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Case Report

Extreme Leukocytosis in a Man after a Half Marathon Race

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Introduction

Leukocytosis is most often defined as an elevated white blood cell count greater than 11.0×10^9 per L in adults, and is a relatively common finding. Normal adult levels of leucocytes is 4.5 to 11.0×10^9 per L. It is of importance for clinicians to be able to distinguish non-malignant from malignant conditions, and to differentiate between the most common non-malignant causes of leukocytosis. Extreme leukocytosis can be seen in a broad spectrum of clinical conditions in the human body under stress. It is most commonly found in patients suffering from leukemia or severe bacterial infections, but can also be seen in people after hard exercise [1-7]. The present clinical case describes a young healthy man, suffering from extreme leukocytosis after a syncope during a half marathon.

Case Presentation

A half marathon is a road running event of 21.0975 km (13.109 miles), half the distance of a marathon. A 39-year-old healthy man suffered from a syncope at the goal line after a half marathon. According to bystanders at the race, the subject's running initially became wiggly and after a short time he fell over but got his consciousness back moments later. The subject, who was a non-smoker and in good physical shape, had no medical history nor any family members with medical history of cardiac disease, diabetes or previous syncopations. When asked, he had never experienced palpitations, chest pain during exercise, previous fainting, shortness of breath or any other cardiovascular symptoms. This was his first half marathon race, but he had prepared himself for the race by running 5-15 km three to four times weekly for at least one year prior to the race.

Initial Work-Up

During the ambulance transport to the hospital and on arrival to the emergency department the subject was awake and hemodynamically stable but a bit nauseous. Repeated blood samples were drawn and Electrocardiograms (ECGs) were taken as a standard procedure in the emergency department. Results of the blood samples can be seen in Table 1, and the ECG's can be seen in Figure 1. A bedside echocardiography was performed, showing a normally structured heart with preserved systolic (LVEF ~ 55%, global longitudinal strain -16.4%, TAPSE 2.5 cm) and normal diastolic function (E'16, normal E/A ratio) and no pericardial effusion. Hypokinesia in the basal anteroseptal segments was reported.

Diagnosis and Management

As a result of the echocardiographic findings and the elevated cardiac enzymes (CK-MB and troponin T), and the previously described ECG-changes, treatment was initiated due to suspected NSTEMI (non-ST segment elevation myocardial infarction). The subject was transferred to the department of cardiology and continuous heart rhythm monitoring was performed, but no

Figure 1: Initial ECG upon arrival: Supraventricular tachycardia with inverted T-waves in the precordial leads V3-V5. No previous ECG was available.

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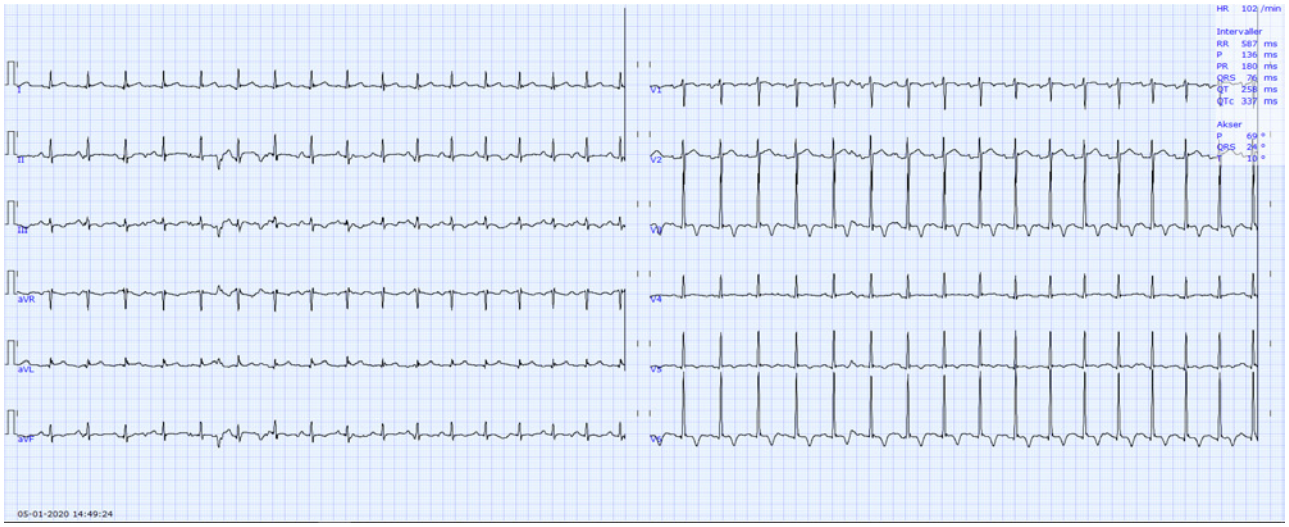

Figure 2: Second ECG, taken 1 hour after the first ECG. Now showing inverted T-waves in V3 and V6, as well as flattened out T-waves in V4-5.

