CASE REPORT

Muscle fasciculation detected by ECG

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SUMMARY

A 79-year-old man presented to hospital with scald burns to the perineum after a syncopal episode while in a hot bathtub. Admission ECG was misdiagnosed as possible ventricular fibrillation with high-frequency irregular waveforms in lead V2 at a rate exceeding 1000 cycles per minute, corresponding to intervening skeletal muscle contractions unrelated to the heart. Follow-up ECG showed full resolution of the irregular waveforms. Muscle fasciculations are a benign cause of ECG artefact and can easily be mistaken for serious cardiac arrhythmias. While most muscle fasciculations detected on ECG are benign, in the correct clinical circumstance these waveforms indicate an underlying neuromuscular disorder. The patient underwent surgical skin grafting with no perioperative cardiac complications and no further syncope in hospital.

BACKGROUND

ECG artefact of significant amplitude and duration can closely resemble a cardiac arrhythmia. Somatic muscle fasciculations of the chest wall unrelated to the heart are an important possible cause of benign ECG artefacts. Sometimes the artefact is isolated to specific intercostal muscles, as in this case. In selected situations, detection of muscle fasciculations on ECG should motivate the search for an underlying neuromuscular disorder.

CASE PRESENTATION

A 79-year-old man presented to hospital with scald burns to the perineum sustained after syncope while in a hot bathtub. His past medical history included coronary artery disease, hypertension, hypothyroidism and dyslipidaemia. His active medications were aspirin, pravastatin, levothyroxine, atenolol

Figure 2 ECG showing subsequent resolution of irregular waveforms in leads II and V2.

and ezetimibe. Physical exam showed tachycardia, hypotension and scald burns involving the left arm, bilateral buttocks and perineum. Screening blood tests showed multiple toxins including benzodiazepines and cocaine metabolites.

The admission ECG showed high-frequency irregular waveforms in lead V2 at a rate exceeding 1000 cycles per minute (figure 1). The extended tracing of lead II also showed high-frequency disorganised activity that was initially interpreted as ventricular fibrillation. The remaining chest leads showed sinus rhythm at a rate of 65 beats per minute with right bundle block conduction. There was no malfunction of the ECG machine or leads. A diagnosis of ECG artefact secondary to skeletal muscle contraction was made after a follow-up ECG showed full resolution of the irregular waveforms (figure 2).

OUTCOME AND FOLLOW-UP

The patient was assessed by the medicine consult service and was medically cleared for planned surgery involving surgical skin grafting. No perioperative cardiac complications occurred and no further syncope appeared while in hospital.

DISCUSSION

Somatic muscle contractions unrelated to the heart are an underappreciated cause of anomalous ECG waveforms. In one study, muscle fasciculation potentials were detected in 1% of routine ECGs.¹ In this case, the muscle fasciculations detected on the ECG were most pronounced in leads II and V2, thereby suggesting contractions of the underlying intercostal muscles.

Clues to the detection of skeletal muscle contractions on ECG include an evanescent synchronous appearance, small amplitude and organised spikes. The ECG abnormality will often be isolated to one or two leads that correspond to a specific muscle

Figure 1 ECG showing high-frequency waveforms in leads II and V2. Remaining ECG shows sinus rhythm with a right bundle branch block at a rate of 65 beats per minute.

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Reminder of important clinical lesson

territory.¹ Small repetitive muscle movements (ie, tapping a toe or finger) are expected to produce short bursts of asynchronous 'noise' on the ECG.¹ Muscle fasciculations are expected to produce discrete organised 'spikes.'¹ Importantly, automated external defibrillators may not be able to distinguish between muscle fasciculation and ventricular arrhythmia leading to potentially harmful and inappropriate defibrillation.

Learning points

- ▶ Somatic muscle contractions can be detected on routine ECG and may be mistaken for a serious cardiac arrhythmia.
- ▶ Clues to the detection of muscle contractions on ECG include an evanescent synchronous appearance, small amplitude, organised spikes and isolation to a specific muscle territory.
- ▶ In the correct clinical context, detection of muscle fasciculation on ECG should prompt an investigation into underlying neuromuscular disease.

An ECG is a useful diagnostic tool that can provide clues to underlying conditions unrelated to the heart. While muscle fasciculations detected on routine ECG may be viewed as artefact by cardiologists, an astute clinician may see these waveforms as the first clue to an underlying neuromuscular disorder.^{1 2}

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REFERENCES

- 1 Thomas DJ, Williams DO. Detection of somatic muscle fasciculation on electrocardiograms. *Br Med J* 1976;1:557–9.
- 2 Webb GJ, Turner MR, Craig SE. Teaching NeurolImages: somatic muscle fasciculations detected by electrocardiography. *Neurology* 2012;78:e19.

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