

ANTEMORTEM DIAGNOSIS OF ATRIAL SEPTAL DEFECT IN A NEWBORN WATER BUFFALO CALF (*BUBALUS BUBALIS*): A CASE REPORT
Yeni Doğmuş Bir Manda Buzağısında (*Bubalus bubalis*) Atrial Septal Defekt'in Antemortem Teşhisi: Vaka Raporu

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Abstract: This report clinically diagnostic evaluation of Atrial Septal Defect (ASD) in a two-days-old, female water buffalo calf. The main clinical signs consisted of dyspnea, weakness and tachycardia. In cardiac auscultation, systolic murmurs were best heard on the left side of the sternum. The animal was diagnosed to have ASD by doppler echocardiography. Severe tricuspid regurgitation, mild mitral regurgitation, mild pericardial effusion, mitral tricuspid valve prolapsed and pulmonary valve dysplasia were determined by doppler echocardiography. Patent foramen ovale might be relatively seen in calves but It has not been reported in water buffalo calves yet. The present case report was performed to demonstrate the various heart anomalies in water buffalo calves and to help to veterinarians for the clinically evaluation of ASD.

Keywords: congenital cardiac defect; atrial septal defect, water buffalo calf

Atrial Septal Defect (ASD) has been reported in dogs, panthers, calves, small antelope and swine.(1-5) This type of defect is relatively common in dogs (6). There are few reports about ASD in calves (4,7,8). This defect may occur in conjunction with

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Özet: Bu vaka raporunda iki günlük, dişi bir manda buzağısında (Malak) Atrial Septal Defekt'in (ASD) klinik açıdan tanısı değerlendirildi. Ana klinik belirtiler; nefes darlığı, halsizlik ve taşikardi idi. Kalp bölgesinin oskültasyonunda; sistolik üfürüm sternumun sol tarafında net olarak duyuldu. Doppler Ekokardiyografi bulgularına dayanarak; ASD, şiddetli triküspit yetmezliği, hafif mitral yetmezlik, hafif perikardiyal efüzyon, mitral kapak prolapsusu, triküspit ve pulmoner kapak displazisi tanısı konuldu. Patent foramen ovale buzağularda görülebilmese rağmen malaklarda rapor edilmemiştir. Bu vaka raporu malaklarda da çeşitli kalp anomalilerini göstermek ve klinisyenlere faydalı olmak amacıyla hazırlanmıştır.

Anahtar kelimeler: Kongenital kardiyak bozukluk, Atrial septal defect, manda buzağısı

other defects such as Patent ductus Arteriosus (PDA) (1) and multiple anomalies (Pentalogy of Cantrell etc.) (9). Atrial Septal Defect is a connection between the each atrium at the septal level (9-11). The cause of ASD is unknown. Proposed etiologies included maternal viral infections, use of pharmacologic agents, exposure to toxins, nutrition of deficiencies in early pregnancy and some hereditary factors (8). Two different types of defect have been reported. Ostium secundum defect is the most common type of ASD. This defect placed on the midportion of the intra-atrial septum. The shunt is usually from left to right and if the defect is large, right ventricular and left atrial dilatation may be present. A patent foramen ovale is seen most fre-

quently. Second type is sinus venous type defect. This is associated with anomalous drainage of one or more pulmonary veins into the right atrium. Animals affected due to this defect are frequently asymptomatic but the clinical findings observed may include lethargy, fatigue, dispnea, symptoms associated with right ventricular failure. Pulmonary hypertension may result from changes in pulmonary vasculature due to the increased blood volume. Cardiac murmur may be clinically inapparent in small defects (7-8). A holosystolic crescendo-decrescendo may be heard at the left heart base. Thoracic radiograph, 2D echocardiography and cardiac catheterization may be useful in the diagnosis of these cases. To our knowledge no previous report describes this syndrome in water buffalo calves. For this reason, the aim of this report was to evaluate the clinical, radiographic and echocardiography findings in a water buffalo calf with ASD. Another objective of this case report is to help to veterinarians for the clinically evaluation of ASD in water buffalo calf.

