

ECG Quiz

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A 90-year-old gentleman was referred to Accident and Emergency Department (AED) by community nurse because he complained of dizziness. He has history of atrial fibrillation, congestive heart failure and Parkinsonism on regular medical treatment. At AED, a 12-lead ECG was done. What was the diagnosis ? (see ECG attached)

- 1) a) Fast atrial fibrillation with aberrant conduction
- b) Atrial flutter with 1:1 conduction
- c) Non-sustained ventricular tachycardia
- d) Tremor-induced ECG artifact

What would be your initial management for this patient ? (His blood pressure was 119/89mmHg and he was conscious)

- 2) a) Intravenous lignocaine
- b) Intravenous ATP
- c) Intravenous verapamil
- d) Observe and repeat ECG later

Cardiologist was consulted for further management because of suspected ventricular tachycardia and dizziness. Physical examination revealed the features of Parkinsonism. A 12-lead ECG was repeated which showed atrial fibrillation and right bundle branch block with tremulous isoelectric line. Blood biochemistry was unremarkable. Echocardiogram revealed satisfactory left ventricular function with mild mitral, aortic and tricuspid regurgitation. He remained stable after admission and was discharged home shortly afterwards. The diagnosis in this patient was tremor-

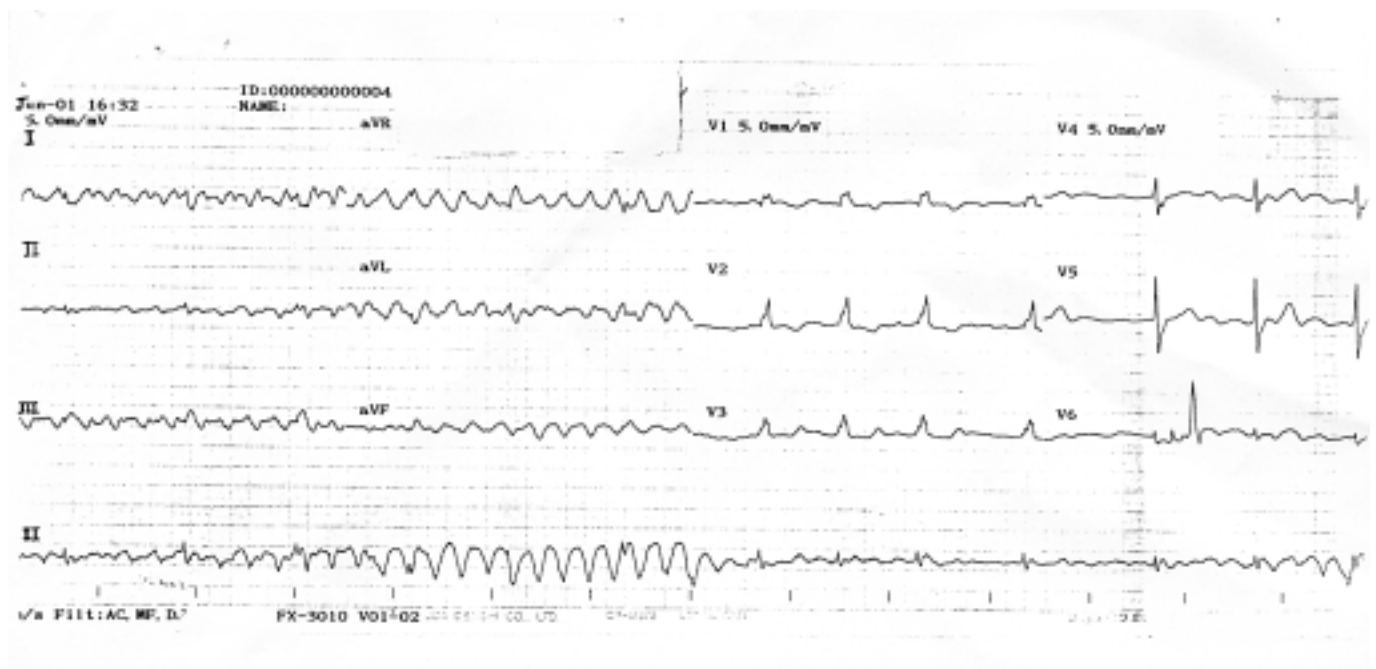


Figure 1. 12-lead ECG done at Accident and Emergency Department

induced ECG artifact mimicking ventricular tachycardia due to underlying Parkinsonism with marked resting tremor.

Answers

- 1) d) Tremor-induced ECG artifact
- 2) d) Observe and repeat ECG later

Discussion

This patient suffers from Parkinsonism for years with history of frequent fall and marked resting tremor. Tremor-induced ECG artifact was suspected at first glance after admission because of the following reasons. First, he was relatively asymptomatic and hemodynamically stable apart from some non-specific dizziness prior to admission. Second, distinct QRS complexes were shown to be buried in the wide amplitude repetitive electrical activity mimicking ventricular tachycardia on careful inspection.¹ Third, judging from the cycle length of the wide amplitude electrical activity, the frequency of the resting tremor was estimated to be 3 to 4 Hz which correlated with that seen in Parkinsonism. Fourth, the wide amplitude electrical activity was more pronounced in the limb leads. Fifth, the ECG was interpreted in the context of the patient with history mentioned above. His previous ECGs already revealed tremulous isoelectric line with background atrial fibrillation and right bundle branch block. Fortunately, no treatment was prescribed for the

ECG artifact in this patient.

In daily clinical practice, electrocardiogram is a common and useful investigation, especially for patients presenting with cardiac problems. Physician should be aware of common ECG artifacts, which can be caused by skeletal muscle tremor, electrical interference from the network or appliance and electrode movements. ECG artifacts may make ECG interpretation difficult or may cause incorrect ECG interpretation with inappropriate subsequent management.

Knight et al. reported 12 artifacts simulating monomorphic or polymorphic ventricular tachycardia.² All those twelve patients underwent unnecessary diagnostic or therapeutic interventions as a result of ECG misdiagnosis, for example, cardiac catheterization, electrophysiologic testing, intravenous lignocaine, implantation of permanent pacemaker and implantable cardioverter defibrillator. Moreover, the use of health care resources was increased and inappropriate in those cases.

In conclusion, when one interprets a wide QRS complex ECG, tremor-induced ECG artifact should be included in the differential diagnosis, especially if the patient has relevant medical illness.

References

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2. Knight BP, Pelosi F, Michaud GF, et al. Clinical consequences of electrocardiographic artifact mimicking ventricular tachycardia. *N Engl J Med* 1999;341:1270-4.