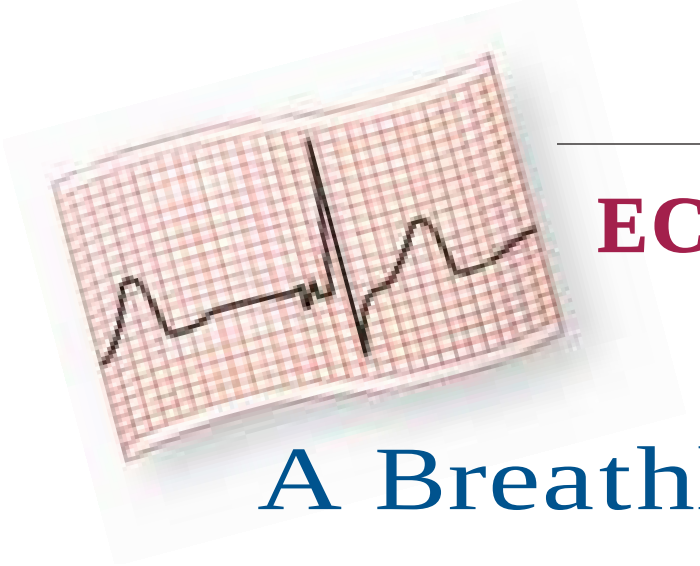

ECG CLINIC

A Breathless Patient

By Keith J.C. Finnie, MB, ChB; and L.J. Melendez, MD

Vignette

A 52-year-old woman presents with complaints of increasing shortness of breath, reduced energy levels and ankle swelling over the preceding few weeks. She gives a history of mastectomy for breast cancer two years ago. Her ECG is shown in Figure 1.

Questions

1) What ECG abnormalities are shown?
2) What is the most likely diagnosis?

