CASE REPORT

Simultaneous Electrocardiography and Doppler Echocardiography in Pulsus Alternans

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Summary

Pulsus alternans, the alternating strong and week pulses which occur in patients with severe heart failure, was first described by Traube in 1872. Since then various methods, both invasive1,2 and non-invasive3,4, have been used to study this phenomenon. This study demonstrates the utility of using simultaneous electrocardiography (ECG) and Doppler echocardiography to document pulsus alternans, and to differentiate it from other causes of alternating pulses.

Key Words: Pulsus alterans, Electrocardiography, Doppler echocardiography

Case Report

A 60-year-old man, a chronic heavy smoker with ischaemic heart disease, was admitted to hospital with an exacerbation of his chronic bronchitis and heart failure. Examination of his radial pulse showed the presence of alternating strong and weak pulses of 110 beats/min. Blood pressure was 130/85 mmHg without paradox. His jugular venous pressure was elevated; Kussmaul's sign was

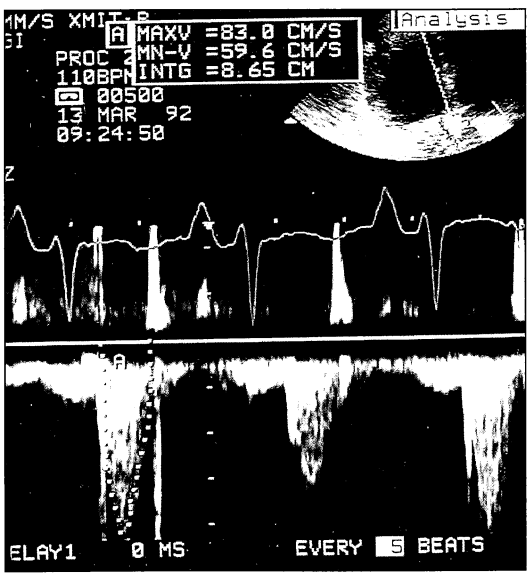

Fig. 1: Simultaneous ECG and Doppler echocardiography of the patient.

absent. There were bilateral basal crackles and there was a third heart sound. His chest radiogram showed cardiomegaly with congested lung fields.

Echocardiography showed biventricular dilatation with an impaired left ventricular function (fractional shortening of 18%). A Doppler study of the left ventricular outflow tract was performed with the patient in the left lateral position and a five chamber apical view was obtained by 2D-echocardiography. The sample for pulsed wave Doppler was obtained from a site just below the aortic leaflets. Figure 1 shows the alternating stroke volumes which were felt in the periphery as alternating pulses.

The simultaneous ECG shows P pulmonale, constant PR intervals and constant narrow QRS complexes in the three consecutive beats. There was no electrical alternans. The dilated left ventricle is well seen in the insert of the figure. Thus the alternating pulses were due to pulsus alternans reflecting a poor left ventricular function. The alternating pulses could not be due to atrial or ventricular ectopics (in particular bigeminy), or changes in cardiac conduction either at the atrioventricular node or at intraventricular levels.

Thus simultaneous ECG and Doppler echocardiography is a simple non-invasive technique to study pulsus alternans and to differentiate it from other cardiac causes which may give rise to alternating pulses in a patient with a severely impaired left ventricle.

References

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