Table 1: Blood tests.

Blood test	First blood test (t: + 0)	Second blood tests (t: +4 hours 40 min)	Third blood test (t: +28 hours 34 min)	Reference value	Units
CRP	<0.5			<8.0	mg/l
Total white cell count	38.0	27.3	18.6	3.5-10.0	10^9/l
Neutrofilocytes	31.17	23.99		2.00-7.00	10^9/l
Lymphocytes	1.89	0.99		1.3-3.5	10^9/l
Monocytes	3.69	1.97		0.2-0.7	10^9/l
Eosinophilocytes	0.15	0		<0.5	10^9/l
RBC	9.4			8.3-10.5	10^9/l
Platelets	209			145-350	10^9/l
Potassium	3.8			3.5-4.6	mmol/l
Sodium	142			136-146	mmol/l
Chloride	114			98-106	mmol/l
Glucose	6.2			4.2-7.8	mmol/l
Creatinine	136			60-105	µmol/l
eGFR /1.73 m^2(CKD-EPI)	56			>60	ml/min
Carbamide	8.9			3.2-8.1	mmol/l
Creatine kinase (CK)			3474	50-270	U/l
CK-MB	13.2	19.5	21.1	<7.0	µg/l
Troponin T (TnT)	240	124	102	<14	ng/l
Myoglobin			747	<75	µg/l

arrhytmias were detected during hospital stay. Also a Coronary Angiogram (CAG) was performed 22 hours and 17 minutes after arrival which showed no signs of atherosclerosis, nor signs of ongoing or previous myocardial infarction. The elevated Creatinine-Kinase (CK) was interpreted as a result of the physical strain of the subject's skeletal muscle during the half marathon. The following day, the subjects' blood samples normalized, and the leucocyte count was reduced from 38.0 x 10^9/l to 18.6 x 10^9/l, CK-MB to 21.1 µg/l and TnT from 240 to 102 µg/l. The subject was discharged the day after the CAG in a good condition. No hospital follow-up was planned.

Follow-Up

A senior hematologist was consulted, and it was concluded that the subjects' symptoms and paraclinical abnormalities was a result of severe exhaustion, and it was decided not to perform any out-of-hospital follow-up.

Conclusion

Extreme leucocytosis (38.0 x 10^9/l) along with temporary

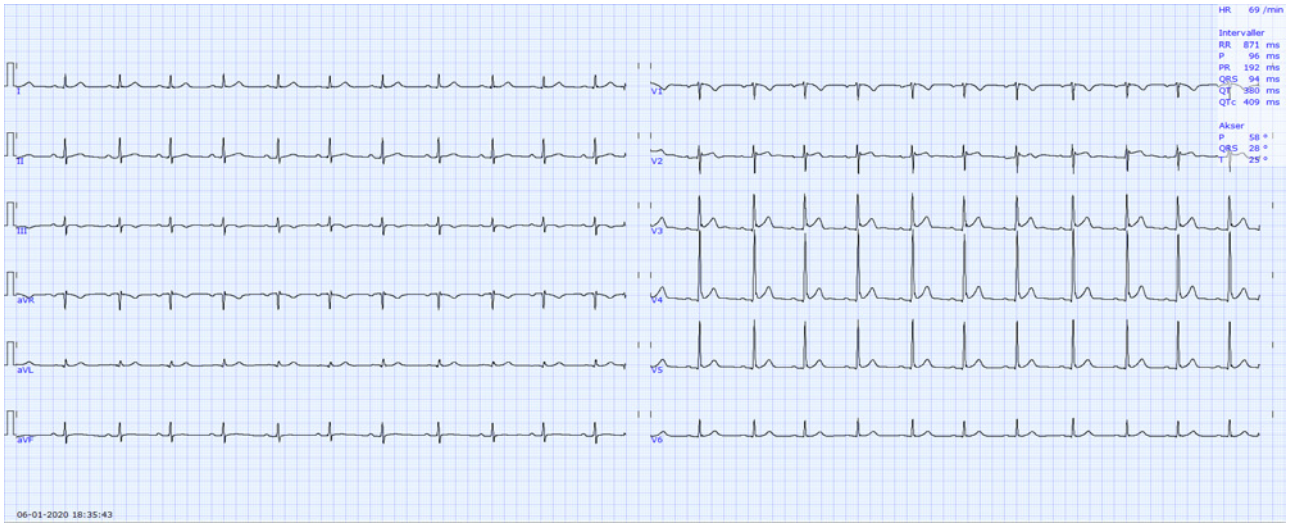

Figure 3: Third ECG, taken on day 2. Normalisation of the T-waves in the precordial leads.

echocardiographic and electrocardiographic changes can be seen in healthy, young adults with no signs of cardiovascular disease as a consequence of extreme physical exercise.

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