Electronic Journal of Polish Agricultural Universities (EJPAU) founded by all Polish Agriculture Universities presents original papers and review articles relevant to all aspects of agricultural sciences. It is target for persons working both in science and industry,regulatory agencies or teaching in agricultural sector. Covered by IFIS Publishing (Food Science and Technology Abstracts), ELSEVIER Science - Food Science and Technology Program, CAS USA (Chemical Abstracts), CABI Publishing UK and ALPSP (Association of Learned and Professional Society Publisher - full membership). Presented in the Master List of Thomson ISI.

ELECTRONIC JOURNAL OF POLISH AGRICULTURAL UNIVERSITIES

2013
Volume 16
Issue 3

Topic:
Veterinary Medicine

Paslawska U. , Noszczyk-Nowak A. , Cepiel A. , Staszczyk M. , Janiszewski A. 2013. ATRIAL SEPTAL DEFECT OSTIUM PRIMUM TYPE IN A DOG - A CASE REPORT, EJPAU 16(3), #06.
Available Online: http://www.ejpau.media.pl/volume16/issue3/art-06.html

ATRIAL SEPTAL DEFECT OSTIUM PRIMUM TYPE IN A DOG - A CASE REPORT

Urszula Paslawska, Agnieszka Noszczyk-Nowak, Alicja Cepiel, Maciej Staszczyk, Adrian Janiszewski
Department of Internal Diseases with Clinic for Horses, Dogs and Cats Faculty of Veterinary Medicine Wroclaw University of Environmental and Life Sciences

ABSTRACT

Atrial septal defects are a common congenital heart malformation in humans, but relatively rare in dogs. Boxers, Doberman pinchers, Old English Sheepdogs, and Samoyeds are the most predisposed breeds. The most frequent type of atrial septal defect is the ostium secundum (98,7%) with 73,7% of affected animals being asymptomatic. An ostium primum type has been reported more frequently in cats then dogs. This article presents a case of atrial septal defect of the ostium primum type in a dog.

Key words: dog, atrial septal defects, congenital heart defects, ostium primum.

INTRODUCTION

Atrial septal defects (ASD) are a common congenital heart malformation in humans, but occur relatively rarely in dogs. Prevalence has been estimated at 0.7–3.7% of all canine congenital heart diseases [5, 10, 12]. The Boxer, Doberman pincher, Old English Sheepdog and Samoyed are the most predisposed breeds [3, 4]. Four types of ASD have been described according to the location of the septal defect: ostim primum, ostium secundum, sinus venosus type and coronary sinus type. The last two types of ASD are extremely uncommon in dogs. Atrial septal defects are most commonly of the ostium secundum type (98,7%) with 73,7% of affected animals being asymptomatic [4].

An ostium primum is located in the lower part of the interatrial septum and has been reported more frequently in cats than dogs [7]. This is a results of altered fusion between the atrial septum and the endocardial cushion and can be part of complex abnormalities, eg. interventricular septum defect, atrioventricular valves malformation, common atrioventricular channel [1, 11]. The latter results in a large communication between the atria and ventricles as well as the left and right heart chambers. Some forms of these malformations lead to small valvular regurgitations and the preclinical stadium is therefore long. Echocardiography is considered to be the best and most widely available diagnostic method for heart malformations in dogs.

CASE HISTORY

A fourteen year old Welsh Terrier, weighing 26 kg was presented to the Department of Internal Diseases with Horse, Dogs and Cats Clinic at Wroclaw University of Environmental and Life Sciences because of severe dyspnoea, exercise intolerance and depression. There were no other clinical signs and the dog was not being treated prior to the visit. Respiratory crackles were detected on thoracic auscultation, as was tachycardia and a very loud systolic murmur (V/VI degree) over both thoracic sides (loudest over the left cardiac apex). After initial clinical examination the dog was referred for a cardiology consultation in the same Clinic. Electrocardiographic examination was performed with the BTL-08-SD machine with bipolar and unipolar standard leads and *crocodile* clips. The echocardiographic examination was performed using the Aloka Prosound 4000+ ultrasound machine with a 3,5 – 8 mHz transducer.

