



Pseudo-Mobitz Type II Atrioventricular Block in a Nigerian Indigenous Dog

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SUMMARY

A 16-year-old Nigerian indigenous dog was presented with history of weakness and coughing. On physical examination, respiratory rate, pulse rate, rectal temperature, packed cell volume and haemoglobin values were within the normal ranges. However, electrolyte values showed hyperkalemia. Electrocardiogram (ECG) revealed three consecutive constant PR-intervals before the elongation of PR-interval preceding the blocked P-wave. There was a conspicuous notch formation in QRS conformation in Leads III and aVL. However, following administration of vetzyme[®] (520 mg/day) for three weeks, the ECG revealed a gradual increase in PR-interval from 0.14-0.2 sec but no dropped P-wave. Given these findings, the abnormal ECG was interpreted as pseudo-Mobitz type II second degree AV-block with remission to first degree heart block. The remission of heart block may be partly related to effect of the vetzyme[®] supplement on muscle tone and antioxidant properties.

Key words: Heart block, antioxidants; Nigerian indigenous dog.

INTRODUCTION

Atrioventricular block is partial or complete blockage of electrical impulses conduction from the atria to the ventricles. It is classified into three, based on degree of severity. In the Mobitz type I form of second-degree atrioventricular block, the PR interval increases progressively until the atrial impulse fails to emerge from the cardiac conducting cells, thus, no QRS complex is produced (Ettinger and Suter, 1970). But when the PR interval remains constant prior to the block, this is termed

Mobitz type II (Mike, 2007) Although, other atypical forms of Mobitz type II has been described in literature (Rardon *et al.*, 2000; Silverman *et al.*, 2004) a wide array of conditions may impair impulse conduction by cardiac conducting cells (Silverman and Upshaw, 2002). Furthermore, considerable published evidence have shown that with advanced age, production of reactive oxygen species significantly increases in both the heart and the vasculature culminating in cardiovascular injury in geriatrics (Ungvari

et al., 2001; Judge *et al.*, 2005). Antioxidants have proved beneficial in management of canine related cardiac problems (Sanderson, 2006; Sagols, 2011). We report herein, for the first time in a Nigerian indigenous dog, a case of pseudo-Mobitz type II second-degree atrioventricular block and its remission to first degree atrioventricular block following supplementation with vetzyme®.

CASE REPORT

An 18 kg, 16-year-old intact male dog was presented to the Small Animal Clinic of the Veterinary Teaching Hospital, Ahmadu Bello University with history of coughing and weakness, noticed about three weeks prior to presentation. No drug was administered prior to presentation.

Physical examination: The dog was of good body condition. Respiratory rate, pulse rate and rectal temperature were 24 cycles/minute, 80 beats/minute and 38.7°C, respectively.

Laboratory findings: Results from helminthology and protozoology indicated absence of helminth egg and coccidial



Figure 1: Left lateral thoracic radiograph of indigenous Nigerian dog

oocyst using simple flotation technique. Similarly, thin blood smear revealed absence of haemoparasites. The PCV and haemoglobin concentration were normal (32 % and 10.6 g/dl, respectively), and electrolyte values revealed hyperkalemia (potassium 6 mmol/l), other electrolytes were within normal limits (Calcium 2.05 mmol/L; Sodium 140 mmol/L and Chloride 101 mmol/L)

Radiographic findings: Lateral thoracic radiograph during maximum inhalation revealed no abnormalities (Figure 1).

Electrocardiography on presentation: A portable, 6-leads standard ECG recorder, Cardisunny D120 (Fukuda M-E Kogyo Co., LTD., Japan) was used at a paper speed of 50 mm/sec, sensitivity of 1 (1cm = 1 mV). The ECG was recorded without sedative and when the dog was thought to be in a quiet state using alligator-type electrodes as described by Sarangni *et al.* (2015). The ECG revealed three consecutive constant P-R intervals before the elongation of P-R interval preceding the blocked P-wave. There was a

conspicuous notch formation in QRS conformation in Leads III and aVL (Figure 2).

Treatment: The dog was given oral administration of vetzyme® (Bob Martin, UK, Ltd) (contains vitamin B, E, Selenium and Zinc) at 520 mg daily for three weeks.

