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## Case Report

# Clinical and electrocardiographic presentations of transient trifascicular block in three cats<sup>☆</sup>

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**Abstract** This report describes transient trifascicular block in three cats presented with lethargy and inappetence, and elevated cardiac troponin I concentrations.

The electrocardiogram (ECG) of cat 1 showed a sinus rhythm with pronounced first-degree atrioventricular (AV) block, right bundle branch block, and left anterior fascicular block. The ECG of cat 2 showed truncular left bundle branch block alternating with left anterior fascicular block coupled with prolonged PR intervals, second-degree heart block, and paroxysmal third-degree AV block. The ECG of cat 3 showed first-degree AV block with concomitant right bundle branch block. The diagnosis of trifascicular block was made when paroxysmal third-degree AV block was documented.

All cats recovered with medical management within weeks. Each cat resumed a sinus rhythm. Elevated cardiac troponin I concentrations suggested myocarditis that improved.

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<sup>☆</sup> A unique aspect of the Journal of Veterinary Cardiology is the emphasis of additional web-based materials permitting the detailing of procedures and diagnostics. These materials can be viewed (by those readers with subscription access) by going to <http://www.sciencedirect.com/science/journal/17602734>. The issue to be viewed is clicked and the available PDF and image downloading is available via the Summary Plus link. The supplementary material for a given article appears at the end of the page. To view the material is to go to <http://www.doi.org> and enter the doi number unique to this paper which is indicated at the end of the manuscript.

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### Abbreviations

AV	atrioventricular
cTnI	troponin I
ECG	electrocardiogram
FS	fractional shortening
IVSd	interventricular septum diastole
LA/Ao	left atrium/aortic
LAFB	left anterior fascicular block
LBBB	left bundle branch block
LVPWd	left ventricular free wall diastole
LVIDd	left ventricular internal dimension diastole
RBBB	right bundle branch block

### Case 1

A 6-year-old male castrated domestic short hair cat (8.1 kg) was referred to Cornell University with a 1-day history of lethargy, inappetence, and dyspnea. Vital signs included a heart rate that ranged from 120 to 150 beats/min, respiratory rate >60 breaths/min, and rectal temperature of 37.4 °C. Muffled heart sounds and harsh lung sounds were auscultated.

Thoracic radiographs showed enlarged pulmonary veins with a diffuse, severe interstitial pattern consistent with pulmonary edema. Mild pleural effusion was also evident. Initial electrocardiogram (ECG) revealed third-degree atrioventricular (AV) block with an idioventricular rhythm and AV dissociation.

The cat was administered 1 mg/kg furosemide and 0.2 mg/kg butorphanol intravenously and placed in an oxygen cage. During the subsequent 12 h, two additional 2 mg/kg boluses of furosemide were administered. The respiratory rate stabilized and the heart rate remained between 120 and 140 beats/min.

A CBC and serum biochemistry were normal and FIV/FeLV were negative. Cardiac troponin I (cTnI)<sup>a</sup> was calibrated according to the manufacturer instructions. Cardiac troponin I was elevated (9.0 ng/mL [normal: 0–0.09 ng/mL]). The cTnI assay was done with an analyzer not validated for use in cats because of the highly conserved sequence of troponin across species.

Echocardiography revealed asymmetrical left ventricular hypertrophy (interventricular septum diastole [IVSd]: 5.7 mm; left ventricular free wall diastole [LVPWd]: 6.9 mm; normal [1] < 6 mm,

with a normal left ventricular chamber dimension; left ventricular internal dimension diastole [LVIDd]: 15.2 mm; normal [1] < 21 mm). The left atrium was not enlarged (left atrium/aortic [LA:Ao]: 1.4; normal [1] < 1.6). Systolic function was also normal (fractional shortening (FS): 74%; normal [1] > 60%). Trivial mitral regurgitation in the absence of noticeable valvular degeneration was present. Right atrial and ventricular dimensions were subjectively considered normal.

From a 6-lead ECG, sinus bradycardia (heart rate 120 beats/min) and first-degree AV block (PR interval: 180 ms; normal [2] < 90 ms) were diagnosed. In addition, the QRS complex was prolonged (60 ms; normal [2] ≤ 40 ms) because of large S waves (rS pattern) in leads II, III, and aVF, but with a left axis shift (−74°; normal: 0°–160°) suggesting a bifascicular block (combination of complete right bundle branch block [RBBB] and left anterior fascicular block [LAFB; Fig. 1A]). Also, paroxysmal third-degree AV block with AV dissociation and a ventricular escape rhythm was present (Fig. 1B). A diagnosis of trifascicular block was made because of (1) RBBB, (2) LAFB, and (3) concomitant paroxysmal AV block.

The cat remained hospitalized for 2.5 days, and serial cTnI concentrations and continuous ECG were monitored. After 24 h, the cat was eupneic, and radiographs confirmed subtotal resolution of pulmonary edema. The heart rate remained above 160 beats/min. Six-lead ECG revealed the presence of trifascicular block, and cTnI was 10.2 ng/mL. A sinus rhythm (180 beats/min) conducted with first-degree AV block (PR interval: 140 ms) was identified. The QRS complex was prolonged (60 ms; normal [2] ≤ 40 ms) because of large S waves (rS pattern) in leads I, II, and aVF with a left axis shift (−74°; normal: 0°–160°) suggesting bifascicular block (combination of complete RBBB and LAFB). In addition, alternating with this pattern was a bifascicular (truncular) left bundle branch block (LBBB) with a wide QRS complex (60 ms) and normal mean electrical axis (+86°) for (Fig. 2A).

The cTnI concentrations were measured every 12–24 h during hospitalization and initially remained elevated, despite the improvements in heart rate and rhythm [12 h post-presentation: 9.0 ng/mL; 24 h post-presentation: 10.2 ng/mL; 36 h post-presentation 9.75 ng/mL; 50 h post-presentation: 3.94 ng/mL].

The cat was discharged with furosemide (1 mg/kg PO q 24 h) and benazepril (0.25 mg/kg PO q 24 h). A 2-week evaluation revealed improved cTnI concentration (0.78 ng/mL). Electrocardiogram revealed sinus rhythm (214 beats/min) with

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