RESULTS AND DISCUSSION

The electrocardiogram (ECG) showed supraventricular tachycardia 146/min, QRS elongation 0,065 sec and right axis deviation (mean electrical axis on the frontal plane = 105°, normal range = 40–100°). Thoracic radiography showed general cardiac enlargement (*Vertebral Heart Size* – 12, normal value ≤ 10.6), widening of the pulmonary vessels and perihilar pulmonary oedema. Two dimensional echocardiography showed dilatation of all heart chambers. Spectral and colour Doppler echocardiography showed severe mitral and tricuspid regurgitation (bicuspidal regurgitation peak velocity 4,98 m/s; pressure gradient 99,2 mmHg, tricuspidal peak velocity 2,4 m/s; pressure gradient 23 mmHg) and low interatrial left-to-right systolo-distolic shunt between the atria (Fig. 1). Because of congestive heart failure digoxin 0.01 mg/kg twice daily, benazepril 0.5 mg/kg once daily and furosemide 2 mg/kg twice daily, were prescribed. Partial remission of clinical signs was observed during the following 6 month, at which time pulmonary oedema recurred. The owner decided to euthanize the dog. At post-mortem examination myxomatous degeneration of both atrio-ventricular valves was seen and a small interatrial defect located in the lower part of the interatrial septum was found (Fig. 2). The edges of tissues surrounding the ASD were regular. Both atria and ventricles were dilated and hypertrophied.

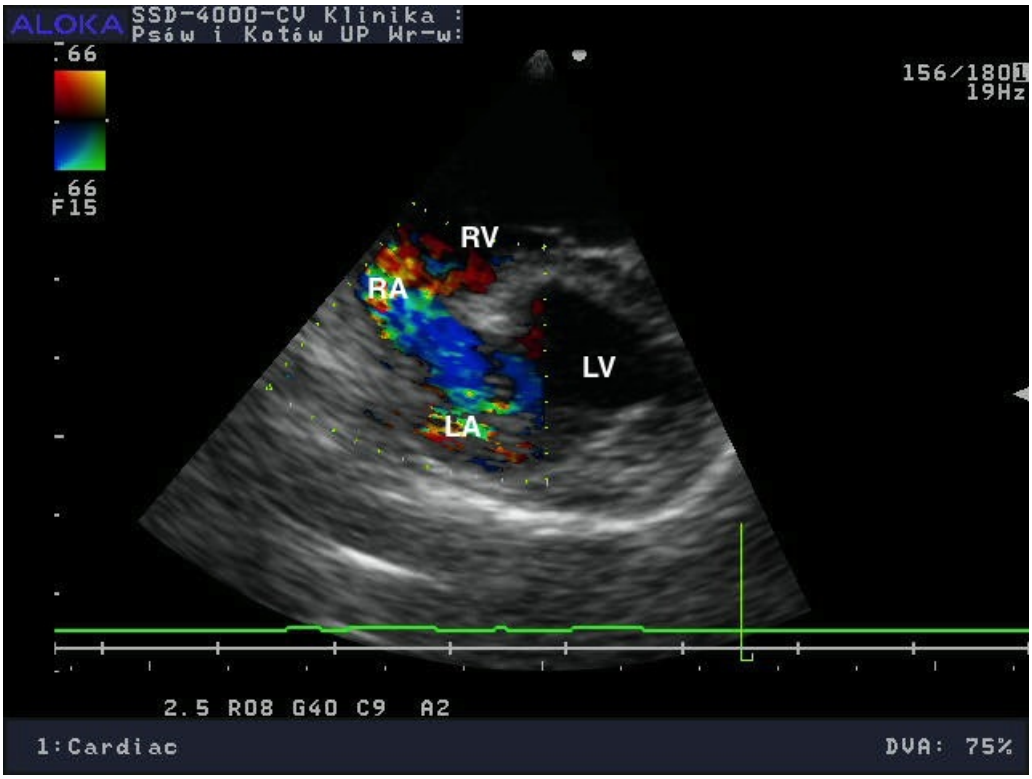

Fig. 1. Color-flow Doppler echocardiogram. The right parasternal long axis four-chamber view (modified). The aliased signal indices turbulent flow in the enlarged atria. RA – Right atrium, LA – Left atrium, RV – Right ventricle, LV – Left ventricle.

