Journal of Veterinary Cardiology (2014) **16**, 109—113

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Journal of Veterinary Cardiology
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Double-chambered left ventricle in a cat

Paul J. Smith, BVetMed DVC MRCVS [a,*], **Marwan N. Tarazi, BVSc MSc MRCVS** [b], **Siew Yen Ho, FRCPath, FESC, FHEA** [c]

[a] *East Anglia Cardiology Ltd, 5 Hall Lane, Great Hormead, Buntingford, Hertfordshire, UK*
[b] *Nuvet, Hedley House, Rightwell, Bretton, Peterborough, UK*
[c] *Cardiac Morphology Unit, National Heart and Lung Institute, Imperial College and Royal Brompton Hospital, Dovehouse Street, London SW3 6LY, UK*

Received 25 April 2013; received in revised form 24 January 2014; accepted 10 February 2014

KEYWORDS
Feline;
Congenital heart disease;
Moderator band;
Left ventricular band

Abstract Double-chambered left ventricle is a rare congenital disorder in which the left ventricular cavity is subdivided into two cavities by an anomalous septum or muscle band. We describe a case of double-chambered left ventricle, most likely caused by the presence of excessive left ventricular bands, in an asymptomatic cat.

An 11-year old, male neutered, 4.12 kg, Siamese cat presented for the investigation of a heart murmur identified by the primary veterinarian as an incidental finding during routine physical examination. No clinical signs were reported and the cat was not receiving any medication at the time of the referral investigation. On physical examination, the cat was bright, alert and responsive and in good body condition. No dyspnea or tachypnea was evident at rest. The heart rate was 210 bpm and the rhythm was regular. A grade 4/6 systolic heart murmur was audible over the left and right sternal borders. The remaining physical examination was unremarkable. A standard 6-lead ECG demonstrated a normal sinus rhythm with tall R-waves in lead II (1.7 mV). The heart rate was 207 bpm and there were no ectopic complexes. An echocardiographic examination[d] was performed with the cat lightly restrained in lateral recumbency on a purpose-designed table, allowing placement of the transducer[e] on the dependent side of the thorax. Echocardiography showed a band of tissue, resembling a shelf with

* Corresponding author.
E-mail addresses: paul@eastangliacardiology.com, paulsmith803@googlemail.com (P.J. Smith).

[d] Vivid Q Cardiac Ultrasound System, GE Medical Systems.
[e] 2.7—7.0 MHz Phased Array Probe, GE Medical Systems.

1760-2734/$ - see front matter
http://dx.doi.org/10.1016/j.jvc.2014.02.002

Abbreviations

DCLV	double-chambered left ventricle
DCRV	double-chambered right ventricle
LA	left atrium or left atrial
LV	left ventricle or left ventricular

multiple openings (fenestrations) bridging the left ventricle (LV). The band of tissue appeared to extend from the LV free wall to the interventricular septum approximately midway between the origin of the papillary muscles and the basal attachments of the mitral valve (Fig. 1). The tissue shelf divided the LV into a basal and apical portion. The basal portion of the LV communicated with the left atrium (LA) and with the normally positioned aorta. The apical portion of the LV had no definite inlet or outlet; instead, a to-and-fro connection was apparent with the basal portion of the LV cavity through the fenestrations. The tissue shelf partially obstructed blood flow from the basal portion of the LV cavity into the apical portion during diastole (Fig. 2) with a peak velocity of 2.44 m/s and from the apical portion to the basal portion during systole (Fig. 3) with a peak velocity 3.3 m/s. This equated to a peak pressure gradient across the shelf during ventricular systole of 44 mmHg. The LV end-diastolic diameter measured 17.9 mm (reference range 15.0 $\pm$ 2 mm).[1] The maximum septum-to-free wall (anteroposterior) LA dimension (measured at end-ventricular systole