Electrocardiography on re-evaluation: Following administration of vetzyme® (Bob Martin LTD. UK) for three weeks, the ECG revealed a gradual increase in P-R interval from 0.14-0.2sec but no drop P-wave. The notches formation in Lead III and aVL persisted (Figure 3).

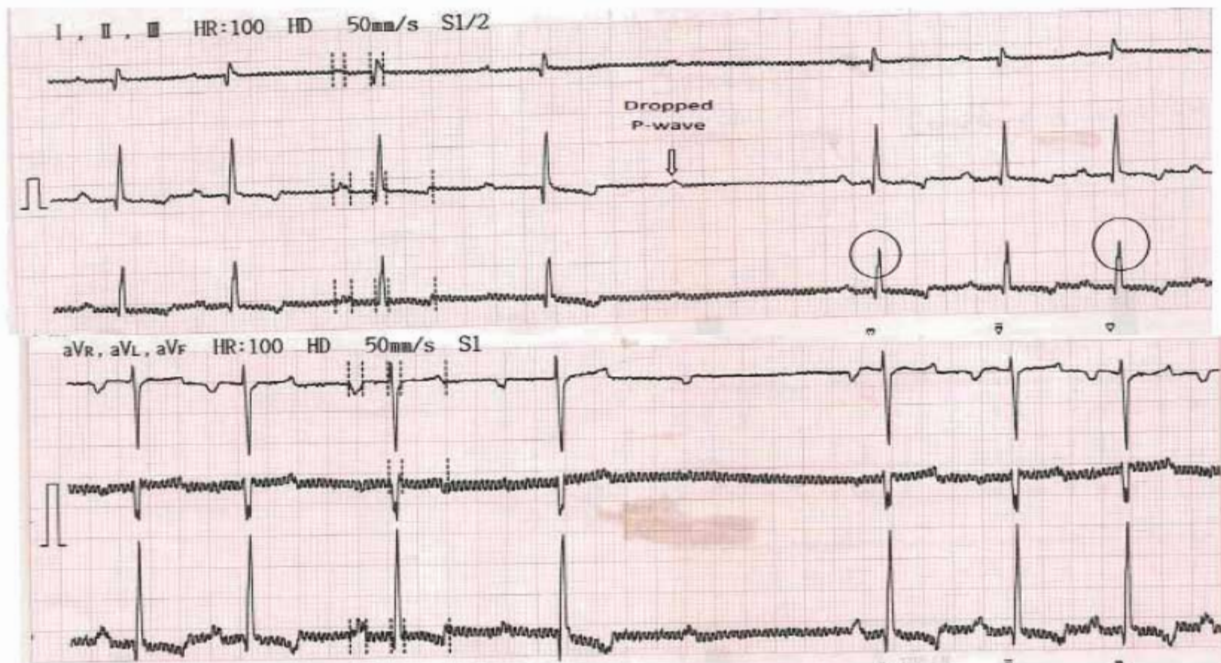


Figure 2: the patient's 6-Leads electrocardiogram before treatment with arrow on lead II showing dropped P-wave and circle showing a notched QRS complex

