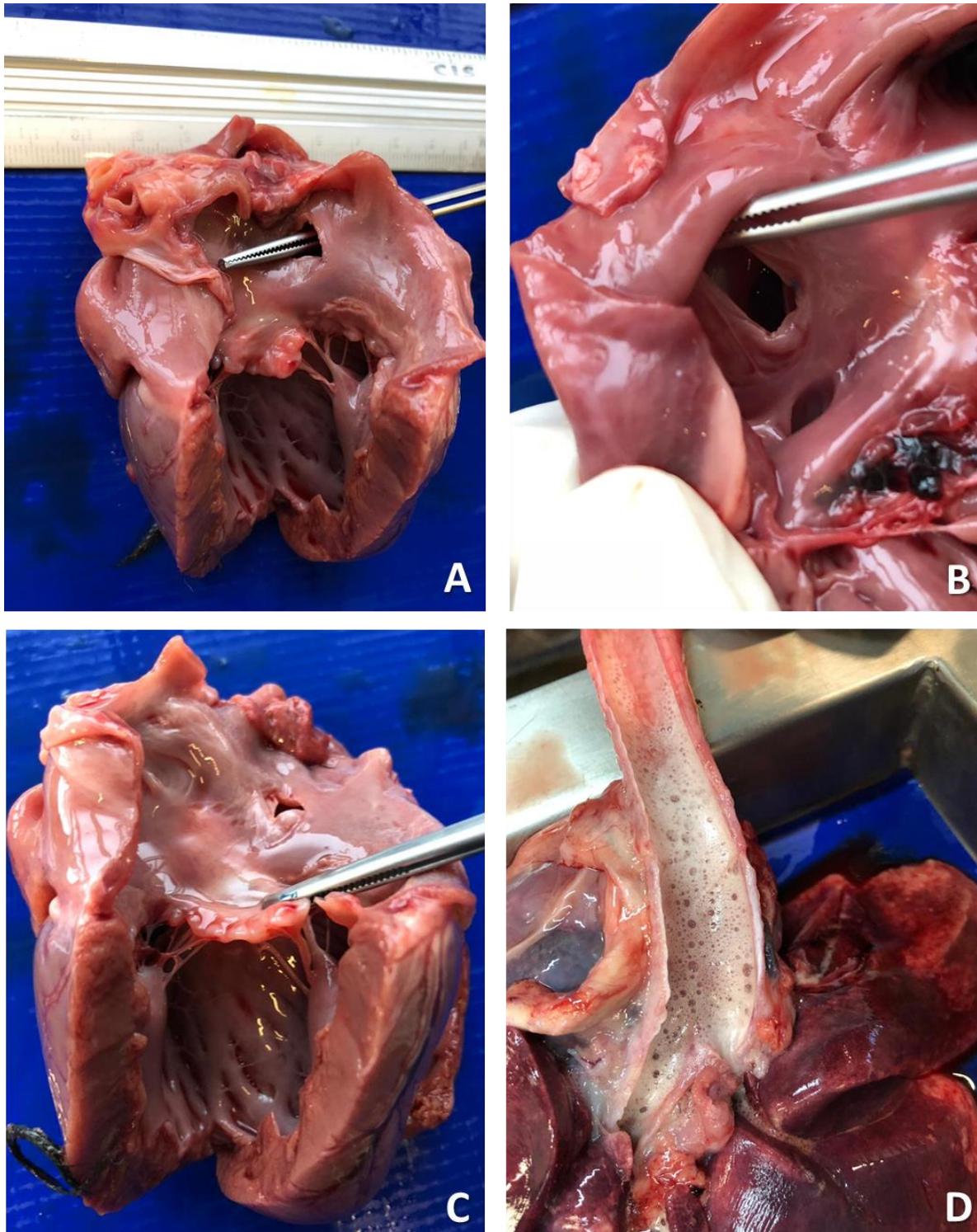


Figure 1: Necropsy findings in the dog. (A) Secondary type of interatrial communication; (B) Secondary type of interatrial communication, enlarged image to highlight the length of the hole; (C) Thickening of the mitral valve; (D) Tracheal fluid.

Conversely, ASD size in dogs ranges from 1.0. to 12.0 mm ([Chetboul et al., 2006](#)). [Gordon et al. \(2009\)](#) found a range of 7–22 mm, but all dogs were more than 15 kg and less than 7 years, which is in

contrast to our patient that was 4 kg, 12 years in age, and 21 mm ASD size. Nevertheless, it was unexpected that an elderly dog lived for over 12 years in an asymptomatic state with a large ASD. We assume that this would be life threatening, especially for humans, at any given age. We found a similar case in a woman who survived for about 50 years with an asymptomatic large septal defect (Nayak, 2017). It is possible that the dog had clinical signs, such as cyanosis and exercise intolerance, but the tutors could not detect it. Other possibility is at the same time spontaneous closure of a small ASD is possible, conversely defects can also enlarge with aging (Naqvi et al., 2018).

This case reports a largest ASDs in an older small dog among those reported to date.

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