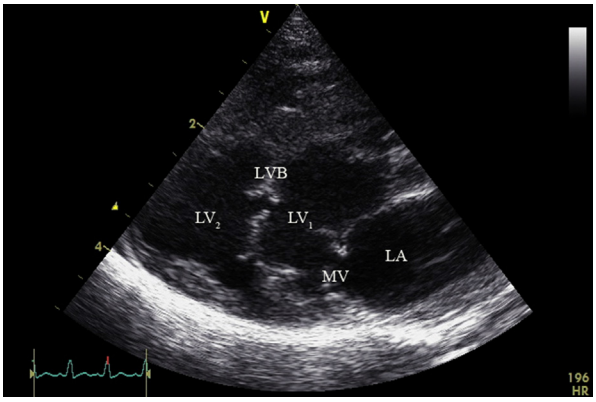

Figure 1 A right-parasternal long-axis four-chamber echocardiographic image showing a band of tissue extending from the LV free wall to the interventricular septum approximately midway between the origin of the papillary muscles and the basal attachments of the mitral valve. The band of tissue is perforated in the center. LA, left atrium; MV, mitral valve; LV_1, basal portion of left ventricle; LVB, left ventricular band; LV_2, apical portion of left ventricle.

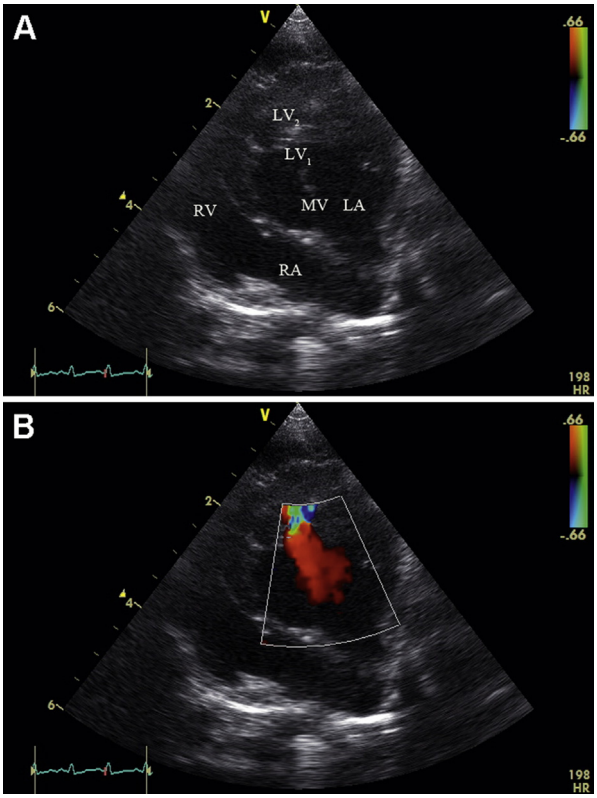

Figure 2 Two-dimensional left apical four-chamber view (A) and left apical four-chamber color flow Doppler echocardiographic image (B), both recorded during late diastole. The color flow Doppler image shows turbulent blood flow passing from the basal portion of the left ventricle (LV_1), across the central perforation of the tissue shelf, into the apical portion of the left ventricle (LV_2). RA, right atrium; RV, right ventricle; LA, left atrium.

by choosing the frame just before mitral valve opening from a right-parasternal, long-axis, four-chamber view) was 2.1 cm (reference range 1.19—1.51 cm).[2] The subjective assessment of LA size, taking into consideration all echocardiographic views, was that the LA was moderately dilated. There was also mild mitral valve insufficiency. Tissue Doppler imaging using a spectral display was employed to investigate myocardial motion. Myocardial velocities were recorded from the lateral mitral annulus along the longitudinal axis of the heart in the left apical four-chamber view. The myocardial velocity profile showed evidence of diastolic dysfunction with a low early diastolic velocity (e′) and an increased late diastolic (a′) component. No LV outflow tract obstruction was evident. There was no spontaneous contrast or thrombus visible within the LA or the LA appendage. To obtain thoracic radiographs, the cat was sedated with 0.8 mg of midazolam IM and 0.8 mg of butorphanol IM, but general