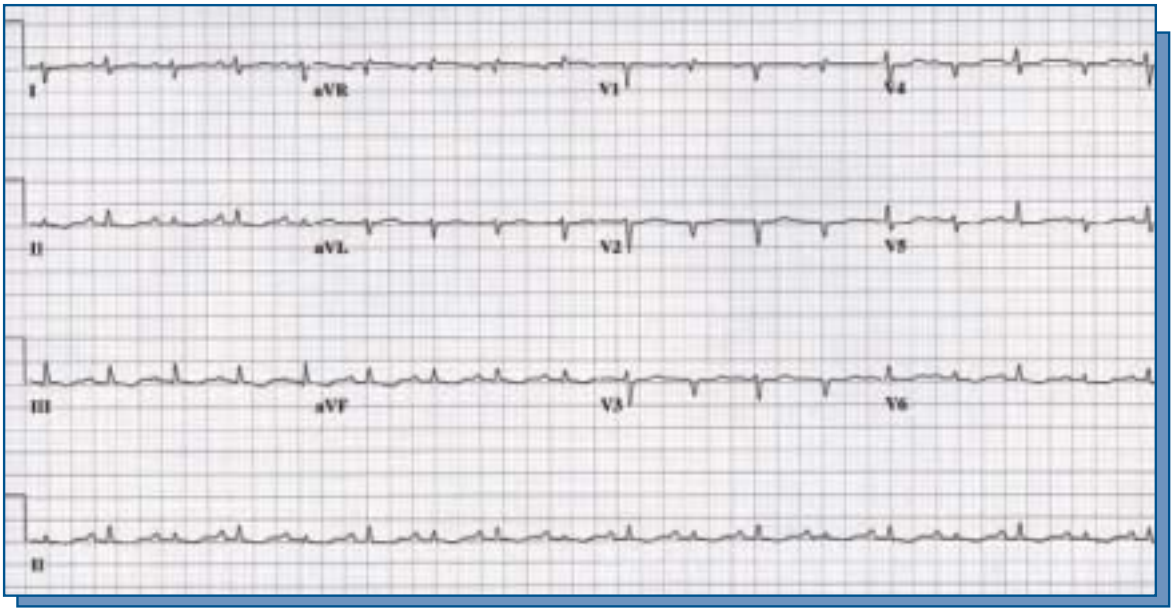

Figure 1

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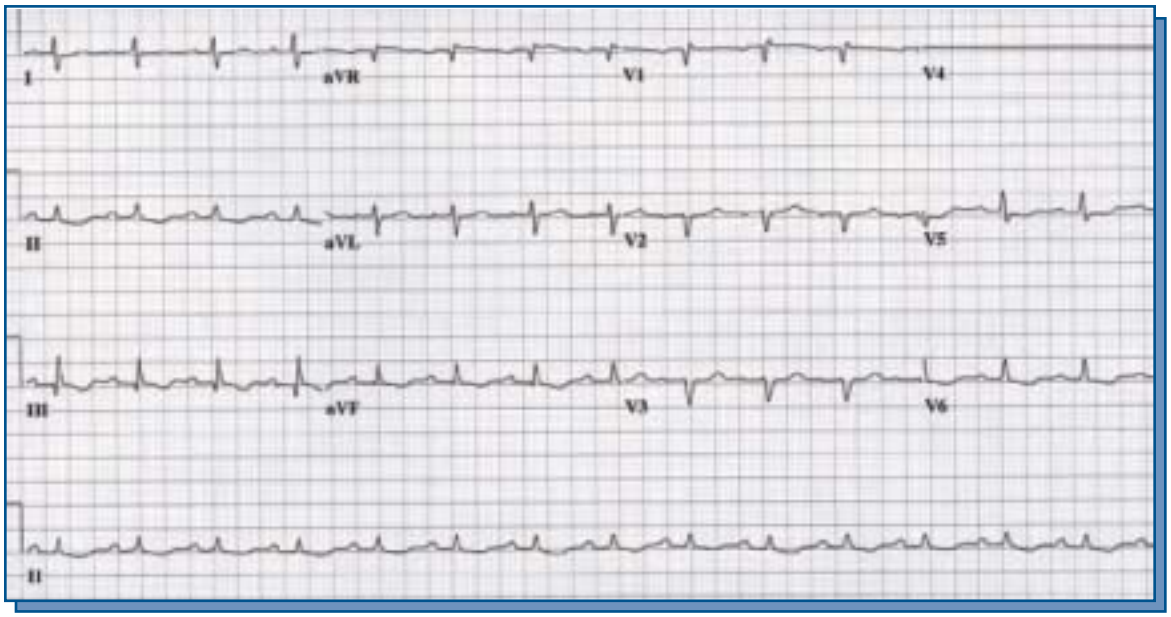

Figure 2

Answer

1) The ECG shows a sinus tachycardia at 105/minute with low voltage QRS complexes. Low voltage is usually defined as limb lead QRS complexes less than 5 mm in amplitude, or precordial QRS complexes less than 10 mm in amplitude; both criteria are present in this case. There is also obvious beat-to-beat variability in the amplitude of the QRS complexes, a phenomenon known as "electrical alternans." This abnormality is present to greater or lesser degree in all leads, but is most easily appreciated in leads II, V_1, V_4 to V_6.

2) Electrical alternans is most commonly associated with a large pericardial effusion, although it has been described in a number of other conditions, including congestive heart failure, ischemic heart disease, myocarditis and amyloidosis. Total electrical alternans is present when the P wave, QRS complex and T wave are all affected and is said to be pathognomic of tamponade due to a malignant pericardial effusion. A 2D echocardiogram confirmed the presence of a large pericardial effusion with evidence of right atrial and ventricular compression due to tamponade. At pericardiocentesis, nearly a litre of bloody pericardial fluid was drained, with relief of the patient's symptoms and resolution of the ECG findings (Figure 2). Cytologic examination of the fluid confirmed the clinical suspicion of malignant spread from the previous breast carcinoma. The mechanism of electrical alternans is thought to be pendular to-and-fro swinging of the heart within the large effusion. While this would not explain alternans in other conditions, its disappearance following complete drainage of the effusion as occurred in this case is entirely consistent with the hypothesis. Dx