CASE STUDY

Two days old, male water Buffalo-calf was presented to the Clinic of Internal Medicine at the Veterinary Faculty from Incesu province with a

history of anorexia, dispnea, and abdominal pain and absent of feces. On visual examination, the animal was lethargic and the visible mucous membranes were hyperemic. On physical examination, the calf was depressed and in a poor body condition (18 kg) but was not premature. It was determined hypothermia (rectal temperature 33°C), tachycardia (166 beats/min), and tachypnea (120 breaths/min). Auscultation of lung fields and heart revealed an increased breath sounds and a grade 5/6 pansystolic murmur with its point of maximal intensity in the nearly pulmonic valve area. Animal was comatose. In first clinical evaluation, signs of heart failure and absent of feces were suspected due to cardiac anomaly and atresia recti.

Thoracic radiographs were taken at two different position (Poskom PXP-40 HF, Poskom, Inc., Midas Venture Tower B/D, 75-1, Koyang City/South Korea). In L/L radiographic findings, contact surface of the heart to sternum increased. The bifurcation region of trachea deviated to dorsal (Figure 1A). In V/D radiographic findings, in 10 hours positions curved boundary were observed at the level of right atrium. It was monitored right half of the heart lies between the lower right chest wall distance (Figure 1B).

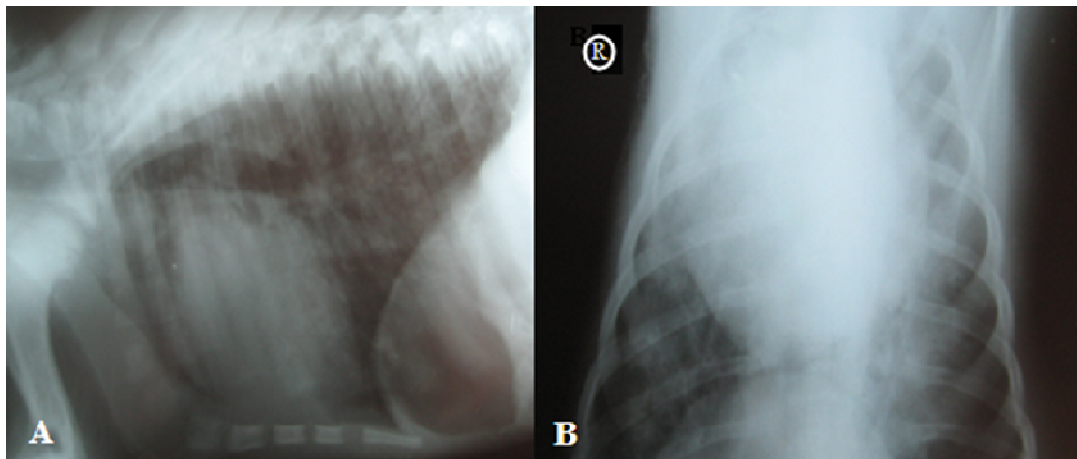


Figure 1. A: Radiographic view (LL) of the thorax of the water buffalo calf: contact surface of the heart to sternum increased. The bifurcation region of trachea deviated to dorsal. **B:** Radiographic view (DV) of the thorax: in 10 hours positions curved boundary were observed at the level of right atrium. Asymmetric position of the heart.(®:Right)

In Electrocardiography findings, PR prolongation was revealed. First degree of hearth blockage was determined. Ultrasonographic diagnosis was based on visualization of the defect in the atrial septum when the heart was imaged in the right parasternal long axis using 2-D and color flow Doppler. Echocardiography data revealed the size of the defect and its location in the interatrial septum. Ultrasonographical examination was made by SonoSite 180 model echocardiographic machine (SonoSite, Inc., 21919 30th Drive SE Bothell, WA 98021/USA).

