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Case Report

Creatine Kinase MB Isoenzyme Increase after Vaccination: A Case Report

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Abstract

The macro-CKemia is a clinical entity thus far described only in certain pathological situations. We describe the case of a 18 months patient followed in time until the age of 7. The baby came to our attention for a sudden lameness, and in order to exclude the diagnosis of muscular dystrophy, during the investigation it was found a significant increase of creatine kinase MB isoenzyme in the absence of other clinical and laboratory signs of myocardial damage.

Keywords: *Lameness; Macro Creatine Kinase MB Isoenzyme*

Introduction

Human tissues contain three forms of creatine kinase, comprising dimers of the muscle and brain-type subunits, M and B. The possible combinations are CK-MM, CK-MB and CK-BB. Skeletal muscle contains mostly CK-MM with only a small amount of CK-MB ranging from 0.2% to 15% of total enzyme activity (mean value of 5 - 6%). The proportion of CK-MB is higher in Type I muscle fibres. Regenerating muscle fibres revert to an embryonic enzyme pattern and have about 40 - 50% of CK-MB. Brain contains only CK-BB while heart muscle contains about 40% CK-MB, the rest being CK-MM. Muscle damage will increase total CK activity and a proportion will be of the CK-MB type, but this is usually < 6%. High plasma CK activity with a CK-MB fraction > 6% may be associated with myocardial damage; however, there are several other situations in which the plasma CK-MB activity may be high, just as muscle injury, surgical interventions, physical exercise, neuromuscular disease, myopathies. In younger children, the percentage of CK-MB in plasma, is higher than in adults in the range of 14 - 26%. Occasionally a significantly elevated CK is found unexpectedly. An example is the macro CK. Normal values are expressed in units per liter (U/L) and will vary depending on the methods used and the temperature at which the assay is performed (room temperature or 37 degrees), for which, currently the hyper-CKemia is defined according to how many times the observed value exceeds the upper limit of normal (eg 2x, 10x, 50x, etc).

Clinical case

We describe the case of a child followed by us in time at the age of 18 months up to seven years. The 18 months aged male child come to our attention for lameness. Negative past and next medical history, no previous problem or hospitalization, normal age at onset of ambulation. Only family date was his mother multiple abortions (three cases). The child had a sudden onset of difficulty in walking. Unique given medical data was the execution of vaccine a month before the episode of lameness (first dose of Measles, Mumps, Mubella, Chickenpox and first dose of anti – Hepatitis A virus). The child had no fever nor problems at clinical examination. In suspicion of hip arthritis, blood tests and ultrasound were performed. All first level blood chemistry were normal (CBC, liver function, renal function, electrolytes, alkaline

phosphatase, TAS, immunoglobulins, protein electrophoresis, C-reactive protein) except for minimal increase of erythrocyte sedimentation rate, with value of 18 (normal values 0 - 15). Also, ultrasound examination of both hips was normal. In the second instance were carried out muscle enzymes to exclude a muscle problem, and the surprising finding was the increase of myocardial creatine with a value exceeding total CK activity of 249 ng/ml (normal values < 5 ng/ml). All other enzymes such as troponin, myoglobin, lactic dehydrogenase and creatine kinase were normal. The lab error was excluded sending new blood champion at another laboratory that confirmed the same value. The examination was repeated after a week, and it was shown a declining value of 94.2 ng/ml. It was also evaluated thyroid function, markers for Celiac disease, antibodies for Cytomegalovirus and Ebstein-Barr virus and coagulation study, all negative. Electrocardiogram and echocardiogram were normal. Electroencephalogram was negative. The child walked normally after a seven days long therapy with ibuprofen. After a month, the value was 11.9 ng/ml, and after three months the value was normal. Other blood values always normal; no clinical problems, nor lameness. In the following three years, the child was tested for CK-MB once a year, but all his values were normal, and he had always normal chemistry, normal growth and no any clinical problem nor deambulation difficulties or cardiac disease. Only pathological incident occurred at the age of six, when the child presented during school time, a sudden cyanosis localized and confined to the middle of the forehead, resolved spontaneously and rapidly. Clinical examination and blood tests (blood cells count, inflammatory markers, liver and kidney function, coagulation tests) were normal. It was performed careful study of the coagulation factors to exclude thrombotic problems and the presence of lupus anticoagulant factor, with negative results. Cardiological and neurological examination were normal. This event seemed attributable to the Raynaud phenomenon. Later, the baby has always presented good clinical condition, a normal growth (25° percentage for height and weight) and normal blood values.

Materials and Methods

Diagnostic test for the quantitative measurement of mass creatine kinase MB isoenzyme was performed using a homogeneous sandwich chemiluminescent immunoassay (Dimension VISTA, Siemens), a method with an analytical measurement range from 0.5 to 300 ng/mL. To exclude an improbable but possible interference from heterophilic antibodies causing falsely elevated result, the samples were pretreated before assay by precipitation with PEG 6000. No significative differences were appreciated in creatine kinase MB isoenzyme concentration between pretreated and no-pretreated samples. For the assay performed in the second laboratory was used another different tool from Siemens Vista and another monoclonal antibody, and this is further evidence of laboratory artefact exclusion.

Discussion

The so-called macroforms (macro-CK) are important for the analytical interferences that can determine. Two types are known: type 1 (macro1-CK), which consists of a complex between CK-BB and IgG in a ratio of 2:1; type 2 (macro 2-CK) is nothing but an oligomer of mit-CK found exclusively in serum of patients with cirrhosis or metastatic tumors. And so, macro CK can be detected as an incidental finding in healthy individuals or as a marker of certain diseases (autoimmune diseases, cancer, severe liver disease, and serious illness).

Conclusion

Post vaccination cases of myopericarditis reported in pediatric literature are also reviewed. But in our case, there were no other clinical and laboratory nor instrumental signs that would allow to make diagnosis of myocarditis or pericarditis. Given the negativity of all the repeated investigations carried out and the good clinical conditions of the child, the most likely hypothesis was that linked to macro-CK phenomenon. In this case the macro-CKemia turns out to be a diagnosis of exclusion given the negativity of all examinations performed and the good child health. The gradual and spontaneous resolution of the problem would seem to direct the diagnosis towards a form of temporary macroCK-emia, probably conditioned from an external insult represented by vaccination. It's difficult to prove if the lameness may be linked to reactive arthritis due to the vaccine or maybe to a little-known trauma. On this clinical entity, there are currently no other data in the literature.

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