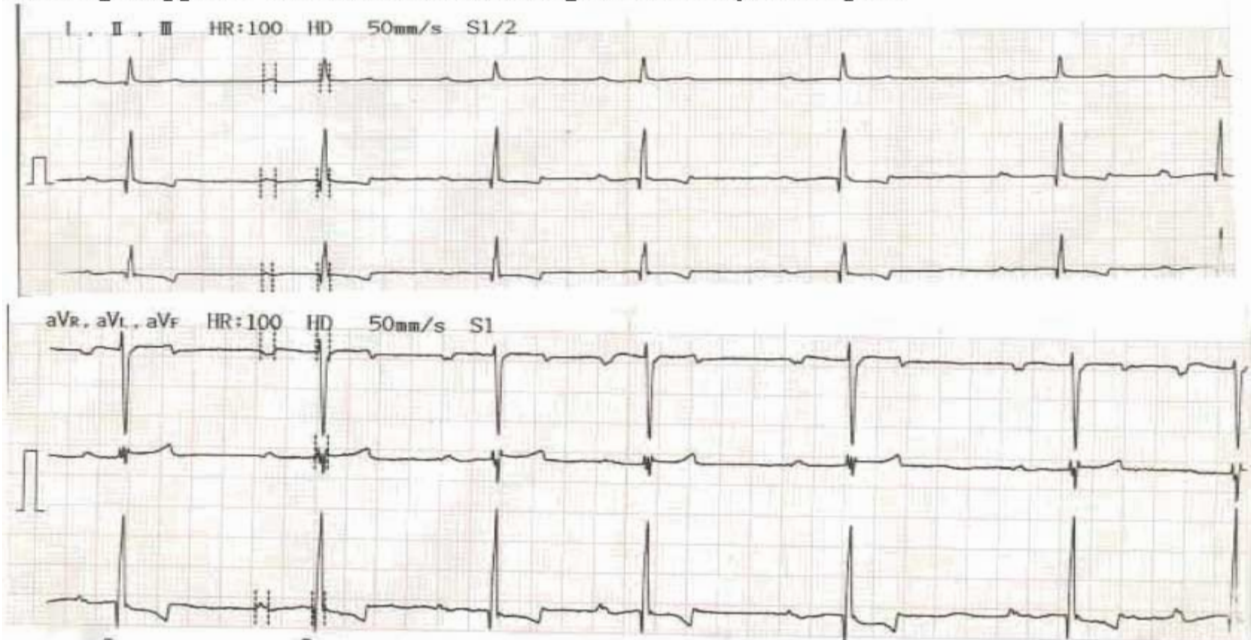


Figure 3: 6-leads electrocardiogram of the dog post-treatment showing a first degree atrioventricular heart block

DISCUSSION

Atrioventricular heart block is a descriptive term encompassing a disturbance in the propagation of cardiac electrical impulse in the heart. The disturbance can be partial or complete, resulting in either a delayed or an

entirely blocked impulse (Hayden *et al.*, 2012). In this present case, the first three PR intervals showed a constant conduction time, while the P-R interval preceding the dropped P-wave showed a marked elongation. This

showed a deviation from the classical definition of Mobitz type I or Mobitz type II second degree AV- block. In human, Denes *et al.* (1975) reported that 86 % of Wenckebach periods varies from classical definition. The P-R intervals may not lengthen progressively and several P-R intervals may share the same duration; the second P-R interval may not represent the greatest increase in duration; the last P-R increment may be of the greatest magnitude. In this case, the last P-R interval had the greatest P-R interval. The prolonged P-R interval clearly indicates a difficulty in impulse propagation across the A-V bundle and this was followed by a dropped P-wave. The characteristic notches in leads III and aVL on the QRS complex may be due to the age related changes in the myocardium. Notching of the QRS complex (R-wave) is often seen in geriatric dogs and is thought to be caused by presence of myocardial infarction. Friedman *et al.*(1975) analysing canine heart with induced myocardial infarction suggested that persistent changes in purkinje fibres and myocardial fibrosis may cause slow and inhomogeneous myocardial activation. Similarly, Gardner *et al.* (1985) proposed that fragmented QRS complex in infarcted canine heart is caused by slow and inhomogeneous myocardial activation. Currently in Nigeria, there is improved level of veterinary health-care available and provided to pets, by their owners. This makes them live longer and therefore now run high risk, than before, of suffering from cardiac related diseases. The hyperkalemia from biochemical result may have contributed to the heart block, as atrioventricular node is known to be susceptible to hyperkalemia, producing the

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classical prolonged P-R interval and QRS widening (Sohoni *et al.*, 2010)

The dog was represented after three weeks of vetzyme[®] administration for re-evaluation. The ECG revealed an increased in P-R interval without a blocked P-wave. However, the notches in Leads III and aVL persisted. The antioxidants in the supplement (vitamin B, E, Selenium and Zinc) may have improved the cardiac electrical impulse conduction. Considerable published evidence in both animal and human experimental models have shown that with advanced age, production of reactive oxygen species significantly increases in both the heart (Judges *et al.*, 2005) and vasculature (Ungvari *et al.*, 2001) culminating in cardiovascular injury. However, antioxidants have been found to be useful in the management of canine cardiac diseases (Sanderson, 2006)

CONCLUSION

This is the first report of pseudo-Mobitz type II second degree heart block in a Nigerian indigenous dog. Though, the aetiology remains largely unproven, but most plausible explanation may be a disturbance in AV-conduction due to age-induced primary degenerative disease in the geriatric dog and probably compounded by hyperkalemia. However, the antioxidant content of vetzyme[®] might have played a significant role in the remission of the heart block to first degree heart block in the present case.

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