

Utility of Transesophageal Echocardiography in the Diagnosis of Tetralogy of Fallot in a Dog (Bir Köpekte Fallot Tetralojisinin Tanısında Transözefagal Ekokardiyografinin Yararlılığı)

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Dear Editor,

Tetralogy of Fallot (ToF) is an uncommon complex congenital cardiac defect in dogs and cats. Its incidence in dogs has been reported to be 0.0025% ^[1,2]. Transesophageal echocardiography (TEE) can be valuable in diagnosis and accurate study of complex congenital heart defects in human medicine, but there is limited data on this subject in veterinary medicine ^[3]. Thus, we reported here utility of TEE compared with trans-thoracic echocardiography (TTE) for the diagnosis of ToF in a dog.

A 4.5 months-old, male, English Bulldog was presented with a history of poor growth, respiratory stress and exercise intolerance since one-month. Physical examination revealed pale mucous membranes, precordial thrill and murmur (4/6 grade) at right and left cardiac bases suggestive for the presence of congenital cardiac defect. Thoracic radiography showed cardiomegaly (vertebral heart score 12.4; reference <10.5), alveolar oedema, bulging of the main pulmonary artery (1 o'clock position on VD view) and dorsal deviation of caudal vena cava and trachea (LL view). Common causes of pulmonary artery bulge include pulmonary hypertension, pulmonic stenosis, patent ductus arteriosus (PDA) or aortopulmonary window (APW) ^[4]. In this dog, PDA and APW were not considered during diagnostic work-up because of which continuous machinery murmur was not auscultated, and ECG revealed small complexes of

QRS and deep S wave on lead II suggestive for right-sided heart disease ^[3].

By use of standard TTE techniques, left ventricular (LV) dimensions and interventricular septum and LV free wall thickness at diastole and systole were observed within reference ranges ^[4], but fractional shortening (16%; reference >25%) and ejection fraction (48%, reference >50%) were lower than their references, incompatible with the poor LV contractility. Wall thickness of right ventricle (RV: 1.71 cm) was nearly equal to that of LV (1.73 cm). Since the RV free wall thickness is normally less than 1/2 of the LV free wall thickness ^[4], our observation indicated RV hypertrophy due to pulmonary hypertension, pulmonic stenosis, RV outflow tract obstruction or congenital cardiac defect such as ventricular septal defect (VSD) and ToF. TTE had a limitation to show further details in this dog, that is, it was challenging to take the high quality images and video records of diagnostic importance due to anatomical structure of the thorax with dorsoventral compression and narrow intercostal spaces in this breed (English bulldog).

TEE allows imaging of the heart through the oesophagus using a special transducer mounted on a modified endoscope. The proximity of the heart and minimal intervening structures enables the acquisition of high-resolution images that are consistently superior to routine TTE and optimal imaging of the heart base anatomy and related structures ^[3].



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Thus, in this dog TEE was performed with anesthesia protocol in this dog as reported in our case presentation [5]. Maximal velocities (2.79 m/s; reference <1.5 m/s) and pressure gradients (31.2 mmHg; reference <25 mmHg) of main pulmonary artery indicated the presence of mild pulmonic stenosis. On the parasternal long axis view, VSD (defect size: 0.88 cm) and overriding aorta were detected and thereafter color Doppler imaging of the defect showed high velocity blood flow (Vmax: 4.5 m/s, PG: 82.4 mmHg) from LV into RV and pulmonary artery (left to right shunt). In addition to color Doppler imaging (Fig. 1), micro-bubble study showed the defect localization just below the pulmonary valve and between two ventricular chambers, suggestive for a perimembranous or conoventricular VSD (type-1) in this case. Based on these observations including a VSD, pulmonic stenosis, overriding aorta and right ventricular hypertrophy, ToF was diagnosed in this dog, as suggested [2,4].

Before surgical correction of the defect, general condition of the dog was considered to improve by increasing cardiac contractility and decreasing cardiac volume over load and pulmonary oedema with medical therapy. Thus, diuretic (furosemide 2 mg/kg 2x1 po), ACE-I (enalapril 0.5 mg/kg, 1x1, po) and inodilator (pimobendan 0.5 mg/kg divided twice daily, po) were suggested [4]. Unfortunately, the dog died at home one week after initial of the therapy. Necropsy confirmed the presence of ToF and their diagnostic criteria [2,4].

In conclusion, TEE plays a crucial role in the anatomical, functional, and hemodynamic evaluations of dogs with a wide range of congenital and acquired heart diseases. This case presentation suggests that TEE as compared to traditional TTE is superior to show complex cardiac pathology such as ToF in English bulldog that has unique anatomical structure of thorax. TEE can offer high quality image, however it may be high invasive and critical for some patients, especially with respiratory distress. Poor LV contractility in these cases should also be considered

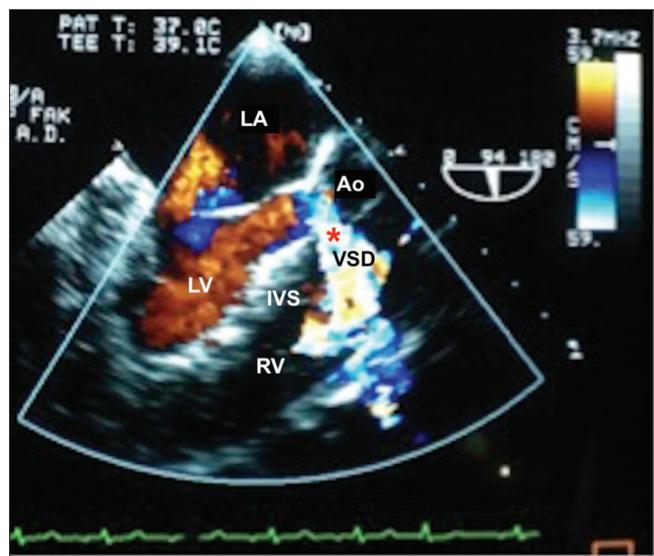


Fig 1. The color flow image of TEE showed the defect with severe turbulence flow on parasternal long axis view

Ao: Aort, LA: Left atrium, RA: Right atrium, IVS: Interventricular septum, VSD: Ventricular septal defect, * defect

as a poor prognostic indicator despite medical support, as well.

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