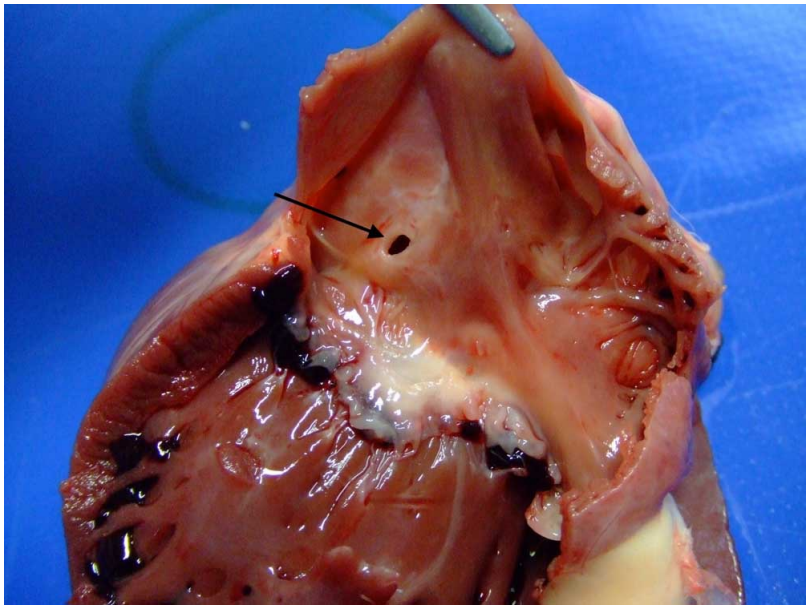

Fig. 2. Autopsy. Over the tricuspid valve is located defect in lower part of interatrial septum.

The hemodynamic consequence of interarial defect is a left-to-right blood shunt. The large defects lead to dilatation of the right atrium and a relative stenosis of the tricuspid and pulmonary valves. Pulmonary hypertension (Eisenmenger's syndrom)

developes rarely. In cases of smaller ASD clinical signs are vague and non-specific. However X-ray and ECG are characteristic and can aid in making a diagnosis. Experimental studies provided by Watt et al. in dogs have establish that a large laceration of the atrial septum, isolating the anterior-superior left ventricular wall from the main Purkinje fibers results in left axis deviation [13]. The studies of Boineau et al. [2] indicated an earlier than normal activation of left posterior ventricular wall and marked increase in the length of right bundle branch in dogs with a spontaneously occurring ASD primum. This unusual activation results in asymmetry and asynchrony of the left ventricular contraction. We cannot discriminate if the QRS prolongation is a results of conduction system abnormality or a concomitant eccentric hypertrophy (as a consequence of atrio-ventricular valvular disease). Ostium primum ASD often occurs concurrently with other cardiac malformation eg., tricuspid or bicuspid insufficiency [5, 8]. Because there was no information about previous cardiological examinations we could not definitely exclude congenital deformations of the atrio-venrticular valves. The diagnosis of ASD is usually based on the echocardiographic examination and estimation of continued postnatal blood flow between both atria. In this case the wide mitral and tricuspid regurgitation mixed with a shunt across the defect, make it impossible to quantify the defect flow velocity. The ASD in the presented case was too small to be responsible for the observed clinical signs. It seems the atrio-ventricular endocardiosis was the main reason for congestive heart failure.

There was a successful surgical repair of canine atrial septal defect of the ostium primum type under extracorporeal circulation using a cardiopulmonary bypass system [1, 8] but surgery is expensive and long-term prognosis for surgical patients is usually poor [6, 9]. A per-cutaneous technique under fluoroscopic imaging is commonly used in humans but in veterinary medicine.

The ostium primum ASD is a rare canine congenital heart disease. Echocardiography is a useful tool for the diagnosis of interatrial shunt, especially with Doppler modalities. A small-sized ASD ostium primum has a good long-term tolerance without treatment.

