

Case Reports

A non-cardiac cause of an abnormal ECG

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Keypoints

- ECG changes simulating acute coronary syndrome event may result from non cardiac conditions including brain tumours.
- Clinicians should consider a non-cardiac cause of an abnormal ECG, especially if the history is not suggestive of a acute coronary syndrome

Abstract

Abnormalities of the electrocardiogram are extremely useful for the diagnosis of heart disease, but they may also occur in non-cardiac conditions. The electrocardiographic abnormalities that have been described in neurological diseases are among the most striking deviations from normal. We describe a patient with an intracranial space occupying lesion (pilocytic astrocytoma) who exhibited electrocardiographic changes suggestive of acute coronary syndrome at the time of presentation with syncope.

Keywords

ECG abnormalities, Brain tumours, cardiac event.

Case Report

A 45 year old gentleman was brought to hospital by ambulance. Following a canoeing contest and while trying to put the canoe back onto his car, he stumbled, fell backwards and injured his wrist. He sustained no head injury but afterwards felt faint and lost consciousness briefly. There was no associated chest pain, shortness of breath or palpitation. Witnesses reported that he regained consciousness quickly and was fully orientated within a few minutes with no post-ictal period. There was no evidence of fitting, tongue biting or incontinence. There was no past medical history of note, specifically with no prior

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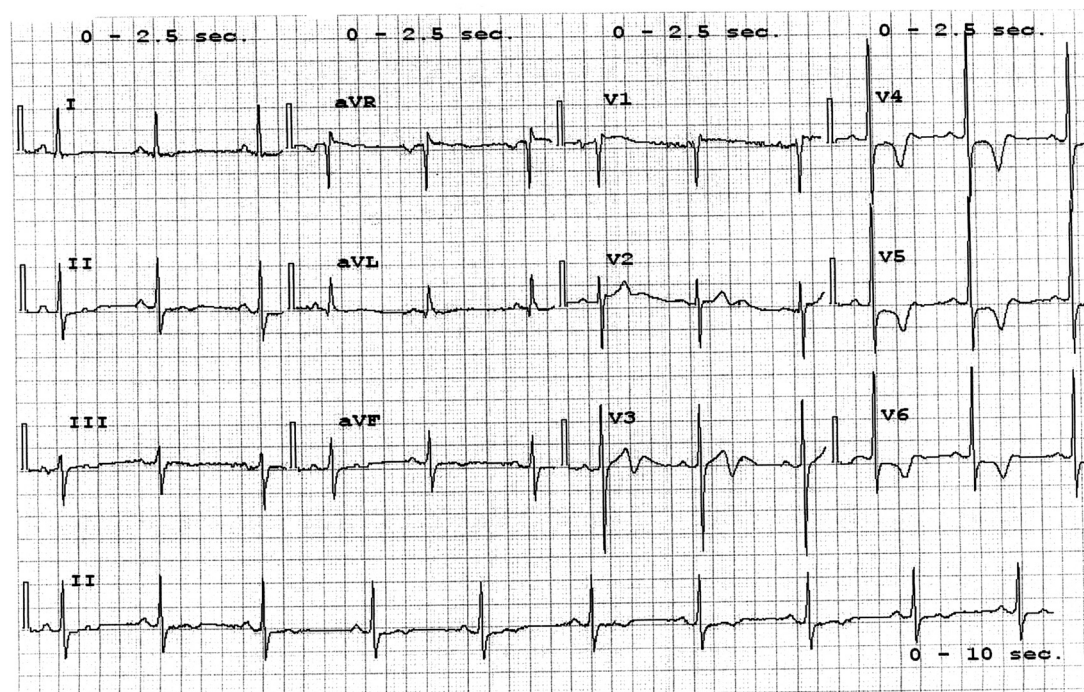


Figure 1. Initial ECG showing the abnormal ST changes.

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Figure 2. Contrast CT scan showing cystic lesion in left cerebellar hemisphere.

history of chest pain or coronary artery disease, and he reported no risk factors for ischaemic heart disease.

On arrival in hospital he appeared well and full examination including cardiovascular and neurological assessment was unremarkable. Admission electrocardiogram (ECG) showed ST segment and T-wave changes in the precordial leads (Figure 1). These abnormalities did not change with serial ECGs repeated over the next few hours. Blood tests including full blood count, electrolytes and 12 hour troponin were all normal. Urgent echocardiogram was undertaken which was also entirely normal.

In view of his unexplained loss of consciousness he underwent CT brain scan which showed a cystic 3.1×2.4 cm lesion in the left cerebellar hemisphere (Figure 2). A second adjacent cystic area was noted immediately posterior and inferiorly, measuring approximately 1.2 cm in diameter.

The patient was referred to the neurosurgical team who recommended excision of the lesion. At the time of admission to the neurosurgical unit his pre-operative ECG was unchanged from the ECG taken at the time of his original assessment several weeks earlier. The space occupying lesion was successfully removed; histology revealed this to be a pilocytic astrocytoma. An ECG undertaken three days after removal of the tumour (Figure 3) showed resolution of the previous T-wave and ST abnormalities.

