

DOPPLER ECHOCARDIOGRAPHIC PARAMETERS IN APPARENTLY HEALTHY GERMAN SHEPHERD DOGS

Snehal P. Saudagar¹, D.A. Pawalkar², R.V. Gaikwad³

¹M.V.Sc. Student, ²Assistant Professor, ³Associate Professor & Incharge, Department of Veterinary Clinical Medicine, Ethics & Jurisprudence; Bombay Veterinary College, Mumbai – 400 012 (MHS.).

[Received: 11.11.2017; Accepted: 14.5.2018]

Twenty apparently healthy German shepherd dogs (10 males and 10 females) were subjected to Dopplerechocardiography and findings correlated with body weight (BW) and body surface area (BSA). The dogs were awake and unsedated, in right lateral recumbency. The following parameters were measured on the Doppler images of four and five chamber view from left parasternal view. viz., Mitral E point peak velocity (MEVp), Mitral A point peak velocity (MAVp), Gradient pressure for mitral valve (MEGp), Mitral E/A, Tricuspid E point peak velocity (TEVp), Tricuspid A point peak velocity (TAVp), Gradient pressure for tricuspid valve (TEGp), Tricuspid E/A, Aortic peak velocity (AVp) and Gradient pressure for aortic valve (AGp). No statistically significant difference was observed in blood velocities across the aortic, mitral and tricuspid valves in male and female. Mitral E/A -0.78, -0.79 and tricuspid E/A -0.57, -0.57 was moderately correlated with BW and BSA respectively in females.

Keywords: Blood flow velocities, Doppler echocardiography, German shepherd dog.

Cardiac diseases are one of the most important diseases being detected frequently in working dogs. Echocardiography is the non-invasive and nonionizing real time visualization of cardiac structure, mechanical activity and blood velocities through different valves in the heart. Echocardiography is used extensively to achieve definitive diagnosis of most cardiac diseases in some parts of the world. Echocardiography has become an indispensable tool in the specialty practice of veterinary cardiology (Kienle and Thomas 2002) and has been adopted widely and is used extensively to achieve definitive diagnosis of most cardiac diseases.

Due to large variations in body weight, sizes observed in dogs the need for separate reference ranges for every breed regarding various echocardiographic parameters is necessary. The aim of this study was to establish the normal Doppler echocardiographic values in apparently healthy German shepherds, in order to serve it as reference values.

This study included 20 apparently healthy German shepherd dogs of both gender (10 males and 10 females), ranging in age from 2 to 8 years and their weight ranged between 25 - 40 kg. The dogs were subjected to complete clinical examination, thoracic radiography (Left lateral), electrocardiogram (ECG) and haemato-biochemical examination (CBC, LFT, KFT and Serum electrolytes). An

ultrasound unit MyLab40VET, phased array Cardiac Probe PA230 with frequency ranged between 3.0 to 5.5 MHz was used for Doppler echocardiographic examination. Sedation or anaesthesia was not given to any of the dog. After clipping of the fur on the left thoracic wall, dogs were placed in right lateral recumbency. The left precordial thrill was palpated by fingers. Ultrasonic gel was used for coupling the transducer with the skin. Transducer location used was between right 3rd to 5th intercostal spaces (left parasternal). Valvular blood flow velocities were measured from left sided four and five chamber view. With each examination site using continuous wave (CW) Doppler, the transducer angle was guided by audio and by the waveforms with a greater velocity.

The Mitral and tricuspid valve flows were obtained using continuous wave in order to determine the velocity peaks and their E/A ratios. The velocity peaks for aortic valves were obtained by making beam pass through the aorta, negative and laminar flows were observed. Standard imaging planes were recorded. A simultaneous ECG was recorded to assist in timing the flow signal with cardiac cycle. Following Doppler parameters were recorded using CW mode from left parasternal view MEVp, MAVp, MEGp, Mitral E/A, TEVp, TAVp, TEGp, Tricuspid E/A, AVp and AGp.

All the echocardiographic measurements were performed on three consecutive cardiac cycles and their averages were used for statistical analysis. The mean, standard deviation (SD) and standard error (SE) of all the measurements were calculated as per the standard methods. Correlation

coefficient was applied to assess the relation of each Doppler echocardiographic parameter with body weight and body surface area. Student 't' test was used to compare the mean values between males and females and to set the significance level (%).

Table-1.depicts the Doppler echocardiographic findings in apparently healthy German shepherd dogs.

Table 1: Doppler echocardiographic findings in apparently healthy German shepherd dogs

Sr. No.	Parameter	Overall / Range (n=20)	Male Mean ± SE / Range (n=10)	Female Mean ± SE / Range (n=10)	t calculated	t table
1	AVp	1.20 ± 0.03 / 0.92 – 1.41	1.17 ± 0.06 / 0.92 – 1.41	1.23 ± 0.04 / 1.02 – 1.40	0.41 ^{NS}	2.10 at 5% L.S. with 18 d.f
2	MEVp	0.82 ± 0.02 / 0.64 – 1.02	0.84 ± 0.03 / 0.64 – 0.97	0.8 ± 0.03 / 0.66 – 1.02	0.50 ^{NS}	
3	TEVp	0.68 ± 0.02 / 0.55 – 0.84	0.69 ± 0.03 / 0.59 – 0.84	0.68 ± 0.03 / 0.55 – 0.82	0.70 ^{NS}	
4	Mitral E/A	1.38 ± 0.05 / 1.12 – 1.80	1.38 ± 0.07 / 1.12 – 1.73	1.38 ± 0.08 / 1.12 – 1.80	0.99 ^{NS}	
5	Tricuspid E/A	1.31 ± 0.04 / 1.00 – 1.80	1.27 ± 0.06 / 1.00 – 1.50	1.35 ± 0.07 / 1.08 – 1.80	0.39 ^{NS}	
6	AGp	5.71 ± 0.32 / 3.39 – 7.95	5.58 ± 0.52 / 3.39 – 7.95	6.09 ± 0.41 / 4.16 – 7.84	0.68 ^{NS}	
7	MEGp	2.49 ± 0.15 / 1.49 – 3.76	2.83 ± 0.21 / 1.64 – 3.76	2.62 ± 0.22 / 1.49 – 3.24	0.02 ^{NS}	
8	TEGp	2.05 ± 0.12 / 1.21 – 2.89	1.94 ± 0.16 / 1.49 – 2.82	1.86 ± 0.15 / 1.21 – 2.89	0.36 ^{NS}	

NS: Non significant ($p \leq 0.05$)

There was no statistically significant difference observed in blood velocities across the aortic, mitral and tricuspid valves in male and female. Mitral and tricuspid E/A was moderately correlated with BW and BSA in females (Mitral E/A -0.78, -0.79 and Tricuspid E/A -0.57, -0.57 respectively with BW and BSA). For no other Doppler parameter correlation coefficient ≥ 0.50 . Observations are in agreement with Muzzi *et al.* (2006) except E and A velocity peaks showed no correlation with BW.

Further studies on Doppler ecocardiographic findings in young, adult,

middle aged and geriatric German shepherd dogs are needed.

References

- Muzzi, R.A.L., Muzzi, L.A.L., De Araujo, R.B. and Cherem, M. (2006). Echocardiographic indices in normal German shepherd dogs. *J. Vet. Science*, 7(2): 193-198.
- Kienle, R.D. and Thomas, W.P. (2002). Echocardiography in "Small Animal Diagnostic ultrasound" J.S. Nyland and T.G. Mattoon (Eds.); 2nd edn. W.B. Saunders, Philadelphia, U.S.A. Pp: 354-424.