REFERENCES

1. Akiyama M., Tanaka R., Maruo K., Yamane Y., 2005. Surgical correction of a partial atrioventricular septal defect with a ventricular septal defect in a dog. J. Am. Anim. Hosp. Assoc., 41, 137–143.
2. Boineau J.P., Moore E.N., Patterson D.F., 1973. Relationship between the ECG, ventricular activation, and the ventricular conduction system in ostium primum ASD. Circ., 68, 556.
3. Buchanan J.W., 2001. Causes and prevalence of cardiovascular disease. In Kirk's Current Veterinary Therapy XI. Small Animal Practice Eds R.W. Kirk and J.D. Bonagura, W.B. Saunders, Philadelphia, 647–655.
4. Chetboul V., Charles V., Nicolle A., Sampedrano C.C., Gouni V., Pouchelon J.L., Tissier R., 2006. Retrospective study of 156 atrial septal defects in dogs and cats (2001–2005). J. Vet. Med. A. Physiol. Clin. Med., 53, 179–184.
5. Guglielmini C., Diana A., Pietra M., Cipone M., 2002. Atrial septal defect in five dogs. J. Small Anim. Pract., 43, 317–322.
6. Jeraj K., Ogburn P.N., Johnston G.R., Edwards W., Yano B., Brunson D., Wallace L., McGrath C., 1980. Atrial septal defect (sinus venosus type) in a dog. J. Am. Vet. Assoc., 177, 342–346.
7. Kittleson M.D., Kienle R.D., 1998. Small Animal Cardiovascular Medicine. Mosby, St. Louis, 218–296.
8. Monnet E., Orton E.C., Gaynor J., Boon J., Peterson D., Guadagnoli M., 1997. Diagnosis and surgical repair of partial atrioventricular septal defects in two dogs. J. Am. Vet. Assoc., 211, 569–572.
9. Nakayama T., Wakao Y., Uechi M., Muto M., Kageyama T., Tanaka K., Kawabata M., Takahashi M., 1994. A case report of surgical treatment of a dog with atrioventricular septal defect (incomplete form of endocardial cushion defect). J. Vet. Med. Sci., 56, 981–984.
10. Oliveira P., Domenech O., Silva J., Vannini S., Bussadori R., and Bussadori C., 2011. Retrospective Review of Congenital Heart Disease in 976 Dogs, J. Vet. Intern. Med., 25, 477–483.
11. Santamarina G., Espino L., Vila M., Suarez M.L., 2002. Partial atrioventricular canal defect in a dog. J. Small Anim. Pract., 43, 17–21.
12. Tidholm A., 1997. Retrospective study of congenital heart defects in 151 dogs. J. Small Anim. Pract., 38, 94–98.
13. Watt T.B. Jr., Freud G.E., Durrer D., Pruitt R.D., 1968. Left anterior arborization block combined with right bundle branch block in canine and primate hearts: An electrocardiographic study. Circ. Res., 22, 57–62.

Accepted for print: 22.08.2013

Urszula Paslawska
Department of Internal Diseases with Clinic for Horses, Dogs and Cats
Faculty of Veterinary Medicine
Wroclaw University of Environmental and Life Sciences
47 Grunwaldzki sq.
50-366 Wroclaw, Poland
Phone: +48 71 320 53 67
email: urszula.paslawska@up.wroc.pl

Agnieszka Noszczyk-Nowak
Department of Internal Diseases with Clinic for Horses, Dogs and Cats
Faculty of Veterinary Medicine
Wroclaw University of Environmental and Life Sciences
47 Grunwaldzki sq.
50-366 Wroclaw, Poland
Phone: (+4871) 320 10 09
email: agnieszka.noszczy-nowak@up.wroc.pl

Alicja Cepiel
Department of Internal Diseases with Clinic for Horses, Dogs and Cats

Faculty of Veterinary Medicine
Wroclaw University of Environmental and Life Sciences
47 Grunwaldzki sq.
50-366 Wroclaw, Poland
Phone: +48 71 320 10 11
email: calicja@op.pl

Maciej Staszczyk
Department of Internal Diseases with Clinic for Horses, Dogs and Cats
Faculty of Veterinary Medicine
Wroclaw University of Environmental and Life Sciences
47 Grunwaldzki sq.
50-366 Wroclaw, Poland
Phone: +48 71 320 53 67

Adrian Janiszewski
Department of Internal Diseases with Clinic for Horses, Dogs and Cats
Faculty of Veterinary Medicine
Wroclaw University of Environmental and Life Sciences
47 Grunwaldzki sq.
50-366 Wroclaw, Poland
Phone: +48 71 320 10 11
email: ajanisz@gmail.com