He made an uneventful recovery from the neurosurgery and subsequently underwent an outpatient exercise tolerance test which showed no evidence of inducible ischemia at a high work load. At outpatient review 3 months later his ECG remained normal, and he had resumed his normal activities.

Discussion

Syncope is a common cause for acute medical admission. Although frequently benign in origin, serious causes need to be considered, particularly when a patient presents with an abnormal electrocardiogram. In this case careful investigations were undertaken to exclude acute coronary syndrome, structural heart disease or arrhythmia as the cause for the patient's loss of consciousness. The patient gave no prior history of chest pain and there were apparently no risk factors for myocardial ischaemia to explain the abnormal ECG. The absence of progression in the changes, negative troponin and normal echocardiogram were reassuring and led to consideration of a non-cardiac cause for the collapse and abnormal ECG.

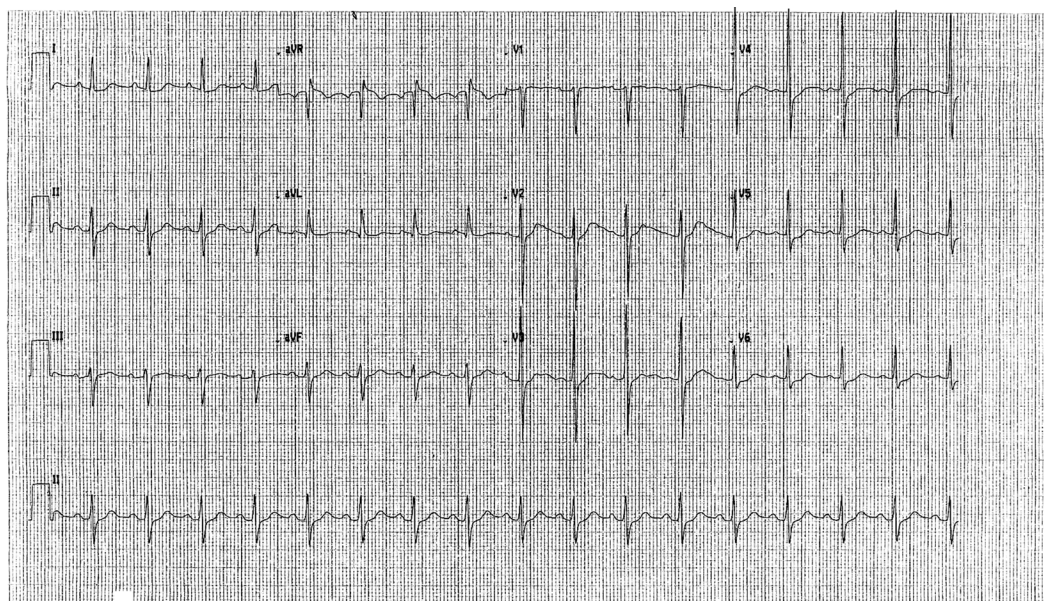


Figure 3. Post-operative ECG.

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The association of ECG changes with intracranial disease has been recognized for many decades.³ ECG changes have been reported in patients with subarachnoid haemorrhage, intracerebral haemorrhage, and ischemic stroke.^{1,4,6} Similar changes have been described in nonvascular intracranial lesions including meningitis and intracerebral tumours.^{4,5,6} The reported ECG abnormalities include QT prolongation, T-wave flattening or inversion and ST-segment elevation or depression.^{1,2,4} The Pathophysiology of these ECG abnormalities is not clear, and several mechanisms have been proposed. These include raised intracranial tension, vagotonicity, sympathetic over-activity and excessive catecholamine production. Direct myocardial damage (focal myocytolysis) may be responsible for the ECG changes associated with central nervous system diseases.⁷ Electrocardiographic abnormalities are also well recognised in other non-cardiac conditions, including electrolyte disturbances, hypothermia and pulmonary embolism.

Our patient was found to have a cerebellar pilocytic astrocytoma. This slow growing astrocytoma is the

most frequently occurring brain tumour of childhood but occurs very rarely in adults.^{8,9} The most common tumour sites are the cerebellum, supratentorial and paraventricular regions, optic pathway, hypothalamus and brainstem, but they may occur in any area where astrocytes are present, including the cerebral hemispheres and the spinal cord. Pilocytic astrocytomas are generally benign tumours; after complete surgical removal, the prognosis is excellent.^{8,9}

The rapid resolution of the ECG changes following excision of the tumour in this case supports the notion that the tumour was responsible for these abnormalities. Further investigation with a normal exercise ECG enabled the patient to be reassured that he could resume his normal level of exercise. It remains unclear whether the initial presentation with collapse related in any way to the abnormalities found on CT or ECG. The history was suggestive of syncope and this may have resulted from a simple faint due to the pain from his prior wrist injury.

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