The level of parameters obtained from M-mode echocardiographic evaluation of this case was given in Table I. Atrial septal defect (Figure 2), sever tricuspid regurgitation (Figure 3), mild mitral

regurgitation, mild pericardial effusion and mitral and tricuspid valve prolapse in right parasternal long axis 4-chamber view and pulmonary valve dysplasia in right parasternal short axis view were determined. Decreased left-heart flow values are expected with a left-to-right shunting ASD. Pulmonary valve blood flow velocity increased, and pulmonary valve velocity (PVV) was 331,1 cm/s (Figure 4). Left to right shunt area was determined as the mosaic-colored flow turbulence at atrial septum level by color Doppler examination (Figure 2). In Pulsed Wave (PW) Doppler examination at the level of the mitral valve, E and A wave peak velocity and pressure values were determined to be decreased.

Table I. Doppler echocardiography findings

| Parameters | Measurements |
|---|--------------|
| Interventricular septum thickness (diastolic) (IVSd) | 0.60 mm |
| Left ventricular diameter (diastolic) (LVDd) | 2.90 mm |
| Left ventricular posterior wall thickness (diastolic) (PWd) | 0.73 mm |
| Interventricular septum thickness (systolic) (IVSs) | 1.12 mm |
| Left ventricular diameter (systolic) (LVDs) | 1.42 mm |
| Left ventricular posterior wall thickness (systolic) (PWd) | 1.22 mm |
| Left ventricular fractional shortening (%) LVFS | 30 % |
| Ratio of Left ventricul/Aort (LA/Ao) | 1.11 |

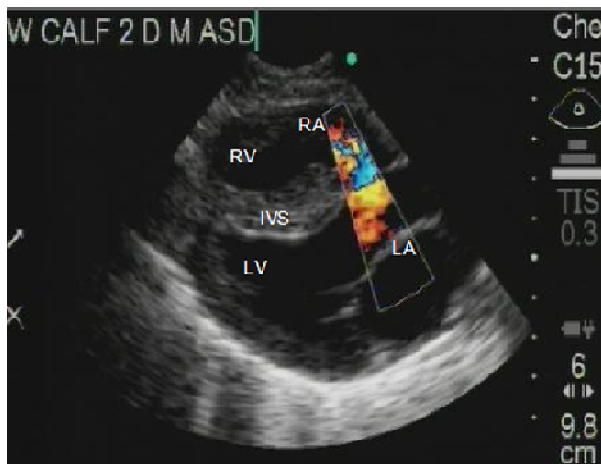


Figure 2. Color Doppler echocardiography view of left to right atrial shunting flow. Noticed to turbulence blood flow (Mosaic picture) from the atrial septal defect in the right parasternal long axis 4 chamber views. (3.5 mHz). RV= Right Ventricle, RA= Right Atrium, IVS=Interventricular septum, LV= Left Ventricle, LA= L Atrium

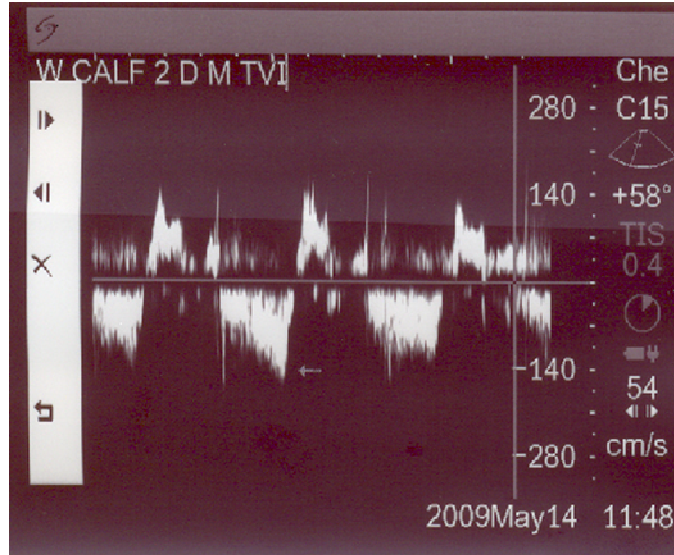


Figure 3. PW Doppler echocardiography traces from level of the pulmonary valve. (Arrow): Higher tricuspid regurgitation.

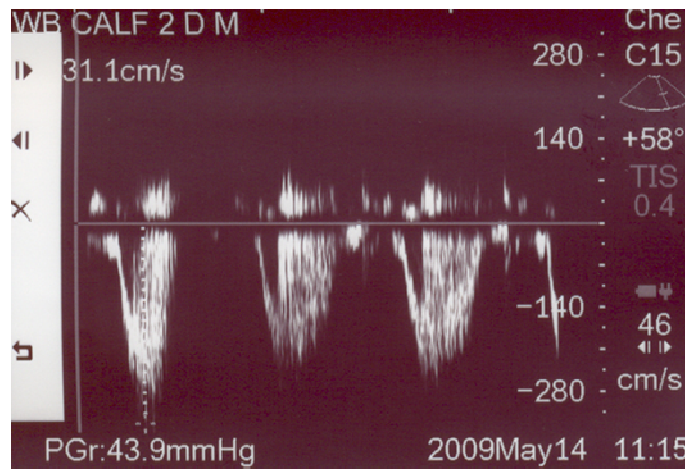


Figure 4. PW Doppler echocardiography traces from level of the pulmonary valve. Increased pulmonary flow velocity determined by 331,1 cm/s

DISCUSSION

Clinical conditions affecting the heart in cattle include bacterial endocarditis, pericarditis, cardiomyopathy, myocarditis, cor pulmonale and congenital cardiac defects (10). Congenital defects can include ventricular septal defect (VSD), ASD, dextroposed aorta, persistent foramen ovale, patent ductus arteriosus and combinations of these, for example, tetralogy of Fallot (1-4,7). Atrial Septal Defect is not relatively a common congenital syndrome of heart in calves, and it is ignored by a number of practitioners and is frequently considered by veterinary practitioners as having a poor long-term prognosis, irrespective of the pathology involved. Gopal et al. (4) reported that the number of interatrial septal defect was two in a 14-year retrospective study of calves with 78 congenital cardiac defects. Seven cases of congenital cardiac anomalies in calves were not determined any ASD case in another report (11) Although two cases of patent ductus arteriosus were described in 2 Murrah buffalos, a 7.5-month-old heifer calf and a 5-month-old bull calf (12). This is the first report in Water Buffalo calf with ASD, it lived only 3 days after birth. A poor prognosis for long-term survival has been reported for cases of VSD (5). Some cattle with VSD may show no clinical signs until adulthood, suggesting that there are varying severities of pathology (13). But clinical signs appeared shortly after parturition in this case. As there were not venous distension and pulse, oedema, pain, polyarthritis, we supposed congenital heart defects in prediagnosing of this case.

The most useful clinical procedure is auscultation of the heart for differentiating between endocarditis, pericarditis and congenital cardiac defects. The presence of muffled heart sounds in cases of pericarditis, even when not accompanied by splashing heart sounds, had a high sensitivity (92%) and specificity (94%). The two other conditions were generally characterized by the presence of an audible murmur. Audible murmur without heart sound splashing was present in this case with ASD. In ASD cases, the shunt is usually left to right, and the murmur is the result of increased volume being ejected across the pulmonic valve. M-mode Echo-

cardiographic results obtained from this case consisted with literature (8). With moderate sized atrial defects survival has been possible, but the animals have not grown normally and have shown exercise intolerance. With large atrial septal defects the animals have not thrived, have shown exercise intolerance, and have often not survived beyond the first few months. In this case in addition to detection of systolic murmur, the prolongation of the PR interval is probably due to the enlargement of the atria that is common in ASDs (14). It is reported that if the defect is large, right atrial, right ventricular, and left atrial dilatation may be present (8). The radiographic findings revealed right atrial dilatation. This finding supported by ECG and physical examination findings (14).

Differential diagnoses include functional murmur, pulmonic stenosis, VSD, or PDA. A definitive diagnosis can be made by two-dimensional echocardiography in which enlarged right atrium, right ventricle and left atrium are imaged. Hagio et al (15). reported that 2 D-echo technique is noninvasive and easily applicable for the diagnosis of bovine intracardiac congenital heart disease. And it limits to the diagnosis of some extracardiac vascular anomalies. Pulsed wave doppler can be used to demonstrate the shunt through the ASD. In this study, ASD was easily diagnosed by Doppler echocardiography and these findings supported physiological and radiographic findings.

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